

Commander
Naval Meteorology and Oceanography Command
Stennis Space Center, Mississippi 39529-5005



**NAVMETOCOMINST 3140.1L
15 SEP 2000**

UNITED STATES NAVY
METEOROLOGICAL &
OCEANOGRAPHIC
SUPPORT MANUAL

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DEPARTMENT OF THE NAVY
COMMANDER
NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND
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NAVMETOCOMINST 3140.1L
N3
15 SEP 2000

NAVMETOCOM INSTRUCTION 3140.1L

From: Commander, Naval Meteorology and Oceanography Command

Subj: U.S. NAVY METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT MANUAL

1. Purpose. To promulgate a revised edition of the subject manual. This manual contains extensive revisions and should be reviewed in its entirety.
2. Cancellation. NAVMETOCOMINST 3140.1K, NAVOCEANCOMINST 5220.1C.
3. Discussion. The purpose of this manual is to describe the environmental services and support available to all ships and stations from the Naval Meteorology and Oceanography Command. Additionally, this manual consolidates environmental product information and serves as a ready reference for requesting and obtaining environmental support.
4. Action. Commands, offices, and activities should review this manual and implement as required. Recommendations for improvements and/or corrections are solicited.
5. Concurrence. This instruction has the concurrence of the Commandant of the Marine Corps. Marine Corps activities shall take those actions prescribed in this instruction which are not contradictory to specifically expressed policies of the Commandant of the Marine Corps.
6. Reports and Forms. The Report Control Symbols listed hereafter are assigned to the reporting requirements of this instruction and are approved for three years. A number of the reporting requirements entail the use of forms. These forms are also listed with other pertinent information.

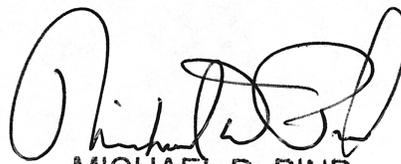
a. Reports

Report Control Symbol	Title	Paragraph(s)
NAVMETOCOM FORM 3140-1	Station Information File NMOC Form 3140-1DF	5.7.3
NAVMETOCOM FORM 3140-2	Meteorological Records Transmittal Form, NMOC Form 3140-2DF	5.7.1

NAVMETOCCOM 3140-9	Daily OTSR Report	4.4.1 Figure 4-2
NAVMETOCCOM 3140-10	Bathythermograph Log, CNMOC Form 3167/2 (REV 3/00)	5.2.3 5.7.2

b. Forms

Title	Stock Number	Cog Symbol	Available From
Station Information File, NMOC Form 3140-1DF	N/A	N/A	FNMOD Asheville
Meteorological Records Transmittal Form, NMOC Form 3140-2DF	N/A	N/A	FNMOD Asheville
Surface Weather Observations (Shipboard)(METAR/SPECI) CNMOC Form 3141/3 (REV 1/96)	0108-LF-019-3000	1I	Normal Supply Channels
Bathythermograph Log, CNMOC Form 3167/2 (REV 3/00)	N/A	N/A	Regional Center Web site
Surface Weather Observations (Shore site)(METAR/SPECI) CNMOC Form 3140/12(REV 1/96)	0108-LF-019-3100	1I	Normal Supply Channels



MICHAEL D. PIND
Chief of Staff
Acting

Distribution:

- 21A Fleet Commanders in Chief
- 22A Fleet Commanders
- 23 Force Commanders

24A Air Force Commanders
24D Surface Force Commanders
24G Submarine Force Commanders
25 Mine Warfare
26A Amphibious Group
26C Beach Group
26D Seal Team, Seal Delivery Vehicle Team and Fleet Introduction Team
26E Amphibious Unit
26F Operational Test and Evaluation Force (Attn: Staff METOC officer)
26H Naval Warfare Coastal Group
26J Afloat Training Group and Detachment
26QQ Special Warfare Group, Unit and Detachment
28A Carrier Group
28B Cruiser-Destroyer Group
28C Surface Group and Force Representative
28D Destroyer Squadron
28J Combat Logistics Squadron
28K Submarine Group, Squadron and Support Unit and Center
28L Amphibious Squadrons
29 Warships
30 Mine Warfare Ships
31 Amphibious Warfare Ships
32 Auxiliary Ships
39H Construction Battalion Unit
41A Commander Military Sealift Command
41B Military Sealift Command Area Commanders
41J Military Sealift Command Military Departments
42CC Helicopter Anti-Submarine Squadron, Light
42DD Carrier Airborne Early Warning Squadron (VAW)
42GG Strike Fighter Squadron (VFA)
42J Carrier Air Wing
42L Fighter Squadron
42N Anti-Submarine Squadron (VS)
42P Patrol and Reconnaissance Wing and Squadron (VP)
42U Helicopter Combat Support Squadron (HC)
42Z Electronic Attack Squadron (VAQ)
45A1 Fleet Marine Force Atlantic, Pacific and South
45A2 Marine Expeditionary Force
45V Marine Expeditionary Unit
46B Marine Aircraft Wing
46Q Wing Support Group (ATTN: WX Service Officer)
46R Marine Wing Support Squadron and Detachment (ATTN: WX Service Officer)
46U Aviation Weapons and Tactics Squadron
50A Unified Commands (J3)
50B Forces Command
50C Subordinate Unified Commands (J3)

NAVMETOC COMINST 3140.1L

15 SEP 2000

51A Supreme NATO Commands (SACLANT Staff METOC officer only)
A3 Chief of Naval Operations (01, 02, 03, 04, 05, 06, 07, 08, 092, 094, 098, 096)
A6 Commandant of the Marine Corps (ASL-37 only)
B2A Special Agencies, Staffs, Boards and Committees (JCS, Joint SPECOPCOM (J3only)
B2E NIMA Components and Elements
B5 Coast Guard (U.S. Coast Guard Headquarters only)
C20C Naval Research Laboratory Detachments (Monterey only)
C3 Naval Personnel at DoD or other Government Agencies (NAVDEPNOAA only)
C40 Shore Based Detachments, Meteorology and Oceanography
C4EE Center for Naval Analyses
C58I Technical Training Center Detachments
E3A Naval Research Laboratory
FA10 Submarine Base, LANT
FA18 Amphibious Base, LANT
FA39 Ocean Processing Facility
FA5 Construction Battalion Center
FA6 Air Station, LANT
FA7 Station, LANT
FB10 Station, PAC
FB13 Submarine Base, PAC
FB28 Navy Region, PAC
FB34 Fleet Activities
FB4 Construction Battalion Center, PAC
FB44 Missile Range Facility
FB48 Support Facility, PAC
FB54 Public Works Center, PAC
FC3 Activities, EUR
FC4 Air Facility, EUR
FC5 Support Activity, EUR
FC7 Station, EUR
FC14 Air Station, EUR
FD2 Oceanographic Office
FD3 Meteorology and Oceanography Center, Fleet Numerical
FD4 Ice, Meteorology and Oceanography Center
FD6 Meteorology and Oceanography Facility
FD7 Training Meteorology and Oceanography Facility
FD8 Meteorology and Oceanography Center, Gulfport
FE4 Naval Security Group Activity
FF38 Station, Naval Academy (Attn: Oceanography Dept.)
FF42 Postgraduate School
FF44 Naval War College
FF5 Safety Center
FF6 Naval Observatory
FF60 Naval Strike and Air Warfare Center
FI1 Special Warfare Center

FKA1A	Air Systems Command
FKA1B	Space and Naval Warfare Systems Command (PMW-185)
FKA1C	Facilities Engineering Command
FKA1G	Sea Systems Command
FKA8F1	Ordnance Test Unit
FKA8F2	Program Management Office
FKN1	Facilities Engineering Command Division
FKP1E	Undersea Warfare Center and Divisions
FKP4	Surface Warfare Center
FKR1	Aircraft Activities
FKR6A	Air Warfare Center Aircraft and Training Systems Division
FKR6B	Air Warfare Center Weapons Division
FR9	Reserve Readiness Command Region
FR10	Reserve Centers
FR11	Reserve Facility
FR14	Air Reserve Center
FR16	Air Reserve Anti-Submarine Warfare Training Center
FR20	Reserve Intelligence Command
FT1	Chief of Education and Training
FT15	Technical Training Unit (Code NTTU-302)
FT20	Construction Training Center
FT24	Fleet Training Center
FT30	Service School Command
FT31	Training Center
FT38	Submarine Training Center
FT39	Technical Training Centers
FT43	Surface Warfare Officers School Command
FT46	Fleet Anti-Submarine Warfare Training Center
FT51	Fleet and Mine Warfare Training Center
FT54	Submarine School
FT65	Fleet Intelligence Training Center
FT78	Education and Training Professional Development and Technology Center
FT97	Intelligence Training Center, Navy and Marine Corps
T-100	Military Sealift Command Ships
T-102A	Fast Sealift Ships
T-103	Oceanographic and Acoustic Surveillance Ships
T-104	MPS Squadrons
T-105A	Medium Roll on/Roll off Ships
V3	Marine Corps Air Bases (ATTN: WX Service Officer)
V4	Marine Corps Air Facility (ATTN: WX Service Officer)
V5	Marine Corps Air Station (ATTN: WX Service Officer)
V7	Marine Corps Aviation Training Support Group

15 SEP 2000

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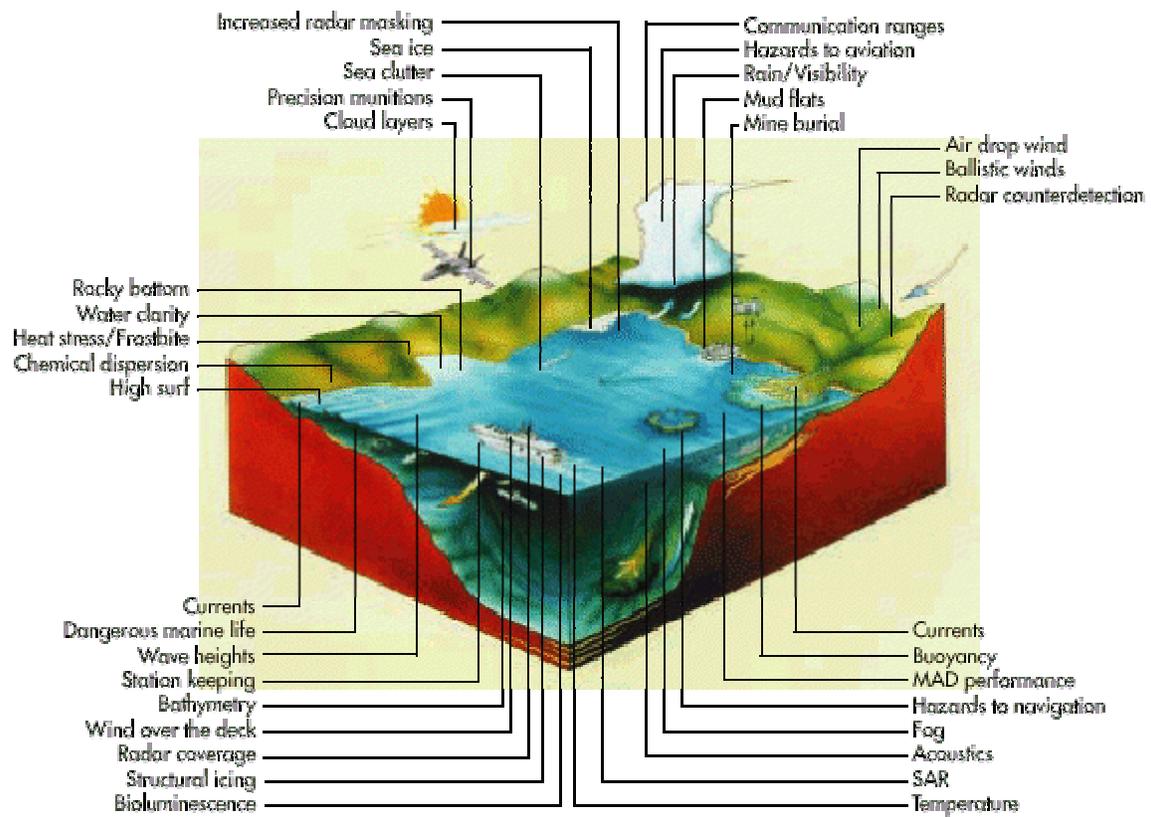
FOREWORD

The primary purpose of this manual is to provide guidance for offices, commands, and activities of the Department of the Navy and the Department of Defense in the acquisition of required environmental support. It is addressed primarily to the Operating Forces, but also will be of value to activities engaged in the areas of design and engineering, research and development, and planning and rehearsal. More detailed technical information of interest to meteorological and oceanographic personnel is available in other directives and manuals issued by the Commander, Naval Meteorology and Oceanography Command. The procedures for provision of oceanographic support outlined herein, which are not contained in other Naval Meteorology and Oceanography Command instructions and manuals, are considered directive in nature.

INTRODUCTION

The meteorology and oceanography (METOC) program of the Navy is worldwide in scope. It utilizes not only the capabilities of the Naval Meteorology and Oceanography Command (NMOC), but also the environmental observation and collection efforts of the Army and Air Force, along with other agencies of the U.S. Government and Foreign countries. International cooperation and coordination for the exchange of oceanographic and meteorological information are achieved primarily through the efforts of member countries of such organizations as the World Meteorological Organization (WMO) of the United Nations, the International Oceanographic Commission, and the North Atlantic Treaty Organization (NATO). Remote sensor platforms such as meteorological satellites and ocean buoys are employed in those areas of interest where available data are otherwise inadequate.

The purpose of the Navy program, which includes elements of the United States Marine Corps, is to meet worldwide military requirements for environmental support. This support includes analyses and forecasts of environmental parameters important to sensors, weapon systems, platforms and operations, as well as climatological data for planning and research purposes. The scope of NMOC is global and includes environmental conditions on and under the sea, and in the atmosphere. The very large and nearly continuous flow of required data necessitates the use of high-speed data links, other rapid communications, and centralized computer processing. The "highly perishable" nature of environmental information requires real-time handling and processing from the time of observation until ultimate delivery of the finished product to the user. It is toward the provision of these services that the efforts of the Naval Meteorology and Oceanography Command are directed.



LIST OF ACRONYMS

ACE	Aviation Combat Element (USMC)
ADCIRC	Advanced Circulation Tide Model
ADP	Automatic Data Processing
AEL	Allowance Equipage List
AESS	Allied Environmental Support System
AFCCC	Air Force Combat Climatology Center
AFGWC	Air Force Global Weather Central
AFWA	Air Force Weather Agency
AFWIN	Air Force Weather Information Network
AG	Aerographer's Mate
AGF	Miscellaneous Command Ship
AIG	Address Indicator Group
AIRMET	Airman's Meteorological Information
AMBTN	Ambient Noise Extract
AN	Alphanumeric
AN/SMQ-11	Meteorological Satellite Receiver
AOA	Amphibious Objective Area
AOR	Area of Responsibility
APL	Allowance Parts List
AREPS	Advanced Refractive Effects Prediction System
ARG	Amphibious Ready Group
ARQ	Automated Response to Query
ASOS	Automated Surface Observing System
ASW	Anti-submarine Warfare
ASWIP	ASW Improvement Program
ATC	Air traffic control
ATD	Actual Time of Departure
ATM	Asynchronous Transfer Mode
ATO	Air Tasking Order
AUTODIN	Automated Digital Information Network
AVHRR	Advanced Very High Resolution Radiometer
AVWX	Aviation Route Weather Forecast
AW	Air Warfare
AWDS	Automated Weather Distribution System
AWN	Automated Weather Network
AXBT	Airborne Expendable Bathythermograph
BALW	Ballistic Wind and Density
BATHY	Bathythermograph
BB	Bottom Bounce
BBS	Bulletin Board System
BG	Battle Group
BIOLUM	Bioluminescence
BNPC	Bathymetric Navigation Planning Chart

BT	Bathythermograph
C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
CAD	Collective Address Designator
CASCOR	Casualty Correction
CASREP	Casualty Report
CBR	Chemical, Biological, and Radiological
CBIRF	Chemical Biological Incident Reaction Force
CBT	Computer Based Training
CD-ROM	Compact Disk-Read Only Memory
CE	Command Element (USMC)
CERS	Coastal Environmental Reference Service
CIB	Communication Information Bulletin
CINC	Commander-in-Chief
CINCCENT	Commander-in-Chief, U.S. Central Command
CINCEUR	Commander-in-Chief, U.S. European Command
CINCLANTFLT	Commander in Chief, U.S. Atlantic Fleet
CINCPACFLT	Commander in Chief, U.S. Pacific Fleet
CINCSAC	Commander-In-Chief, Strategic Air Command
CINCSOC	Commander-In-Chief, Special Operations Command
CINCSOUTH	Commander-in-Chief, U.S. Southern Command
CINCUSA	Commander-in-Chief, U.S. Atlantic Command
CINCUSNAVEUR	Commander-In-Chief, U.S. Navy Europe
CJCS	Chairman, Joint Chiefs of Staff
CJTF	Commander, Joint Task Force
CMC	Commandant of the Marine Corps
CNMOC	Commander, Naval Meteorology and Oceanography Command
CNO	Chief of Naval Operations
COA	Course of action
COAMPS	Coupled Ocean Atmosphere Mesoscale Prediction System
COE	Common operating environment
COMCABEAST	Commander Marine Corps Air Bases East
COMCABWEST	Commander Marine Corps Air Bases West
COMET	Coop Program for Operational MET Education and Training
COMMARCORBASES	Commander Marine Corps Bases
COMMARFORLANT	Commander, Marine Forces Atlantic
COMMARFORPAC	Commander, Marine Forces Pacific
COMNAVMETOCCOM (CNMOC)	Commander, Naval Meteorology and Oceanography Command
COMNAVSURFLANT	Commander, Naval Surface Force Atlantic
COMNAVSURFPAC	Commander, Naval Surface Force Pacific
COMSEC	Communications Material Security
COMSPAWARSSYSCOM (SPAWAR)	Commander, Space and Warfare Systems Command

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COMSUBLANT	Commander Submarine Force, U.S. Atlantic Fleet
COMSUBPAC	Commander Submarine Force, U.S. Pacific Fleet
CONOPS	Concept of Operations
CONUS	Continental United States
COOP	Cooperative Oceanographic Observation Program
COP	Common operating picture
COR	Condition of Readiness
COSAL	Consolidated Shipboard Allowance List
COTS	Commercial Off The Shelf
CRADA	Cooperative Research and Development Agreement
CSSE	Combat Service Support Element (USMC)
CTAPS	Contingency Tactical Automated Planning System
CTD	Conductivity, Temperature, Depth
CV(N)	Aircraft Carrier (Nuclear)
CVTG	Aircraft Carrier Task Group
DAMPS	Distributed Atmospheric Modeling Prediction System
DB	Data Base
DBDB	Digital Bathymetric Data Base
DBDB-C	Digital Bathymetry Data Base-Confidential
DBDB-S	Digital Bathymetry Data Base-Secret
DBDB-V	Digital Bathymetry Data Base-Variable resolution
DEA	Data Exchange Agreement
DET	Detachment
DIFAX	Digital Facsimile
DII	Defense Information Infrastructure
DISN	Defense Information Systems Network
DMS	Defense Message System
DMSO	Defense Modeling and Simulation Office
DMSP	Defense Meteorological Satellite Program
DNC	Digital Nautical Chart
DOC	Department of Commerce
DOD	Department of Defense
DON	Department of the Navy
DSN	Defense Switching Network
EM	Electromagnetic
EM/EO	Electromagnetic/electro-optical
EO	Electro-optical
EOTDA	Electro-Optical Tactical Decision Aid
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
FAX	Facsimile

FCC	Federal Climate Complex
FLENUMMETOC DET (FNMOD)	Fleet Numerical Meteorology and Oceanography Detachment
FLENUMMETOCEN (FNMOC)	Fleet Numerical Meteorology and Oceanography Center
FLIP	(DoD) Flight Information Publication
FLIR	Forward Looking Infrared
FLTBCST	Fleet Broadcast
FMF	Fleet Marine Force
FMH	Federal Meteorological Handbook
FMQ-17	Shore-based Navy Satellite System (formerly NSDS-E)
FNMOC	Fleet Numerical Meteorology and Oceanography Center
FOM	Figure of Merit
FTP	File transfer protocol
FTR	Field Technical Representative
FTV	Flight Test Vehicle
GBS	Global Broadcast System
GCCS	Global Command and Control System
GCCS-M	Global Command and Control System-Maritime
GCE	Ground Combat Element (USMC)
GDEM	Generalized Digital Environmental Model
GDEM-V	Generalized Digital Environment Model - Variable resolution
GEM	General Environmental Message
GEOSAT	Geodetic Earth Orbiting Satellite
GFMPPL	Geophysics Fleet Mission Program Library
GFO	GEOSAT Follow-on
GI&S	Geospatial Information and Services
GIS	Geographic Information System
GMS	Geostationary Meteorological Satellite (Japanese)
GMT	Greenwich Mean Time
GOES	Geostationary Environmental Satellite
GOTS	Government Off The Shelf
GPS	Global Positioning System
GWIP	Global Weather Intercept Program
HEPC	Historical Electromagnetic Propagation Conditions
HF	High Frequency
HFBL	High Frequency Bottom Loss
HITS	Historical Temporal Shipping
HOP	Historical Ocean Profile
HSL	Hydrographic Survey Launch
HTML	Hyper Text Markup Language
HYCOOP	Hydrographic Cooperative Program
IABP	International Arctic Buoy Program
ICAPS	Integrated Carrier ASW Prediction System
IDBMS	Integrated Data Base Management System

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IIP	International Iceberg Patrol
IMAT	Interactive Multi-sensor Analysis Training
IMETS	Integrated Meteorological System
IMOSS	Interim Mobile Oceanographic Support System
INMARSAT	International Maritime Satellite
INTELINK	Intelligence Link
INTELINK-S	Intelligence Link-Secret
IPL	Image Products Library
IR	Infrared
IRCS	International Radio Call Sign
IREPS	Integrated Refractive Effects Prediction System
ISEA	In-Service Engineering Agency
ISMCS	International Station Meteorological Climatic Summary
ISO	International Standards Organization
IUSS	Integrated Undersea Surveillance System
JBS	Joint Broadcast System
JCS	Joint Chiefs of Staff
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JLOTS	Joint Logistics Over The Shore
JMCIS	Joint Maritime Command Information System
JMFU	Joint METOC Forecast Unit(s)
JMO	Joint METOC Officer
JMTAC	Joint METOC Tactical Applications Course
JMV	Joint METOC Viewer
JOAF	Joint Operations Area Forecast
JOPEX	Joint Operation Planning and Execution System
JOTS	Joint Operational Tactical System
JTF	Joint Task Force
JTFEX	Joint Fleet Exercise
JTWC	Joint Typhoon Warning Center
JWICS	Joint Worldwide Intelligence Communications System
K	Kelvin (degrees)
KQ	Tactical Location Identifiers
LABS	Laser Airborne Bathymetry Survey
LCAC	Landing Craft Air Cushion
LCC	Amphibious Command Ship
LFBL	Low Frequency Bottom Loss
LHA	Amphibious Assault Ship
LHD	Multi-purpose Amphibious Assault Ship
LIDAR	Light Detection And Ranging
LOI	Letter of Instruction
LPATS	Lightning Positioning and Tracking Systems
LUF	Lowest Usable Frequency
MAGTF	Marine Air-Ground Task Force
MARFOR	Marine Corps Forces

MAW	Marine Aircraft Wing (USMC)
MC&G	Mapping, Charting, and Geodesy
MCAF	Marine Corps Air Facility
MCAS	Marine Corps Air Station
MCCDC	Marine Corps Combat Development Command
MCM	Mine Countermeasures
MCSST	Multi Channel Sea Surface Temperature
MEDAL	Mine Warfare Environmental Decision Aid Library
MEF	Marine Expeditionary Force
MET	Mobile Environmental Team
METAR	Aviation Routine Weather Report
METCON	Control of Meteorological Information
METEOSAT	Meteorological Satellite (European Geostationary Satellite)
METMF (R)	Meteorological Mobile Facility (Replacement)
METOC	Meteorology and Oceanography
METOCFAC	Meteorology and Oceanography Facility
METSAT	Meteorological Satellite
MFC	Meteorological and Oceanographic (METOC) Forecast Center
MIDDS-T	Meteorological Integrated Data Display System - Tactical
MIST	Meteorological Information Standard Terminal (USAF)
MIW	Mine Warfare
MODAS	Modular Ocean Display and Analysis System
MODLOC	Miscellaneous Operational Detail Location
MOODS	Master Oceanographic Observation Data Set
MOSS	Mobile Oceanographic Support System
MOVREP	Movement Report
MPS	Maritime Patrol Aircraft
MRS	Mini-Rawinsonde
MSC	Military Sealift Command
MST	MEF Weather Support Team
MUF	Maximum Usable Frequency
MVL	METOC Virtual Library
MWP	Mine Warfare Pilots
MWSG	Marine Wing Support Group
MWSS	Marine Wing Support Squadron
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NATOPS	Naval Air Training and Operating Procedures
NAVAF	Navy/Air Force
NAVAIR	Naval Air Systems Command
NAVEURMETOCCEN (NEMOC)	Naval European Meteorology and Oceanography Center
NAVFOR	Navy Forces
NAVICECEN (NIC)	Naval Ice Center
NAVLANTMETOCCEN (NLMOC)	Naval Atlantic Meteorology and Oceanography Center

NAVLANTMETOCDET (NLMOD)	Naval Atlantic Meteorology and Oceanography Det
NAVLANTMETOCFAC (NLMOF)	Naval Atlantic Meteorology and Oceanography Facility
NAVMETOC DET	Naval Meteorology and Oceanography Detachment
NAVMETOCEN	Naval Meteorology and Oceanography Center
NAVMETOCCOM	Naval Meteorology and Oceanography Command
NAVMETOCFAC	Naval Meteorology and Oceanography Facility
NAVO	Naval Oceanographic Office
NAVOBSY	U.S. Naval Observatory
NAVOCEANO	Naval Oceanographic Office
NAVPACMETOCEN (NPMOC)	Naval Pacific Meteorology and Oceanography Center
NAVPACMETOCDET (NPMOD)	Naval Pacific Meteorology and Oceanography Detachment
NAVPACMETOCFAC (NPMOF)	Naval Pacific Meteorology and Oceanography Facility
NAVTRAMETOC DET (NTMOD)	Naval Training Meteorology and Oceanography Detachment
NAVTRAMETOCFAC (NTMOF)	Naval Training Meteorology and Oceanography Facility
NCDC	National Climatic Data Center
NCEP	National Centers for Environmental Prediction
NCTAMS	Naval Computer and Telecommunications Area Master St
NEMOC	Naval European Meteorology and Oceanography Center
NESDIS	National Environmental Satellite, Data, and Information Service
NEXRAD	Next Generation Doppler Weather Radar (WSR-88D)
NGDC	National Geophysical Data Center
NIC	National Ice Center
NIMA	National Imagery and Mapping Agency
NIPRNET	Non-secure Internet Protocol Router Network
NITES	Naval Integrated Tactical Environmental System
NLMOC	Naval Atlantic Meteorology and Oceanography Center
NLMOD	Naval Atlantic Meteorology and Oceanography Detachment
NLMOF	Naval Atlantic Meteorology and Oceanography Facility
NM	Nautical Mile(s)
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NODDS	Naval Oceanographic Data Distribution System
NOGAPS	Navy Operational Global Atmospheric Prediction System
NOTAM	Notice to Airmen
NPMOC	Naval Pacific Meteorology and Oceanography Center
NPMOD	Naval Pacific Meteorology and Oceanography Detachment
NPMOF	Naval Pacific Meteorology and Oceanography Facility
NRL	Naval Research Laboratory

NSDS-E	Naval Satellite Display System-Enhanced
NTM	National Technical Means
NTP	Naval Telecommunications Publication
NWP	Numerical Weather Prediction
NWS	National Weather Service
NWTDB	Naval Warfare Tactical Data Base
OA	METOC Division on ship
OAML	Oceanographic and Atmospheric Master Library
OFCM	Office of the Federal Coordinator, Meteorology
OIC	Officer-in-Charge
OPAREA	Operating Area
OPARS	Optimum Path Aircraft Routing System
OPCON	Operational Control
OPEVAL	Operational Evaluation
OPLANS	Operational Plans
OPORD	Operation Order
OPSEC	Operations Security
OPTEST	Operational Test
ORD	Operational Requirements Document
ORG	Operational Requirements Group
OT&E	Operational Test & Evaluation
OTC	Officer in Tactical Command
OTCIXS	OTC Information Exchange System
OTG	Over-the-Horizon Targeting Gold
OTH	Over the Horizon
OTIS	Optimum Thermal Interpolation System
OTSR	Optimum Track Ship Routing
PACFLT	Pacific Fleet
PDC	Professional Development Center
PIBAL	Pilot Balloon
PIM	Projected Intended Movement
PIPS	Polar Ice Prediction System
PIREP	Pilot Weather Report
PLA	Plain Language Address
POM	Princeton Ocean Circulation Model
POPS	Primary Oceanographic Prediction System
POTS	Plain Old Telephone Service
QUICKSCAT	NASA Scatterometer Satellite
RADARSAT	Radar Satellite (Canadian)
RADFO	Radiological Fallout
RADIOSONDE	Atmospheric Temperature, Humidity Sounding
RATT	Radio Teletype
RDT&E	Research, Development, Test and Evaluation
RECCO	Aerial Meteorological Reconnaissance Reporting Code
RFI	Radio Frequency Interference
ROV	Remotely Operated Vehicle

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RRS	Remote Replicating Station
RVRS	Research Vehicle Reference Service
RWS	Rawinsonde subsystem
SACEUR	Supreme Allied Commander, Europe
SACLANT	Supreme Allied Commander, Atlantic
SAIL	Satellite Annotated Image Littoral
SALTS	Streamlined Alternative Logistics Transmission System
SAR	Synthetic Aperture Radar
SAT	Satellite
SATCOM	Satellite Communications
SATMSG	Satellite Image Message System
SDV	SEAL Delivery Vehicle
SHAREM	Ship ASW Readiness Effectiveness Measuring
SHOALS	Scanning Hydrographic Operational Airborne LIDAR Survey
SIF	Station Information File
SIIP	SPPEDS and ICAPS Integrated Product
SIMAS	Sonar In-situ Mode Assessment System
SIPRNET	Secure Internet Protocol Router Network
SLOC	Sea Lanes of Communications
SMO	Senior METOC Officer
SMOOS	Shipboard METOC Observing System
SN	Shipping Noise
SNDL	Standard Navy Distribution List
SOA	Speed of Advance
SOF	Special Operations Forces
SOPA	Senior Officer Present Afloat
SOWT	Special Operations Weather Team
SPAWAR	Space and Naval Warfare Systems Command
SRF	Subregional Forecast
SSC	Stennis Space Center
SSIC	Standard Subject Identification Code
SSM/I	Special Sensor Microwave Imager
SSMIS	Special Sensor Microwave Imager and Sounder
SSMO	Summary of Synoptic Meteorological Observations
SST	Sea Surface Temperature
SSXBT	Submarine Expendable Bathythermograph
STOIC	Special Tactical Oceanographic Information Chart
STORM	Submarine Tactical Oceanographic Reference Manual
STW	Strike Warfare
STWAVE	Steady Wave Shallow Water Wave Model
SURTASS	Surface Towed Array Surveillance System
SURVOPS	Survey Operations
SUW	Surface Warfare
SVP	Sound Velocity Profile
SWAFS	Shallow Water Analysis and Forecast System
SWAPS	Spectral Wave Prediction System

SWH	Significant Wave Height
SWI	Special Weather Intelligence
SWO	Staff Weather Officer
SXBT	Submarine Expendable Bathythermograph
TAF	Terminal Aerodrome Forecast
T-AGOR	Auxiliary General Oceanographic Research Ship
T-AGS	Auxiliary Survey Ship
TAMPS	Tactical Aircraft Mission Planning System
TCFA	Tropical Cyclone Formation Alert
TDA	Tactical Decision Aids
TESS	Tactical Environmental Support System
TF	Task Force
TFU	Theater/Tactical Forecast Unit
TIROS	Television and Infrared Observation Satellite
TLAM	Tomahawk Land Attack Missile
TOPEX	Ocean Topography Experiment (U.S. and Japan)
TOS	Tactical Oceanographic Summary
TOW	Tactical Oceanography Workshop
TPFDD	Timed-Phased Force and Deployment Data
UA	Upper Air
UAV	Unmanned Aerial Vehicle
UNOLS	University National Oceanographic Laboratory System
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USCINCPAC	Commander in Chief, U.S. Pacific Command
USMC	U.S. Marine Corps
USN	U.S. Navy
USNS	U.S. Naval Ships (Military Sealift Command)
USTRANSCOM	United States Transportation Command
USW	Undersea Warfare
UTC	Universal Time Coordinated
UUV	Unmanned Underwater Vehicle
VSAT	Very Small Aperture Terminal
VSS	Volume Scattering Strength
WAM	Wave Model ---European Third Generation
WEAX	Enroute Weather Forecast
WEFAX	Weather Facsimile
WMO	World Meteorological Organization
WRN	Wind and Residual Noise
WSC	Warfighting Support Center
WX	Weather
XBT	Expendable Bathythermograph

CHAPTER 1

NAVY AND MARINE CORPS METEOROLOGY AND OCEANOGRAPHY ORGANIZATION

1.1.0 Naval Meteorology and Oceanography Command

The Naval Meteorology and Oceanography (NAVMETOCCOM) command, as used herein, is a collective title which includes: all Navy units which contribute oceanographic, meteorological and hydrographic observations or services; the activities assigned to the Commander, Naval Meteorology and Oceanography Command (COMNAVMETOCCOM); and a very limited number of other oceanographically or meteorologically oriented activities such as the Naval Research Laboratories (NRL) located at John C. Stennis Space Center (SSC), MS, and Monterey, CA.

1.2.0 Mission

The mission of NAVMETOCCOM is to provide Navy, Marine Corps and Department of Defense forces relevant and integrated full-spectrum weather, ocean, charting, precise time, and astrometric knowledge to minimize risk and optimize operational success anytime, anywhere.

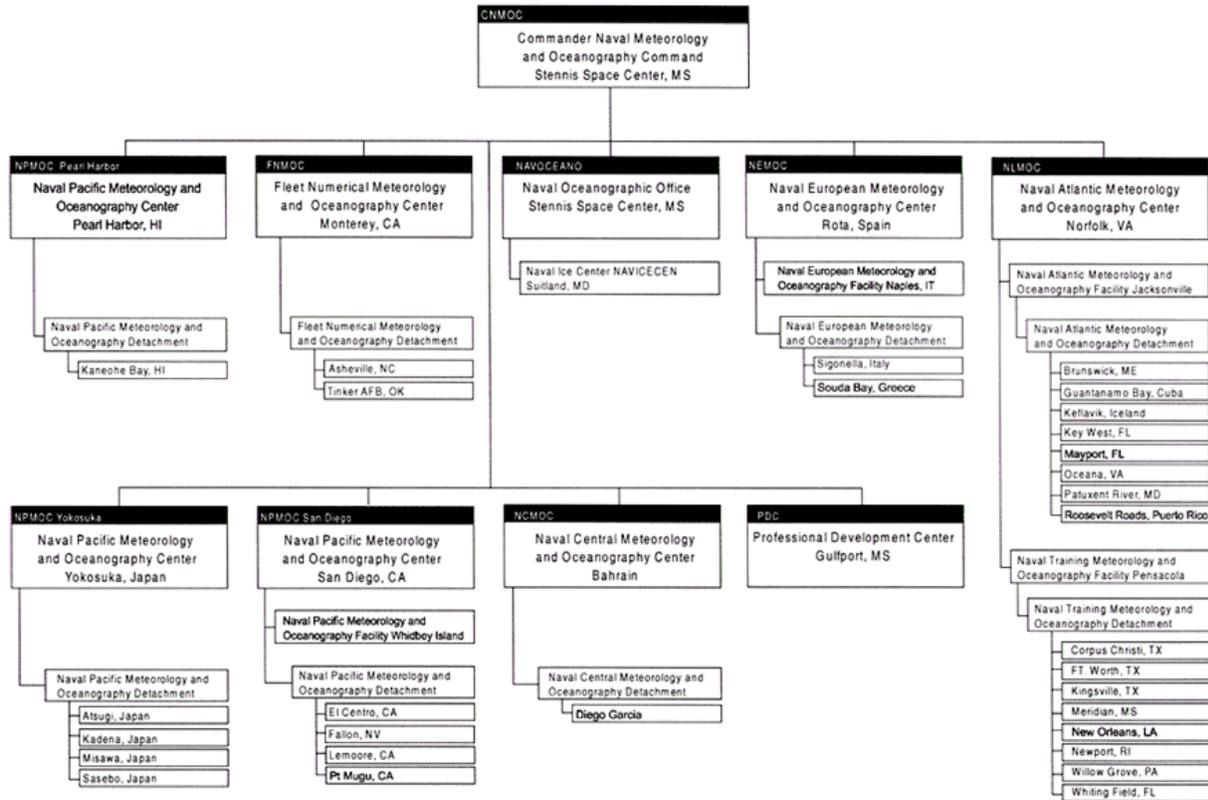
1.3.0 Commander, Naval Meteorology and Oceanography Command

COMNAVMETOCCOM is a second echelon shore activity located on the grounds of the National Aeronautics and Space Administration (NASA) SSC, MS. Activities assigned to the Commander are described in the following paragraphs.

1.3.1 Organization

Activities assigned to the NAVMETOCCOM are organized to collectively provide global fleet support and services to other DoD and civil activities. The command structure of the activities assigned to and under the technical control of COMNAVMETOCCOM is shown in Figure 1-1. (Click on individual Command name for contact information.) Appendix A provides the address and telephone information for these activities. These field activities are functionally oriented as follows:

Naval Meteorology and Oceanography Command Organization



as of 1 June 2000

Figure 1-1. Naval Meteorology and Oceanography Command Organizational Chart as of June 2000

(a) **Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCCEN)**. FLENUMMETOCCEN, Monterey, CA, is the Naval Meteorology and Oceanography Command’s processing center which is dedicated to running state-of-the-art, operational global and high resolution regional atmospheric and oceanographic analysis and forecast models. FLENUMMETOCCEN is linked with the data collecting and distributing networks of the U.S. Air Force (USAF), the National Oceanic and Atmospheric Administration (NOAA), and the World Meteorological Organization (WMO). Through these sources, FLENUMMETOCCEN collects and assimilates massive volumes of global METOC data for input into its numerical models and distribution to DoD forces worldwide. Additionally, utilizing this collection of data, basic and applied numerically-generated (computer) meteorological and oceanographic (METOC) products are made available for distribution on Navy and Joint command, control, communications, computers, and intelligence (C4I) systems via the Navy theater METOC centers. At this point value-added products and services tailored to specific military operations or exercises are developed. The Joint METOC Viewer (JMV) permits worldwide NIPRNET, SIPRNET, and higher classification access to FLENUMMETOCCEN products. Additionally, the Navy Mobile Meteorology and Oceanographic Support System

(NMOSS) permits worldwide, dial-in access to FLENUMMETOCCEN products. FLENUMMETOCCEN is uniquely capable of providing high resolution meteorological products on short notice, for any location, in support of contingency military and humanitarian operations. Additional products available from FLENUMMETOCCEN include atmospheric and oceanographic observations, data extracts, and application products.

(b) **Naval Oceanographic Office (NAVOCEANO).** NAVOCEANO, SSC, MS, is a primary oceanographic production center for the Navy, responsible for collecting, processing, and distributing hydrographic, oceanographic and other geophysical data and derivative products. NAVOCEANO responds both to long term national and strategic requirements as well as emergent, short term requirements in support of contingency operations. To accomplish this, NAVOCEANO has a fleet of eight survey ships, a sophisticated satellite and ocean buoy data processing facility, and access to oceanographic survey aircraft. Their Warfighting Support Center (WSC), using the large scale computer facility at NAVOCEANO, operates interactive ocean models for littoral regions and special automated ocean models which may be required on a non-routine basis such as ocean drift and oil spill models. Products available from NAVOCEANO include ocean fronts and eddies analyses, and surface and three-dimensional ocean thermal fields which are distributed through the Navy theater METOC centers via Navy and Joint C4I systems. NAVOCEANO is also the Navy's primary NOAA TIROS data processing facility. NAVOCEANO controls management of COMNAVMETOCCOM sponsored forms and publications; and the distribution of non-DoN/CNMOC forms, directives and handbooks to NAVMETOCCOM activities in accordance with this instruction.

(c) **Naval Ice Center.** The Naval Ice Center, Suitland, MD, is the vehicle for Navy participation in the National Ice Center (NIC). In cooperation with NOAA and the U.S. Coast Guard (USCG), NIC's mission is to provide global sea ice and Great Lakes/coastal U.S. ice analysis and forecasting services. NIC products are available to the DoD and allied activities either directly or through theater NAVMETOCCOM centers.

(d) **Theater Meteorology and Oceanography Centers.** Six Naval theater Meteorology and Oceanography Centers are hubs for the dissemination of METOC data. They provide value added, full spectrum METOC services to forces operating within their respective area of responsibility. These hubs are: Naval Pacific Meteorology and Oceanography Center (NAVPACMETOCCEN) at Pearl Harbor, HI; Yokosuka, Japan; and San Diego, CA; Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN) at Norfolk, VA; Naval European Meteorological and Oceanography Center (NAVEURMETOCCEN) at Rota, Spain; and Naval Central Meteorology and Oceanography Center (NAVCENTMETOCCEN) at Bahrain. Aligned with specific Navy component commanders and focused on operations within theater, products are transmitted to operating forces via AUTODIN, high speed fleet broadcast, via linkage to Navy and Joint C4I systems, and through NIPRNET and SIPRNET web pages and JWICS internet networks. Because of their in-theater presence and focus, NAVMETOCCOM centers and facilities are ideally suited to serve as Joint Force METOC Forecast Units (JMFU) in support of theater operations.

As depicted in Figure 2-1, NAVLANTMETOCCEN is responsible for the Atlantic Ocean; NAVEURMETOCCEN for the Mediterranean and Black Sea areas; and NAVPACMETOCCEN San Diego for the Eastern Pacific; and NAVPACMETOCCEN Yokosuka for the Western Pacific

and Indian Oceans and NAVCENTMETOCEN for the Arabian Gulf and the Red Sea area. However, ships under Atlantic Fleet operational control between 70W and 92W will receive environmental support from NAVLANTMETOCEN. This support will continue as long as the ship remains under operational control of Commander, Second Fleet during excursions beyond 92W. NAVPACMETOCEN Pearl Harbor, HI also commands the Joint Typhoon Warning Center (JTWC). The JTWC is a joint USN/USAF activity established by USCINCPAC at the request of the Joint Chiefs of Staff (JCS) to issue tropical cyclone warnings in the western Pacific and Indian Oceans. NAVEURMETOCEN Rota provides environmental services in the Baltic and Mediterranean Seas. NAVLANTMETOCEN and NAVPACMETOCEN San Diego share responsibilities for the polar regions. NAVLANTMETOCEN covers the area north of 60N (east of 95W to 100E) and the area south of 60S (east of 92W to 17E). NAVPACMETOCEN San Diego is responsible for the area north of 60N (east of 100E through the dateline to 95W) and the area south of 60S (east of 17E through the dateline to 92W).

(e) **Meteorology and Oceanography Command Facilities.** There are four Naval Meteorology and Oceanography Command Facilities (METOCFAC). One in each of the following locations: Pensacola, FL; Jacksonville, FL; Naples, Italy; and Whidbey Island, WA. These facilities provide limited area, local and aviation environmental forecast services, as well as services to aircraft, ship, and submarine staffs. METOC forecast guidance from their theater NAVMETOC COM centers and FLENUMMETOCEN is used by all facilities. All facilities command assigned detachments.

(f) **Naval Meteorology and Oceanography Command Detachments.** There are 35 Naval Meteorology and Oceanography Command Detachments (METOC COM DET) worldwide. Although primarily situated at Naval Air Stations, several are located at Naval Stations in support of sea-going units. Each is established under an Officer or Chief Petty Officer who reports to one of the NAVMETOC COM centers or facilities listed above. Most of these detachments are oriented to provide direct environmental support, including aviation and oceanographic forecast and warning services to the DoD and allied units within their local areas. Two detachments are oriented to provide specific technical services: in coordinating the Navy's climatological program at the National Climatic Data Center (NCDC), Asheville, NC; and in circuit management of Naval data requirements for the USAF Automated Weather Network (AWN) at Tinker AFB, OK.

(g) **Naval Meteorology and Oceanography Professional Development Center.** (NAVMETOC PRODEV CEN) NAVMETOC PRODEV CEN (PDC) was commissioned in July 2000 to consolidate all meteorological, oceanography and geospatial information and services training functions to provide for single source accountability and enhance efficiency. Specifically, the mission of the PDC is to conduct active and reserve officer and Aerographer's Mate (AG) meteorology, oceanography, mapping, charting, and geospatial information and services training; to provide technical guidance and METOC training materials and to ensure development and technical accuracy of METOC portions of warfare pipeline training. The Commanding Officer of the PDC reports directly to COMNAVMETOC COM.

1.3.2 Activities and Units Under the Technical Control of COMNAVMETOCCOM

In addition to those activities discussed in paragraph 1.3.1 above, there are other activities and units which, although not directly assigned to COMNAVMETOCCOM, function under technical control of NAVOCEANO. These are:

(a) Two NP-3D aircraft operated by the Naval Research Laboratory for COMNAVMETOCCOM, which are tasked by NAVOCEANO for the collection of geophysical, oceanographic and acoustic data.

(b) Eight multi-purpose (oceanographic/hydrographic) ships that are operated by the Commander, Military Sealift Command (MSC) and under the operation control of the numbered Fleet Commanders through MSC's area Commanders. These ships are manned by civilian scientific and technical personnel (NAVOCEANO Detachments) as required.

1.4.0 Other Naval Oceanographic and Meteorological Support System Units

Other NAVMETOCCOM units composed of varying numbers of geophysical personnel are assigned to staffs, ships, and activities according to the specific requirements for environmental support. These units are normally integral components of the commands to which they are assigned. They are staffed and equipped in accordance with the designated functions. Assigned oceanography personnel, because of their specialized training and skills, should be effectively utilized within their specialty.

1.5.0 Participating Units

Ships, aircraft squadrons, and some shore activities to which no oceanography personnel are assigned are also elements of the NAVMETOCCOM. They are direct contributors of environmental observations. They perform a vital function in this respect, especially in data sparse oceanic areas. COMNAVMETOCCOM provides technical guidance and direction in these observation and reporting functions.

1.6.0 Subregional Forecast Center (SRFC) Operations

Six NAVMETOCCOM activities are designated as Subregional Forecast Centers (SRFC). In addition to providing support to their host activity, SRFCs provide off peak hours forecast and warning support to other naval activities where on-scene forecasters are normally available only during that installation's normal or peak operating hours. The NAVMETOCCOM activities involved in the SRFC operations are outlined in Figure 1-2.

<u>Subregional Forecast Center</u>	<u>Satellite Detachments</u>	
NAVLANTMETOCFAC Jacksonville, FL	NAVLANTMETOC DET	Mayport, FL Kings Bay, GA Key West, FL
NAVTRAMETOCFAC Pensacola, FL	NAVTRAMETOC DET	Meridian, MS New Orleans, LA Whiting Field, FL
NAVTRAMETOC DET Corpus Christi, TX	NAVTRAMETOC DET	Fort Worth, TX Kingsville, TX
NAVPACMETOCEN San Diego, CA	NAVPACMETOC DET	El Centro, CA
NAVEURMETOCEN Rota, SP	NAVEURMETOC DET	Souda Bay, GR
NAVCENTMETOCEN Bahrain	NAVCENTMETOC DET	Diego Garcia

Figure 1-2. Subregional Forecasting Organization

1.7.0 U.S. Marine Corps Organization

The Deputy Chief of Staff for Aviation, Headquarters, U.S. Marine Corps (Code ASL-37) is the cognizant office for Marine Corps METOC support and requirements. The Marine Corps METOC organization consists of two operational chains of command; one for the Fleet Marine Force (FMF), and the other for Marine Corps Air Stations and Facilities.

1.7.1 Fleet Marine Force (FMF) Organization

The FMF weather structure provides personnel who are trained and prepared to meet the challenges of Marine Air-Ground Task Force (MAGTF) METOC support, weather Operational Maneuver from the Sea (OMFTS), Sustained Operations Ashore (SOA) or Other Expeditionary Operations (OEO). FMF weather personnel reside at the Command Element (CE) of the Marine Expeditionary Force (MEF) and within the Aviation Combat Element (ACE), of the MEF, in Marine Wing Support Group (MWSG) Headquarters, and in the Marine Wing Support Squadron (MWSS). ACE MWSS weather personnel, operating from the Meteorological Mobile Facility (METMF) in support of forward deployed base (FOB), provide the full spectrum of meteorological support and limited oceanographic support to the ACE and MEF Weather Support Teams (MSTs) who support all phases of operational planning and coordination at the CE, Ground Combat Element (GCE) and Combat Service Support Element (CSSE) and the Marine Expeditionary Unit (MEU) Commander. All requests for METOC support from the MEF should be from the respective CE. Figure 1-3 provides the FMF weather service operational structure.

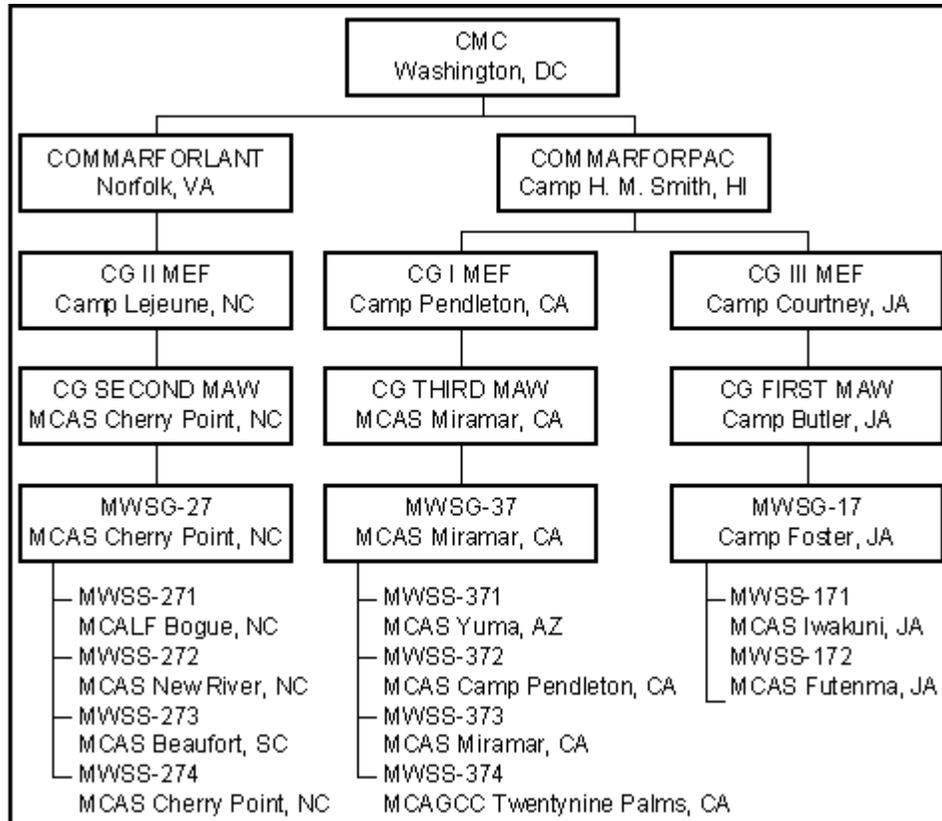


Figure 1-3. Fleet Marine Force METOC Support Organization and Structure

1.7.2 Marine Corps Weather Services

Marine Corps weather personnel are composed of weather service officers (MOS 6802), weather service forecasters (MOS 6842) and weather service observers (MOS 6821). Weather personnel are located within Fleet Marine Force (FMF) organizations and Garrison based Marine Corps Air Stations/Facilities. Weather support for FMF, Marine Air Ground Task Force (MAGTF), is derived from the Marine Wing Support Squadron's (MWSS). The MWSS can provide support to the Aviation Combat Element (ACE) at a expeditionary airfield by deploying the Meteorological Mobile Facility (METMF) or by a MEF Weather Support Team (MST) assigned in direct support to the Command Element (CE), Ground Combat Element (GCE) and Combat Service Support Element (CSSE).

1.7.3 Marine Corps Products and Services

The Marine Corps utilizes all NAVMETOCCOM Instructions, which have concurrence from the Commandant of the Marine Corps (ASL). Marine Corps weather personnel utilize NAVMETOCCOM production and theater center products to fuse meteorological and oceanographic (METOC) data sets in support of MAGTF operations.

1.7.4 Marine Corps Air Stations and Facilities

The Marine Corps Air Stations and Facilities are the garrison (shore) based supporting establishments for Marine aviation. They function in the same manner as NAVMETOCCOM Detachments, but under Marine Corps management. Their mission is to provide twenty-four hour METOC support services to the host and tenant organizations. Local weather observations and forecasts are inserted into the Automated Weather Network (AWN) for further dissemination to military and civilian locations throughout the world. MCAS's Cherry Point and Miramar serve as the senior METOC advisors to the Commander, Marine Corps Air Bases East and Marine Corps Air Bases West, respectively. They are responsible for coordinating manpower and meteorological equipment allowances at subordinate stations and facilities, providing assistance to the Commander and their staffs on METOC plans, policies, training, and doctrine and assisting subordinate stations and facilities in all METOC related matters. Figure 1-4 provides the garrison weather service operational chain of command.

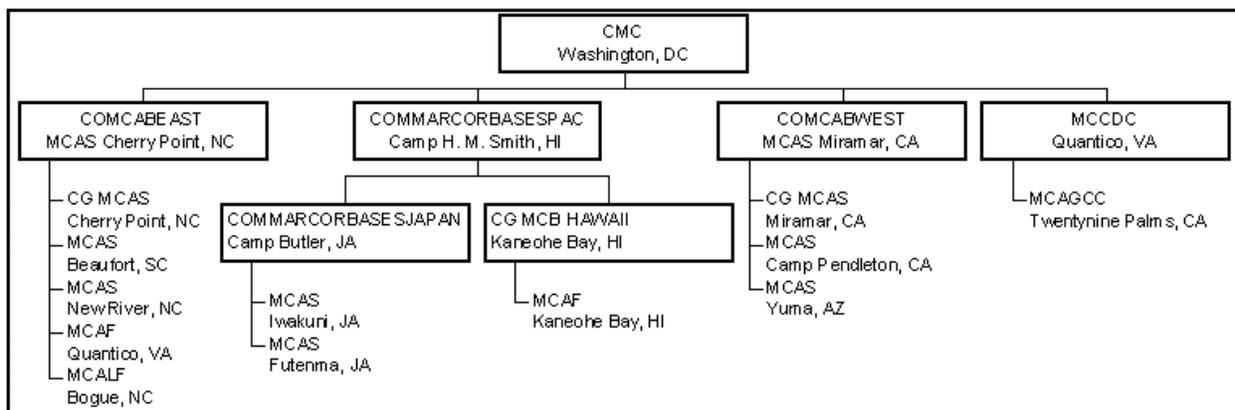


Figure 1-4. Garrison Based METOC Support Organization and Structure

1.7.5 Marine Corps Weather Personnel External Billets

Marine Corps personnel also serve in billets external to the above structure.

a. Naval Meteorology and Oceanography Command: The Marine Corps Liaison and Joint Operations Officer assigned to this Headquarters is responsible for advising the Commander on issues affecting Littoral and Expeditionary Warfare operations; the Marine Corps' METOC support requirements for the CE, ACE, GCE, CSSE and MEU; and interaction with joint command staffs. This billet is located within the Joint Operations Division, Operations Directorate (N3). Weather officer billet at Keesler AFB MS and MSGT billet at NAVOCEANO.

b. Naval Space and Warfare Systems Command: The Marine Corps Weather Service Officer assigned to COMSPAWARSSYSCOM, METOC Systems Office (PMW-185), is the Program Manager for the Marine Corps' Meteorological Mobile Facility program. The program managers responsibilities encompass all aspects of acquisition strategy including life cycle support of fielded systems (i.e., provisioning, personnel training, etc.), and the guidance provided to the Program Manager (PMW 185) and all project officers on all issues affecting the

development, employment, training and support of METOC equipment being fielded for Marine Corps applications (i.e., ASOS, NEXRAD, MRS).

c. Marine Corps Aviation Weapons and Tactics Squadron 1 (MAWTS-1): The primary mission of MAWTS-1 is to provide standardized training in all aspects of the employment of Marine Aviation units, from assisting in the development of aviation weapons and tactics to the preparation of aviation units for evaluation. MAWTS-1 conducts a Marine Corps Aviation Weapons and Tactics Training Program designed to increase the combat readiness of aviation units through individual and collective weapons and tactics training. A Marine Corps weather officer is assigned to the Aviation Ground Support Department and has the responsibilities of instructing meteorological influences on aviation tactics, maximizing the awareness of atmospheric effects on weapon system selection and performance, and maintaining the advantages of incorporating meteorological parameters in tactical planning.

d. Naval Meteorology and Oceanography Professional Development Center (PDC): The Marine Corps Weather Staff Non-Commissioned Officer assigned to the PDC is responsible to and acts as a special liaison to the Commanding Officer on issues affecting the development and review of meteorological training materials, publications, directives and training requirements for in support of the MAGTF; coordinate and provide initial and refresher training to the MAGTF for METOC systems and applications; advise the Commander on current and anticipated environmental support training requirements of Marine Corps Forces worldwide, including requirements for updating meteorological forecasting techniques, climatology and environmentally-based tactical decision aids; and assist in the development and management of METOC sustainment training for all enlisted Marines serving in OccFld 68XX, Weather Service.

1.7.6 Marine Corps Personnel

Marine Corps Weather Services Military Occupational Specialty's (MOS) which pertain to the weather career field are: MOS 6802, Weather Service Officer; MOS 6842, Weather Service Forecaster; MOS 6821, Weather Service Observer; and MOS 6493, Meteorological Equipment Repair Technician and MOS 6877, Weapons and Tactics Instructor (WTI). All formal school training for forecasting, observing and equipment repair are conducted at Keesler AFB, Mississippi. The weapons and tactics instructor course is conducted semi-annually at MAWTS-1, MCAS Yuma, AZ.

CHAPTER 2

OPERATIONAL ENVIRONMENTAL SUPPORT SERVICES

2.1.0 General

Environmental support to the operating forces is provided in accordance with fleet requirements and may be tailored to the needs of specific units. This support consists primarily of meteorological and oceanographic (METOC) information and forecasts for current operational use, forecast tactical indices for weapon and sensor system employment and tactical decision-making, and climatological (statistical) information for long-range planning and design purposes.

2.2.0 Sources of Support to Forces Afloat and Ashore

Environmental support to U.S. Navy (USN) and U.S. Marine Corps (USMC) bases and aviation activities ashore is provided by collocated NAVMETOCCOM activities and USMC aviation weather service units. This support is supplemented in some areas by USAF services, and within the United States, by services provided by the Federal Aviation Administration (FAA) and the National Weather Service (NWS). This support includes weather analyses and forecasts prepared from a variety of data sources and tailored to the needs of the customer. OPNAVINST 3710.7 series, the NATOPS Manual, provides details for aviation personnel regarding weather briefing requirements, weather criteria for filing flight plans, and weather minima.

The primary sources of environmental support for forces afloat (for ships/staffs without permanently assigned meteorological units) are NAVLANTMETOCCEN Norfolk, NAVPACMETOCCEN/JTWC Pearl Harbor, NAVPACMETOCCEN San Diego, NAVPACMETOCCEN Yokosuka, NAVEURMETOCCEN Rota and NAVCENTMETOCCEN Bahrain. Areas of Responsibility (AOR) for each center are depicted in Figure 2-1.

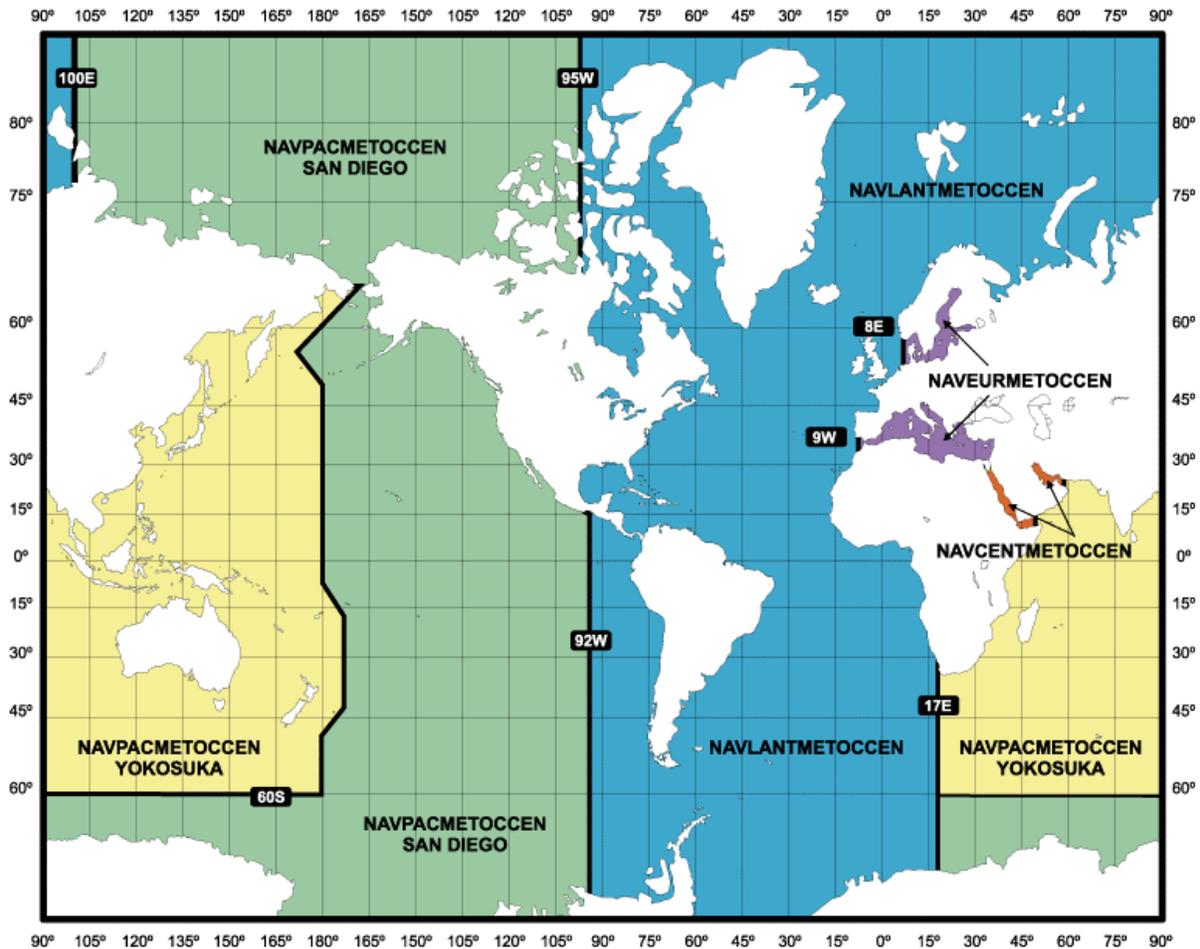


Figure 2-1. Areas of Responsibility for Environmental Support

2.2.1 Requesting Support Services

Commands and units ashore and afloat not collocated with one of the Navy or Marine Corps support activities described in Chapter 1 which do not receive adequate weather support from other agencies may request support services directly from the appropriate NAVMETOCCOM center. Such requests should be addressed in accordance with Table 2-1. Requests which cannot be satisfied by the receiving center will automatically be forwarded to COMNAVMETOCCOM for appropriate action.

a. MOVREP exception. As indicated in NWP 1-03.1, appropriate NAVMETOCCOM centers are included in MOVREP AIGs. Therefore, it is not necessary to add individual NAVMETOCCOM activities as MOVREP addressees. When required, centers will automatically readdress MOVREPs to NAVMETOCCOM activities providing services to ships conducting operations in adjacent fleet operating areas. MOVREPs will be passed between centers as necessary.

b. METOC equipment and equipment maintenance support are described in NAVMETOCCOMINST 13950.1L.

Area	Message Addrees*
Atlantic Ocean, North, Barents and Kara Seas (Note 1)	TO: NAVLANTMETOCCEN NORFOLK VA//30// (Note 2)
Mediterranean, Black, and Baltic Seas.	TO: NAVEURMETOCCEN ROTA SP//30// (Note 3)
Eastern Pacific while under COMSECONDFLT OPCON	TO: NAVLANTMETOCCEN NORFOLK VA//30// INFO: NAVPACMETOCCEN SAN DIEGO CA//30//
Pacific Ocean east of International Dateline (Note 4)	TO: NAVPACMETOCCEN SAN DIEGO CA//30// INFO: NAVPACMETOCCEN YOKOSUKA JA//30// NAVPACMETOCCEN PEARL HARBOR HI//30//
Pacific Ocean west of International Dateline, Indian Ocean (Notes 4,5)	TO: NAVPACMETOCCEN YOKOSUKA JA//30// INFO: NAVPACMETOCCEN PEARL HARBOR//30//
Arabian Gulf, and Red Sea (Note 6)	TO: NAVCENTMETOCCEN BAHRAIN//30// INFO: NAVPACMETOCCEN YOKOSUKA JA//30//
Polar Regions (North of 60N, South of 60S) (Note 4)	
<p>*NOTES</p> <p>1. When operating in the North Sea, Norwegian Sea, or Atlantic waters around the United Kingdom, coastal France, Spain, Portugal or south of 20N and east of 80W, INFO: NAVEURMETOCCEN ROTA//30//</p> <p>2. Foreign ships use routing indicator RULYCKA.</p> <p>3. Foreign ships use routing indicator RHDLPVH.</p> <p>4. For Polar Regions (North of 60N, South of 60S): NAVLANTMETOCCEN and NAVPACMETOCCEN San Diego share responsibilities for the polar regions. NAVLANTMETOCCEN covers the area north of 60N (east of 95W to 100E) and the area south of 60S (east of 92W to 17E). NAVPACMETOCCEN San Diego is responsible for the area north of 60N (east of 100E through the dateline to 95W) and the area south of 60S (east of 17E through the dateline to 92W). See Figure 2-1.</p> <p>When North of 50N or South of 50S, INFO: NAVICECEN SUITLAND MD//JJJ//</p> <p>5. When operating in the Indian Ocean south of 5S and west of Madagascar, INFO: NAVEURMETOCCEN ROTA//30//</p> <p>6. For Suez Canal transits, send request: TO: NAVEURMETOCCEN ROTA//30// NAVCENTMETOCCEN BAHRAIN//30//</p>	

Table 2-1. Message Addrees for Requesting Environmental Support

2.2.2 Availability of Support Services

Most of the environmental support routinely required by Fleet units is available on a regularly scheduled basis via normal Navy communications channels. Table 2-2 lists the common communications media used for the various types of support provided.

Products/Sources	AUTODIN (Note 2)	Fleet Broadcast (Notes 1, 2)	Web Pages	OTCIXS TADIXS SSIXS (Note 3)
Wind Warnings (Oceanic Areas)	X	X	X	X
Local Severe Weather	X	X	X	
Tropical Cyclone Forecasts and Warnings	X	X	X	X
High Seas Warnings	X	X	X	X
Small Craft Warnings (Harbor)	X	X	X	
Storm Tide or Surge Warnings (Harbor)	X	X	X	
Area Analyses and Prognostic Charts (Meteorological/Oceanographic)			X	
Fleet OPAREA Forecasts	X	X	X	
Oceanic Frontal Positions	X		X	X
Ice Conditions (Note 4)	X		X	X
<p>*NOTES</p> <p>1. Details of worldwide radio-facsimile and radio teleprinter broadcasts are contained in the "Worldwide Marine Weather Broadcasts," published jointly by the National Oceanic and Atmospheric Administration/National Weather Service (NOAA/NWS), available from the National Imagery and Mapping Agency (NIMA) and online at: http://www.nws.noaa.gov/om/marine/home.htm . Corrections and changes to the broadcast details are distributed by means of the Weekly Notice to Mariners issued by NIMA.</p> <p>2. Proposals for changes, along with justification, in the content of environmental broadcasts shall be submitted via the operational chain of command to the appropriate Fleet CINC with copy to COMNAVMETOCCOM and appropriate NAVMETOCCOM activity.</p> <p>3. Afloat Units refer to latest Subscriber Identification (SID) number assignments promulgated by Fleet Commanders to receive meteorological and oceanographic products via tactical circuits.</p> <p>4. Detailed ice edge data is available weekly via AUTODIN/JMCIS/WWW, http://www.natice.noaa.gov from NAVICECEN.</p>				

Table 2-2. Environmental Products Routinely Available to Fleet Units

Environmental messages intended primarily for use by embarked METOC personnel are transmitted to ships on the weather channel of the Fleet multi-channel broadcast. Contents of this broadcast include raw synoptic observations, processed data, analyzed and forecast meteorological information, area forecasts, and hazardous weather advisories and warnings. These environmental messages are identified by special MANOP bulletin headings which define message content and originator. The broadcast content is controlled by the appropriate NAVMETOCCOM center, and is coordinated with the appropriate Fleet CINC.

2.2.3 Support Services During MINIMIZE

Doctrine on transmission of messages during MINIMIZE may be found in NWP 6-014. Certain environmental support messages will not be affected by MINIMIZE, as they provide information necessary to prevent serious damage to Navy assets, loss of life, or detrimental impact on operational missions. These messages include:

- (a) Warnings/advisories-small craft, thunderstorm, tornado, gale, storm hurricane/typhoon, high seas.
- (b) Tropical disturbance advisories.
- (c) Route Weather Forecasts (WEAX/AVWX)-sent only if potentially destructive weather is forecast.
- (d) Optimum Track Ship Routing (OTSR) advisories.
- (e) ASW forecasts-as dictated by operational need.
- (f) Ice forecasts-as dictated by operational need.
- (g) Specialized environmental support.

Routine area forecasts do not generally meet the requirements for transmission during MINIMIZE.

2.2.4 In-port Support Services

a. Routine support. Ships arriving in ports where a NAVMETOCCOM activity is collocated are routinely provided storm, small craft, and severe weather forecasts. These are normally delivered by AUTODIN message and are often supplemented by Port/Harbor Control broadcasts, visual signals, messenger and/or telephone contact. Tailored support services are available on request.

b. Technical advice/assistance. The NAVMETOCCOM Fleet Liaison Program includes visits to ships and squadrons to provide technical advice and assistance. The objectives of these visits are:

- (1) To evaluate, and assist with, environmental support under actual operating conditions;

(2) To assist in training the operating forces in the tactical exploitation of the environment and its effects on various Fleet weapon, sensor, and communication systems, and platforms;

(3) To provide information, advice, and assistance concerning the availability, applications, limitations, and methods of obtaining products and services;

(4) To improve the quality of environmental observations and data collection efforts through an ongoing training program for Fleet personnel who observe, record, and transmit environmental information;

(5) To assist with staff level planning, and to arrange for needed pre-deployment and pre-exercise oceanographic and meteorological briefings; and

(6) To provide assistance to Fleet staffs and units in the preparation of the environmental sections of TACMEMOs, TACFACTs, and Lessons Learned.

Routine Fleet liaison visits to ships in ports near NAVMETOCCOM activities will normally be scheduled by these activities without specific requests from the ship. Fleet liaison visits for specific purposes, or for ships in ports where no NAVMETOCCOM activity is located should be requested from the nearest NAVMETOCCOM activity or from the cognizant NAVMETOCCOM center. The Fleet Liaison Program is further described in NAVMETOCCOMINST 3140.7 series.

2.2.5 Great Lakes Support Services

a. Marine weather forecasts/warnings. Weather support for ships in the five Great Lakes and St. Lawrence Seaway are provided by the NWS. This support includes weather, wind, lake conditions, and ice observations and forecasts. Bulletins are broadcast continuously by the National Oceanic and Atmospheric Administration (NOAA). Broadcast frequencies can be found in "Worldwide Marine Weather Broadcasts," a joint NWS/Navy publication available through NIMA.

b. Great Lakes Ice Charts. Ice charts are available from NAVICECEN every Tuesday and Friday during the winter months (typically early December through mid May). These charts, as well as a seasonal outlook and monthly 30-day forecasts of Great Lakes ice conditions are available on the Naval/National Ice Center's World Wide Web site at www.natice.noaa.gov.

c. Other support. For coordination of NWS support or for support not available from NWS, contact NAVLANTMETOCCEN.

2.3.0 Significant Weather and Sea Advisories and Warnings

Advisories and warnings of potentially destructive weather (high winds, thunderstorms, tornadoes, etc.) are routinely issued by NAVMETOCCOM and USMC weather activities. These services are provided in direct support of the requirements outlined in OPNAVINST 3140.24 series (Warnings and Conditions of Readiness Concerning Hazardous or Destructive Weather Phenomena) and to meet other Navy requirements. Conditions of readiness are set by the local

area commander or designated representative. NAVMETOCCOM activities do not set these conditions.

These advisories and warnings are based on forecast wind velocities and significant wave heights.

a. Wind velocity. Because of its variability in space and time, wind velocity is usually expressed in a ten-knot range in speed and 45-degree range in direction (e.g., NW at 40-50 knots). Wind speeds forecast are not averages over the forecast period, but are rather the sustained wind speeds (ten-minute average) expected over the period and area of the forecast. Wind speeds of +20% can, and most likely will, occur over shorter intervals during the forecast period (e.g., peak winds of 55-60 knots). Amplifying remarks (such as: backing, veering, shifting, increasing, decreasing, fronts, squalls, thunderstorms, storm centers) and characteristics of wind gusts (such as: abrupt, very short duration, strong winds) are added to wind advisories and warnings, as appropriate.

b. Significant wave height. Significant wave height is defined as the average of the highest one-third of all waves observed in the local sea, which includes both short-period and long-period waves. Short-period waves (seas) are normally generated by the local wind, while longer-period waves (swell) are generated by a distant wind source.

2.3.1 Wind Warnings

Warnings are characterized by location of storm origin and wind speed.

a. Extra-tropical Systems (or tropical systems other than closed cyclonic circulations).

(1) Small Craft Warnings. Issued in harbors, inland waters, and coastal OPAREAS, as well as other coastal inshore regions prescribed by the local area commander. The lower limit of the sustained wind speed used to set this warning varies by region, and is defined by the local area commander. The local NAVMETOCCOM or Marine Corps aviation weather activities can provide further information.

(2) Gale Warnings. Area(s) experiencing sustained wind speeds of 35 knots or higher will be bounded and a Gale Warning issued.

(3) Storm Warnings. Area(s) experiencing sustained wind speeds of 50 knots or higher will be bounded and a Storm Warning issued.

(4) Wind Warning. Wind Warnings for the Northern Hemisphere are automatically disseminated via the Fleet Broadcast or AUTODIN as outlined in Table 2-2. Automatic dissemination of warnings in the Southern Hemisphere are limited to specifically defined areas designated by Fleet Commanders due to limited naval operations and sparsity of observations. The appropriate NAVMETOCCOM center can provide the locations of these areas upon request. Additional areas in the Southern Hemisphere can be requested for specific reasons (e.g. UNITAS, SHAREM, special operations, etc.) by contacting the appropriate NAVMETOCCOM center as outlined in paragraph 2.2.1 above. During periods of MINIMIZE warning(s) will be initially issued and not repeated unless there is a significant change or the warning is canceled.

b. Cyclonic Circulation of tropical origin.

<u>Type of Warning</u>	<u>Wind Speed</u>
Tropical Cyclone Formation Alert (TCFA)	N/A
Tropical Depression	up to 33 knots
Tropical Storm	34 to 63 knots
Hurricane/Typhoon	64 knots or more

TCFA advisories are issued whenever conditions are conducive to the development of a tropical cyclone.

Tropical depression/storm and hurricane/typhoon warnings are issued via AUTODIN and the Fleet Multi-channel Broadcast every six hours for storms in the Northern Hemisphere. These warnings originate from three places:

(1) NAVLANTMETOCCEN Norfolk issues warnings for storms in the North Atlantic, Caribbean Sea, and Gulf of Mexico.

(2) NAVPACMETOCCEN/Joint Typhoon Warning Center Pearl Harbor issues warnings for storms in the Pacific and Indian Oceans.

NAVMETOCCOM centers monitor Southern Hemisphere tropical cyclones in their individual AORs. Because of the limited data and weather satellite coverage of the Southern Hemisphere, warnings are issued via AUTODIN only at 12 or 24 hour intervals and may contain less specific information than Northern Hemisphere warnings.

2.3.2 High Seas Warnings

These warnings are issued every 12 hours whenever actual or forecast significant wave heights in an ocean area of the Northern Hemisphere equal or exceed 12 feet.

2.3.3 Storm Tide/Surge Warnings

Forecasts of the height and inland reach of abnormal tides and storm surges are provided by NAVMETOCCOM activities to ships and commands in their local areas.

2.3.4 Mediterranean Wind/Sea Warnings

Figure 2-2 depicts areas in the Mediterranean for use by NAVEURMETOCCEN Rota when issuing high wind/sea warnings. Ships and other afloat units are advised to use this chart in interpreting issued warnings.

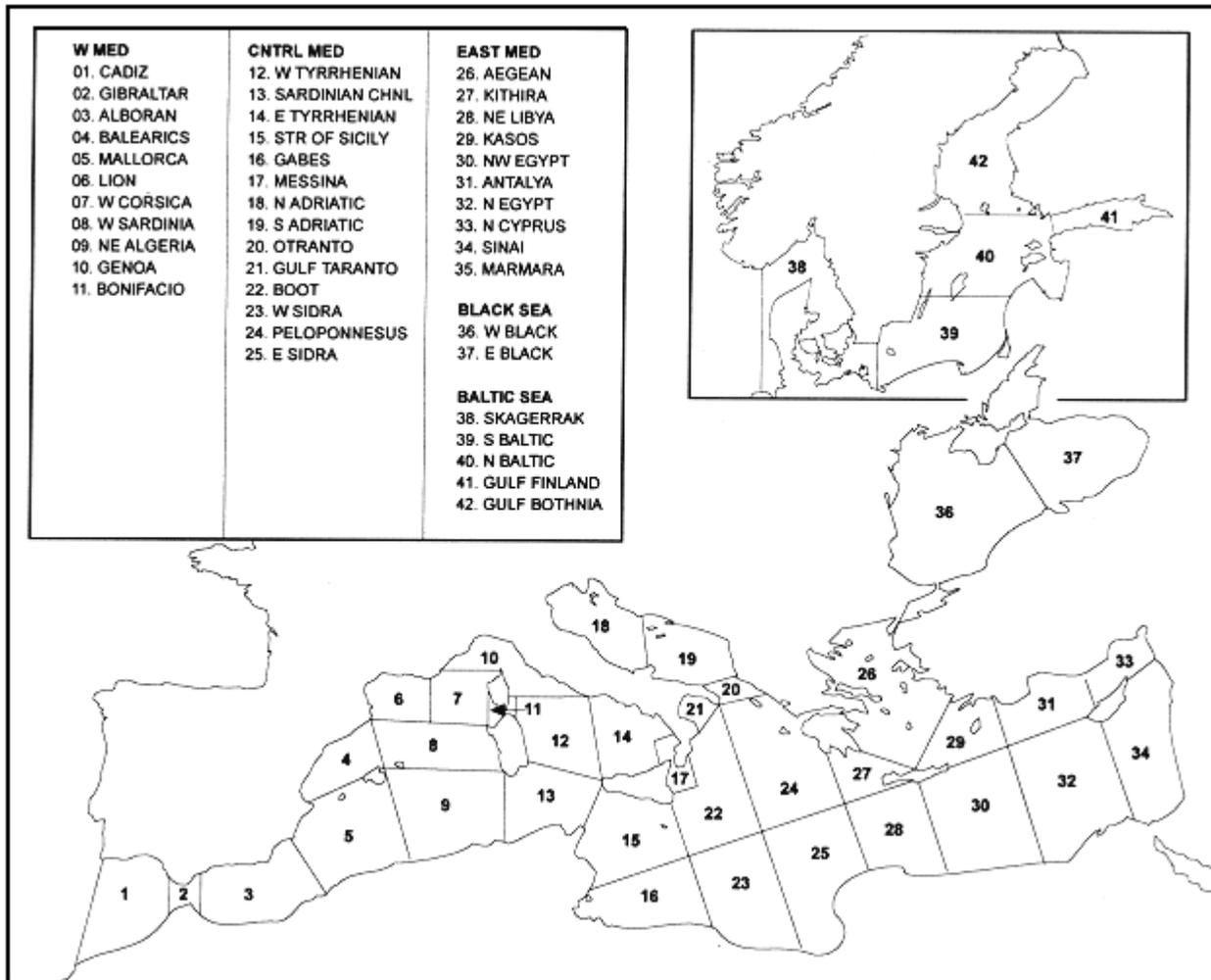


Figure 2-2. Naval European Meteorology and Oceanography Center - Rota, Spain High Wind/Sea Warning Areas

2.3.5 Additional Information Concerning Warnings

Detailed information concerning weather warnings is provided by OPNAVINST 3140.24 series, various directives of the OPNAV 3140- and 5400- series, SOPA instructions, and pertinent operations orders.

2.4.0 Tailored Support Services

Support services tailored for specific operations are available to afloat and ashore activities on request. Requests should be forwarded in accordance with paragraph 2.2.1 above. The request should provide pertinent operational information (e.g., ship's schedule, route, PIM, operations requiring special consideration, references to specific operations order(s), physical environmental limitations of the ship/unit/operation, etc.). These services include, but are not limited to, the following:

Meteorological MET ASSIST Bulletins
Mobile Environmental Team (MET) Service
Satellite Products
Fleet Operating Area Forecasts
Oceanographic Forecasts
Oceanic Frontal Position Analyses
Aviation Forecasts at Sea
Amphibious Operational Forecasts
Nuclear, Biological, Chemical Hazard Prediction
Computerized Search and Rescue (SAR) Planning
Optimum Path Aircraft Routing System (OPARS) Support
Other Tailored Products
On-Scene Prediction System Support
Ice Analyses and Forecasts, and Reconnaissance Services
Cooperative Oceanographic Observation Program (COOP) Participation

Additional environmental observations (in addition to those required by Chapter 5) may be required by the supporting NAVMETOCCOM activity to effectively provide the requested support.

2.4.1 Meteorological MET ASSIST Bulletins

MET ASSISTs are issued to underway ships with permanently assigned METOC units only when current/forecast weather conditions differ significantly from the latest issued prognosis discussion. It alerts the afloat METOC officer to any impending severe weather or condition which would adversely affect planned operations. Although follow-up MET ASSISTs are not routinely issued, the responsible NAVMETOCCOM activity continues to closely monitor the ship's track until the potential hazard diminishes.

MET ASSISTs are routinely issued to temporarily embarked meteorological units (e.g., Mobile Environmental Teams) which often have limited capability to receive and process pertinent environmental data.

2.4.2 Mobile Environmental Team (MET) Services

The primary purpose of the MET concept is to provide short term, on-scene environmental support to ships and other activities. Support is typically provided to embarked Warfare Commanders, AW/USW ships, ships conducting special operations and independent transits, and to Navy Research and Development (R&D) activities.

a. Requesting MET Services. MET services are available from NAVLANTMETOCEN Norfolk, NAVPACMETOCEN Pearl Harbor, San Diego and Yokosuka, NAVEURMETOCEN Rota, NAVCENTMETOCEN Bahrain and NAVMETOC COM Facilities Jacksonville, Pensacola, and Whidbey Island. At-sea services will be provided upon request, but may be limited due to manning constraints. See Figure 2-3 for a sample MET request message. Following information should be included:

1. Length of services requested
2. Type of support required
3. Berthing limitations by rank/gender
4. Short notice requests are acceptable.

Priority in filling requests will be:

- I. Warplans and Contingency Operations (Navy/Joint).
- II. Deployments and Workups (Navy/Joint) Exercises (Navy/Joint)
- III. Other (including support to Allied, Foreign, and Coalitions Armed Forces).

b. Areas of Responsibility (AOR). METs are responsible for providing and/or coordinating MET support for units homeported within their AOR. MET AORs correspond to the theater center AORs in Figure 2-1 with the exception of MET Pearl Harbor, which is responsible for providing and/or coordinating support of units homeported in Hawaii. Theater centers may assign sub-AORs to their subordinate MET activities.

(1) MET AORs serve to develop regional expertise and to foster good working relations with local units and activities. Assigned AORs do not preclude use of one MET in another's AOR provided there has been prior close coordination and agreement between cognizant MET activities. METs are encouraged to continue providing support to a deploying or transiting unit with whom they have developed a good working rapport, regardless of AOR.

(2) In addition to AORs, specific NAVMETOC COM activities are designated to provide MET support to Unified, sub-Unified Commands and Naval Component Commands. These associations are listed in Tables 2-3 and 2-4.

c. Underway Support Services. Teams have the capability to provide METOC products and forecasts using shipboard and mobile equipment. Services and products include but are not limited to:

1. **General Weather Forecasting:** Tropical Cyclone Evasion, Aviation Weather Forecasting, Amphibious Assault Forecasting, Tomahawk Land Attack Missile (TLAM) Forecasts, Special Tailored Forecasts

2. **Electromagnetic/Electro-optical Propagation (EM/EO) Products:** Tactical Atmospheric Summary (TAS), Radar Performance Prediction (IREPS), Radio Communication Range Prediction, Electro-Optical Tactical Decision Aids (EOTDA),

3. **Oceanography/Acoustic Sensor Performance Prediction:** Tactical Oceanographic Summary (TOS), USW Environmental Packets, Active/Passive Sonar Range Prediction, Mine Warfare Environmental Summaries (MWES), SST/Fronts and Eddies Forecasts, Surf Forecasting, Tidal Forecasting, Special Tailored Forecasts

4. **Training:** Observing, recording and reporting surface weather, General oceanography, and bathythermograph observations, records and reports, Surface Warfare Officers/Officer Trainees (general weather/oceanography).

d. Unified Combat Commander/Joint Support Ashore Services. MET services are available to Unified Combat Commands desiring METOC support during the planning and execution phases of joint operations and exercises. Although originally formed to support afloat forces, MET personnel have increasingly been called upon to provide Navy representation/augmentation in Theater and Forward Deployed Joint Meteorological Forecast Units (JMFU) ashore. As such they provide the Navy environmental perspective to joint operations.

e. Special Forces Support. MET services are provided to SOCPAC/LANT, SEAL Delivery Vehicle Teams, Special Warfare Boat Squadrons, Joint Task Forces, SOF units, etc. Support includes but is not limited to: Climatology and Weather Briefings, Astronomical Summaries, Weather/Oceanography Operations Impact Summary, Naval Special Warfare METOC Summary (NSWMS).

Unified Command	MET Parent Command
USPACOM	NAVPACMETOCEN Pearl Harbor, HI
USJFCOM & USSOUTHCOM	NAVLANTMETOCEN Norfolk, VA
USEUCOM	NAVEURMETOCEN Rota, SP
USCENTCOM & USSOCCOM (Note 1)	NAVLANTMETOCFAC Jacksonville, FL
USSPACECOM	Contact COMNAVMETOCOM
USSTRATCOM	Contact COMNAVMETOCOM
USTRANSCOM	Contact COMNAVMETOCOM
Note 1: USCENTCOM SPECWAR Support will be provided by NAVCENTMETOCEN MET COMP while in the CENTCOM AOR.	

Table 2-3. Mobile Environmental Team Assignments to Support Unified Command Requirements

The point of contact for a Unified Command is the point of contact for the Sub-Unified Commands and the Naval Component Commands with the following exceptions listed in Table 2-4:

Command	MET Parent Command
COMNAVSPECWARCOM & CJTF FIVE	NAVPACMETOCCEN, San Diego
COMNAVSPACECOM	NAVLANTMETOCCEN
COMUSJAPAN, COMUSKOREA & DEPCOMUSNAVCENT	NAVPACMETOCCEN, Yokosuka
CJTF FOUR	NAVLANTMETOCCFAC, Jacksonville
COMSOPAC	NAVPACMETOCCEN, Pearl Harbor
Maritime Defense Zone Commanders	
COMUSMARDEZLANT	NAVLANTMETOCCEN
COMUSMARDEZPAC	NAVPACMETOCCEN, San Diego

Table 2-4. Mobile Environmental Team Assignments to Support Sub-Unified Command Requirements

FM USS NEVERDOCK
TO REGIONAL NAVMETOCCOM CENTER (OR FACILITY)//MET//
INFO OPERATIONAL CHAIN OF COMMAND
BT
UNCLAS //N03145//
MSGID/GENADMIN/NEVERDOCK//
SUBJ/MET SUPPORT REQUEST//
REF/A/DOC/NAVMETOCCOM//
REF/B/PHONCON/NEVERDOCK /23JAN01//
NARR/REF A IS THE NAVMETOCCOMINST 3140.1L, REF B IS PHONCON BTWN LT SMITH, (REGIONAL METOC CENTER) AND LT JONES, USS NEVERDOCK//
POC/JONES/LT/PRIPHN: 808 471-4599/-/NEVERDOCK//
RMKS/1. IAW REF A, REQUEST ON-SCENE ENVIRONMENTAL SUPPORT TO INCLUDE METEOROLOGICAL FORECASTS, OCEANOGRAPHIC FORECASTS AND TRAINING FOR QM, OS, EW, ST, AND OFFICERS. REQUEST CLIMATOLOGICAL AND PRESAIL BRIEF PRIOR TO 16MAR01 UNDERWAY.
2. REQUEST MET MEMBER(S) EMBARK NEVERDOCK 14MAR01, AT (ORIGIN) FOR TRANSIT TO (DESTINATION). DISEMBARK IN (DESTINATION) ON 26MAR01. ORIG IS (OR IS NOT) CONFIGURED FOR WOMEN AT SEA.//
BT

Figure 2-3. MET Request Message Example

2.4.3 Satellite Products and Support

NAVMETOCCOM Regional and Production Centers and selected Facilities have robust capability for reception of and tailored product generation from METOC Satellites. These include U.S. and foreign polar-orbiting and geostationary operational programs and some R&D programs. A suite of standard regional satellite-based products is found on each Regional Center web site, and global products are maintained as part of FNMOC and NAVO product suites. These products include satellite images from visible, infrared, water-vapor and microwave sensors alone and combined with other METOC overlays. Products which use satellites to derive METOC parameters such as sea surface temperature (SST), Surface Wind Speed and rain rate are also available.

Tailored satellite-based products may be requested from Satellite-capable activities when operational needs are not met by the standard product suite. Plain language requests may be passed by voice, message or E-mail to appropriate NAVMETOCCOM activity.

2.4.4 Fleet Operating Area Forecasts

Fleet operating areas are established by the appropriate Fleet commander. Forecasts for these areas are routinely provided by the appropriate NAVMETOCCOM center or its designated subordinate activity in response to a unit's request. The information contained in these forecasts is very similar to that contained in the WEAX/AVWX bulletin. Ships and other units conducting operations in Fleet OPAREAs should request Fleet Operating Area Forecasts vice requesting WEAX/AVWX.

2.4.5 Oceanographic Forecasts

Physical oceanographic information is an important element of oceanographic acoustic forecasts. Oceanographic information, both climatological and synoptic, is routinely available from NAVMETOCCOM activities.

a. Critical Factors Charts. Critical Factors Charts are a graphic display of critical environmental factors (e.g., fronts, bathymetry, marine life, currents, etc.) that can impact acoustic prediction ranges.

b. MODAS Support. Modular Oceanographic Data Assimilation System is available from each NAVMETOCCOM center providing customer defined areas of gridded sound velocity and temperature fields for input into various tactical systems (SIMAS II, SIIP, GF MPL, AESS, etc.) and JJYY/JJV messages (single point or array). See section 8.4.1 for details on requesting MODAS support.

c. Other Oceanographic Forecasts. Special oceanographic forecasts or climatological data can be provided, on request, to meet unique operational requirements. Requests should be specific and contain enough detail to define the requirement.

2.4.6 Oceanic Frontal Position Analyses

Near real time information on the position of major ocean fronts and associated eddies can be obtained from NAVMETOCCOM centers either via AUTODIN message or over the Joint Maritime Command Information System (JMCIS) or the Global Command and Control System - Maritime (GCCS-M). This information is developed by the Warfighting Support Center at NAVOCEANO, which also generates enhanced satellite imagery of these oceanic features and transmits them to the various NAVMETOCCOM centers. See section 8.4.2 for details on requesting this product.

2.4.7 Aviation Forecasts at Sea

Aviation forecasts at sea are produced for ships at sea conducting air operations where adequate weather information is not otherwise available, and contain detailed information for specific flights or air operations. Requests should clearly and completely describe the operation or flight intended. See Chapter 3 for additional details.

2.4.8 Amphibious Operational Forecasts

In addition to meteorological and oceanographic forecasts for an amphibious objective area (AOA), forecasts of surf heights, surf characteristics, and littoral currents are available for beaches where specific bathymetric profile information is known. These products are available upon request to the appropriate NAVMETOCCOM center. The Joint Surf Manual, COMNAVSURFLANT/COMNAVSURFPACINST 3840.1 series, provides formats and details for requesting surf forecasts as well as additional guidance for environmental support of amphibious operations. This manual should be consulted whenever requesting support services for such operations.

2.4.9 Nuclear, Biological and Chemical Hazard Prediction

Vapor Liquid Solid Tracking (VLSTRACK) provides downwind hazard predictions for known or suspected chemical and biological agents and a variety of munitions capable of disseminating chemical or biological agents.

Hazard Prediction Assessment Capability (HPAC) is a counter-proliferation and counter-force tool for weapons of mass destruction (WMD). HPAC provides downwind hazard prediction of NBC materials through the atmosphere.

2.4.10 Computerized Search and Rescue (SAR) Planning

FLENUMMETOCCEN can provide global computer drift computations to assist SAR coordinators planning search operations in the open ocean. A description of the service and procedures for its use are contained in Chapter 9 .

2.4.11 Optimum Path Aircraft Routing System (OPARS) Support

OPARS is an aviator's preflight planning aid which integrates forecast atmospheric conditions with the pilot's proposed flight profile to provide information on fuel consumption, time enroute, and weather conditions expected on each leg. As a planning aid, it supplements but does NOT replace the required flight plan (DD-175) or flight forecast (DD-175-1). OPARS forecasts are available from all NAVMETOCCOM and USMC aviation support units upon pilot request and will normally be discussed by the aviation weather forecaster during the DD-175-1 briefing.

OPARS forecasts, associated bulletins and advisories, and overall system quality control originate at FLENUMMETOCCEN. Direct access to OPARS is controlled by FLENUMMETOCCEN. Refer to the OPARS user's Manual, available on the FLENUMMETOCCEN web site, for more detailed information. See section 9.7 for details on requesting OPARS.

2.4.12 Other Tailored Products

FLENUMMETOCCEN produces tailored environmental products, listed in Table 2-5, in support of military operations. A description of available products and procedures for ordering them is contained in Chapter 9. These products can be obtained by request to the appropriate NAVMETOCCOM center (AOR for Environmental Support in Figure 2-1) as described in paragraph 2.2.1.

Applications Product Product Identification
Search and Rescue (SAR) SAR
Bathythermograph Data Extract BTXT
General Acoustic Conditions GEM GAC GEM
General Environmental Message GEM
Point Data Extract PNTDT
Refractive Information By Station RIBS
Spout Data SPOUT
Tomahawk Support Message HAWK
Ocean Model Temperature Profiles (JJYY Format) JJPRO
*NOTES
1. Requests for products should be submitted to the appropriate NAVMETOCCOM Center in accordance with Chapter 9 of this instruction.
2. All products listed above are available via AUTODIN.

Table 2-5. Fleet Numerical Meteorology and Oceanography Center Tailored Support Products

2.4.13 On-Scene Prediction System - Geophysics Fleet Mission Program Library (GFMPL)

GFMPL is a Windows NT based software library that contains meteorological and oceanographic (METOC) applications, METOC climatology, and other environmental analyses tools. These applications assist in the assessment and exploitation of environmental effects on Naval communication, weapon, and sensor systems. The Commander, Naval Meteorology and Oceanography Command (CNMOC) established GFMPL to ensure that on-scene METOC support is available to Navy, Marine Corps and other DoD users.

GFMPL is populated by standardized METOC applications and decision aids. This is accomplished by the use of CNO accredited Oceanographic and Atmospheric Master Library (OAML) models, algorithms and databases within GFMPL applications. It is also accomplished through strict configuration management (CM) practices and through automatic distribution of software updates to all GFMPL users.

There are over 30 METOC applications in GFMPL; most are contained within the following:

(1) Vapor Liquid Solid Tracking (VLSTRACK) provides downwind hazard predictions for known or suspected chemical and biological agents and a variety of munitions capable of disseminating chemical or biological agents.

(2) Advanced Refractive Effects Prediction System (AREPS) is used for EM range predictions.

(3) Windows Electro-optical Tactical Decision Aid (WINEOTDA) is used to predict the performance of air-to-ground weapon systems and direct view optics based on the tactical situation and the environment.

(4) Hazard Prediction Assessment Capability (HPAC) is a counter proliferation and counterforce tool for weapons of mass destruction (WMD). HPAC provides downwind hazard prediction of NBC materials through the atmosphere.

(5) Target Acquisition Weather Software (TAWS) predicts the performance of air-to-ground Electro-optical weapon and navigation systems. Several types of performance predictions are available: illumination analysis; target acquisition analysis for a single location; and target acquisition analysis for multiple locations on a regional map.

(6) Submarine Tactical Reference Manuals (STORMS) include 4 CDs and provide regional oceanographic, acoustic, and meteorological data and analysis to support mission planning primarily for anti-submarine warfare (ASW) and undersea warfare (USW) operations.

(7) Personal Computer - Interactive Multisensor Analysis Training (PC-IMAT) is an ASW TDA and concept/context based trainer.

(8) Global Tracks is an application for plotting and displaying tropical cyclone bulletins and advisories.

(9) Solar Lunar Almanac Program (SLAP) is used to compute solar lunar rises and sets, light level planning calendar and moon phases.

To be placed on distribution or get more information on GF MPL contact NAVOCEANO (N643) at DSN 485-4056, Commercial (228) 688-4056.

2.4.14 Ice Analyses and Forecasts, and Ice Reconnaissance Services

NAVCECEN routinely produces synoptic analyses and forecasts of polar ice characteristics and movement in support of the CNO's Arctic Warfare Program requirements, sea-based strategic warfare, USW, and Arctic/Antarctic logistic requirements. Such support is periodically extended to other U.S. governmental programs and projects of national interest, other U.S. military and civilian agencies, and foreign agencies in accordance with NAVOCEANCOMINST 3140.17 and existing agreements and treaties. NAVCECEN provides a variety of services upon special request, including pre-sail ice condition briefings, mission location assessment, OTSR recommendations (via regional METOC Center), sea-ice identification training, and aerial ice observation.

a. Analyses and forecasts of ice characteristics. Ice characteristics monitored for analysis and forecasting include: ice edge, location, ice concentration, flow size, stage of ice development (estimated/theoretical ice thickness), topography (ridging), areal coverage, openings and leads, and the location and number of Antarctic icebergs (larger than 10NM).

(1) NAVCECEN produces a global, regional scale analysis on a weekly basis. Regional chartlets are available as .gif image files on the WWW at <http://www.natice.noaa.gov>. These analyses are also available on the WWW site as ARC View/Explorer compatible GIS files.

(2) NAVCECEN routinely produces the text analysis products listed in Table 2-6. These products can be disseminated via AUTODIN message, JMCIS/JOTSII OVLY2 transmission, as well as both NIPRNET and SIPRNET web sites and electronic mail.

(3) NAVCECEN routinely produces the forecast products listed in Table 2-7.

(4) Special long-range forecasts and climatologies of the extent, types, concentrations, sea-ice characteristics, and ship navigability in both polar regions are provided upon request.

(5) Assistance in the selection of aircraft landing sites on the ice, and the evaluation of ice conditions for establishment of ice camps, data buoy insertion, and other polar operations is available on request.

(6) Northern and Southern Hemisphere Iceberg databases are available via the WWW at <http://www.natice.noaa.gov/icebergs.htm>. The International Ice Patrol (IIP) maintains the Northern Hemisphere Iceberg database during the season (usually February through July). NAVCECEN maintains the southern hemisphere iceberg database year round.

(7) Other tailored support products are available to DoD/U.S. Government customers upon request.

Product	Region	Frequency	Description
Special Arctic Oceanographic Synopsis East (SPAROS East)	East Greenland to Kara Sea	Daily (Year Round)	Depicts the ice edge, 100% concentration boundary and a 24 hour forecast
Ice Hazard (SPAROS West)	Yellow Sea to Gulf of Alaska	Biweekly -- Tuesday, Friday (November 15 - June 15)	Depicts the ice edge, 100% concentration boundary and a 72/96hr max. extent
Fractures, Leads and Polynyas (FLAP)	Arctic	As Required (Year Round)	Location and orientation of exploitable openings or thin ice features in the ice pack
Global Ice Edge (text message. lat./long. pairs)	Arctic Antarctic	Weekly . Friday	Summarizes the weekly southern and northern limit (ice edge) of all known ice
Arctic Buoy Message	Arctic	Weekly . Wednesday (Year Round)	Drifting data buoy position, ARGOS ID, and WMO ID

Table 2-6. Text Analyses Products

Forecast	Frequency	Description
7 Day Arctic Forecast	Weekly . Wednesday	OVLY2 text message containing ice edge, 100% concentration boundary and a 7 day forecast for the entire Arctic
Special Arctic Oceanographic Synopsis (SPAROS East)	Daily (Year Round)	OVLY2 text message containing ice edge, 100% boundary and a 24 hour forecast (same as analysis product)
Ice Hazard (SPAROS West)	Biweekly . Tuesday, Friday	OVLY2 text message containing ice edge, 100% concentration boundary and a 72/96 hour maximum extent of sea ice (same as analysis product)
Great Lakes 30-day Forecast	First Friday of each month (Dec 1 . Mar 1)	Forecast ice edge and inner pack boundaries hosted on WWW site as .gif and ARC GIS files
Great Lakes 90-day Outlook	Annually (Dec 1)	Climatology and forecast ice edge and inner pack boundaries hosted on WWW.
West and East Arctic 30-day Forecast	Monthly (First Friday of each month)	Forecast ice edge and inner pack boundaries hosted on WWW site as .gif and ARC GIS files
West Arctic 90-day Forecast	Annually (June 1)	Climatology and forecast ice edge and inner pack boundaries for the north slope of Alaska hosted on WWW site.
Ross Sea-McMurdo Sound Seasonal Outlook	Annually (Oct 15)	Climatology and forecast ice edge and inner pack boundaries for the Ross Sea hosted on WWW site.
Eastern Arctic Seasonal Outlook	Annually (June 1)	Climatology and forecast ice edge and inner pack boundaries for the Gulf of St Lawrence, Labrador Sea, Davis Sts, and Baffin Bay hosted on WWW.

Table 2-7. Forecast Products

b. Aerial ice reconnaissance services. NAVICECEN maintains a team of trained aerial ice observers, available to provide specific on-site support to DoD/U.S. Government customers upon request. Coordination and planning services are performed by NAVICECEN based on the minimum essential requirements for on-scene ice observations, and the availability of adequate

satellite imagery and aircraft assets. Agencies requesting support shall provide or fund aircraft assets. NAVICECEN funds ice observer personnel expenses.

c. Briefing services. The Liaison Branch at NAVICECEN is available to provide pre-sail ice condition briefings and ice recognition training upon request. The Liaison Branch can be reached at (301)457-5303, ext. 303 or 311, or by E-mail: liaison@natice.noaa.gov.

d. Requests for products and services. All requests for ice analyses, forecasts, and services should be sent to NAVICECEN SUITLAND MD//JJJ//.

2.4.15 Cooperative Oceanographic Observation Program (COOP) Participation

Through the COOP, selected research, merchant, and fishing vessels voluntarily take and report bathythermograph observations for use by FLENUMMETOCEN in synoptic ocean models. Participation in this program is limited to civilian (non-Navy) ships.

CHAPTER 3

ENROUTE WEATHER FORECASTS WEAX/AVWX

3.1.0 General

WEAX provides tailored weather forecasts for ships requesting the service. WEAX is provided along a ship's track as stated in the unit's MOVREP. AVWX is designed for ships with embarked aircraft. AVWX provides forecast services as described for WEAX with the addition of aviation parameters. WEAX and AVWX are designed for ships operating independently without embarked METOC personnel. Units receiving OTSR services must request WEAX/AVWX services separately, because OTSR service does not include specially tailored weather forecasts.

3.2.0 WEAX/AVWX Procedures

- a. Request WEAX/AVWX service in the MOVREP in accordance with NWP 1-03.1. Once WEAX/AVWX has been requested and a change has been made to the initial and subsequent MOVREP, units should continue entering the WEAX/AVWX notation to ensure support is continued.
- b. In-port WEAX/AVWX service is also available. In-port WEAX/AVWX forecasts are issued once daily if requested and only if the unit is not in a port supported by one of the NAVMETOC COM activities listed in Chapter 1.
- c. As a ship passes from one NAVMETOC COM activity area of responsibility to another, the forecast responsibility is automatically passed between centers. Ships will be advised when this occurs in the remarks section of the WEAX/AVWX message.
- d. When WEAX/AVWX service is requested, forecasts will be provided at least once per 24 hour period and updated whenever a significant change in the forecast occurs, whether caused by atmospheric changes or changes in the ship's operating area or route.
- e. Wind and sea warnings discussed in Chapter 2 of this instruction (high wind, high sea, tropical cyclone, etc.) will be referenced in the WEAX/AVWX message when applicable.
- f. WEAX/AVWX will be provided twice daily to units involved in towing, salvage or other special operations, and upon unit request.
- g. During MINIMIZE, all units will receive an initial WEAX/AVWX. Updates will be provided only when one or more of the following conditions are forecast: winds 34 knots or greater; seas 12 feet or higher; prevailing visibility 1 NM or less.

3.3.0 WEAX/AVWX Standard Format

a. Figure 3-1 outlines the standard text format used by NAVMETOC COM activities responsible for providing WEAX/AVWX services when sent via AUTODIN message. The format is dynamic and can be changed to delete or include additional parameters requested by a fleet unit.

b. The WEAX/AVWX meteorological situation will include the locations and forecast movements for pertinent meteorological features such as high and low pressure centers and frontal systems.

c. If AVWX is requested, appropriate items in Figure 3-1, subparagraphs 2E through 2H will be included. AVWX forecasts will be increased to twice daily when the prevailing visibility and/or ceiling is at, or decreases below, 3 NM or 1,000 feet.

d. If the difference between sea and swell in direction and/or height is significant, it will be so indicated.

e. Graphical WEAX Support

(1) WEAX Support is also available in a graphical format. This format includes a Horizontal Weather Depiction (HWD) and a satellite image covering the area in which the unit is operating.

(2) Graphical WEAX support is available to SIPRNET/NIPRNET capable ships. This is a standard product available from NMOC. Figures 3-2 and 3-3 show examples of underway and in-port NEMOC graphical WEAXs. Graphical WEAXes can be sent by NIPR- or SIPRNET E-mail, or they can be retrieved from the Regional Center's SIPRNET web page.

15 SEP 2000

P/O (Precedence)

FM: NAVMETOCCEN

TO:

INFO: (Include appropriate NAVMETOCCOM activities and CNO
WASHINGTON DC//N311WX//)

BT

Classification//N03145//

SUBJ: WEAX or AVWX (U)

MSGID/GENADMIN/NAVMETOCCEN//

REF/A/(MOVREP reference)//

REF/B/(OTSR Divert MSG reference)//

REF/C/(Wind/Tropical Warning reference)//

REF/D/(High Seas Warning reference)//

REF/E/(Passing MSG reference)//

AMPN/NARR/As Required//

RMKS/1. () Meteorological situation at: _____. See ref(s)
_____ for warnings affecting your track.

2. () 24 hour forecast commencing _____Z along track from
_____N(S) _____E(W)

to _____N(S) _____E(W) as indicated ref(s) A and _____.

A. () Sky, weather:

B. () VSBY (NM):

C. () Surface Winds KTS):

D. () Max/Min Temps (F):

E. () SST (F):

F. () Combined Sea (FT):

G. () Aviation Parameters:

(1) Cloud Tops/Ceilings:

(2) Winds Aloft: 1000 FT

3000 FT

5000 FT

(3) Turbulence:

(4) Freezing LVL (FT):

(5) Icing:

(6) Divert Fields:

H. () K and ALPHA Index:

3. () Outlook to 48 hours:

4. () OTSR Update as required

5. () (Select as appropriate)

(NAVY) REQ 6 HRLY WX REPORTS IAW NAVMETOCCOMINST
3140.1L

(USCG) REQ 6 HRLY WX OBSERVATION REPORTS IAW
INTERNATIONAL SHIP WEATHER CODE

(MSC) REQ 6 HRLY WX OBSERVATION REPORTS IAW

COMSCINST 3141.1
 THIS IS MY FINAL FORECAST UNOREQ TIMELY OBS
 RECEIVED FROM YOUR COMMAND GREATLY APPRECIATED
 NEXT FORECAST WILL BE ISSUED BY (Appropriate Center).
 REQ (Appropriate Center) ACK.
 OUTLOOK FOR ARRIVAL AT YOUR DESTINATION: _____.
 DECL: (If appropriate) _____//

Figure 3-1. Enroute Weather Forecast (WEAX/AVWX) Format

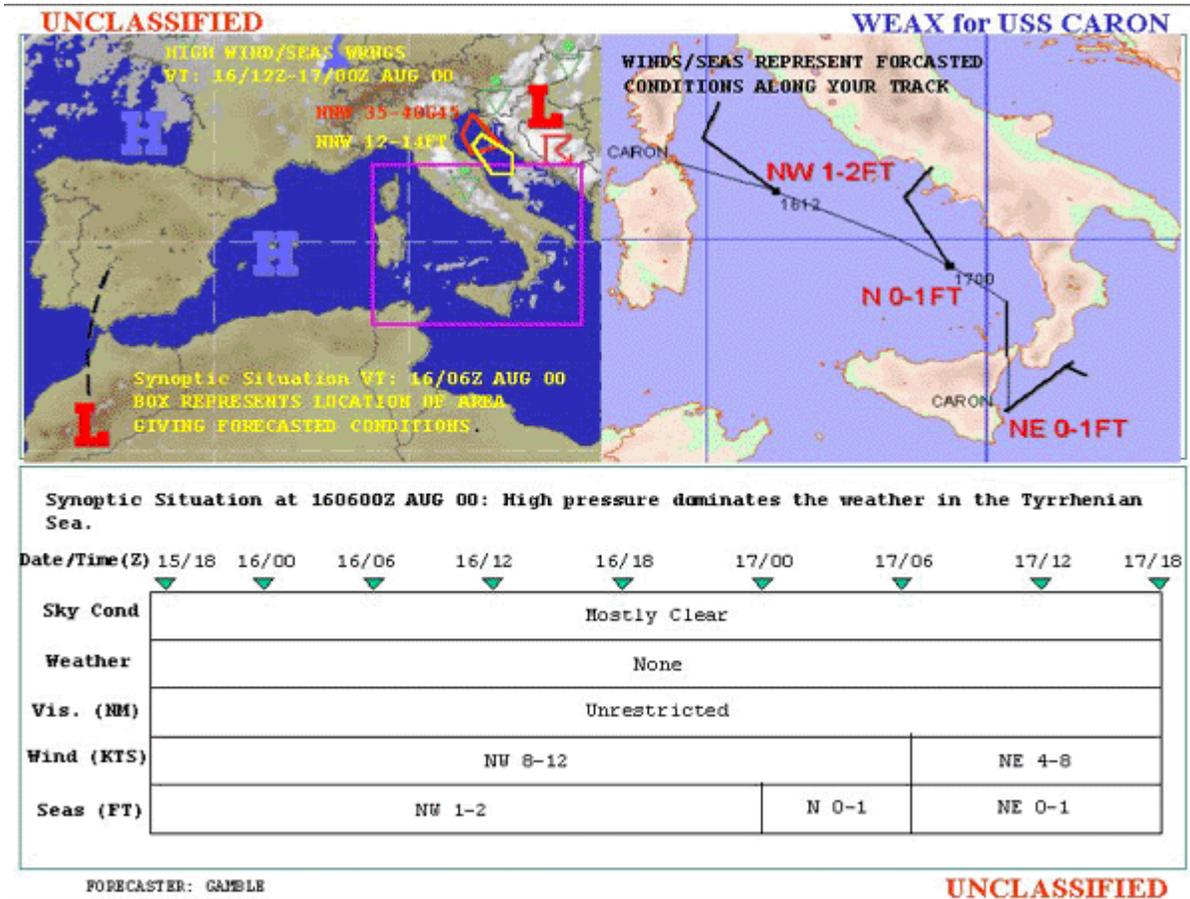


Figure 3-2. Sample underway graphical WEAX

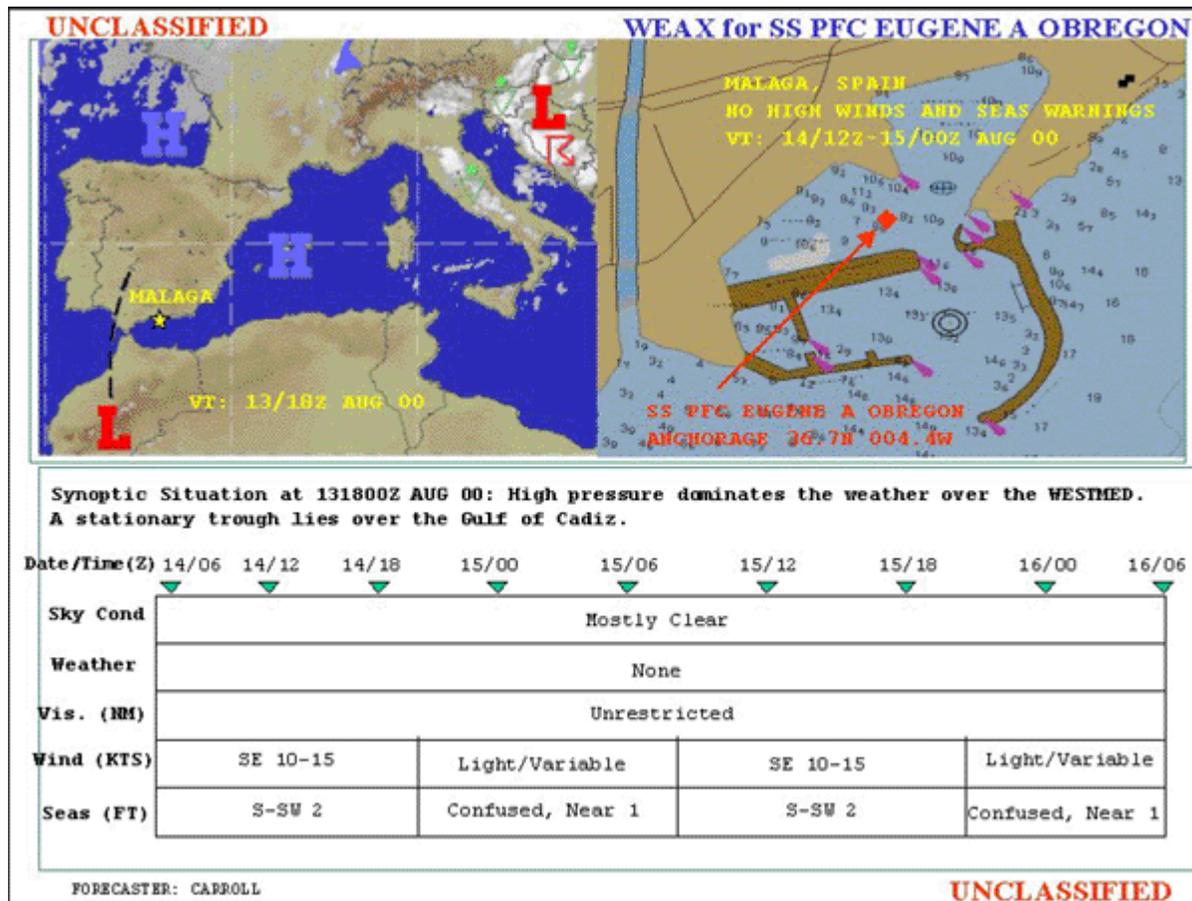


Figure 3-3. Sample in-port graphical WEAX

3.4.0 Weather Observation Reports

Ships utilizing the WEAX/AVWX service shall continue reporting synoptic weather reports in accordance with current directives (USNS ships refer to NTP 10, Communications Instructions for Ships Controlled by the MSC). Details on weather observation reporting requirements are addressed in Chapter 5. Reports shall be sent to the appropriate Collective Address Designator (CAD) as indicated in paragraph 5.4.1 of this instruction.

3.5.0 Utilization of Fleet Operating Area Forecasts

As discussed in Chapter 2, paragraph 2.4.2, Fleet Operating Areas Forecasts are routinely prepared for designated fleet areas and contain the same forecast parameters normally included in the WEAX. OPAREA forecasts are transmitted on the Fleet Multi-Channel Common Broadcast. In the interest of the most efficient use of communication resources, ships conducting operations in Fleet Operating Areas will normally receive the OPAREA forecasts vice WEAX. Since OPAREA forecasts do not include aviation parameters, AVWX will be provided when requested on the MOVREP.

For transits through the Suez Canal, ships will be provided an area forecast while in the Red Sea and an individual WEAX/AVWX while in the Mediterranean.

CHAPTER 4

OPTIMUM TRACK SHIP ROUTING (OTSR)

4.1.0 General

Optimum Track Ship Routing (OTSR) is an advisory service whose primary mission is safety. Originally designed as an enroute time and/or fuel saving service, OTSR has evolved into the primary tool for ships to minimize the risk of damage from extra-tropical and tropical storms, high seas and sea ice. In addition, OTSR will assist port authorities and/or ships in port to avoid damage from tropical cyclones by issuing sortie recommendations to the Senior Officer Present Afloat (SOPA). These recommendations assist the SOPA in choosing a time to depart, sortie direction, and location to sortie the ships toward. If DoD assets are in any foreign or domestic port and no U.S. SOPA is specified, OTSR sortie recommendations will be sent directly to the units in port.

4.2.0 OTSR Limitations

a. OTSR for the purpose of saving time enroute and/or fuel economy is generally feasible only for voyages of 1500 miles or more in unrestricted waters. Certain voyage information must be provided in the OTSR request as described later in this chapter. This information is also needed for damage avoidance routing purposes.

b. Route surveillance and recommendations for damage avoidance is available for voyages in unrestricted waters such as the Caribbean, South and East China Seas, and U. S. coastal waters where the ship has selected the route. Certain voyage information must be included in the route surveillance request. While OTSR route recommendations are not generally provided in the Great Lakes, Arabian Gulf, Mediterranean, Baltic, Black, and Red Seas because of geographic constraints, supporting regional METOC centers will advise ships when adverse conditions may significantly impact ship operations.

c. WEAX/AVWX services are not automatically provided with OTSR services. Units desiring WEAX/AVWX will request such services on their MOVREP as described in Chapter 3.

d. To maximize fuel economy, OTSR provides recommendations for Ocean Current Assistance/Avoidance Routes in the vicinity of strong ocean currents such as the Gulf Stream in the Atlantic and the Kuroshio in the Pacific.

e. OTSR/Route Surveillance system takes into consideration individual ship and cargo characteristics, as well as specific operations enroute. Adequate information must be provided by the requesting unit in order to achieve maximum benefit. Likewise, it is of paramount importance that the routing activity be advised promptly of significant deviations from the intended route or changes in operational commitments so that OTSR/Route Surveillance may be adjusted accordingly. Personal visits to NAVMETOCCOM activities providing OTSR services are encouraged, particularly where special requirements exist.

4.3.0 OTSR/Route Surveillance Procedures

4.3.1 OTSR/Route Surveillance Requests

a. Table 4-1 outlines specific information required by the NAVMETOCCOM center when requesting OTSR services. Letter or message requests for OTSR/Route Surveillance must be in the format of Figure 4-1 and should be addressed to:

NAVLANTMETOCCEN NORFOLK VA//30// for the Atlantic Ocean,
NAVPACMETOCCEN SAN DIEGO CA//30// for EASTPAC
(For TRANSPAC (East to West) info NAVPACMETOCCEN YOKOSUKA JA//30//),
NAVPACMETOCCEN YOKOSUKA JA//30// for WESTPAC, Indian Ocean
(For TRANSPAC (West to East) info NAVPACMETOCCEN SAN DIEGO CA//30//).

b. NAVLANTMETOCCEN and NAVPACMETOCCEN will coordinate with NAVICECEN Suitland, MD, prior to issuing route recommendations to vessels when proposed tracks may take them into an area where sea ice or icebergs may present a hazard to safe navigation.

c. For best services, OTSR route surveillance requests should be sent at least 72 hours prior to the estimated time of departure (ETD).

d. Inclusion of the flag word "OTSR" in line 01 of the MOVREP (REF: NWP 1-03.1) is acceptable for routine voyages; but, is not considered ideal for optimum support when requesting this service. A specific request with the information contained in Table 4-1 is preferred and recommended for optimum OTSR/Route Surveillance.

- (1) **Name(s) and type(s) of ship(s).**
- (2) **Point of departure, ETD, and classification of movement.** (Advise by message if ETD changes by more than 12 hours.)
- (3) **Destination and preferred ETA (OTSR) or intended ETA (Route Surveillance).** Include any qualifying remarks, as appropriate.
- (4) **Intended cruising speed and maximum acceptable SOA.** (Include speeds for any legs that differ significantly from SOA.)
- (5) **Draft.** (Include draft fore and aft if an unusual trim condition exists.)
- (6) **Voyage and loading information.** Commanding Officers and Masters must state highest operational limits for head, beam, following seas, and wind velocities.
- (7) **The following additional information, if applicable, should be included** to aid the OTSR forecaster:
 - a. Loading which gives a metacentric height (GM) that makes the ship very stiff or tender (top heavy).
 - b. Salt spray sensitive deck cargo, such as POVs or unprotected aircraft components.
 - c. Carriage of a large amount of ammunition as cargo.
 - d. Carriage of hard to stow and secure cargo such as steel treaded vehicles, locomotives, yard tugs, or large boats.
 - e. Carriage of deck loaded containers or vans stacked more than two high.
 - f. LSTs should indicate side loading of causeways.
 - g. Deck loaded aircraft in flight condition and positioning (fore and aft).
 - h. Material condition of the ship which affects speed capability and/or seaworthiness, such as: partial operation of rudders or steering engines and screws; hull plating or bottom damage; engineering plants out of operation or with reduced capabilities.
 - i. Sea sensitive operations scheduled enroute, such as:
 - Underway replenishments

- Flight Operations
- Competitive exercises
- Extensive topside maintenance
- Extensive personnel training where moderate sea states take precedence over minimum enroute time

j. For any planned rendezvous, state any plans/limitations concerning time and location of rendezvous, and if feasible, names of ships involved.

k. If towing, give the nature and condition of the tow and the required sea condition limitations. State if engine of towed vessel is inoperative.

l. Any unusual communication channel (Navy or commercial) to be used for OTSR messages to the routed unit. Including INMARSAT or STEL/STU phone numbers.

(8) Ocean Current involved when Ocean Current Assistance/Avoidance routes are requested. The last line of the OTSR request should state "Gulf Stream Assistance," "Kuroshio Avoidance," etc., as appropriate.

***NOTE**

For cross reference purposes, the paragraphs in the OTSR Surveillance Request Format corresponds to paragraphs contained in Figure 4-1, Sample OTSR/Route Surveillance Request Message.

Table 4-1. OTSR/ROUTE Surveillance Request Format

```
FM    USS GEORGE WASHINGTON
TO    NAVLANTMETOCEN NORFOLK VA//30//
INFO  FLENUMMETOCEN DATA MONTEREY CA//DATA//
      NAVPACMETOCEN YOKOSUKA JA//30//
      USS SAN JACINTO
      USS BARRY
CONFIDENTIAL (Example Only)//N03145//
SUBJ// OTSR ROUTE REQUEST (U)//
MSGID/GENADMIN/USS GEORGE WASHINGTON//
REF/A/DOC/NAVMETOC COM//
AMPN/NAVMETOC COMINST 3140.1L SUPPORT MANUAL//
RMKS/1.(C) GEORGE WASHINGTON (CVN), SAN JACINTO (CG),
      BARRY (DDG).
2. (C) NORFOLK, ETD 260800Z JAN 00.
3. (C) ROTA SP, ETA 141800Z FEB 00.
4. (C) 18 KTS, MAX ACCEPTABLE SOA 22 KTS.
5. (U) DRAFT: GEORGE WASHINGTON (39 FT), SAN JACINTO
      (FWD: 31 FT/AFT: 32 FT), BARRY (33 FT).
6. (C) HIGHEST OPERATIONAL LIMITS: HEAD 12 FT, BEAM 12
      FT, FOLLOWING 16FT, WIND 30 KTS.
7. (C) FLT OPS TO BE CONDUCTED UNDERWAY. UNREPS TO
      BE SCHEDULED AS NECESSARY. DETAILS TO BE INCLUDED
      IN DAILY OTSR REPORT.
8. (U) KUROSHIO CURRENT ASSISTANCE ROUTING
      REQUESTED IF APPLICABLE.//
DECL:

*NOTE
Paragraphs in this sample are keyed to guidance contained in Table 4-1,
OTSR/Route Surveillance Request Format
```

Figure 4-1. Sample OTSR/ROUTE Surveillance Request Message

4.3.2 OTSR Preliminary Planning Routes

There are occasions when a commander, particularly of a large force or group of ships, desires a provisional route recommendation for planning purposes based on climatological data. In such cases the information will be provided. It should be understood that the recommendation provided may be modified by the operational route recommendation which is based on the weather forecast at the time of the voyage. The planning route will be confirmed or modified by message 36 to 48 hours prior to ETD.

4.3.3 OTSR Route Recommendations

The route recommended will normally be sent by message to the vessel or unit commander being routed about 36 hours prior to ETD. Major turning points, rhumb-line, great circle, or coastal track, will be specified in the message. Information copies of the routing message are sent to the originator of the route request if different than the ship or unit to be routed. If the route recommendation has not been received 18 hours prior to ETD, send a follow-up request by immediate precedence message. These **OTSR routes are recommendations** only, and safe navigation remains the responsibility of the Commanding Officer, Master, and Unit Commander.

4.3.4 OTSR/Route Surveillance and Diversions

a. During the transit of a ship under OTSR, weather and sea conditions along the ship's intended track are closely monitored by NAVLANTMETOCEN, NAVPACMETOCEN San Diego and NAVPACMETOCEN Yokosuka. If forecast weather or sea conditions are expected to exceed the values specified in the OTSR request, an advisory or a diversion recommendation will be sent. If forecast weather/sea conditions improve such that a change of course can result in significant savings in time and fuel, a diversion will also be recommended. In either case, the reason for the recommended deviation will be explained in the diversion recommendation message.

b. Sometimes conditions along the most reasonable route exceed desired limits. The objective of staying below stated limits of wind and seas cannot always be guaranteed. It is subject to the limitations of forecasting, the alternatives available and the ability to communicate the forecast to the ship in a timely manner. Therefore, if unforeseen dangerous weather/sea conditions appear imminent for the ship's intended track, independent action should be taken by the ship/unit based on local evaluation of the situation without waiting for recommendations from the routing center. This is particularly applicable near the point of departure or destination when OTSR alternatives are not available.

c. It is essential that the ship promptly advise the routing center of significant deviations from the intended route so that meaningful surveillance may be continued. Furthermore, the routing center will respond by concurring or recommending alternate action.

4.3.5 OTSR Port Sortie Recommendations

When U.S. assets are threatened by the approach of tropical cyclones to a port, OTSR will issue sortie recommendations to the SOPA of that port, including a recommended time to depart and a recommended direction and/or location to sortie to. These recommendations will require close coordination between the OTSR activity and the SOPA, and are meant to be **used as decision aids**. Only in the event that there is no U.S. officer in charge of the port will OTSR issue a sortie recommendation directly to the ship. This service will be automatic but can also be requested by telephone or message in preparation for the approach of a tropical system.

4.3.6 Panama Canal Transits

Send OTSR requests to both NAVPACMETOCEN SAN DIEGO CA//30// and NAVLANTMETOCEN NORFOLK VA//30// when a Panama Canal transit is involved. Send daily OTSR reports for action to both Norfolk and San Diego beginning two days prior to entering the canal. Refer to paragraph 4.4.1 and 4.4.3 for normal reporting procedures.

4.4.0 Reports

4.4.1 Daily OTSR Report

a. The daily OTSR Report (Figure 4-2) submitted by the ship is essential for continuous surveillance and evaluation of the route. It is used in making any necessary recommended route changes and to assist in providing services to other enroute units. The OTSR report is a **0800 LOCAL TIME observation** of existing weather and sea conditions which follow the guidelines of Table 4-2, and should be transmitted as a PRIORITY message when reporting winds less than 34 knots and sea conditions (seas and/or swell) are less than 12 feet. IMMEDIATE precedence should be used when winds are 34 knots or higher and/or sea conditions are 12 feet or higher. Send the report to the appropriate addressee(s) as listed in Table 2-1.

b. The first daily OTSR report shall include the Actual Time of Departure (ATD) under remarks. The last daily OTSR report prior to entering port should include the word "FINAL" under remarks.

c. Any changes regarding engineering or cargo load conditions that may impede the vessel's maneuvering or sea keeping capabilities should be reported in the remarks section of the daily report.

d. If weather induced damage to the ship or cargo is sustained enroute, a brief description phrase must be appended to the final report under remarks, such as "MINOR SEA DAMAGE 13 DEC TO VEHICLES ON NR ONE HATCH."

P 070840Z JAN 00
FM USS BARRY
TO NAVLANTMETOCEN NORFOLK VA//30//
BT
UNCLAS//N03145//
MSGID/GENADMIN/USS BARRY//
RMKS/1. 07100Z 3600N 0630W CUS/SP/RPM 085/161/087
WND 330/16 SEA 300/05/04 SWELL 200/12/07
SLP 1018 SEATEMP 21
2. ATD 0623Z JAN 95//
BT

*NOTE
Paragraphs in this sample are keyed to guidance contained in Table 4-2,
Daily OTSR Format.

Figure 4-2. Sample Daily OTSR Report

SUBJ/OTSR REPORT/IRCS//
 RMKSI. DDGGggZ_LaLaLaLa_LoLoLoLoLo_CUS/SP/RPM_dc dc dc/sss/rr
 WND_ddd/ff_SEA_dwdwdw/PwPw/HwHw_SWELL_dLdLdL/PLPL/HLHL
 SLP_pppp_SEATEMP_TwTw_

2. (REMARKS)//
 BT

FORMAT EXPLANATION

<u>Code Group</u>	<u>Explanation of Terms</u>
IRCS	International Radio Call Sign of the Originator
DDGGggZ	Day, Time in hours and minutes UTC
LaLaLaLa	Latitude in degrees and whole minutes. Appended with N or S.
LoLoLoLoLo	Longitude in degrees and whole minutes. Appended with E or W.
CUS dc dc dc	True direction of the course in whole degrees
SP sss	Speed in knots and tenths
RPM rr	Revolutions-per-minute
WND ddd	True direction in whole degrees from which the wind is blowing
ff	Sustained wind speed in knots
SEA* dwdwdw	True direction, in whole degrees, from which (wind driven) waves are coming
PwPw	Period of (wind driven) waves in seconds
HwHw	Height of the (wind driven) waves in feet
SWELL** dLdLdL	True direction, in whole degrees, from which swells are coming
PLPL	Period of swell in seconds
HLHL	Height of the swell in feet
SLP PPPP	Pressure, reduced to sea level, to the nearest millibar (preferred) or hundredths of an inch of Hg. or hectopascal.
SEATEMP TwTw	Seawater temperature as taken from the main condenser intake (or other suitable measuring device) to the nearest whole degree (C)

2. (REMARKS): Any additional pertinent operational remarks, e.g., "INTEND REDUCE SPEED TO 14 KT PRD 011200Z TO ABT 021800Z WITH HALF MAIN PLANT DISABLED" or "DIVERTED 021700Z TO 27N 65W TO TENDER MED ASSISTANCE. SOA 20. WILL ADVISE," or "INTEND FUEL DD'S FIRST LIGHT 22 JAN.," or "REDUCED SPEED TO 10 KT 2300Z IN VERY ROUGH HEAD CONDITIONS."

*NOTES

The " _ " in the above message format denotes one space is needed during message transmission for ADP handling procedures.

* Sea waves should be coming from the same direction as the true wind.

** Swell waves should not be reported unless they can be clearly distinguished from the sea waves, i.e., by either a longer period and/or direction differing by at least 30 or 40 degrees from the same direction as the true wind.

The remarks section should refer to engineering or cargo load issues that would impact on the ships maneuverability and changes to the performance criteria originally submitted in the OTSR request. This alerts the OTSR forecaster to take these new factors into consideration. Indicate any damage sustained due to weather conditions.

Table 4-2. Daily OTSR Report Format

4.4.2 Movement Reports (MOVREP)

Ships sailing under OTSR shall include this fact in their MOVREP and all changes thereto in accordance with current movement report instructions (NWP 1-03.1). See paragraph 2.2.1 of this instruction.

4.4.3 Weather Observation Reports

Ships sailing under OTSR shall report synoptic weather reports in accordance with current directives (USNS and Military Sealift Command chartered ships refer to NTP 10, Communications Instructions for Ships Controlled by the Military Sealift Command). Weather observation reports are discussed in Chapter 5. Reports shall be sent to the appropriate CAD as indicated in paragraph 5.4.1 of this instruction.

CHAPTER 5

ENVIRONMENTAL OBSERVATIONS

5.1.0 Observation Program Afloat

Applicable to all Navy (USS), Military Sealift Command (MSC) United States Navy ships (USNS), and United States Coast Guard (USCG) ships when under the operational control of U.S. Navy Fleet Commanders.

5.1.1 Importance of Observations

Since the U.S. Navy may be committed to operations anywhere in the world, global observations of meteorological and oceanographic conditions are required, particularly over ocean areas where environmental data are extremely sparse. These observations provide the baseline data required to develop meteorological and oceanographic forecasts and climatology products that promote safe fleet operations, or data needed as input to tactical decision aids (TDA) to effectively employ weapons systems. A concerted effort to routinely take environmental observations from Navy ships and aircraft is therefore particularly important.

5.1.2 Requirements

a. The need for collecting and reporting environmental observations has been a long-established requirement by the DoD and DoN. Besides immediate utilization to support real-time operations by on-scene personnel, many DoN activities use observations taken by the fleet as input to perform their own missions and functions. This information is also routinely exchanged with national and international agencies. Environmental observations taken by DoN units mainly consist of surface weather, upper air, and bathythermograph observations. Special observations are also taken by naval aircraft. These observations are encoded in specific formats established by the WMO and transmitted via a Collective Address Designator (CAD) described later in this chapter.

b. The minimum requirements for taking and transmitting environmental observations are contained in Tables 5-1 and 5-2. Other special weather and oceanographic observation reporting requirements are promulgated in pertinent operation plans (OPLANS), operational orders (OPORDS), and operational tasks (OPTASKS). Weather reporting requirements by ships at sea in specific operation areas, particularly where tropical cyclones or disturbances are suspected or known to exist, will be promulgated by the cognizant area or force commander, or when requested, by the nearest NAVMETOCCOM activity.

c. Environmental observations shall be made using installed systems and/or equipage. METOC-unique equipage for each active ship is described in various Allowance Equipage Lists loaded into the ship's COSAL. Forms and publications used to make or record observations may be found in the NAVSUP P2002.

d. Each ship or shore unit taking environmental observations will forward all observation (paper or digital) records, or sensor outputs down-loaded to floppy diskette, in accordance with paragraphs 5.7.0 through 5.7.2 not later than the fifth day of the following month.

e. Appendix D describes the identification (through radar-scope features) and reporting procedures for tropical storms, hurricanes and typhoons.

Type Observation	Without METOC Units (Note 6)	With METOC Units (Notes 6, 7)	Special Equipment	Underway Only	Observation Frequency	Transmit Schedule	Precedence (Note 5)	Reference
Surface Weather	X	X			(Note 1)	Table 5-2	Table 5-2	NAVMETOC COMINST 3144.1D
Upper Air (Radiosonde)		X	X	X	(Note 8)	(Note 8)	"O"	FMH-3
Bathythermograph	X	X	X	X	(Note 4)	(Note 4)	"O"	(Note 9)
Indications of a Tropical Cyclone	X	X			(Note 2)	(Note 2)	"O"	NWP-4B(EMCON Instructions)
Unusual/Hazardous Weather	X	X			(Note 2)	(Note 2)	"O"	NWP-4B(EMCON Instructions)
Radar Detection of a Tropical Cyclone	X	X			(Note 3)	(Note 3)	"O"	Appendix D

*NOTES

1. Hourly
2. When first detected (Plain Language)
3. Procedures for identifying and reporting tropical cyclones with pertinent definitions in Appendix D.
4. At least every 6 hours. For details see paragraph 5.2.3.
5. "O" indicates IMMEDIATE Precedence.
6. As determined by competent authority, meteorological units of less than three personnel may be exempted from the full schedule of surface weather observations, in which case observations are taken by the normal bridge watch.
7. Full schedule of observations taken by embarked METOC unit.
8. Upper air observations are desired at 0000Z and 1200Z daily when underway greater than 180NM from a regular reporting station. However, observation time can be adjusted to fit ship operations, biased toward earlier rather than later observation times.
9. Amplifying instructions in this chapter (Chapter 5) and OPNAVINST 3141.1

Table 5-1. Requirements for Ship Environmental Observations

Ships are required to transmit surface weather observations as follows:

Sea Height (FT)	Surface Wind Speed (KTS)	Frequency From 0000Z	Precedence
0-11	0-33	every 6 hours	PRIORITY
12 and greater	34 and greater	every 3 hours	IMMEDIATE

Table 5-2. Requirements for Transmission of Ship Environmental Observations

5.2.0 Ship Observations and Reporting Procedures

5.2.1 Upper Air Weather Observations

a. Upper air observation soundings are routinely taken by fleet units having permanently assigned METOC Divisions (OA), an embarked Mobile Environmental Team (MET), or by deployed USMC units. Procedures for operating the hardware system(s) have been provided to designated units. No special forms are required to record the observations since the equipment provides an automatic output in accepted coded formats. Submit original paper and magnetic media containing sounding data with NMOC FORM 3140-2. Classified records must be forwarded in accordance with SECNAVINST 5510.30A. The NAVMETOCCOM FORM 3140-3DF "Upper Air Termination Height Log", is NO LONGER REQUIRED.

b. Upper air observations are to be taken at the synoptic times of 0000Z and 1200Z. However, any sounding, regardless of time taken should be transmitted after termination of sounding. Other special observations and reporting schedules may be required and will be promulgated in pertinent OPLAN/OPORD/OPTASKs.

5.2.2 Ship Surface Weather Observations

a. Procedures for conducting a surface weather observing program are outlined in NAVMETOCCOMINST 3144.1D "U.S. Navy Manual for Surface Ship's Observations." All observations taken by Navy and MSC ships will be recorded on the form specified therein. Submarines are exempted from these requirements unless involved in extended surfaced operations.

b. Synoptic Weather Observation reports are to be routinely transmitted at 0000Z, 0600Z, 1200Z, and 1800Z. When other unusual or significant weather phenomena are encountered, asynoptic reports may be transmitted at 0300Z, 0900Z, 1500Z, and 2100Z. **use "METOC SFC OB" as the subject line for all synoptic surface weather observations.**

c. **When underway, all ships are required to record regular observations on an hourly basis.**

(1) Weather Guard Arrangements. When several ships are steaming in company, or in near proximity (within 10 miles), **the Officer in Tactical Command (OTC) may designate one ship to act as the "Weather Guard" who will transmit the synoptic observation for the entire group.** When a ship is designated as the Weather Guard in a group, all other ships in

company are not required to encode the synoptic report on their log form. However, each ship must make a notation on their respective form that identifies the designated guard ship and the effective period.

(2) The fact that a "Weather Guard" has been established by the OTC does not relieve the responsibility of each ship to continue recording weather observations for their unit. The Weather Log is akin to the Ship's Deck Log; it is a legal record that chronicles weather experienced by the unit. The weather form is typically referred to in JAG investigations and is used many years after the fact, to either prove or refute claims against the government of the existence of certain weather conditions that may have contributed to injuries sustained by former military personnel. Therefore, the necessity of maintaining an effective on-board training program that promotes awareness of the importance to accurately observe and log weather conditions, must be stressed.

d. While in port, all ships should continue regular weather observing and reporting by electronic means unless there is a nearby U.S. manned weather reporting activity which meets existing reporting requirements. In-port weather guard ship arrangements, to observe and report weather, may be used for groups of ships at the discretion of the SOPA. In such instances, the Weather Guard ship should make a notation on the observation form indicating other vessels in company for which weather guard is being reported.

5.2.3 Ship Bathythermograph Observations

a. Surface Ships. In general, surface ships are required to take and transmit shipboard expendable bathythermograph (SXBT) observations at least every six hours while underway in open ocean areas where depths exceed 100 fathoms. Observations should be taken to coincide with synoptic weather observation times of 0000Z, 0600Z, 1200Z, and 1800Z. The Bathythermograph Log, CNMOC Form 3167/2, is used to record the BT observation. The form includes a sample BT log, with instructions. Strict adherence to the prescribed format is essential for effective data processing. Completed observation records are forwarded in accordance with paragraphs 5.7.0 and 5.7.2.

At least one BT observation shall be taken in ocean areas of differing thermal structure, i.e., fronts and eddies, or in areas of salinity changes, i.e., river outflow and marginal ice zones. NAVOCEANO Pub RP-33, the Fleet Oceanographic and Acoustics Reference Manual, contains specific environmental criteria that would require when a new acoustic prediction should be performed. However, reduced observations of once-per-day-per-ship are authorized in designated high density operating areas (OPAREAs) (e.g., SOCAL and VACAPES OPAREA) and when MODLOC for over 24 hours. Units operating in these areas are encouraged to take one observation during the local afternoon time-frame, as close to the above mentioned observations times as possible. When ships are steaming in close proximity, the OTC may designate one ship to take and report BTs. NAVMETOCCOM activities can advise fleet units of designated high density areas, as well as those areas where BT data is needed.

b. Submarines. Consistent with mission and operational requirements, and unless otherwise directed, submarines should take one or two observations each day for data collection. Specific areas of interest may be listed in submarine mission tasking but in general, most forward

submarine operating areas are of high interest since data collection opportunities with other assets is so limited. Submarines involved in Battle Group or Task Group operations should submit message reports as directed by OTC and following procedures listed in para 5.4.0 below. Sound velocity (SV) and BT data from any sensing systems are valuable and should be submitted with final patrol and mission data packages. When security permits, submarines not required to submit a patrol or mission data package, should submit GENSER SV and BT data recorder traces (or copies) to:

Commanding Officer
Naval Oceanographic Office
1002 Balch Boulevard
ATTN: Code N34D
Stennis Space Center, MS 39522-5001

Follow procedures defined in applicable Force OPORDS.

5.3.0 Aircraft Observations and Reporting Procedures

5.3.1 Aircraft Weather Observations

Aircrews provide meteorological observations as specified by their mission, or when required in areas of sparse data (e.g., oceanic). Aircraft observations are transmitted when radio contact is made, or are delivered, along with observations of unexpected enroute weather, to the NAVMETOCCOM activity or Marine Corps Weather Service Office at the air station at which the aircraft lands. NAVMETOCCOMINST 3142.1 contains specific instructions for manual encoding and dissemination of PIREPS in a standard format to facilitate processing, transmission, storage and retrieval of in-flight weather phenomena. Additional pertinent information is contained in Naval Warfare Publication (NWP) 4, DoD Flight Information Publication (FLIP), and Force instructions.

5.3.2 Aircraft Bathythermograph Observations

Bathythermograph observations shall be taken by sonobuoy equipped aircraft in open ocean areas where depths exceed 100 fathoms. A minimum of one aircraft expendable BT (AXBT) observation shall be taken during each USW flight which uses sonobuoys. Additional observations are desired for each USW prediction area transited. For multiple aircraft operations in the same USW Prediction Area, AXBT observations shall be coordinated by the functional wing commander. Logging requirements described in paragraph 5.2.3(a) also apply to AXBT observations. Completed observation records are to be forwarded in accordance with paragraph 5.7.0 and 5.7.2.

5.4.0 Message Reporting Procedures

5.4.1 Reporting Weather and Bathythermograph Observations

a. Two Collective Address Designators (CAD) have been established for use by all U.S. Navy and U.S. Marine Corps activities and all ships (USS, USNS, U.S. non-Navy, and foreign) for reporting environmental observations. MSC ships should include additional Information addressees to MSC Area Commanders and Offices as may be directed by unit sailing orders/directives. The appropriate CAD depends on the operating area as depicted in Figure 2-1 and described below:

OCEANO WEST: For observations reported in the North Pacific, South Pacific, Arabian Gulf, Red Sea, and Indian Ocean, including associated seas and basins; all areas south of 60S, and surrounding land areas. The addressees of CAD OCEANO WEST consist of the following:

TO: NAVPACMETOCCEN PEARL HARBOR HI//30/JTWC// (COG Authority)
FLENUMMETOCCEN DATA MONTEREY CA//DATA//
NAVPACMETOCCEN SAN DIEGO CA//30//
NAVPACMETOCCEN YOKOSUKA JA//N3//
INFO CNO WASHINGTON DC//N096/N311WX/TFC//
COMTHIRDFLT
NAVOCEANO STENNIS SPACE CENTER MS//N321//

OCEANO EAST: For observations reported in the North Atlantic, South Atlantic, Gulf of Mexico, the Norwegian, Baltic, North, Black, Mediterranean and Caribbean Seas, the Great Lakes, all areas north of 66N in the Pacific and 60N/70N in the Atlantic, and surrounding land areas. The addressees of CAD OCEANO EAST consist of the following:

TO: NAVLANTMETOCCEN NORFOLK VA (COG Authority)
NAVEURMETOCCEN ROTA SP//NEMOC//
NAVEURMETOCFAC NAPLES IT//NEMOF//
FLENUMMETOCCEN DATA MONTEREY CA//DATA//
NAVOCEANO STENNIS SPACE CENTER MS//N5242//
LANT NCCS WEATHER NORFOLK VA//00//
ADWS OFFUTT AFB NE//00//
MRC NORFOLK VA//00//

b. Special Instructions

(1) INFO NAVICECEN SUITLAND MD//JJJ// on all observations taken near Polar regions (North of 50 N or South of 50S). Include as action addree NAVLANTMETOCCEN for the area north of 60N (east of 95W to 100E) and the area south of 60S (east of 92W to 17E). Include NAVPACMETOCCEN San Diego for the area north of 60N (east of 100E through the dateline to 95W) and the area south of 60S (east of 17E through the dateline to 92W). See Figure 2-1.

(2) In the Eastern Pacific region, east of 92W (Figure 2-1), ships under COMSECONDFLT OPCODE address observation reports as follows:

TO: OCEANO WEST
NAVLANTMETOCEN NORFOLK VA//30//

(3) INFO NAVLANTMETOC DET KEFLAVIK IC//00// for all observations taken in the Atlantic Ocean north of 55°, inclusive of the Labrador, Greenland, Norwegian, Barents and North Seas and Baffin Bay.

(4) Any CV, LHA, LHD, which conducts flight operations between nearby Marine Corps aviation activities are encouraged to INFO applicable Garrison based USMC aviation weather unit (Figure 1-4) on all weather observations/forecasts in support of ship-to-shore movements for the duration of offshore operations. USMC plain language addresses (PLA) are included in Appendix B.

(5) use Standard Subject Identification Code (SSIC) N03141 for all surface/upper air weather and bathythermograph observation messages.

(6) Foreign ships use routing indicator RULYSCC.

c. Atlantic Ocean and Mediterranean Sea BT Exception. Units operating in the Atlantic Ocean and Mediterranean Sea should include foreign nations, as appropriate, as information addressees on unclassified BT observation reports as indicated below. Classified BT information should be released to foreign nations only as authorized by Fleet OPORDS or other current directives:

TO: OCEANO EAST
INFO: (Refer to ATP 32, depending upon location)
Other units as appropriate.

5.4.2 Message Classification/MINIMIZE Procedures

a. Security requirements and wartime communications doctrine on message classification, downgrading/declassification instructions, and message transmission under MINIMIZE conditions are contained in NTP 3 and NWP 4. Weather and oceanographic observations are considered significant and should be transmitted during MINIMIZE when any of the following conditions exist:

- (1) Wind speeds in excess of 34 knots.
- (2) Sea state of 12 feet or greater.
- (3) Moderate or heavy precipitation.
- (4) Pressure change of 3 millibars or greater within the past 3 hours.
- (5) Visibility less than 1 mile.
- (6) Oceanographic observations as dictated by current operations.
- (7) Volcanic activity producing volcanic ash.

b. Most observations are classified due to location information. Declassification may be possible within days or weeks after the observation date.

c. CV, LCC, LHA, LHD, and units with embarked MET taking environmental observations may be exempt from MINIMIZE restrictions as directed by Fleet Commanders.

5.5.0 Observation Program Ashore

Meteorological observations are taken at designated shore activities by assigned Navy and USMC METOC personnel. Maintenance of the surface and upper air weather observation program for these activities is accomplished through well-planned and aggressive training programs. Commanding Officers/Officers in Charge/Chief Petty Officers in Charge must actively support such programs within their commands and subordinate activities to emphasize excellence (accuracy, completeness, timeliness) in operational and transmitted observations. The goal is, first, to provide high quality observations which are transmitted electronically for operational use and, secondarily, to produce accurate, legible records for climatological use. Manpower dedicated to correct manuscript or computer archived data entries merely to satisfy the verification process at Fleet Numerical Meteorology and Oceanography Detachment (FLENUMMETOC DET) Asheville has no part in this program and is not desired. If manuscript entries or computer-aided observation archival software programs are accurate and complete, it follows that real time transmitted data will also be correct. Use of computer-aided observation archival software programs should lessen some of the effort expended for quality control, however, routine verification of observations by supervisory watch personnel and forecasters, to ensure observation accuracy, completeness and timeliness, is encouraged as a good management practice.

5.6.0 Observation Data Quality Control

a. Accurate observation data elements are a critical factor in determining the immediate usefulness of the data in forecasts and tactical applications/decision aids. After this data has been used for immediate operational use it is ultimately used to develop or produce tailored atmospheric or oceanographic historical databases which are needed to support future fleet planning, reconstruct environmental scenarios, assess weapons systems performance, or pursue other research activities. Observers are urged to pay careful attention to environmental conditions and develop a habit to quality control data prior to their transmission.

b. NAVMETOCCOM has a quality control program to help assess the accuracy of observation data submitted by fleet units and shore activities. Feedback reports are routinely prepared and forwarded to Fleet Units, NAVMETOCCOM, and USMC activities that identify discrepancies or consistently high quality reports. FLENUMMETOC DET Asheville provides detailed listings of surface observation discrepancies (METAR surface sites only) to the observation activity, with a copy to their parent command (if applicable). A suitable statement shall also be included if the records are below acceptable standards for climatological use or microfilming and data transfer purposes. Direct liaison with an observing site is warranted when a significant erroneous observing practice is detected.

5.6.1 Training

a. Training is available upon request in observation procedures, recording, and reporting of data through the NAVMETOCCOM Fleet Liaison Program discussed in Chapter 2. Command training programs should be structured as required, to maintain legible records, eliminate reporting errors and discrepancies and safeguard computer diskette storage media. Reports and material provided by the Naval Meteorology and Oceanography Professional Development Center (NAVMETOCPRODEVCCEN) and FLENUMMETOC DET Asheville shall be utilized as aids in developing these programs. As a minimum, each error or discrepancy shall be brought to the attention of the responsible observer, with an explanation of the necessary corrective action. These training programs shall be continuous to insure that NAVMETOCCOM and Marine Corps activities produce accurate observations and legible records.

b. FLENUMMETOC DET Asheville will also provide guidance and clarification to all observing sites on use of revised observing procedure manuals, forms and computer software prior to and after implementation.

5.7.0 Observation Records and Forms

Only original copies of observation records are to be forwarded. The records must be neat, legible, and assembled in chronological order. Geographical positions will not be deleted in order to make the observation records unclassified since observations without position data are useless. Submitting units should ensure that declassification instructions are included, if appropriate. Classified observation records will be forwarded in accordance with SECNAVINST 5510.30A.

5.7.1 Meteorological Observation Records

a. Original meteorological records (paper or digital) are to be mailed between the first and fifth day of the following month to the activity indicated below. Copies of all weather records are to be retained locally for six months, then discarded if considered no longer useful for reference purposes.

b. Each unit is to submit a Meteorological Records Transmittal Form with the original records. The form is not required to be submitted if no observations have been taken during the preceding month. The transmittal form, NAVMETOCCOM FORM 3140-2DF, is only available from FLENUMMETOC DET Asheville. The form is available as an MS-DOS based executable software program that will allow users to fill in blank field entries and produce a printout using local computer resources, or a MS Word document. The transmittal form can be obtained from the FLENUMMETOC DET Asheville web site. These forms were designed to replace the paper form previously stocked in the Navy Supply System and can be provided upon request to any activity requiring a copy. Mail observational records with transmittal form to:

Officer in Charge
Fleet Numerical Meteorology and Oceanography Detachment
151 Patton Avenue
Asheville, NC 28801-5014

Requests for additional transmittal forms can be sent to the above address
or on-line at: <http://navy.ncdc.noaa.gov>

5.7.2 Bathythermograph Observation Records

- a. Mail CLASSIFIED and UNCLASSIFIED BT recorder charts to:

Commanding Officer
Naval Oceanographic Office
1002 Balch Blvd., Code N34D
Stennis Space Center, MS 39522-5001

BT Log sheets (FORM CNMOC 3167/2) are no longer required to be sent to the Naval Oceanographic Office. Ensure that entries of date/time, position and declassification instructions on recorder charts are included if appropriate (Report Symbol 3140-10).

- b. Additional BT log sheets may be downloaded on-line through your regional METOC Center Web site or by contacting your regional METOC fleet liaison representative.

5.7.3 Station Description Report

Each shore and fleet meteorological unit shall prepare and submit NAVMETOCCOM FORM 3140-1DF, "Station Information File" (SIF), not later than 25 January annually, or at any time the instrumentation or its location is changed. The report is to reflect current station instrumentation as of 1 January of the year submitted. Instructions regarding the preparation and mailing of the form are found in the user's manual provided with the software application or on-line at <http://navy.ncdc.noaa.gov>.

The accuracy of environmental studies derived from environmental observations recorded from instruments or sensors at a site depends upon correct documentation describing instruments and sensing elements, exposure, location, height above the ground, terrain features surrounding the station and other pertinent remarks regarding sensor performance.

CHAPTER 6

ALPHANUMERIC ENVIRONMENTAL DATA REQUIREMENTS

6.1.0 General

Alphanumeric support is provided to end users via the Department of Defense NIPRNET. The Automated Weather Network (AWN), terminating at Tinker AFB, OK is the DoD link to the WMO Global Telecommunications System (GTS), a network of interconnected military, civilian and foreign computer interfaces, used for collecting and distributing environmental data worldwide. FLENUMMETOC DET Tinker, collocated with AFWA DET 7, provides support to USN and USMC units worldwide, ensuring METOC units have alphanumeric data required to fulfill their assigned missions.

6.2.0 Responsibilities

FNMOD Tinker will ensure that USN and USMC units have access to alphanumeric data, and will work with the NWS and USAF in providing valid and useable products. Additionally FNMOD Tinker will maintain data requirements for the Fleet Broadcast circuits. Each USN and USMC METOC activity is responsible for establishing and maintaining their own data requirements.

6.3.0 Products

The following products are used to manage alphanumeric data requirements efficiently and to aid in identifying observational data input problems.

a. Station Database. This is a list of all worldwide stations that prepare aviation and synoptic weather data for transmission. FNMOD Tinker will maintain a station database and make it available to software and hardware program managers for use in METOC data retrieval systems.

b. Weather Products Database. This is a complete listing of all weather bulletins available through the AWN/GTS. FNMOD Tinker will maintain a product database and make it available to software and hardware program managers for use in METOC data retrieval systems.

6.4.0 Data Management

Alphanumeric data must be managed to ensure data is available to support the dynamic nature of weather forecasting and the changing mission of the warfighter. To that end, all users are encouraged to build redundancies into, and supplement their data delivery systems with trusted government and non-government alternate means of data retrieval.

6.5.0 Emerging Requirements

USN and USMC METOC units including Regional METOC Production Centers will liaison with FNMOD Tinker to ensure new alphanumeric products are developed in accordance with WMO and DoD standards. METOC units requiring products not found in the products database shall contact FNMOD Tinker. FNMOD Tinker will ascertain if the required product is available within the GTS/AWN network or from a trusted source outside the network, such as a university or research center. If not, FNMOD Tinker will submit a request via CNMOC to the agency responsible for the requested product.

6.6.0 Units Copying the Fleet Environmental Broadcasts

Send requests for additions or changes to the NAVMETOC COM Center responsible for the broadcast management. Centers will determine applicability of the requests and forward them to FNMOD Tinker for action.

Navy Fleet Environmental Broadcasts:

<u>METOC Center</u>	<u>AWN CLT</u>	<u>AWN Routing ID</u>	<u>Region</u>
NLMOC Norfolk	CLT 110	H52N	NATO
NLMOC Norfolk	CLT 133	LMHB	WESTLANT
NLMOC Norfolk	CLT 137	LMHA	EASTLANT
NEMOC Rota	CLT 151	MMHH	MED
NPMOC San Diego	CLT 118	PSDA	EASTPAC
NPMOC San Diego	CLT 119	PSDB	PAC COMBINED
*NPMOC Pearl Harbor	CLT 157	PMOO	EASTPAC
*NPMOC Pearl Harbor	CLT 158	VFCT	PAC COMBINED
NPMOC Yokosuka	CLT 166	PMHH	WESTPAC
NPMOC Yokosuka	CLT 167	GMWW	Indian Ocean

*Circuits are scheduled for termination in FY01. CLTs 118/119 will become primary EASTPAC/COMBINED data source.

6.7.0 Operational Plans (OPLANS)

a. Shore units receive and manage their data on a day-to-day basis in such a manner to preclude the use of designated OPLANS inserted from a remote location (FNMOD Tinker). Units should review operational and geopolitical areas for which a contingency or emergency situation may arise, identify stations and products that are associated with those areas, and develop lists of products to add/delete from their data flow to satisfy changing requirements. FNMOD Tinker is available to assist units in identifying stations and products, and assist in developing contingency lists.

b. FNMOD Tinker and the METOC centers listed in paragraph 6.6 will coordinate the development of OPLANS for the Fleet Broadcasts in support of Mobile and Ship units. Contingency lists will be developed as discussed above and produced as custom bulletins that will stand ready for insertion into the broadcast. To ensure currency with ongoing missions, both FNMOD Tinker and the METOC Center will review these bulletins annually and as needed.

Because of the Fleet Broadcast slow speed and limited bandwidth care must be taken to ensure a one-for-one data swap is designed when developing contingency bulletins.

c. To active/deactivate a Fleet Broadcast OPLAN, METOC Centers should contact FNMOD Tinker or the AWN Weather Network Duty Officer (WNDO) by the following means:

FNMOD Tinker
DSN 339-7638/39
COMM (405) 739-7638/39
FAX 7641
Email: nav@tinker.af.mil

WNDO Tinker
DSN 334-5761
COMM (405) 734-5761
Email: wndo@tinker.af.mil

Be prepared to give the following information:

1. ACTIVATE OPLAN (OPLAN Number) at (DTG), or DEACTIVATE OPLAN (OPLAN Number) at (DTG).
2. Date to deactivate OPLAN, if known.
3. Additional data requirements not covered in the OPLAN.

6.8.0 Special Reporting Requirements and Data Requests

a. FNMOD Tinker will assist any USN/USMC METOC unit requiring special reporting procedures or special data requirements. This includes data from other services or foreign allies, special data encoding/decoding, and special data dissemination requirements.

b. FNMOD Tinker maintains a list of valid KQ identifiers for reporting METAR, TAF, and RAOB DATA. These identifiers may be used for short-term field/afloat deployments, contingency operations, and exercise units. KQ series KQM*, KQN*, and KQP* are reserved for USN/USMC use and are managed and assigned by FNMOD Tinker. All other KQ identifiers are managed and assigned by AFWA. Contact FNMOD Tinker for assignment and special reporting procedures of KQ data.

CHAPTER 7

CLIMATOLOGY INFORMATION AND DATA SUPPORT SERVICES

7.1.0 General

DoD, U.S. Navy and Marine Corps operational forces require information about the environment in which they plan to operate. Regardless of the global location or the seasonal time-frame that deployment of military forces occur, the environment will have an impact on some aspect of real-time operations. Knowledge of the global climate or historical oceanographic influences is one of the fundamental core support responsibilities of the NAVMETOCCOM.

Two activities in NAVMETOCCOM engage in climatology-related services for DoN. Fleet Numerical Meteorology and Oceanography Detachment (FLENUMMETOC DET) Asheville, NC, (meteorology oriented) is collocated with National Climatic Data Center (NCDC) and the Air Force Combat Climatology Center (AFCCC) at the Federal Climate Complex; and Naval Oceanographic Office (NAVOCEANO) Stennis Space Center, MS (oceanography oriented). The FLENUMMETOC DET and NAVOCEANO are tasked to ensure timely observation data collection, data quality control, selected database construction, database maintenance, development and distribution of tailored climatology reference products.

7.1.1 Operational use of Climatology Information

In NAVMETOCCOM, meteorological or oceanographic observation data that are not synoptically current, including numerical field analysis data beyond 72 hours from data origination, are considered historical data for use in climatology programs. These data form the basis for developing summarized statistics needed for numerous operational databases and other development activities in the DoD.

Climatology data and products should be used as a planning tool when operations are being planned beyond skill levels of meteorological or oceanographic numerical forecasting predictions.

Climatological data can be presented in a variety of formats (i.e., tabular, graphical, narrative, digital or analytical chart). Useful means and extreme values of oceanographic and meteorological parameters can be derived whenever adequate historical data are available. When summaries and studies are used for planning, it should be kept in mind that statistical averaging causes smoothing of the basic data. Additionally, the mean or average of a given parameter may be a value which is seldom actually observed. Mean data may serve as a useful planning aid when accompanied by extreme values, standard deviations, or statements of probabilities.

7.2.0 Climatology Services Support Infrastructure

The NAVMETOCCOM climatology program emphasizes routine development and pre-positioning of a basic core of data summaries and reference products with end users, or on a web site. Numerous references are automatically distributed to METOC activities via standard distribution lists maintained by FLENUMMETOC DET Asheville and NAVOCEANO. These products are typically designed to support multiple naval warfare mission areas; they supplement real-time operational meteorological and oceanographic analyses and forecasts produced by FLENUMMETOCCEN, NAVOCEANO, NAVICECEN and Regional METOC centers.

These products contain global or regional information to provide users with an on-scene capability to quickly respond to requests for climatic information about a particular operating environment. If baseline climatology products do not contain the required information, customers should request additional support service from the appropriate Regional METOC Center, Facility or Detachment. Recommendations for changes to the content of climatology products should be forwarded directly to FLENUMMETOC DET Asheville or NAVOCEANO via their chain-of-command with an information copy to COMNAVMETOCCOM (N31).

Individual fleet units and shore activities can request to be added to standard product distribution lists maintained by FLENUMMETOC DET Asheville and NAVOCEANO. Requests should be forwarded directly to FLENUMMETOC DET Asheville or NAVOCEANO as appropriate.

7.2.1 Operational Support Responsibilities

Operational climatology support services for global, regional, or local areas of responsibility are supplied by NAVMETOCCOM Regional Centers, or USMC Weather Service Units located at designated shore activities as described in the following paragraphs:

a. Fleet units with permanently assigned METOC personnel are responsible for providing and coordinating METOC support services for units within their respective Battle Group (BG) or Task Force (TF). Units having no assigned METOC personnel are to forward requests to their assigned BG/TF Staff METOC Officer in accordance with the OPTASK METOC or Fleet Operation Order. Staff METOC Officers will coordinate requests for information, that are beyond the scope of on-scene capabilities, with the appropriate NAVMETOCCOM Regional Center.

b. Fleet units which are operating independently should submit requests directly to the appropriate NAVMETOCCOM Regional Center, and provide an information copy to their assigned Force or Group Commander. While in port, personnel assigned meteorological and/or oceanography-related duties, are encouraged to conduct personal visits with a nearby NAVMETOCCOM Center, Facility, or Detachment, to gain assistance with planning future deployments.

c. Shore activities without METOC personnel should contact the nearest NAVMETOCCOM activity or USMC Weather Service Unit in their immediate geographic area for assistance in obtaining required climatology information or data. When a NAVMETOCCOM activity or USMC aviation weather service unit is not located nearby, send a letter or message, or

telephone the appropriate NAVMETOCCOM Regional Center (Figure 1-1 and Appendix A or USMC Aviation Weather Site (Appendix B)).

d. If a request for climatological information and/or data cannot be satisfied by a NAVMETOCCOM field activity or a USMC Weather Service Unit, that activity will immediately refer the request to FLENUMMETOC DET Asheville and/or NAVOCEANO for appropriate assistance. Requesters should provide an information copy of correspondence to FLENUMMETOCEN when assistance is requested of FLENUMMETOC DET Asheville. All requests for support which are beyond the capabilities available to FLENUMMETOC DET Asheville or NAVOCEANO, will be forwarded to COMNAVMETOCCOM for determination of final action.

e. Requests for atmospheric climatological products and data that are made by R&D activities to FLENUMMETOC DET Asheville, will be serviced on a reimbursable basis. It is recommended that FLENUMMETOC DET be contacted to discuss project requirements prior to submitting requests.

7.2.2 Product Availability

a. NAVMETOCCOM and USMC Weather Service Activities often prepare and distribute tailored climatological summaries for local use. Inquiries as to their availability should be directed to the nearest supporting activity.

b. FLENUMMETOC DET Asheville, the smallest production center of its kind in the DoD, produces a variety of atmospheric climatological publications and products in support of Fleet operations. Principle categories of FLENUMMETOC DET Asheville publications include the following:

(1) *Marine Climatic Atlas of the World*. This series of Atlases containing surface marine statistics are presented on monthly charts in the form of graphs, tables, and isopleth maps. Statistics include the means of percent frequency of occurrence of threshold values for wind, visibility, clouds, precipitation, air and sea surface temperatures, ocean waves, and sea ice for a given month. These data are presented without narrative discussion or interpretation. They were produced for each of the six ocean basins.

(2) *U.S. Navy Climatic Studies*. This series provides similar information to the Atlases but on regional scale. They primarily cover near shore (brown water) areas for 18 regions.

c. Since 1990, FLENUMMETOC DET Asheville has been phasing out existing paper-based atmospheric climatic atlases and tabular references and reissuing them as revised products on Compact Disc-Read Only Memory (CD-ROM) media. CD-ROMs currently available from FLENUMMETOC DET Asheville are unclassified and operate with IBM-PC compatible systems using MS-DOS version 3.1 or higher (they also will operate in Windows).

- *International Station Meteorological Climate Summary (ISMCS)* Windows Version distribution expected by Dec 00
- *Marine Climatic Atlas of the World (MCA) 1.1*

- *Global Upper Air Climatic Atlas, Volumes I and II (GUACA)*
- *Global Tropical and Extratropical Cyclone Climatic Atlas (GTECCA)*
- *Global Historical Fields (GHF)*

Activities not already on standard distribution and interested in receiving automatic distribution of CD-ROM products prepared by FLENUMMETOC DET, should submit a request via one of the following:

Mail: Officer in Charge
Fleet Numerical Meteorology & Oceanography Detachment
Federal Building, Room 563
151 Patton Avenue
Asheville, NC 28801-5014

Telephone: 828-271-4852/4232, 252-7865

Facsimile: 828-271-4672

E-Mail: navy@ncdc.noaa.gov

PLA: FLENUMMETOC DET ASHEVILLE NC//00//

Web site: <http://navy.ncdc.noaa.gov>

d. FLENUMMETOC DET Asheville also maintains a web site containing a variety of products and summarized data sets. New products are added regularly, some examples of those currently available are:

Global Marine Climatic Atlas (GMCA)

GMCA Version 1.1 is derived from the Comprehensive Ocean Atmosphere Data Set (COADS), which includes virtually all marine data from 1854 through 1995. Additional data will be added to the GMCA database as it becomes available and is quality controlled. GMCA data is in 1 deg. x 1deg. box. The user can define: the area, beginning and ending; month, year and hour which is displayed as statistical analysis in tabular form (Mean, Median, Min, Max, Std Dev, and Mode) for all elements and as a graphical display for user selected elements (Single and Bi-Variate Frequency Distribution). Our intent is to keep GMCA and/or future versions of an on-line Marine Climatic Atlas (MCA) as current as technology and technical capabilities allow.

Global Tropical Cyclone Climatic Atlas (GTCCA)

GTCCA Version 3.0 (beta) is a JAVA applet used to access, retrieve and display tropical cyclone tracks, data and narratives much like the CD-ROM product. The entire data set, which begins in the 1800's and continues through latest available, is downloadable through the OAML Data Set section.

Special Interest Areas: Balkans, Mid-East & Korea

Climatology from GUACA CD-ROM

- Upper Air charts include the 850mb, 700mb, 500mb and 300mb levels depicting mean monthly heights, winds, and temperature and Wind Roses.
- Surface Charts depicting mean monthly pressure and winds.

Historical Data

- NOGAPS and WAM Daily Analysis Charts Reproduced from FLENUMMETOC CEN Gridded Fields for Surface, 850mb, 700mb, 500mb and 300mb levels depicting heights, winds, temperature, relative humidity, % Cloud Cover for Low, Middle and High Clouds and Significant Height and Direction for Wind and Swell Waves, upon request.
- Surface Weather Observations for Selected Sites, upon request.

International Station Meteorological Climate Summary (ISMCS)

All data from the ISMCS Windows Version 1.0 CD-ROM.

Oceanographic and Atmospheric Master Library (OAML) Data Sets

The Surface Marine Gridded Climatology (SMGC), Global Tropical Cyclone Tracks (GTCT), Northern Hemisphere Extra-tropical Cyclone Tracks (NHECT) and the Upper Air Gridded Climatology (UAGC) data sets are all downloadable.

GRAPHICS AND VISUALIZATION PRODUCTS

FLENUMMETOC DET Asheville can provide high quality maps and charts depicting customer-specified atmospheric variables (including wave heights) using FLEET NUMERICAL METOC CENTER's gridded fields. Graphical products can be provided on paper or in standard graphic file formats such as GIF and JPG.

CLIMATIC DATA BASES

As part of the Federal Climate Complex (FCC); FLENUMMETOC DET Asheville, the National Climatic Data Center (NCDC) and the U.S. Air Force Combat Climatology Center (AFCCC), provide access to the world's largest active archive of meteorological data and global baseline data sets developed for climate monitoring. These data can be provided on any digital media or via ftp in a variety of formats including spreadsheet compatible.

e. Special atlas publications are prepared by NAVOCEANO that primarily detail oceanographic information for various regions of the world's oceans. FLENUMMETOC DET Asheville also contributes summarized climatic data for selected meteorological elements for inclusion in many of these atlases. Information about available publications from NAVOCEANO can be obtained as follows:

(1) Fleet Allowance Requests. Follow procedures outlined in the CINCLANTFLT, CINCPACFLT, COMSUBLANT or COMSUBPAC Allowance Instructions.

Director
National Imagery and Mapping Agency
Customer Interface Division attn: OCIA
Naval Stop D16
4600 Sangamore Road
Bethesda, MD 20816-5003
PLA: NIMA CSC WASHINGTON DC//PMA//
Telex: 710-824-0293 (NIMA CSC WSH)
Commercial (301) 227-2495
Toll Free: 1-800-826-0342

(2) Other requests should be submitted by letter to:

Commanding Officer
Naval Oceanographic Office
ATTN: Maury Library
1002 Balch Blvd.
Stennis Space Center, MS 39522-5001
PLA: NAVOCEANO STENNIS SPACE CENTER
MS//N4312//
Telephone: DSN 485-4017 commercial (228) 688-4017
Facsimile: DSN 485-4191 commercial (228) 688-4191

f. Reference materials, other than climatology, are also available through the Naval Research Laboratory and may be useful for pursuing independent research and study in the fields of oceanography and meteorology. Information concerning available research publications may be directed to:

Director
Naval Research Laboratory
Attn: Technical Library
Monterey, CA 93943-5004
DSN: 878-4791 Commercial 831-656-4791

7.3.0 Special Summaries / Data Request Procedures

Standard reference products may not be available or be able to meet every operational requirement. In these instances, special studies or summaries can be prepared to meet specific requirements. These may range from simple tabulations and summarized data, to the development of highly complex computer programs that require ingesting vast amounts of data for processing. The latter may necessitate a considerable expenditure of funding and time to complete. Before development of a new study or summary commences, a determination is made to ensure that an existing product currently "on the shelf," regardless of origin, does not meet all

or part of the requirement. If these sources do not meet requirements, alternate data resources will be evaluated with respect to delivering information based upon the project specifications or request.

In order for NAVMETOCCOM and/or Marine Corps Weather Service Activities to provide quality service and timely response to requests for climatology information, pertinent information must be provided by requesters. The following format is provided as a general guideline to be used in correspondence/messages:

- a. Request/Reply Communications (i.e., telephone, facsimile, e-mail, U.S. Mail, AUTODIN).
- b. Data Type Required (i.e., surface observations, upper air observations, gridded fields, satellite imagery, summarized data, other specified information).
- c. Area and/or Station(s) Required (i.e., latitude/longitude point or area; geographic region; WMO station number, or Marsden square number).
- d. Data period of interest (i.e., year, month, day, hour).
- e. Data output format (i.e., paper or digital).
- f. Digital media type (i.e., floppy diskette, CD-ROM, exabyte tape, other specified media).
- g. Classification (unclassified, confidential, secret).
- h. Amplifying Remarks (Provide an overview on how data is to be used; Navy contract number and Program Manager point of contact; Command/unit point of contact; DSN and commercial telephone numbers; other information as appropriate).
- i. Date product is required (no later than date).

7.4.0 Climatology Requirements

OPNAVINST 3140.54A outlines procedures for submitting requirements for new or modified METOC products or services. Requirements for new or modified climatology products should be identified as soon as possible to allow sufficient lead time for their development.

CHAPTER 8

PRODUCTS AND SERVICES OF THE NAVAL OCEANOGRAPHIC OFFICE

8.1.0 Oceanographic Office Support Services

NAVOCEANO operational programs are developed to support the DoD and U.S. Navy requirements in oceanography and Geospatial, Information and Services (GI&S) (formerly mapping, charting, and geodesy (MC&G)). Environmental data collected during various oceanographic surveys are analyzed at NAVOCEANO, put in usable form and distributed to the Fleet, DoD elements, and other interested groups, as appropriate. NAVOCEANO works closely with Navy commands in planning operational surveys and in application of environmental data to user requirements.

The Customer Service Division (CSD)(N24) coordinates WSC actions and other NAVOCEANO actions as required in response to Fleet/CINC/DOD/Center mission-related operational requests by providing the necessary internal and external liaison for timely and reliable NAVOCEANO product and service deliveries. The CSD maintains production management of requests for products (RFPs) and quality control (QC) of final products for the WSC, and conducts customer outreach to streamline products and requests. The CSD serves as the NAVOCEANO single point of contact for 24hrs/7days a week operations. The CSD is also the distribution point of contact for hardcopy products via FEDEX and Priority Mail; softcopy products via INTELINK, SIPRNET and NIPRNET. Image Product Library (IPL) is used in conjunction with Remote Replication Sites (RRS) for full-size image transfer and printing at remote sites. Requests for products can be directed via:

E-mail-unclass: wsc@navo.navy.mil
E-mail-classified: wsc@navo.navy.smil.mil
Phone: DSN 485-5382, 5661;
COMM (228) 688-5382, 5661, 6637

8.1.1 Oceanographic and Geophysical Survey Aircraft Services

The Naval Research Laboratory operates one NP-3D aircraft for COMNAVMETOCCOM, which is employed by NAVOCEANO for the collection of geophysical, oceanographic, and acoustic data.

8.1.2 Fleet Support Services

NAVOCEANO plans and conducts oceanographic, geophysical, and acoustic surveys in response to validated Fleet requirements. The survey results are processed, analyzed, and used to produce information that directly supports Naval warfare tasks. NAVOCEANO is responsible for establishing and maintaining master digital databases of all oceanographic and acoustic parameters necessary to support Fleet and System Command requirements. Data are collected,

processed, and analyzed, and products are prepared for Naval operating areas both in hard copy and in digital format. NAVOCEANO maintains a large professional work force with experience in shallow, littoral, and deep-water oceanography and acoustics, and NAVOCEANO also operates geological and biological laboratories.

NAVOCEANO identifies and develops applications of oceanography for Fleet operations, with particular emphasis on real-time tactical situations. Active participation by NAVOCEANO personnel in Fleet exercises helps to evaluate the adequacy of existing environmental systems and define requirements for new services. The command provides oceanographic and acoustic analyses for large-scale Fleet exercise reconstruction, and revises and updates Fleet tactical guides and manuals.

8.1.3 TOSS

Extremely high-resolution acoustic and optical bottom-mapping and deep-water search services are available from NAVOCEANO using the towed oceanographic survey system (TOSS) and associated launch/retrieval and precise navigation equipment. TOSS, a fiber-optic, tethered vehicle with a full-ocean operating depth of 20,000 feet, is equipped with dual-frequency, bottom-mapping side-scan sonar; high-resolution video cameras; digital electronic still cameras; obstacle avoidance sonar; Acoustic Doppler Current Profiler (ADCP); conductivity, temperature, depth (CTD) profiler; acoustic sediment classification system (ASCS); transmissometer; and an acoustic transponder navigation system. A small side-scan sonar (Klein 2000) is available for detailed surveys in shallow water. The TOSS is maintained in a rapid-response, roll-on/roll-off mode to support high-priority short-fused survey requirements aboard NAVOCEANO ships and various platforms of opportunity.

8.1.4 SEAMAP

SEAMAP is a unique bilateral side-scan sonar/bathymetric imaging system that collects side-scan sonar imagery and bathymetry over a swath up to 20-km wide at tow speeds of 4-8 knots. The system permits acquisition of high-resolution ground-truth imagery in diverse areas and can also map an area equivalent to that of Mississippi in approximately 15 days. The sonar also has demonstrated great potential for bottom classification and mapping sonar targets in littoral environments. As customers typically require immediate access to finished products, SEAMAP data are processed aboard ship through the generation of bathymetric and acoustic backscatter maps of the seafloor. Improvements to the system include a fiber-optic telemetry system, transitioned from TOSS technology, and a chirp pulse capability, which provides improved cross-track resolution at long ranges. SEAMAP's fiber-optic digital telemetry system facilitates high data rates and high system reliability.

8.1.5 EARS

The Environmental Acoustic Recording System (EARS) collects long-term low-frequency acoustic ambient noise. The flexibility and reliability of the EARS buoy design allows NAVOCEANO to meet varying new bandwidth and sample-rate requirements and applications. EARS buoys can be deployed in littoral waters with trawl-resistant mounts or in depths to 3000 meters. They can be left in place recording data for up to a year.

8.1.6 UNISIPS

The Unified NAVOCEANO Integrated Swath Image Processing System (UNISIPS) is a generic processing system for all acoustic imaging systems at NAVOCEANO. UNISIPS enables NAVOCEANO to more effectively exploit the acoustic imaging capabilities of hull-mounted multibeam bathymetric systems and towed imaging systems in use by NAVOCEANO and the Fleet. UNISIPS is also used to work with the R&D community in using backscatter for bottom/subbottom classification and geoacoustic provincing, as well as in calibration of sonar systems to produce quantitative backscatter.

8.1.7 CEAS

The Comprehensive Environmental Assessment System (CEAS) is a multidisciplinary analysis and visualization tool for environmental databases on a Geographic Information System (GIS). CEAS supports environmental assessment, deployment planning (cable lay-down support), and survey planning. It includes fixed deployable system/advanced deployable system (FDS/ADS) support, transfer of geophysical and oceanographic databases into ARC/INFO format, and an acoustic model operating system with database linkages and tailored applications. A separate version of CEAS specific to MIW is now operational at COMINEWARCOM and onboard the USS INCHON during MIW exercises. SIPRNET connectivity has been established between NAVOCEANO and the COMINEWARCOM CEAS, and MIW data sets are routinely transferred. CEAS can output data to the Mine Warfare Environmental Decision Aid Library (MEDAL).

8.1.8 Scientific Diving Team Services

NAVOCEANO's scientific diving team responds to Fleet requirements for trained observers to make ecological and environmental impact studies, cable route surveys, geological and biological sampling, underwater photography, equipment/instrument installation and retrieval, and shallow-water surveys. Requests for the use of the team should be made directly to NAVOCEANO.

8.1.9 Laboratories Support Services

This branch consists of modern biology, chemistry, and geology laboratories and a staff of scientists to support a wide range of services. Field and laboratory analyses of biological and geological samples are routinely performed for ocean measurement programs, mine warfare studies, special warfare operations, and environmental studies for other Naval commands.

NAVOCEANO survey personnel measure bioluminescence and ancillary parameters with state-of-the-art photometer systems. BIOLITE measures near-surface bioluminescence, temperature, conductivity, and chlorophyll fluorescence while the ship is underway. The High Intake Defined Excitation Profiling System (HIDEX) is a vertical profiling instrument that measures bioluminescence, temperature, conductivity, depth, chlorophyll fluorescence, and optical transmission. TOWDEX, a remotely controlled, variable depth, towed version of HIDEX, also measures dissolved oxygen, pH, spectral scattering, and spectral absorption. All data reside in a relational database for quick retrieval.

Geology lab personnel conduct studies involving the physical nature of the bottom. Cores and grab samples are analyzed for textural, chemical, physical, acoustic, and engineering properties. When combined with seismic data, these samples allow construction of three-dimensional images of the ocean bottom. Analyses completed onboard the ship include x-raying the samples, measuring sediment sound velocity, and determining sediment shear strength of the layers. The samples are then shipped to the laboratory, where additional properties are analyzed: moisture content, bulk density, specific gravity, grain size, mineralogy, and sediment chemistry. The laboratory maintains the Bottom Sediments Database that contains the processed results from over 13,000 bottom samples collected over the last 40 years.

8.1.10 Geospatial Information and Services (GI&S)

NAVOCEANO plans and conducts bathymetric, gravity, geodetic, and hydrographic surveys; analyzes and disseminates survey data to NIMA and Fleet users; and formulates requirements for improved survey techniques and facilities. These surveys are conducted to meet requirements identified, endorsed, and prioritized by unified commands. NIMA validates the need for surveys to support these requirements based on the availability of data. OPNAVINST 3140.55 explains how GI&S requirements are submitted.

8.1.11 Publications

NAVOCEANO produces a variety of publications in support of Fleet operations. Allowance lists are maintained by Commander in Chief, U.S. Atlantic Fleet and Commander in Chief, U.S. Pacific Fleet. Commander Submarine Force, U.S. Atlantic Fleet and Commander Submarine Force, U.S. Pacific Fleet maintains separate allowance directives. Any NAVOCEANO publication on a Fleet allowance list can be obtained from NAVOCEANO.

Principal categories of NAVOCEANO publications include the following:

- a. Environmental Guides (SP-3160 series). These guides provide a wealth of oceanographic and acoustic information. Each Environmental Guide covers a Standard Navy Ocean Area. Environmental Guides are not currently being updated, but numerous Guides are posted on SIPRNET and all are available from NAVOCEANO in hard copy format.
- b. Submarine Tactical Oceanographic Reference Manual (STORM) (SP-279 series). These publications provide oceanographic, acoustic, and meteorological information in support of the submarine community. Distribution is controlled by COMSUBDEVRON TWELVE.
- c. Mine Warfare Pilots (MWP) (SP-800/900/1000 series). These publications provide information on ports and harbors in support of mining and mine countermeasure operations.
- d. Strait Studies (SP-200 series). Oceanography and acoustic information is provided for over 30 strategic straits in the Pacific Ocean. Strait studies are not currently being conducted, but existing studies are available from NAVOCEANO.
- e. Oceanographic/Environmental Summaries (OES) (SP-285 series). These publications provide information on port and country specific areas in support of special operations and amphibious warfare.

Three of the categories of the publications listed above (Environmental Guides, Mine Warfare Pilots, and Oceanographic/Environmental Summaries) are available via SIPRNET on the NAVOCEANO Intelink-S web server, <http://199.208.205.50>.

Appendix C provides information on available publications and instructions. In addition to the above categories, other available NAVOCEANO publications are listed in NAVOCEANO's catalogs of classified and unclassified publications, RP 50 and RP 51. All Naval ships and activities should order NAVOCEANO publications and instructions directly from NAVOCEANO as follows:

Commanding Officer
Naval Oceanographic Office
Attn: Library
1002 Balch Blvd.
Stennis Space Center, MS 39522-5001
DSN: 485-4017
Message Address: NAVOCEANO STENNIS SPACE CENTER
MS//N1L//

8.2.0 Oceanographic Office Data

Survey measurements and data are maintained in various computer files. These files are used in-house for analysis and generation of products including graphics in support of various Navy programs. NAVMETOCCOM activities requesting data from the files in the following paragraphs will forward their requests to NAVOCEANO via the chain of command. All other requests should be submitted either by letter to the Commanding Officer, Naval Oceanographic Office, 1002 Balch Blvd., Stennis Space Center, MS 39522-5001, or message to NAVOCEANO Stennis Space Center, MS. Requests which are beyond the capabilities available to NAVOCEANO will be forwarded to COMNAVMETOCCOM for action.

8.2.1 Ocean Profile Data

The Master Oceanographic Observation Data Set (MOODS) is one of the largest collections of temperature and temperature/salinity profile data, including some observed sound speed profiles, known to exist in a single format. MOODS contain about six million observations. MOODS is the Navy's primary source for temperature and temperature/salinity profile data. Software is available to export digital data on magnetic/optical media. Graphical data (composite plots, location chartlets, and data summary pages) are also available. Both unclassified and classified files are maintained.

MOODS is also accessible on the classified NAVOCEANO Web page, via the SIPRNET.

8.2.2 Historical Ocean Current Data

The unclassified files of ocean surface current data are derived principally from ship observations. These data are used in the preparation of surface current atlases and are stocked by NAVOCEANO as the SP-1400 series. Requests for surface current data in regions not yet included in the publication series may be made to NAVOCEANO (N344).

NAVOCEANO also measures and maintains classified and unclassified data files on subsurface currents. These data are available on request as both graphic and tabular products. Requests for subsurface currents may be made to NAVOCEANO (N351).

8.2.3 SAGEBATE Underway Data

SAGEBATE (SA-linity, GE-ophysics, BA-thymetry, TE-mpérature) was developed as an underway data repository for the old Oceanographic Data Acquisition System (ODAS). The SAGEBATE digital data file contains real-time data, including salinity, magnetics, seismic horizons, bathymetry, and sea surface temperature collected by USNS SILAS BENT, KANE, and WILKES, and other vessels from 1968 to 1989. The seismic data are deep-penetration reflection profiles recorded by the sparker seismic systems and interpreted as line drawings of significant seismic horizons. Data holdings are mainly for the Northern Hemisphere and consist mostly of random track information collected in the Pacific, Atlantic, and Indian oceans and their adjacent seas. The data products consist of a variety of plots, profiles, and computer listings retrieved by geographical area, ship name, or survey number. Data through 1989 are available in microfilm with copies primarily obtainable from the National Geophysical Data Center (NGDC) of NOAA and from NAVOCEANO. The survey vessels involved were USNS SILAS BENT, KANE and WILKES. Data are available on microfilm with copies obtainable from NAVOCEANO. Distribution of these data are restricted to DoD agencies and DoD contractors in accordance with NAVOCEANOINST 4900.1A. Requests for SAGEBATE Underway Data may be made to NAVOCEANO (N351).

8.2.4 Seismic Profile Data

NAVOCEANO maintains a large collection of analog seismic data from random survey tracks in the North Pacific, North Atlantic and Indian oceans and adjacent seas, such as the Sea of Japan, and East China, South China, and Yellow seas. These data are of two types: deep-penetration reflection profiles recorded by the sparker seismic system and shallow subbottom profiles recorded by a 3.5-kHz system. Data through 1989 are available in microfilm from NGDC of NOAA and from NAVOCEANO. The original analog data are retained at NAVOCEANO. Requests for Seismic Profile Data may be made to NAVOCEANO (N351).

8.2.5 Acoustic Bottom-Loss and Transmission-Loss Data

NAVOCEANO has collected acoustic bottom-loss and transmission-loss data at stations in open ocean areas and in most straits. Stations are located in the following areas: North Atlantic, Eastern North Pacific, and Indian oceans, Caribbean, Norwegian, Mediterranean, Bering, South China, and Philippine seas, the Sea of Japan, and Gulfs of Alaska and Mexico.

Bottom-loss information is available as numerous reports in tabular form for frequency ranges from 32 Hz to 3.5 kHz at grazing angles from 0 to 90 degrees. Fleet users can obtain bottom-loss or transmission-loss information by specifying geographic areas of interest. Measurements have been incorporated into the Navy Standard High- and Low-Frequency Bottom-Loss Databases.

8.2.6 Ambient Noise Data

Data have been collected in all the major water masses, including the North Atlantic, North Pacific, and Indian oceans and the Mediterranean, Caribbean, Norwegian, and East China seas.

In addition, noise measurements are reported for most straits and choke points. Ambient noise information is collected for frequencies up to 5 kHz. Data are collected using air-deployed sonobuoys and bottom-moored acoustic vertical arrays. Measurements have been incorporated into the Navy Standard Shipping Noise Database.

8.2.7 Volume Reverberation Data

Both point and towed measurements are currently being made at specific frequencies. The areas in which data have been collected include the North Atlantic and North Pacific oceans and the Norwegian, Mediterranean, and Yellow seas. These data are processed to yield volume scattering strength as a function of depth and integrated column scattering strengths. Seasonal day and night multi-frequency data are collected to measure diurnal variations.

8.2.8 Coastal Oceanographic Survey Data

NAVOCEANO provides coastal environmental data support for mine warfare and other coastal warfare requirements by conducting specialized shallow-water surveys and producing customized data reports, such as Mine Warfare Pilots, Q-route surveys, Straits Studies, Flushing Studies, and Oceanographic/Environmental Summaries.

8.3.0 Oceanographic and Atmospheric Master Library (OAML)

The Oceanographic and Atmospheric Master Library (OAML) is the Navy's library of METOC models, algorithms, and databases that are integrated into a myriad of Fleet and allied operational environmental prediction systems. The library was created by the Oceanographer of the Navy in 1984 in order to standardize METOC software that is used for operational purposes. The Oceanographer of the Navy has designated Commander, Naval Meteorology and Oceanography Command (CNMOC) as the Navy's meteorology and oceanographic model and database manager.

COMNAVMETOCOM maintains rigorous configuration management over all the items in OAML. This includes policy and administrative support, distribution, and scientific peer review of the items. For more information on OAML contact NAVOCEANO (N641) at 228-688-5160.

8.3.1 Generalized Digital Environmental Model Variable Resolution (GDEM-V) Database

Seasonal models of temperature and salinity have been developed by NAVOCEANO and are used to produce unclassified graphic representations of various ocean parameters related to sound speed. This ocean climatology covers all ocean areas with a depth of 100 meters or greater except for the region south of 60 degrees S (40 degrees S for the Indian Ocean) surrounding the Antarctic. Development of climatologies for the regions between the coast and 100 meters is currently underway. Products available include charts of contoured parameters such as sonic layer depth, sound channel axis depth temperature, sound speed gradients, and sound speed at the ocean bottom, as well as profiles and other graphics. GDEM has been selected as the Navy Standard Historical Ocean Profile (HOP) model, and subsets have been generated for Sensor Performance Prediction (SPP) applications. Copies of the master GDEM or SPP subsets can be provided to DoD components by request to NAVOCEANO via COMNAVMETOCOM.

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The Generalized Digital Environmental Model Variable Resolution (GDEM-V) Database is physical oceanographic synthetic environments that provide temperature and salinity versus depth at various grid and depth resolutions (GDEM) supplemented by temperature variability vs. depth estimates of temperature variability (TVAR) in ocean areas where data density supports standard statistical analysis. GDEM-V was developed by NAVOCEANO to support the generation of Fleet products and to provide synthetic oceanographic data to be integrated with other geophysical and environmental parameters for ocean and acoustic modeling. The database is UNCLASSIFIED.

The GDEM-V database provides the sound speed profile input to various acoustic propagation-loss models and all other applications that require temperature, sound-speed, or density profiles. The variability models will provide temperature envelopes to quality control at-sea observations and to provide the expected range of those parameters included in the variability files.

8.3.2 GDEM Province Subset (GDEMPS) Database

The GDEM Province Subset (GDEMPS) database consists of provinces represented by a single profile >400 meters and 12 monthly profiles <400 meters in such a manner that substituting the representative profile for any other GDEM profile in the province generally introduces <1 NM deviation in the range to the convergence zone. The GDEM Province Subset database is a subset of the OAML Navy Standard GDEM database but is distributed separately. This database is UNCLASSIFIED.

The GDEM Province subset database is used to support systems with memory constraints that cannot use the gridded GDEM database. It provides historical ocean profiles (composed of GDEM standard depths, temperatures, and salinities) and sound speed profiles to drive environmental and acoustic prediction models.

8.3.3 Digital Bathymetric Variable Resolution (DBDB-V) Database

The Digital Bathymetric Database-Variable resolution (DBDB-V) is a digital bathymetric database that provides ocean depths at various gridded resolutions. Data access software is provided with the database. DBDB-V was developed by NAVOCEANO to support the generation of bathymetric chart products and to provide bathymetric data to be integrated with other geophysical and environmental parameters for ocean modeling.

DBDB-V, version 3.0, is produced at several different levels of classification and detail. The classes of DBDB-V are known as DBDB-V Level 0 (Unclassified; Approved for public release; distribution is unlimited), DBDB-V Level 1 (Unclassified; Distribution limited to DoD and DoD contractors only), DBDB-V Level 2 (SECRET; Distribution only as directed by CNO (N096)), and DBDB-V Level 3 (SECRET; Distribution only as directed by CNO (N096)). Some Levels of DBDB-V may also be produced as multiple CD-ROM volumes with each volume corresponding to specific geographic regions.

DBDB-V can be applied to any application module requiring bathymetry as a required element in producing an environmental product. It can support several different warfare/nonwarfare areas (e.g., ASW, Mine-Warfare, and Navigation Chart Production).

8.3.4 Low-Frequency Bottom-Loss (LFBL) Database

The Low-Frequency Bottom-Loss (LFBL) Database has historically included 15 geoacoustic parameters plus sediment thicknesses for the Very-Low-Frequency (VLF) upgrade. These parameters are used to describe the reflective and refractive characteristics of the ocean bottom for acoustic frequencies from 0 to 1000 Hz. Upgrades to this database are being made by NAVOCEANO in selected areas using an N-layer description of geoacoustical parameters plus N-sediment thickness maps. This more physical description of the bottom is used in upgrade areas to describe bottom characteristics for acoustic frequencies from 20 to 1000 Hz.

As sound interacts with the seafloor, the energy is, in general, partly reflected at the water-sediment interface and partly transmitted into the sediments. The amount of energy carried by the reflected and transmitted sound waves is determined by the properties of the seafloor. These properties may be described in terms of geoacoustic parameters, such as sound speed, attenuation, and sediment density. In the simple historical model, the seafloor is considered to consist of a thin surficial layer, a fluid sediment layer of variable thickness, and a reflecting subbottom half-space. In the NAVOCEANO upgrade areas, the seafloor is considered to consist of N-number of elastic layers, each with an independent geoacoustic description, and a reflecting subbottom half-space.

The original source of the LFBL database is the Bottom-Loss Upgrade (BLUG) database. NAVOCEANO is responsible for upgrades to BLUG. The database is CONFIDENTIAL.

The LFBL database provides the input for appropriate acoustic propagation-loss models to calculate frequency-dependent bottom-loss curves.

8.3.5 High-Frequency Bottom-Loss (HFBL) Database

The High-Frequency Bottom-Loss (HFBL) Database describes the HF (1.5-4.0 kHz) bottom-loss provinces using Navy Standard Bottom-Loss Curves 1-9. The source of the HFBL Database is from the analysis of bottom-loss data collected during the Marine Geophysical Survey (MGS) program and similar surveys conducted by NAVOCEANO. The database is CONFIDENTIAL.

The database is suitable for input to an appropriate bottom-loss model that calculates bottom loss vs. grazing angle for an underwater acoustic propagation-loss model.

8.3.6 Consolidated Bottom Loss Upgrade (CBLUG) Category Display Database

Bottom loss can be an extremely complicated function of grazing angle, frequency, and location (through changing geoacoustic parameters). Recent updates to the Navy Standard LFBL database have increased the number of bottom provinces to more than 800 areas. For this reason, it is extremely difficult for the Fleet user to assess even the gross characteristics of bottom loss at a particular location by merely examining the geoacoustic parameters and virtually impossible to determine when ocean bottom conditions have changed enough to require a new performance prediction.

The ASW Environmental Acoustic Support (AEAS) Program of the Office of Naval Research (ONR) developed the Consolidated Bottom-Loss Upgrade (CBLUG) Category Display Database

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in response to this problem. In generating the CBLUG dataset, LFBL parameters were consolidated into nine broad categories, based on expected acoustic performance. The database is CONFIDENTIAL.

The CBLUG is used to drive graphic displays of its simplified bottom classifications, which indicate major changes in bottom properties, and provide the Fleet user with an indication that ocean bottom conditions have changes enough to require new performance predictions. Users should understand, however, that CBLUG bottom classes represent generalized bottom conditions, and should not under any circumstances be considered a replacement for the full Navy Standard bottom-loss analysis and databases or an alternate means of predicting ASW system performance.

8.3.7 Geophysical Database (GDB)

The Geophysical Database is a layered geophysical description of the seafloor and subbottom properties of regional areas of interest (AOIs). The compressional sound speed, bulk shear wave speed, compressional attenuation, and density are specified as a linear gradient (or constant) at each geographic cell in each layer. The database also contains information regarding the depth and thickness of each layer. The number of layers in each AOI is dependent on the degree of information available and acoustic modeling requirements. These parameters are used to describe the reflective and refractive characteristics of the ocean bottom for acoustic frequencies below 50 Hz. NAVOCEANO is responsible for the upgrades and maintenance of the GDB. This database is UNCLASSIFIED.

The layered functionality of the GDB has been incorporated into the LFBL N-layer description to provide acoustic prediction performance for acoustic frequencies for the range of 0-1000 Hz. As such, the GDB is no longer being supported by NAVOCEANO as an input to acoustic propagation loss models.

8.3.8 Consolidated Bottom-Loss Upgrade (CBLUG) Category Database

The CBLUG was developed to allow Fleet operators to gauge low frequency bottom-loss characteristics from the OAML LFBL database in a visual manner.

8.3.9 Vertical Line Array DIFAR (VLAD) Noise Gain Database

The Vertical Line Array DIFAR (VLAD) Noise Gain database contains two major components. The first is the predicted omnidirectional noise levels computed by the Ambient Noise Directionality Estimation System (ANDES). The second is the beam noise predictions, which are based upon the ANDES noise predictions, for the VLAD sonobuoy.

8.3.10 Surface Marine Gridded Climatology (SMGC) Database

The Surface Marine Gridded Climatology (SMGC) Database replaced the Historical Wind Speed Database in the OAML. It describes the atmosphere at the surface of the world's oceans for each month of the year represented on a 1.0-degree latitude-longitude global grid. Mean and standard deviation values were compiled for sea level pressure, wind speed, air temperature, dewpoint, sea surface water temperature, air-sea temperature difference, and wave height. Also, included are percent frequency of occurrence of light superstructure icing potential (air temperature less

than or equal to -2°C and wind speed greater than or equal to 13 knots), heavy superstructure icing potential (air temperature less than or equal to -9°C and wind speed greater than or equal to 30 knots), percent frequency of gales (wind speed greater than or equal to 34 knots), and an 8-point wind rose. This database is UNCLASSIFIED.

The SMGC Database is suitable for Fleet operations planning, war-gaming, systems development and design, and simulation. It will uniformly support the needs of any model or system requiring gridded climatic surface marine data.

8.3.11 Historical Temporal Shipping (HITS) Database

The Historical Temporal Shipping database describes the number of ships expected in each region of the ocean-defined by a 1° arc in latitude by a 1° arc in longitude. Each region is called a 1° square; and the number of ships per square is called the ship density. The 1° squares have areas that vary with latitude. Ship densities are given for five major ship types:

- Fishing vessel
- Merchant
- Tanker
- Large tanker
- Supertanker

Small ships (<18 meters in length and 1000 tons of gross weight) are not included in HITS. Also not included are Naval vessels, passenger ships, or auxiliary ships that contributed negligibly to total ship counts. The expected values are derived from observations of past history over several years, hence *historical* is included in the name of the data base. This database is UNCLASSIFIED.

HITS was developed to aid in the description of the absolute levels and directional dependence (in both elevation and azimuth directions) of the low-frequency ambient noise. The levels and directionality of ambient noise, as a function of season, location, and depth, are necessary for predicting the acoustic gain achieved by vertical and horizontal arrays deployed as parts of passive or active low-frequency systems on either surveillance or tactical missions. The present operational capability to predict ambient noise levels and directionality is provided by the Ambient Noise Directional Estimation System (ANDES). ANDES makes its predictions by modeling the propagation sound from the primary sound sources (wind and the large ocean-surface ships) using climatological databases of both the ocean environment (sound speed profiles and wind speeds) and surface shipping. The only climatological global database of surface shipping is HITS.

8.3.12 Wind and Residual Noise (WRN) Database

The Wind and Residual Noise database describes the spectra for wind-generated noise, as well as the presence of transient/residual noise sources. The source of the WRN database is the Acoustic Performance Prediction (APP) Ambient Noise (AN) database developed by the Office of Naval

Research Detachment. Modifications to the wind-noise spectra have been provided by NAVOCEANO. The WRN database contains a new wind-noise table and does not include shipping density data. The Historical Temporal Shipping (HITS) database contains updated shipping density data. The WRN database is classified CONFIDENTIAL.

The wind-generated noise level is interpolated linearly at a desired wind speed between adjacent spectral curves at a given frequency. The wind noise, along with indicators of the presence of residual noise sources, may be used with the Shipping Noise (SN) database to produce estimates of the total Ambient Noise field. The total ambient noise may be used as input to Probability of Detection (POD) and tactical models, which may in turn be used to make predictions of sonar performance.

8.3.13 Shipping Noise (SN) Database

Shipping Noise (SN) is perhaps a misnomer, since, even though the database will produce values at frequencies as high as 15,000 Hz, it is primarily a low-frequency (<300 Hz) ambient noise database, derived from various sound sources (i.e., ice, oil rigs, etc.). Low Resolution, High Resolution, Directional Noise, and Historical Ice Edge data sets comprise the database. The SN database is CONFIDENTIAL.

SN data sets may be used as low-frequency input to probability of detection (POD) and tactical models. By combining shipping- and wind-noise components, the total ambient noise spectra are available.

8.3.14 Volume Scattering Strength (VSS) Database

The Volume Scattering Strength (VSS) Database provides integrated column scattering strength by season represented on a geographic grid. Diurnal and frequency-specific data are available, as well as estimates of the scattering layer depth and strength within that layer. This database is CONFIDENTIAL.

Integrated scattering strength (or column scattering strength) data are designed to satisfy the input requirements of reverberation models in calculating volume reverberation. Approximations of volume reverberation versus depth profiles enable calculations of reverberation levels at different depths.

8.3.15 ICECAP Database

The upgraded ICECAP database contains the 10 statistics for each season, averaged over all the years. The averaged data are presented on a rectangular, constant-area grid (one grid unit represents a 60 NM square) superimposed over a polar projection. The database provides a quantitative description of ice thickness characteristics and ice keel distribution, which are required by the OAML Passive Propagation-Loss models when ice loss is taken into account. The gridded ICECAP database is based on digitally collected ice profile data from 11 Submarine Ice Exercise cruises spanning 1977-91. The statistical parameters are calculated from 1 NM cruise segments, with a constant speed and bearing, and are averaged for all years for each season. The database is UNCLASSIFIED.

The ICECAP database provides parameters for computation of ice-loss values for input to Navy Standard Passive Propagation-Loss models. The ICECAP database provides the needed data for these models to calculate transmission loss versus range for Arctic under-ice areas.

8.3.16 Vertical Line Array DIFAR (VLAD) Database

The Vertical Line Array DIFAR (VLAD) database contains two major components. The first is the predicted omnidirectional noise levels computed by the Ambient Noise Directionality Estimation System (ANDES). The second is the beam noise predictions, which are based upon the ANDES noise predictions, for the VLAD sonobuoy. This database is classified CONFIDENTIAL.

The VLAD Noise Gain database provides omnidirectional and beam noise values to the OAML Navy Standard passive acoustic prediction models, which results in predicted transmission loss (TL) for the VLAD (SSQ-77A and B) sonobuoy.

8.3.17 Historical Electromagnetic Propagation Conditions (HEPC) Summary Database

The Historical Electromagnetic Propagation Conditions (HEPC) function generates an alphanumeric table that summarizes HEPC for any latitude and longitude requested by the operator, and generates, as an option, one or more M-unit profiles based on historical data for an operator specified month. This database is UNCLASSIFIED. Database elements include:

- Historical Surface Observation (HSO) Data Set
- Historical Radiosonde Observation (HRO) Data Set

The HSO data set provides the user with data of evaporation-duct-height occurrence, mean evaporation-duct-height, and mean surface wind speed for both day and night.

The HRO data set provides the user with the average surface and elevated-duct thickness, height, and trapping frequencies for both day and night.

The HSO and HRO data sets are used to create a climatological EM propagation conditions summary that is used to support exercise planning.

8.3.18 Upper Air Gridded Climatology (UAGC) Database

The Upper Air Gridded Climatology (UAGC) Database describes the atmosphere for each month of the year represented on a 2.5° global grid at 15 standard pressure levels. Mean and standard deviation values were compiled for sea level pressure, wind speed, air temperature, dewpoint, height, and density. This database is UNCLASSIFIED.

The UAGC database is suitable for Fleet operations planning, war-gaming, systems development, design, and simulation. It will uniformly support the needs of any model or system requiring gridded climatic upper air data.

8.3.19 Global Tropical Cyclone Tracks (GTCT) Database

The Global Tropical Cyclone Tracks (GTCT) Database is a consolidation of ungridded historical data sources for global tropical cyclones through the year 1992. This database is UNCLASSIFIED.

The GTCT database is suitable for fleet operations planning, war-gaming, systems development, design, and simulation. It will uniformly support the needs of any model or system requiring tropical cyclone track information.

8.3.20 Northern Hemisphere Extratropical Cyclone Tracks (NHECT) Database

The Northern Hemisphere Extratropical Cyclone Tracks (NHECT) Database is a consolidation of ungridded historical data sources for global extratropical cyclones through 1993. NHECT is UNCLASSIFIED.

The NHECT data set is suitable for fleet operations planning, war-gaming, systems development, design, and simulation. It will uniformly support the needs of any model or system requiring extratropical cyclone track information.

8.4.0 Warfighting Support Center (WSC)

WSC products are distributed via automated push or pull file transfer protocol (both classified and unclassified) to the Theater METOC Centers for further distribution to Fleet and joint units. Additionally, the WSC makes most of its satellite-derived products available to authorized users via NIPRNET and SIPRNET web access.

8.4.1 MODAS Support

Modular Oceanographic Data Assimilation System (MODAS) analyses are produced by the Regional Centers from data provided by the Naval Oceanographic Office. MODAS provides a modular approach to the analysis of ocean data in support of ocean/acoustic and sensor predictions. It is designed to assimilate random ocean XBT/CTD data and remotely sensed sea surface temperature and sea surface height data with climatology to produce a synthetic ocean. This synthetic ocean can yield vertical profiles of temperature, salinity or density for ingest into fleet tactical decision aids. MODAS 2.1 first guess fields will be produced by the Naval Oceanographic Office for regional centers AORs with maximum resolution as shown in Figure 8-1. These fields will be compacted and sent to regional centers. Regional centers add value by ingesting the most recent locally held XBT's to produce an improved product. The Centers will then provide tailored support to individual customers within their AOR with data extracted from these large-scale areas.

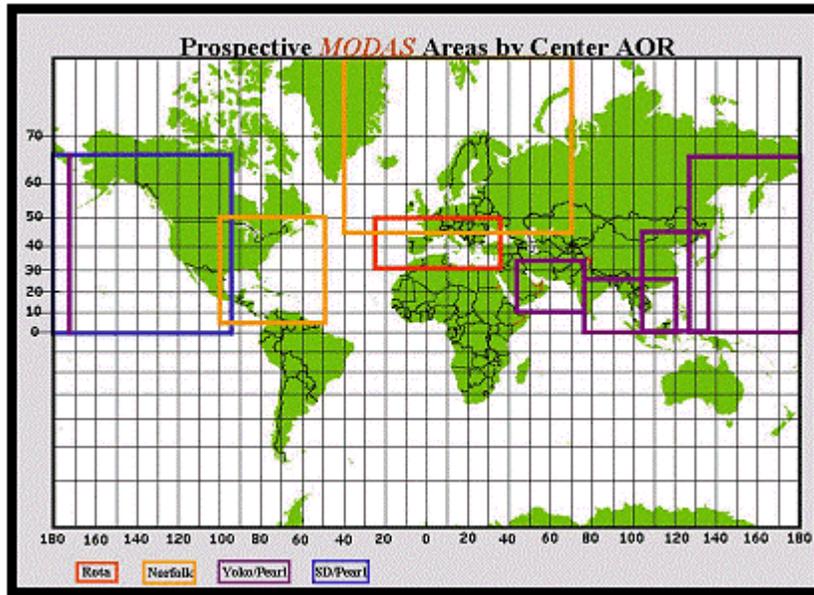


Figure 8-1. Example MODAS areas by Center AOR

a. Request Procedures. Figure 8-2 is an example MODAS support request message. The format may be changed to support specific fleet requests based on which system the user has to ingest MODAS data.

Note: Prior to sending a MODAS tailored support request, check with your regional METOC center to see if standard OPAREA support is already available in your area of interest.

P XXXXXXXZ JUN 00
FM (UNIT REQUESTING)
TO SERVICING REGIONAL METOC CENTER (AS LISTED BELOW)
NAVLANTMETOCEN NORFOLK VA //N31//
NAVPACMETOCEN PEARL HARBOR HI//30//
NAVPACMETOCEN SAN DIEGO CA//30//
NAVPACMETOCEN YOKOSUKA JA//30//
NAVEURMETOCEN ROTA SP//30//
INFO COMSUBPAC PEARL HARBOR HI//N73// (FOR WEST COAST BASED
SUBMARINE REQUESTS)
COMSUBLANT NORFOLK VA//N317// // (FOR EAST COAST BASED
SUBMARINE REQUESTS)
COMSUBGRU NINE//N33// (FOR WEST COAST BASED SUBMARINE
REQUESTS)
COMSUBGRU TWO//N35// (FOR EAST COAST BASED SSN REQUESTS)
COMSUBGRU TEN//N35// (FOR EAST COAST BASED SSBN REQUESTS)
NAVPACMETOCFAC WHIDBEY ISLAND WA//00// (FOR WEST COAST SSBN
REQUESTS)
NAVPACMETOCFAC COMP BANGOR WA//00// (FOR WEST COAST SSBN
REQUESTS)
COMPATRECFORPAC KANEOHE BAY HI//N3// (FOR HI BASED P3
REQUESTS)
NAVPACMETOCDET KANEOHE BAY HI//33// (FOR HI BASED P3 REQUESTS)
COMPATRECONWING TEN WHIDBEY ISLAND WA//N3// (FOR WEST COAST
P3 REQUESTS)
NAVOCEANO STENNIS SPACE CENTER MS//N2/N3// (ALL REQUESTS)
BT
UNCLAS (or classified)//N03145//
SUBJ/MODAS PRODUCT REQUEST (U)//
MSGID/GENADMIN/NEVERSAIL//
REF/A/DOC/NAVMETOC COMINST 3140.1L//
AMPN/US NAVY METOC SUPPORT MANUAL//
RMKS/1. TYPE OF DATA REQUESTED: (CHOOSE FROM ONE OF THE
FOLLOWING): SOUND VELOCITY/GRIDDED TEMP/SEA-SURFACE
TEMP/SONIC LAYER DEPTH/TEMP AT SPECIFIED DEPTH/3-D DATA CUBE.
2. FORMAT TYPE: (CHOOSE ONE) GRAPHICAL/OVERLAY 2 /TEXT DATA
(E.G. SYNTHETIC JJYY/JJVV PROFILES, EMPIRICAL ORTHOGONAL
FUNCTION).
3. TYPE OF DELIVERY: (CHOOSE ONE) AUTODIN/E-MAIL/SIPRNET /JMCIS.
4. AREA OF INTEREST: PROVIDE CENTER POINT AND RADIUS FROM
CENTER POINT OR PROVIDE FOUR POINT LAT/LONG GRID
COORDINATES: (E.G. 21.00N AND 25.00N TO 156.00W AND 164.00W).
5. START DATE AND END DATE OF REQUESTED PRODUCT (YYMMDD TO
YYMMDD).

6. RESOLUTION OF REQUESTED GRID (TENTHS OF DEGREE) AND/OR MAXIMUM MESSAGE LENGTH DESIRED: 0.1, 0.2, 0.3, 0.4, 0.5.(SEE FIGURE 8-3).

7. FREQUENCY OF PRODUCT: TWICE A WEEK, THREE TIMES A WEEK, MONTHLY (DEPENDING ON VARIABILITY OF WATER IN YOUR AREA).

8. ROUTING/CLASSIFICATION INSTRUCTIONS*: (SONAR SHACK, ASW WATCH OFFICER).//

BT

* Requesting Unit can specify the classification of the data or product. If not specified, then data will be classified the same as the request message.

Figure 8-2. Example MODAS Support request message

b. Compaction Scheme. The current compaction scheme is Empirical Orthogonal Function (EOF). This allows the regional centers to compact the data into a message size that can be transmitted and ingested by the fleet users. The regional center will determine which compression factor is necessary to produce the requested length of message. Requests from the fleet should include the maximum number of pages that are acceptable. A byte-encoded data transmission scheme is available and is employed to send MODAS fields from NAVOCEANO to the regional centers. However, most TDA's are unable to ingest this type of data due to the size of the generated files. Hence the EOF compaction scheme is used to transfer MODAS data from regional centers to end line users.

Note: The total area and resolution requested affect the size of the output. Consideration should be given to keeping the area as small as possible or decreasing the resolution if a large area is required. Figure 8-3 provides some examples of message length for various resolution, compaction and area combinations. When possible, the regional METOC center should confirm with the requesting unit the best compromise data set available once the data is processed.

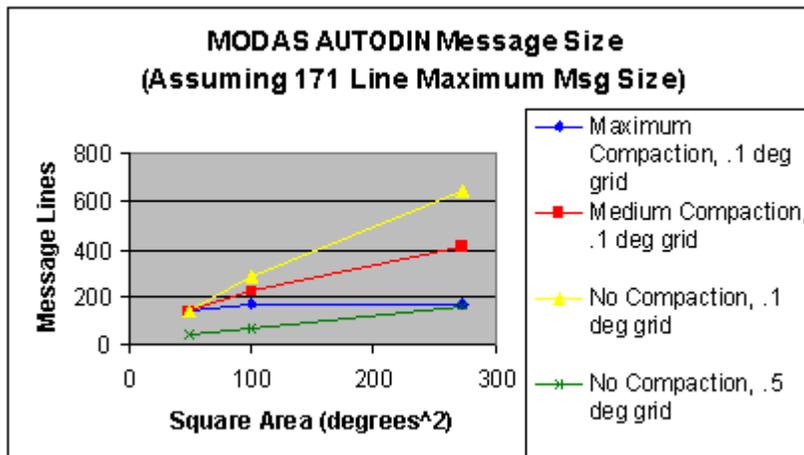


Figure 8-3. Examples of AUTODIN message length for various resolution, compaction and area combinations

c. Bathythermographs. To ensure regional centers have the most current data to ingest, bathythermograph observations should be taken and reported IAW Chapter 5 of this instruction.

8.4.2 Front and Eddy Analyses

Near-real-time high-resolution (1.1-km) infrared and visual imagery is acquired from the Advanced Very-High-Resolution Radiometer (AVHRR) sensor hosted aboard NOAA polar-orbiting satellites. Multi-Channel Sea Surface Temperature (MCSST) algorithms are used to create images in gray shades or false color which are calibrated, geo-referenced, and optimally enhanced to locate ocean thermal features in cloud-free areas. Ocean areas analyzed include the North Atlantic and North Pacific oceans, Mediterranean Sea, Greenland-Iceland-Norwegian Sea, and the Western Indian Ocean.

Identification of ocean features is accomplished by defining the surface position of fronts and eddies through daily analysis of AVHRR imagery. This information is assimilated with data from drifting buoys, bathythermographs, ocean circulation models, and altimetry-derived sea surface heights to determine the position of frontal boundaries. Fronts and eddies are digitized on the satellite image and replicated in specially formatted data files which include frontal positions (latitude/longitude) and frontal strengths by temperature gradient (deg C per 10 NM). Tailored composites of observed frontal boundary locations from recent cloud-free images as well as estimated positions from frontal climatology are provided to Theater METOC Centers in Navy Standard Over-The-Horizon Targeting Gold (OTG) OVLY2 format.

8.4.3 Mine Drift Product

Driven by the Princeton Ocean Model (POM), the Mine Drift product is provided in OTG OVLY2 text format and as a graphic via SIPRNET. This product depicts the time-averaged expected motion of a semi-submerged object due to currents and windage. The product displays a two-day forecast and three-day hindcast of the direction and speed of a minelike object for points selected by on-scene personnel. Object drift output can be produced for any area where the Modular Ocean Data Assimilation System (MODAS), Shallow-Water Analysis and Forecast System (SWAFS), or Advanced Circulation (ADCIRC) models are currently running (see section 8.4.6). New areas can be created in one to three days.

8.4.4 Oil Spill Dispersion Model

The General NOAA Oil Modeling Environment (GNOME) is a lagrangian particle trajectory model and expert system developed by NOAA for use in predicting the fate of a hydrocarbon spill (crude, fuel oil, diesel, or gasoline), including the effects of wind, currents, evaporation, and dispersion. NOAA's Hazardous Materials Response Branch (NOAA/ HAZMAT) has national responsibility for oil spill forecasts in U.S. waters, even if the spill involves a U.S. Navy vessel. NAVOCEANO may use the On-Scene Spill Model in international or foreign territorial waters in support of DoD exercises or actual spills upon request from U.S. DoD commands.

8.4.5 Contingency Ocean Modeling

Under the COMNAVMETOC COM Concept of Operations for Ocean Modeling, NAVOCEANO is responsible for ocean models in support of contingency operations or exercises.

Using the Wave Model (WAM), the Steady State Spectral Wave Model (STWAVE), the Navy Standard Surf Model 3.0 (SURF 3.0), and the Modular Ocean Data Assimilation System (MODAS) coupled with the Princeton Ocean Model (MODAS/POM), NAVOCEANO can provide wave, thermal, and circulation (geostrophic and wind driven currents) products for most areas of the globe to spatial resolutions of 5 minutes (compatible with DBDB-5). WAM and MODAS/POM areas with spatial resolutions of 5 minutes can be implemented for most areas of the globe within 48 hours of the initial request. Higher resolution wave model areas can be implemented to the spatial resolution of the available bathymetry. The time required to implement higher resolution areas vary depending upon the availability of finer-scale bathymetry.

NAVOCEANO has the limited capability to provide tidal heights and tidal currents (astronomical and wind driven) using ADCIRC. All areas are NOT run on a routine basis. If an area is not being run when a product is requested, the modeled area must be "cold started." The areas available are:

1. Northwest Atlantic
2. Yellow Sea and Sea of Japan
3. Arabian Gulf
4. Southern California
5. Mediterranean Sea

ADCIRC areas require an 18-cycle spin-up period if cold started. The time required to accomplish a cold start is five days.

All model output is available as graphics at the NAVOCEANO web site. Some MODAS output is available as Empirical Orthogonal Functions (EOF) and Byte Encoded Data files via the NAVOCEANO web site and/or directly by the Distributed Processing System Replacement (DPSR). Models undergoing transition are listed in the annual NAVOCEAN Plan and updated in the NAVOCEANO Quarterly Report.

8.4.6 Multi-Channel Sea Surface Temperature (MCSST)

NAVOCEANO produces real-time global MCSSTs between 80N and 70S. AVHRR data from NOAA polar-orbiting satellites are converted into MCSSTs within 10 minutes of receipt using the Satellite Processing System (SPS). MCSSTs are used at NAVOCEANO for ocean thermal and circulation analysis and prediction in coastal and semi-enclosed basin modeling. MCSSTs are also provided to FLENUMMETOCEN for use in world-wide open-ocean thermal analysis prediction models and to NOAA/NESDIS for use and distribution to the civilian community. MCSSTs are also provided to regional centers for ingest into MODAS. Several 10-km regional SST analyses and data distribution graphics are available via the NAVOCEANO World Wide Web page.

NAVOCEANO is the National Core Processing Center for the production of MCSSTs and has the responsibility of ensuring accurate and timely global production of MCSSTs on the SPS. The accuracy of MCSSTs compared to drifting buoys must be less than 0.2 deg C bias and 0.7 deg C root-mean-square difference. To ensure this, NAVOCEANO uses several quality control databases to monitor MCSST production: an 8-day MCSST observation file, a global 100-km analyzed sea surface temperature field, and an MCSST/drifting buoy comparison file.

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MCSST products available via SIPRNET, NIPRNET, and DPSR include regional 1/10° gridded MCSST composites, daily observations, and 8-day observation graphics.

8.4.7 Altimetry Products

NAVOCEANO's Altimetry Data Fusion Center (ADFC) is the Core Processing Center for satellite altimetry data. The ADFC is the only real-time processing center in the world providing operational altimetry products from TOPEX/POSEIDON and ERS-2. The ADFC also serves as the Payload Operations Center (POC) for the U.S. Navy's GEOSAT Follow-On (GFO) satellite altimeter program. The ADFC processes altimetry data into Sea Surface Heights (SSH) for assimilation into oceanographic analyses and models and to support mesoscale front and eddy nowcasting within the WSC. Significant Wave Heights (SWH) are calculated from altimetry in a unique measurement from space-based platforms to support wave modeling and high seas warnings. SWH and MWS observations are produced in near-real time and distributed to Fleet users and other customers via NIPRNET, SIPRNET, and DPSR.

8.4.8 Ocean Features Analysis

Near real-time high resolution (1.1 km) infrared and visual imagery is acquired from the Advanced Very High Resolution Radiometer (AVHRR) sensor hosted aboard polar-orbiting satellites. Multi-Channel Sea Surface Temperature (MCSST) algorithms are used to create images in 256 gray shades which are calibrated, georeferenced, and optimally enhanced to locate ocean thermal features in cloud free areas. Ocean areas analyzed include the North Atlantic and North Pacific Ocean, Mediterranean Sea, Greenland-Iceland-Norwegian Sea and the Western Indian Ocean.

Identification of ocean features is accomplished by defining the surface position of fronts and eddies through daily analysis of AVHRR imagery. This information is assimilated with data from drifting buoys, bathythermographs and altimetry-derived sea surface heights to determine the position of frontal boundaries. Fronts and eddies are digitized on the satellite image and replicated in specially formatted data files which include frontal positions (latitude/longitude) and frontal strengths by temperature gradient (deg C per 10 NM). Tailored composites of observed frontal boundary locations from recent cloud-free images as well as estimated positions from frontal climatology are provided to Theater METOC Centers in Navy Standard Over-The-Horizon Targeting Gold (OTG) OVLY2 format. Composites of frontal positions are also provided to FLENUMMETOCEN for ocean modeling efforts.

8.4.9 Rapid Environmental Assessment Chart-Tactical (REACT)

REACT is an extension of the Ocean Feature Analysis concept, using a Geographic Information System application to create layers of data. Layers include fronts and eddies, MCSST, altimetry, significant wave height, imagery, bathymetry, weather, and other METOC data sets that are available both in real time and through a data warehouse. REACT allows a data query and manipulation capability allowing products to be tailored to meet specific customer requirements. Prototype products are being tested for real world support and Fleet exercises.

8.4.10 Additional Services

The WSC serves as the focal point in NAVOCEANO's support to special operations amphibious and other military forces through the Global Fusion Division. All forms of tactical oceanographic information are fused with all source imagery and in-situ data to support joint operations and Fleet exercises within the littoral in near-real time.

NAVOCEANO uses a variety of sources to produce imagery-based products. Depending on the intended use of the product, as well as the required turnaround time, imagery is acquired either from commercial or national sources. Product descriptions of some key WSC products are listed below:

a. Environmental Support Package (ESP). An Environmental Support Package is a text product consisting of a highly detailed all-source data fusion analysis of the environmental factors of the oceanographic and littoral regions the world. This analysis consists of information defined as Essential Elements of Information (EEI). This information is obtained from libraries, publications, databases, maps, charts, information from the world wide web and other commercial and Department of Defense sources. The information contained in the EEIs of an ESP consists of, but is not limited to: currents, tides, tidal currents, bathymetry, bottom sediments, bioluminescence, waves, sea and swell, surf, breakers, vegetation, biofouling, dredging, pollution, dangerous marine life, water clarity, water temperature, turbidity, approaches to beaches, ports and harbors, anchorages, climatology, riverine environments and fishing methods and activity. This product is normally 10 to 20 pages in length and may have graphics, maps, charts and analyzed imagery attached. This product can be completed in two weeks to one month depending on the justification provided by the customer and the priority from the Customer Service Division at the Warfighting Support Center.

b. Executive Summary (ES). The Executive Summary is an abbreviated version of the Environmental Support Package. This text product contains only that data which is significant to customer or that can be rapidly researched and is easily available on short notice to the analyst. This research information is collected from the same Sources as the Environmental Support Package. The Essential Elements of Information contained in Executive Summary are the same as in the Environmental Support Package. This product is only 2 to 5 pages in length and contains highly detailed all-source data fusion analysis of the environmental factors in the oceanographic and littoral regions of the world. It may have an analyzed imagery product attached but does not normally have graphics, maps or charts as attachments. This product can be produced in hours or days depending on the justification provided by the customer and the priority given from the Customer Service Division at the Warfighting Support Center.

c. Analyzed Imagery (AI). Analyzed Imagery is an imagery product, which can be based on one or multiple images. Analyzed Imagery is collected from all commercial and/or Department of Defense platforms, sensors and sources. It can be digital or hardcopy imagery or photography. The Imagery is annotated with information that is researched from libraries, databases, models and analysis based on imagery interpretation. Analyzed Imagery is provided to the customer in either a matter of hours, days or weeks depending on the justification provided by the customer and the priority given the request from the Customer Service Division at the Warfighting Support Center.

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d. Special Tactical Oceanographic Information Chart (STOIC) is a composite of imagery, bathymetry and EEIs for an area measuring 8NM X 8NM. Users can specify which EEI datasets they want from a list of 42. Information available on a STOIC can include currents, tides, sea surface temperatures, salinity, pollution and drainage, navigation aids, submerged objects, visibility, shipping, vegetation, encrustation rates, mine burial prediction, sonar predictions, mine dip, beach slope, beach trafficability and surf. The final product can be a hardcopy chart or a digital download from the SIPRNET.

e. Special Analyzed Image, Littoral (SAIL) is often used if no bathymetry is available to make a STOIC, or if the product is needed in less time than a STOIC requires. The SAIL consists of an analyzed image of the desired area, along with a smaller set of EEIs. If the user does not specify which EEIs are needed, the SAIL will be tailored to the customer's need based on the justification given at the time of the request. A SAIL can be completed in about three weeks.

CHAPTER 9

PRODUCTS AND SERVICES OF THE FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY CENTER

9.1.0 Introduction

The Fleet Numerical Meteorology and Oceanography Center's (FNMOC) mission is to: "Combine innovative technology with the best available science in order to provide the best weather and oceanographic products, data and services to the operating and support forces of the DoD anywhere, anytime." FNMOC achieves this by performing a number of functions:

- a. Collecting, decoding, managing, assimilating, and analyzing, global data including quality control and re-distribution.
- b. Operation of state-of-the-art global and mesoscale numerical METOC analysis and forecast models which extend from the top of the atmosphere to the bottom of the ocean.
- c. Tailoring/relocating METOC models anywhere in the world to support the operating and support forces of the DoD.
- d. Provision of computational and communication support.

FNMOC produces thousands of meteorological and oceanographic products for U.S. and Allied Forces monthly. Most requests for these products are received via phone, fax, E-mail and the Department of Defense Automated Digital Network (AUTODIN). FNMOC continually pushes the limits of hardware/software capability to satisfy the customer requirement of timely and accurate support without product degradation. FNMOC continually assesses the following areas of concern:

- The structure of how the models are run and computer resources.
- Data ingest in to the models.
- Appraising and making code changes to allow for new and remotely sensed data sources.
- Researching/changing model algorithms to increase efficiency and provide improved products.

In essence, FNMOC receives data from a variety of sources to provide the customer with the following:

- Raw and quality controlled METOC data.
- Satellite imagery (particularly SSM/I).
- Gridded fields of analyzed and forecast METOC parameters.
- Tailored application products, for example, forecasts of refractivity.

- Distribution, communication, application and display software for viewing METOC products and data.
- Access via multiple state-of-the-art communication pathways.

As implied previously, FNMOC's goal is to provide the above in a timely, efficient manner while continuing to push science and technology with the express aim of improving product provision.

9.2.0 Fleet Support Division (FSD)

In order to enhance the interface between FNMOC support resources and external customers, FNMOC established the Operations Department Fleet Support Division (FSD) (310 Division). By acting as the external customer's single Point of Contact (POC), FSD improves FNMOC's quality of support by streamlining and facilitating all FNMOC METOC support processes. The primary FSD POC for all requests is the Fleet Liaison Officer.

As the POC to handle all customer support requests, FSD will staff Routine, Special and Contingency support to provide high quality products and facilitate timely completion of projects. Though routine support requests are normally handled via automated processes (i.e., Data Request Product) or cognizant divisions (i.e., Web Support Division for JMV), FSD routes these requests to the appropriate POC/Division and provides notification/follow-up services.

9.2.1 FSD Mission Scope

a. Contingency Support

In support of high-interest operations, FNMOC provides fast-reaction, specialized model and satellite support. Normal completion time from receipt of request is 7 working days, but emergent support is possible within 1 - 2 calendar days. FSD initiates contingency support processes, coordinates product quality control and verification, and administers final product delivery. Contingency support typically includes Special Support, which makes the QC process critical to delivering an accurate and reliable product. However, FSD staffing will ensure completion of the entire process as quickly as possible. FSD will maintain customer connectivity from initial request to support completion.

FNMOC's standard contingency support package includes a high-resolution METOC model and specialized DMSP satellite imagery products with JMV and NODDS support.

b. Special Support

FNMOC defines this as support requiring product format or transmission modification, specialized METOC model or new product development. FSD will staff customer requirements and provide assessment of FNMOC capabilities and resources necessary to complete requests.

c. Routine Support

Routine support consists of existing FNMOC products transmitted via operational delivery circuits that do not require specialized METOC model support or product format changes. FSD will route Routine support requests to cognizant Departments or Divisions for action. In all cases, FSD will provide notification and follow-up services.

d. Contact Information

FLEET SUPPORT DIVISION	24 HOUR SUPPORT - CDO
fso@fnmoc.navy.mil	cdo@fnmoc.navy.mil
831-656-4339/4442	831-656-4325/4326/4302
DSN 878-4339/4442	DSN 878-4325/4326/4302
Unclass FAX: x4313	Unclass or Class FAX: x4577

9.3.0 Data Request Product (DRP)

This section provides general descriptions of DRP's and alphanumeric products. The following products (Table 9-1) and request procedures are detailed in FLENUMMETOCEN P-3146 (DRP user Manual which can be found at www.fnmoc.navy.mil under the DoD area Software & Manuals). As an overview, requests can be made via DRP formatted AUTODIN message or telephone request to Regional Centers. Normal request procedure is via AUTODIN, but short-notice support requirements may require telephone request direct to FNMOC. All DRP products are available for immediate processing and transmission via AUTODIN, NIPRNET/SIPRNET, NIPRNET E-mail and fax, 24 hours a day.

Data Request Products		Short Name
1	Search and Rescue	SAR
2	Spot Output	SPOUT
3	Grid Data Extract	OMDAT/FEXT
4	General Environmental Message	GEM
5	Point Data Extract	PNTDT
6	Refractive Information By Station	RIBS
7	Ballistic Wind and Density	BALW
8	Sound Focusing	SNDFO
9	Bathythermograph Data Extract	BTXT
10	Ocean Model Temperature Profiles	JJPRO
11	General Acoustic Conditions	GEM GACGEM
Alphanumeric Products		
12	Strike/Wind Probability and Storm Surge Warnings	Wind P/Strike P

Table 9-1. DRP Products

9.3.1 Search and Rescue Product (SAR)

Navy SAR (NSAR) is designed for open-ocean SAR situations and provides computer generated historical (60 hours) and forecast (72 hours) output. NSAR is a search and rescue planning support product that provides a summary of the SAR situation, target location maps, search recommendations and a summary of the environmental conditions at the requested times. Probability maps are generated using Monte Carlo simulation. It is available to all SAR coordinators for operational and training missions. Required inputs to SAR product in relation to drifting object are:

- a. Type of object
- b. Time object began to drift
- c. Lat/Long where object began to drift
- d. Navigational error in object position.

Product turn-around time is less than 20 minutes from time of receipt at FNMOC to time of transmission from FNMOC. For the fastest turn-around time, contact the watchfloor, (831) 656-4302, or DSN 878-4302. SAR output can be received via fax, AUTODIN Message, E-mail or read over the phone.

SAR coordinators should use caution when requesting solutions for coastal areas. Local small-scale land effects, tidal effects, and local near-shore currents are not included in the solution. The land-sea definition of grid spacing makes details of coastal topography and small islands transparent to the model, therefore, best results are obtained in the open ocean. (For coastal CONUS SAR support contact the Coast Guard, (202) 267-2100.)

9.3.2 Spot Output (SPOUT)

SPOUT provides surface land, surface ship, radiosonde, pilot balloon, aircraft, satellite infrared spectrometer, and/or hourly report observations extracted from the FNMOC database in an easy-to-read format. Observation reports up to 72 hours prior to the current Date Time Group (DTG) can be obtained.

9.3.3 Grid Data Extract (OMDAT or FEXT)

Grid Data Extract products provide environmental data extracted from FNMOC data grids for selected geographic areas as an ocean-met alphanumeric OTH-T message (OMDAT) or as a field extract alphanumeric message (FEXT).

9.3.4 General Environmental Message (GEM)

GEM provides the user with analyzed (synoptic) or forecast environmental data for specified locations or grid points within an area. Table 9-2 shows GEM data available:

GEM Data	GEM Data
Pressure surface height	Ditch heading
Height differential	Wave direction, period & ht
Wind direction and speed	Freezing level
Marine (sea surface) wind	Thickness (500 mb to 1000 mb)
Sea-level air pressure	Evaporative duct height
Altimeter setting	Ocean current dir & speed
Air temperature	Mixed layer depth
Sea-surface temperature	Wind gusts at sea surface(direction & speed)
Contrail probability	Below Layer Gradient
Sonic Layer Depth	Surface Ducting
Convergence Zone Prob	General Acoustic Conditions
Half-channel Conditions	Ocean Bottom Depth
Shallow Sound Channel Axis Depth	Shallow Sound Channel Frequency Cutoff
Deep Sound Channel Axis Depth	

Table 9-2. GEM Data Products

9.3.5 Point Data Extract (PNTDT)

Table 9-3 provides PNTDT Data Products extracted from METOC model fields:

PNTDT Data	PNTDT Data
Marine Wind Speed	Primary Wave Period
Marine Wind Direction	Primary Wave Direction
Sea Surface Temperature	Secondary Wave Period
Significant Wave Height	Secondary Wave Direction

Table 9-3. PNTDT Data Products

9.3.6 Refractive Information by Station (RIBS)

RIBS provides decoded upper air soundings data from requested upper air reporting stations or from all stations within a geographic area defined by a circle or rectangle. RIBS output provides pressure, temperature, dew point depression, M units, gradient of M per 1000 ft, height and type of refraction. Users may choose up to 25 stations per request. RIBS output is useful for inputting into electromagnetic propagation models, for example, the Integrated Refractive Effects Prediction System (IREPS).

9.3.7 Ballistic Wind and Density (BALW)

The BALW product is designed to support Naval Gunfire operations. It provides surface-to-surface, surface-to-air, and rocket assisted projectile forecasts. The product is a tabular listing of wind direction, speed and air density for up to fifteen altitude zones. It is derived from various atmospheric analysis and forecast data fields, which can be combined with a user-provided upper air sounding.

9.3.8 Sound Focusing (SNDFO)

SNDFO provides atmospheric sound (i.e. Sonic Boom or bomb blast) propagation loss at selected altitudes and bearings using characters to represent loss magnitude.

9.3.9 Bathythermograph Data Extract (BTXT)

BTXT provides Expendable Bathythermograph (XBT) observations from FNMOC synoptic databases and outputs an alphanumeric product in JJYY/JJVV format; essentially, this is another version of a SPOUT.

9.3.10 Ocean Model Temperature and Sound Velocity Profiles (JJPRO & JJSVP)

The JJPRO product provides computer generated Global model ocean analysis temperature profiles in JJVV format. The JJSVP product provides derived sound speed profiles in JJYY format. The profiles extend from the surface to 400 meters or to the ocean floor depth, whichever is shallower.

9.3.11 General Acoustic Conditions GEM (GACGEM)

The GACGEM product provides General Acoustic Conditions (GAC) products for requested geographic regions. The product is displayed in General Environmental Message (GEM) format. This allows GAC products not routinely made at FNMOC to be requested. High-resolution gridded data is utilized in building these products.

9.3.12 Department of State Tropical Cyclone Strike, Wind and Storm Surge Probability Warnings

a. Description. The Tropical Cyclone Strike, Wind and Storm Surge Probability Warning message provides a prediction of the track, maximum wind, wind distribution and storm surge over a three-day period of a tropical cyclone. These deterministic forecasts represent the best estimate of the future, but by no means represent the only possible future for the storm.

b. Output Options and Formats. The Tropical Cyclone Strike, Wind and Storm Surge Probability Warning message format is preset. The message is issued for all storms that threaten Embassies, Consulates, Defense Attaches, Liaison Offices and other activities as determined by the Department of State. For detailed information and interpretation of the warning message, refer to FNMOC's "Users Guide to the Department of State Tropical Cyclone Strike, Wind and Storm Surge Probability Warnings" dated Nov 1994.

9.4.0 Navy Oceanographic Data Distribution System (NODDS) Products

In the future NODDS will be phased out as a method of retrieving data. FNMOC recommends users transition to the latest version of JMV software to take advantage of its greater capabilities. The Travelling Training Team can assist commands in training personnel in the use of JMV. Contact Information:

Email: fso@fnmoc.navy.mil
Comm: 831-656-4453
DSN: 878-4453

9.5.0 Mobile Meteorology and Oceanography Support (MMOS) Products

Users are normally required to dial-in to FNMOC to retrieve NODDS data or access our NIPRNET/SIPRNET homepages to download JMV thumbnails. However, these communication paths are not always available to all customers. As a solution, FNMOC has developed a method of transmitting data via other means. These methods include, but are not limited to: AUTODIN and E-mail. To reflect changes in AUTODIN-BASED NODDS support, the name has been changed to Mobile Meteorology and Oceanography Support (MMOS).

9.5.1 Requesting MMOS Data

a. Regional centers and facilities should coordinate all requests for MMOS for units operating within their respective AOR.

b. To ensure quality support is properly initiated, request messages must be received at the FNMOC administrative PLAD (FLENUMMETOCCEN MONTEREY CA) at least 72 hours prior to requested start date. Requests received less than 72 hours prior to the requested start date will be temporarily filled using predefined areas until the request can be processed. Standard products provided in the predefined areas will be: 12 & 36 hour Surface Pressure & Winds, 500mb Heights & Winds, & Significant Wave Height .

c. Due to AUTODIN communication restraints, MMOS messages are limited in size. As a result the following guidelines are necessary:

(1) For 1 degree surface / 2.5 degree upper air resolution request: The area of interest should not be larger than 30 degrees latitude and 50 degrees longitude. Additionally, no more than 10 product-taus* may be requested.

(2) For 2.5 degree surface / upper air resolution request: The area of interest should not be larger than 40 degrees latitude and 60 degrees longitude. Additionally, no more than 18 product-taus* may be requested.

* **NOTE:** Wind products count as 2 Product-TAUS because they consist of a direction and a speed (U and V components).

d. To prevent delays in providing requested support, requests should use the following template:

- A. METHOD OF VIEWING: (JMV or NODDS)
- B. PERIOD OF SUPPORT: (start date to end date)
- C. AREA: (latitude and longitude)
- D. GRID SPACING: 2.5 DEGREE (standard - 1.0 degree optional)
- E. FREQUENCY: TWICE DAILY (standard - once daily optional)
- F. PRODUCTS AND TAUS REQUESTED: (use product manual)
- G. PRIORITY: PRIORITY (standard - routine/immediate optional)
- H. PASSING INSTRUCTIONS: PASS TO EMBARKED MET (standard)
- I. ACTION ADDEES:
- J. INFO ADDEES:

K. POC INFO:

L. COMMENTS:

NOTE: Follow-on requests to continue support as ships transit may be included in the same message. A NIPRNET and SIPRNET based form for requesting MMOS will soon be available on the FNMOC websites.

- e. Users with E-mail capability can request MMOS via E-mail vice AUTODIN. In this instance, users should include the E-mail address in the request message and indicate the desire to receive products via E-mail in the 'COMMENTS' section of the request. This should eliminate the inherent problems of the AUTODIN system, but accessibility and bandwidth limitations of requesting unit should be considered.

9.5.2 Viewing MMOS Data (with NODDS and JMV)

a. Viewing with NODDS

(1) Capture the environmental data via AUTODIN message, E-mail, or other means of data transfer. The transmission of data via AUTODIN will result in a message with multiple sections. These sections must be copied in the correct order to a file named "packet.dat" in order to process correctly, that is, Section 1 of X, Section 2 of X,, Section X of X.

(2) Once the packet.dat file has been assembled as required, transfer this file to the host PC for NODDS 4.1. The packet.dat file may be processed directly from a floppy disk, or copied to a directory on the host system hard disk and processed.

(3) Select 'Process Transmit File' under the 'Data Manager' menu. This option breaks up the packet.dat file into its constituent components, stores them in the appropriate directories, and processes the data for display.

(4) Select 'Map' under the 'Display' menu and view data as usual.

b. Viewing with JMV 3.1

(1) Save the AUTODIN message as 'packet.dat', as described in Section 9.5.2(a).

(2) View any area with JMV 3.1, the data cannot be imported for display unless an area is being viewed. Select FILE – IMPORT MESSAGE. Browse to the location of the 'packet.dat' file and select OPEN, the file is then imported as a map into the display menu.

(3) Close the area you were viewing. Select DISPLAY – MAP. The AUTODIN Area will have a blank picture and the name that FNMOC assigned when setting-up the message.

(4) Select the Area and view normally.

9.6.0 Joint METOC Viewer (JMV) Products

9.6.1 Overview

The Joint METOC Viewer (JMV) is a user-friendly, yet sophisticated software package for the display, manipulation and annotation of meteorology and oceanography (METOC) charts and related information distributed on the World Wide Web. JMV uses the latest Web technology to retrieve information from Navy data repositories at Regional Centers throughout the world. The user can gain access to the network via either NIPRNET, SIPRNET, JWICS, or Commercial Internet Service Provider.

The hardware and operating system combinations necessary to run JMV are:

Sun Solaris Minimum Configuration

Sun SparcStation or equivalent
128 MB RAM Solaris 2.6 or higher

32-Bit Windows Minimum Configuration

Pentium 200 Mhz
96 MB RAM
Windows 95
Video Color Palette 32768 colors
Resolution: 1024X768

32-Bit Windows Recommended Configuration

Pentium III 500 Mhz
128 MB RAM
Windows NT, Windows 95, Windows 98, Windows 2000

JMV is unique in its approach to environmental data communications. A geographical area and associated products are stored on a host server. Any authorized user can download the area to their computer. Once raw data is received by the client's computer, the products are processed automatically until all are in a ready-to-display format. A variety of display options are configurable, these include contour intervals, colors for screen and printer, and units. JMV can display, and loop, up to ten different products.

Information regarding JMV can be obtained from the JMV User Manual or by viewing JMV Frequently Asked Questions on FNMOC's web site (www.fnmoc.navy.mil).

9.6.2 Products Available

a. WEB Thumbnails

JMV currently provides Regional Centers with the capability to define areas of interest and select different gridded products for the defined areas. Customers can request a new area and corresponding products via E-mail or telephone. JMV is currently limited to 300 products per thumbnail.

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The new way of generating thumbnails uses a variant of METCAST which was developed for the Regional Centers specifically to create thumbnails. This new system allows Thumbnails to be updated with data on a constant basis.

On the customers side, the processing of the data has been streamlined so that it is cleaner. The data is provided in a compressed GRIB format that is then converted into a .jmv format for use in the viewer. Both formats of the data are stored on your computer which allows you to use the thumbnails for JMV or for GRIB to feed to other programs.

Partial downloads of JMV thumbnails provide users more flexibility. Whether you have a bandwidth problem or are interested in only certain fields, the SELECT PRODUCTS method will allow you to pull only those fields you want or can handle. Users can see what data is actually available, from what model and from what synoptic time. Additionally, you can download a thumbnail in pieces: if you have bandwidth problems where you time-out, download the first few products, then the next few products, etc. JMV will not purge data unless it is more than 24 hours past the current synoptic time downloaded.

The following centers provide JMV areas on their web pages: FNMOC Monterey, CA; NEMOC Rota, Spain; NLMOC Norfolk, VA; NPMOC San Diego, CA; NPMOC Yokosuka, Japan; NATICE Suitland, MD.

b. METCAST

METCAST is a standards-based, request-reply and subscription (channel) system for distributing weather and oceanographic information over the Internet using Hyper-Text Transfer Protocol (HTTP) and Multipurpose Internet Mail Extensions (MIME).

Using METCAST, you can:

- Define geographic areas of interest (areas for which you need weather and oceanographic data)
- For each area, select the products you wish to receive
- Specify the schedule for retrieving the products
- Send your request to a remote or local server via the World Wide Web, and
- Have your products retrieved and returned to you at the scheduled times, again via the World Wide Web.

The METCAST Client Segment includes a graphical user interface (GUI) to allow the user to select the products to be retrieved and the frequency and types of retrievals, and a retriever process that establishes communication with a METCAST server, submits a request for the data requested, and delivers the reply to the local user.

9.6.3 JMV Support

a. How to Request an Account

To request an account for JMV and the web page, users must be a valid member of the Department of Defense or an authorized DoD contractor. All requests for accounts should be sent to fso@fnmoc.navy.mil (accessible through the FNMOC web page) or by writing to:

Commanding Officer
Fleet Numerical Meteorology and Oceanography Center
Attn: Fleet Support Officer
7 Grace Hopper Avenue, Stop 1
Monterey, CA 93943-5501

For authentication purposes, a DSN telephone number and .mil E-mail address or an official request on command letter head (contracting command if contractor) is required. The FNMOC CDO can provide an ID and Password after working hours, if necessary.

b. Software Web Page

A software web page has been created and linked to the FNMOC home page. Access to this section is only available to authorized users meeting all registration requirements. This page serves three major functions:

- (1) Enables FNMOC to expedite the distribution of software modifications and changes to user manuals.
- (2) Provides direct communication from FNMOC's technical experts to customers regarding software, models, products, etc.
- (3) Provides customers with another avenue to contact FNMOC concerning software, data or web problems and enhancements desired.

c. Time usage

Peak usage hours for the FNMOC web pages are between 0600Z to 0900Z and 1800Z to 2100Z. Approximately 1200 to 2000 products are downloaded during these times, which is a 25% increase over non-peak periods. It is requested that non-operational commands use non-peak time frames to prevent interference with direct support of operational forces.

9.6.4 General JMV Products

The products types listed below are subject to minor change on relatively short time scales. When downloading data from a JMV thumbnail it is recommended that the product list associated with the thumbnail is viewed in order to ensure the required products are available.

a. Met. Observations

Upper Air Sounding and Synoptic Reports at 00Z or 12Z

b. Surface Met. Products:

Product	Forecast Period
Surface Pressure, FNMOC (mb)	00 – 144
Surface Pressure, NCEP (mb)	00 – 240
Surface Pressure, SAEF (mb)	48 – 72
Surface Pressure, JMA (mb)	00 – 72
Surface Air Temperature (C)	00 – 108
Surface Wind (kts)	00 – 144
Peak Winds (shaded - kts)	00 – 144
12-hr Precipitation Accumulation (10 th inch)	12 – 120
Ensemble Gale Probability (%)	24 – 240
Ditch Headings (Magnetic)	00 – 72

c. 1000mb Pressure Level Products

Product	Forecast Period
1000mb Height, FNMOC (m)	00 – 120
1000mb Height, NCEP (m)	00 – 144
1000mb Temperature (C)	00 – 120
1000mb Wind (kts)	00 – 144
1000mb Relative Humidity (%)	00 – 96

d. 925mb Pressure Level Products

Product	Forecast Period
925mb Height, FNMOC (m)	00 – 120
925mb Temperature (C)	00 – 120
925mb Wind (kts)	00 – 120
925mb Relative Humidity (%)	00 – 72

e. 850mb Pressure Level Products

Product	Forecast Period
850mb Height, FNMOC (m)	00 – 120
850mb Height, AUST (m)	00 – 120
850mb Wind, FNMOC (kts)	00 – 120
850mb Wind, AUST (kts)	00 – 120
850mb Temperature (C)	00 – 120
850mb Relative Humidity (%)	00 – 96

f. 700mb Pressure Level Products

Product	Forecast Period
700mb Height, FNMOC (m)	00 – 120
700mb Temperature (C)	00 – 120
700mb Wind (kts)	00 – 120
700mb Relative Humidity (%)	00 – 96

g. 500mb Pressure Level Products

Product	Forecast Period
500mb Height, FNMOG (m)	00 – 132
500mb Height, NCEP (m)	00 – 240
500mb Height, SAEF (m)	48 – 72
500mb Height, AUST (m)	00 – 120
500mb Height, JMA (m)	48 – 72
500mb Temperature (C)	00 – 120
500mb Wind (kts)	00 – 132
500mb Vorticity	00 – 120
500mb Short Wave	00 – 120
500mb Long Wave	00 – 120

h. 400mb and above Pressure Level Products

Product	Forecast Period
400mb/300mb/250mb/200mb/50mb/30mb Height (m)	00 - 120
400mb/300mb/250mb/200mb/50mb/30mb Temperature (C)	00 – 120
400mb/300mb/250mb/200mb/100mb/50mb/30mb Wind (kts)	00 – 120

i. Other Upper Level Products

Product	Forecast Period
1000ft – 19000ft (1000ft increment) Winds (kts)	00 - 48
19000ft – 45000ft (2000ft increment) Winds (kts)	00 – 48
1000ft – 19000ft (1000ft increment) Temperature (C)	00 - 48
19000ft – 45000ft (2000ft increment) Temperature (C)	00 – 48
1000mb – 500mb Thickness (m)	00 – 144
Freezing Level (flight level – ft)	00 – 72
Total Cloud Cover (%)	00 – 120
Upper Troposphere Mean Wind (kts)	00 – 72
Deep Layer Mean Wind (kts)	00 – 72
Tropospheric Layer Shear Wind (kts)	00 – 72

j. Sea Conditions Products

Product	Forecast Period
Significant Wave Height (ft)	00 – 144
Wind Driven Currents (kt x 10)	00 – 72
Whitecap Coverage (%)	00 – 144
Sea Height (ft)	00 – 144
Sea Period (s)	00 – 144
Sea Direction (degrees)	00 – 144
Swell Height (ft)	00 – 144
Swell Period (s)	00 – 144
Swell Direction (degrees)	00 – 144
Mean Wave Period (s)	00 – 144
Mean Wave Direction (degrees)	00 – 144
Maximum Wave Height (ft)	00 – 144
Primary Wave Period (s)	00 – 144
Primary Wave Direction (degrees)	00 – 144
Secondary Wave Period (s)	00 – 144
Secondary Wave Direction (degrees)	00 – 144
Ice Edge (Pacific/Atlantic/Antarctic)	Analysis
Ice Coverage (> 20%)	00 – 12

k. Physical Oceanography Products

Product	Forecast Period
SST (OTIS) (C)	00
SST Forecast (TOPS) (C)	00 – 72
Mixed Layer Depth (m)	00 – 72
Fronts and Eddies (West Pacific, East Pacific, Atlantic, Mediterranean, Indian Ocean)	Analysis

l. Acoustic Oceanography Products

Product	Forecast Period
Sonic Layer Depth (ft)	00
Surface Duct Cut-Off Frequency (Hz)	00
Shallow Sound Channel Depth (ft)	00
Shallow Sound Channel Strength	00
Shallow Sound Channel Cut-Off Frequency (Hz)	00
Below Layer Gradient (°F/100ft)	00
Half Channel (Yes/No)	00
Deep Sound Channel Depth (ft)	00
Bottom Bounce Probability	00
Convergence Zone usage	00
VLAD Acoustic Conditions – Low Frequency	00
General Acoustic Conditions – Low Frequency	00

m. 3-D Products (Meteorological and Oceanographic)

Product
Ocean 3-D (Temperature, Sound Speed, Temperature Anomaly)
Atmospheric 3-D (Temperature, 500mb height deviation)

n. Warning Products (Meteorological and Oceanographic)

Product
Wind Warning (Pacific, Atlantic, Indian Ocean, Mediterranean)
High Seas Warning (Pacific, Atlantic, Indian Ocean, Mediterranean)
Tropical Cyclone Warning (West Pacific, East Pacific, Atlantic, Indian Ocean, South Pacific, South Indian Ocean)

9.6.5 Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) JMV Products

All COAMPS regions run at FNMOC are available. These areas may change in accordance with operational necessity.

When a COAMPS area is selected, a number of new products become available in addition to the many listed in the General Products section. The COAMPS products available are listed below and are applicable to all areas.

a. Surface Meteorological Products

Product	Forecast Period	
	9km nest	27km nest
Surface Pressure (mb)	00 - 24	00 – 48 (72 some areas)
Surface Air Temperature (2m) (C)	00 - 24	00 – 48 (72 some areas)
Surface Wind (kts)	00 - 24	00 – 48 (72 some areas)
12-hr Precipitation Accumulation (10ths inch)	12 - 24	12 – 48 (72 some areas)
Evaporation Duct (ft)	00 - 24	00 – 48 (72 some areas)
Surface Terrain (ft) – not EUROPE 27km/9km or SWASIA 9km		

b. Upper Air Products

Product	Forecast Period	
	9km nest	27km nest
1000/925/850/700/500mb Height (m)	00 - 24	00 – 48 (72 some areas)
1000/925/850/700/500mb Temp. (C)	00 - 24	00 – 48 (72 some areas)
1000/925/850/700/500mb Wind (kts)	00 - 24	00 – 48 (72 some areas)
1000/925/850/700/500mb R.H. (%)	00 - 24	00 – 48 (72 some areas)

c. Oceanographic Products (not 9km nests)

Products	Forecast Period
Significant Wave Height (ft)	00 - 48 (72 some areas)
Sea Height(ft)/Sea Direction(degrees)/Swell Height(ft)/Swell Direction(degrees)	00-48

9.6.6 JMV Point of Contact:

Email: NIPRNET - webmaster@fnmoc.navy.mil SIPRNET- webops@metoc-c1.fnmoc.navy.smil.mil
Comm: 831-656-4325
DSN: 878-4325

9.7.0 Optimum Path Aircraft Routing System (OPARS)

OPARS is a preflight planning aid that integrates forecast atmospheric conditions with the pilot's proposed flight profile to provide an optimized flight plan in order to minimize fuel consumption and time enroute for each leg. OPARS serves as a supplement to the DD-175 (Military Flight Plan) and DD-175-1 (Military Flight Weather Brief). Additional information is available in the OPARS User's Manual which can be found at www.fnmoc.navy.mil under "Manuals."

OPARS consists of a set of computer programs, which select optimum routes for aircraft in support of flight operations. Within the context of OPARS, an optimum route is defined as the selected aircraft path and altitude that is constrained by the aircraft performance parameters, weather conditions, flight regulations and minimum total fuel consumption. OPARS is comprised of four distinct sub-systems briefly described as follows:

a. OPARS Customer Interface. The OPARS Customer Interface GUI provides an interface for the OPARS user to generate and submit OPARS Flight Plan requests. Additionally, it allows the METECH at FNMOC to assist customers in flight plan development.

b. Flight Planner and Monitor. Computes optimized flight plans per routing and performance parameters for given aircraft in support of flight operations. Additionally, it allows the METECH at FNMOC to monitor, control the OPARS server and assist in flight plan development.

c. OPARS Aeronautical Database. Consists of aircraft performance characteristics, jet-route structure and boundary data (Prohibited/Restricted areas and Special Use Airspace) as required for the satisfactory computation of OPARS Flight Plans.

d. Environmental Database. Consists of global flight level temperature and wind fields which are produced twice daily and are derived from the FNMOC Navy Operational Global Atmospheric Prediction System (NOGAPS) forecast model. Flight levels supported range from 1000 - 55000 ft. Forecast taus supported are 0 - 72 and 6hr intervals. Temperature and Wind fields based upon climatology are also available to allow for future planning.

The OPARS user is the individual interacting through a personal computer linked with the computer system at FNMOC. The OPARS user builds a flight plan request at the terminal with the aid of a windows program and submits the flight plan request to the computer for processing. Included within this request will be such information as aircraft type, point of departure, time of departure, point of arrival and other pertinent information.

After the flight plan request is submitted to and accepted by the system, the Flight Planner begins selecting an optimum route for the aircraft to fly. During this building process, the Flight Planner will call on different route options for the flight path. These routes are all checked for critical wind data and aircraft parameters. Ultimately, the route that optimizes fuel consumption is chosen. As the final step in the process the information is formatted as a flight plan and made available for retrieval from the personal computer of the OPARS user. Delivery to flight personnel completes the process.

9.7.1 User Access to OPARS

- a. Remote Terminal Access.** User access to OPARS is provided primarily via remote terminals using conventional telephone lines for communications. The user, at their personal computer, connects to FNMOC's computer system and submits information necessary for OPARS to generate a flight plan. The completed flight plan is returned to the user via his remote terminal.
- b. NIPRNET.** Flight plans may be requested via the NIPRNET. FNMOC's host computers are accessed via NIPRNET in the same manner as described in Section 9.7.1(a).
- c. Telephone and/or Fax Requests.** Flight plans may be requested via the telephone or fax. The METECH will enter the Flight Plan Request and return the completed Flight Plan via E-mail or fax. METECH contact information is given below.

9.7.2 User Responsibility

It is the responsibility of the flight forecaster or OPARS user to review OPARS products to ensure their consistency/correctness with present and forecast synoptic conditions.

9.7.3 OPARS Support

- a. How to Request an Account.** Users will need an OPARS user ID and password in order to submit requests for OPARS Flight Plans or receive OPARS Environmental data via N-PFPS. To request an account, users must be a valid member of the Department of Defense (DoD) or other U.S. Government agencies. All requests for accounts should be sent to fso@fnmoc.navy.mil (accessible through the FNMOC web page) or by writing to:

Commanding Officer
Fleet Numerical Meteorology and Oceanography Center
Attn: Fleet Support Officer
7 Grace Hopper Avenue, Stop 1
Monterey, CA 93943-5501

For authentication purposes, a DSN telephone number and .mil E-mail address or an official request on command letter head (contracting command if contractor) is required. The FNMOC CDO can provide an ID and password after working hours, if necessary.

Within a few days of the request, the assigned user ID and password, program software and related documents will be mailed.

The new user will also be assigned a JMV account that will allow the user to download the OPARS Customer Interface software (includes Aeronautical Database), OPARS manuals, software updates, and view documents directly from the FNMOC homepage. This is the current method for getting the OPARS monthly Aeronautical Database updates.

b. OPARS Software Web Page

A software web page has been created and linked to the FNMOC home page. Access to this section is only available to authorized users meeting all registration requirements. This page serves three major functions:

- (1) Enables FNMOC to expedite the distribution of software modifications and changes to user manuals.
- (2) Provides direct communication from FNMOC's technical experts to customers regarding OPARS software.
- (3) Provides customers with another avenue to contact FNMOC concerning OPARS problems and enhancements desired.

9.7.4 Contact Information

METTECH	Technical/Software Aspects
Comm 831-656-4453	Comm 831-656-4677/4486
DSN 878-4453	DSN 878-4677/4486

9.8.0 Web Site Specific Products

FNMOC maintains web sites to provide access to the most updated meteorological and oceanographic products available. These sites are for use by DoD activities, authorized non-DoD

users, as well as the public. The public side of the web site contains a limited amount of products, while the DoD side provides a much larger list of products for the wide range of military use. Authorized users who desire access to restricted sections of the web site may inquire for an account through the following E-mail address: *webmaster@fnmoc.navy.mil*.

9.8.1 Weather Map (WxMAP) Products

a. Overview. WxMAP is a web-based interface designed to display images containing meteorological data updated following each model run. Data from FNMOC's NOGAPS and COAMPS models, along with those from NCEP's AVN and MRF model are displayed via this medium. It depicts commonly used parameters in an easily readable format for several pre-determined areas around the globe. Images are available for the current and the previous five model runs. The images may be viewed individually or animated in a movie loop. The strength of WxMAP is that it allows the user to display basic meteorological data from related FNMOC and NCEP models in a consistent format in order to assess the likely evolution of environmental parameters. Access to WxMAP is available via either NIPRNET or SIPRNET.

b. WxMAP Products

(1) COAMPS Products

WxMAP displays of COAMPS products are available for all 27 and 9 km COAMPS areas. Current areas, their resolution, and forecast periods are shown in the following table.

Area	Resolution	Forecast Period
Central America	27km	T+48
East Pacific	27km	T+48
Europe	27km/9km	T+72/T+24
West Pacific	27km	T+72
CONUS	27km	T+48
SW Asia	27km/9km	T+48/T+24
West Atlantic	27km	T+48

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Individual product displays are as shown in the following table. Unless noted otherwise, all products are available for each area at 6-h intervals from hour 0 to the maximum forecast period.

Products	Notes
500hPa Height(m) and Relative Vorticity(10^{-5} s^{-1})	
700hPa Height(m); Wind(kt); Temperature(C)	
850hPa Temperature(C), Wind(kts) and RH(%)	
925hPa Height(m); Wind(kt); Temperature(C)	
10m Wind(kts); Sea Level Pressure(hPa)	
1000-500hPa Thickness(dm); Sea Level Pressure(hPa)	
Previous 6-hr Precipitation Rate(mm/6hr); Sea Level Pressure(hPa)	No hour 0 precipitation rate
WAM Sig. Wave Height(ft); Over Ocean Surface Wind(kts)	Not available for Europe, SW Asia or CONUS
10m Wind(kts); 1 hr animation	Europe only

(2) NOGAPS/NCEP AVN/NCEP MRF Products

WxMAP displays of global model products are available for the regions and forecast periods in the table, below.

Area	Forecast Period		
	NOGAPS	AVN	MRF
North America	T+144	T+72	T+144
Europe	T+144	T+72	T+144
SW Asia	T+144	T+72	T+144
West Pacific	T+144	T+72	T+144
East Pacific	T+144	T+72	T+144
Atlantic	T+144	T+72	T+144
Australia/New Zealand	T+144	T+72	T+144
Tropical SW Pacific	T+144	T+72	T+144
Tropical East Pacific	T+144	T+72	T+144
Tropical Atlantic	T+144	T+72	T+144
Tropical Indian Ocean	T+144	T+72	T+144

Individual global model product displays are as shown in the following table. Unless noted otherwise, all products are available for each model and region at 12-h intervals from hour 0 to the maximum forecast period.

Products	Notes
300hPa Height(m) and Isotachs(kts)	Not available for tropical areas
500hPa Height(m) and Relative Vorticity(10^{-5} s^{-1})	Not available for tropical areas
700hPa Height(m); RH(%); Vertical Velocity(Pa/s) [Only]	NOGAPS North America, East Pacific and SW Asia, only
850hPa Temperature(C), Wind(kts) and RH(%)	Not available for tropical areas
1000-500hPa Thickness(dm); Sea Level Pressure(hPa)	NOGAPS North America, East Pacific and SW Asia, only
Previous 12hr Precipitation Rate(mm/12hr); Sea Level Pressure(hPa)	In tropical areas, NOGAPS only; no hour 0 precipitation rate
WAM Sig. Wave Height(ft); Over Ocean Surface Wind(kts)	NOGAPS only
200hPa Streamlines; 850-200 Wind Shear ; 850hPa and 200hPa Wind Barbs	Tropical areas only
Surface Streamlines and Wind speeds(kts)	Tropical areas only
Clear Air Turbulence	NOGAPS West Pacific, East Pacific, and Atlantic, only to T+60

9.8.2 Other FNMOC Web Products

Images from many different model outputs are via FNMOC's web site by following the web site index to the appropriate page. Samples of relevant products currently available via NIPRNET and SIPRNET are as follows:

a. Satellite Images

FNMOC generates satellite imagery through DIGS that allows users to define specific areas on the Earth in which they want to view data. Images can contain OLS IR/VIS or SSM/I data from one or more DMSP satellites and be tailored to the user's specifications. Characteristics such as map projections, geographic boundaries, and resolution can be created for each image. Currently, predefined

areas of interest are being created for use on our SIPRNET, NIPRNET, and JMV pages as well as for tropical cyclone tracking. More details on these products are available in Section 3.4.

b. Oceanography Products

Oceanographic products include the WAM, both global and regional, WAM with ERS2 Altimetry overlay for verification purposes and OTIS output. More details on these products are available in Section 10.

c. Ensemble Forecast System (EFS) Products

The EFS products available via FNMOC's web site are covered extensively in Section 9.9.3.

d. Model Descriptions and Performance Information

In addition to the model output displays described above, the FNMOC web site includes background information on model formulation and performance, both historical and immediate. This information helps the user to assess model accuracy and tendencies, and enhances the value of the daily output products.

Descriptions of model dynamics, physics, and implementation details are available for NOGAPS, COAMPS, MVOI, EFS, OTIS, and WAM. The historical performance characteristics of NOGAPS, COAMPS, and WAM forecasts are documented. A tutorial on the use of numerical guidance for mesoscale forecasting and a number of case studies further illustrate typical behavior of the models.

The Model Summary pages provide a specific description of model performance for NOGAPS, COAMPS, WAM, and PIPS, updated monthly. The analysis includes qualitative discussions, mean depictions of the environment, and statistical verification scores for each model with respect to verifying observations and analyses.

Model performance can be evaluated on a daily basis by viewing comparisons of 24 and 48 hour NOGAPS, COAMPS, and AVN forecasts with verifying analyses of 500 hPa heights, sea level pressure, and 10 m wind speed. Differences between NOGAPS and AVN analyses of 500 hPa height and sea level pressure are displayed shortly after each model run. Data coverage diagrams display the various types of data that were available to the models from the REAL TIME (00Z and 12Z) and OFF TIME (06Z and 18Z) observations. Images are produced shortly after each data cut for the PRELIM, REAL TIME and POST TIME runs.

9.9.0 Meteorological Models

9.9.1 Navy Operational Global Atmospheric Prediction System (NOGAPS)

NOGAPS (Figure 9-1) is a global spectral numerical weather prediction model; it is the only global meteorological model operated by the DoD. The model employs state-of-the-art data quality control, data assimilation, non-linear normal mode initialization and atmospheric physics to produce skillful medium-range weather forecasts. NOGAPS generates several thousand operational fields per day, including, surface winds and heat fluxes to drive ocean models and lateral boundary conditions to support regional atmospheric models. By whatever means, NOGAPS output supports almost every operational application run at FNMOC.

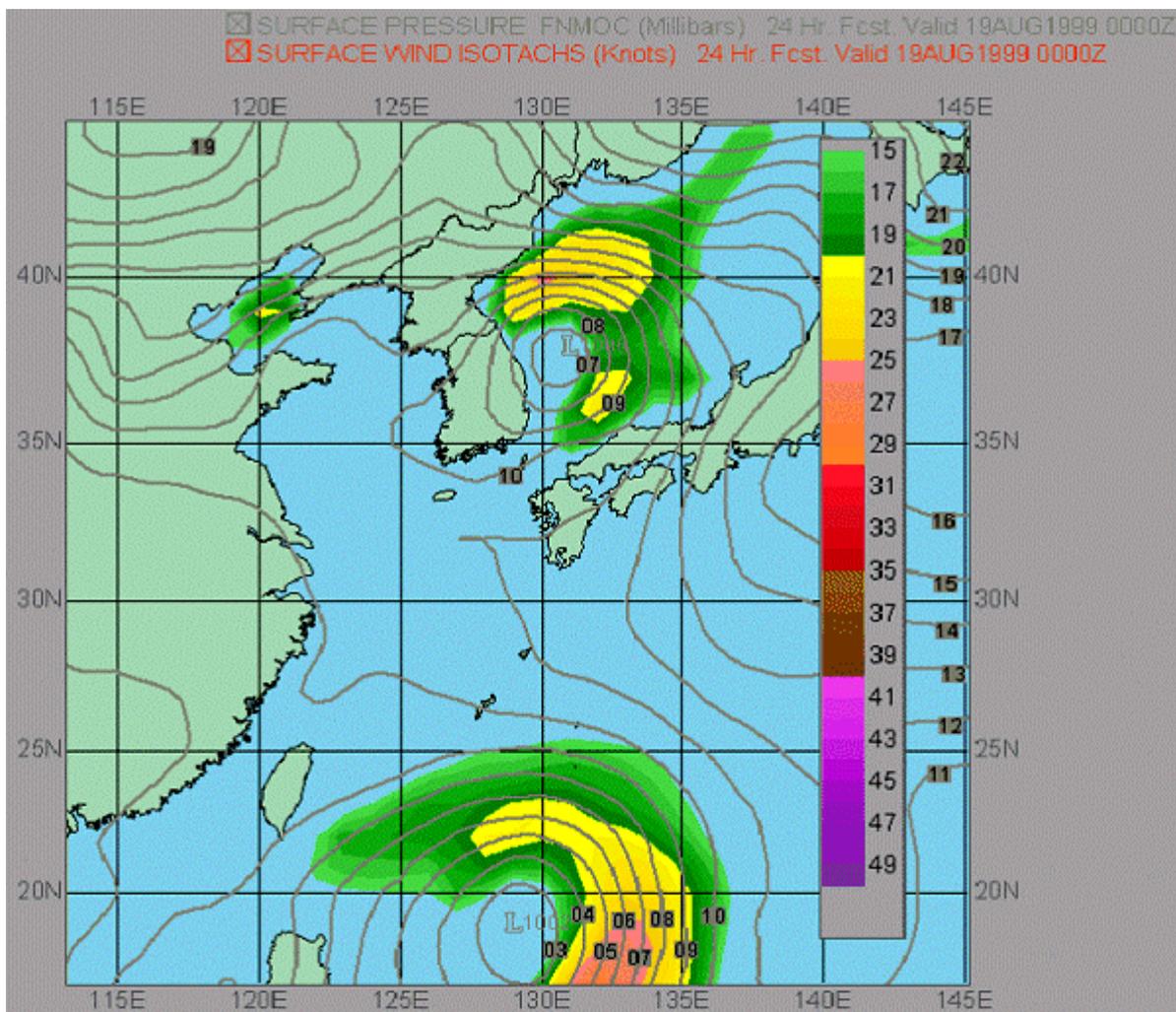


Figure 9-1. NOGAPS forecast of mean sea level pressure and wind speed in the West Pacific

The following are useful links for learning more about NOGAPS:

- a.** Model Specifications: Brief summary of the physics and parameterizations used in NOGAPS.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_SPEC/nogas4.0.html
- b.** Model Characteristics and Tendencies: Summary of NOGAPS model performance and tendencies.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_TENDENCY_REVIEW/tendencies.html
- c.** Monthly Model Summary: Monthly statistical analysis of NOGAPS model performance.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MONTHLY_MODEL_SUMMARY/

9.9.2 Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS)

COAMPS provides an integrated system approach to mesoscale analysis and forecasting. The current operational system includes modules for METOC data quality control and assimilation, meteorological forecasts, and product generation. The tight integration of these modules helps provide a high level of consistency among the analysis and forecast products at various resolutions.

COAMPS is designed to use multiple nested grids to represent the evolution of environmental quantities over progressively smaller regions of the world at progressively higher spatial resolution. This approach is particularly useful for providing tactical METOC products in coastal regions, where phenomena of concern include coastal winds, squalls, and other organized convection.

The following are useful links for learning more about COAMPS:

- a.** Model Specifications: Brief summary of the physics and parameterizations used in COAMPS.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_SPEC/nogas4.0.html
- b.** Model Characteristics and Tendencies: Summary of COAMPS model performance and tendencies.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_TENDENCY_REVIEW/tendencies.html
- c.** Monthly Model Summary: Monthly statistical analysis of NOGAPS model performance.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MONTHLY_MODEL_SUMMARY/

- d. Forecasting Tutorial: Tutorial on mesoscale forecasting using COAMPS and the Joint METOC Viewer.
http://www.fnmoc.navy.mil/DOD/COAMPS/FCST/fcst_index.html

9.9.3 Ensemble Forecast System (EFS)

FNMOC's EFS is based on NOGAPS. It is designed to extend the useful range of global numerical forecasts and provide improved guidance regarding their reliability. The theoretical basis for ensemble forecasting depends on the chaotic nature of the atmosphere. Due to the natural occurrence of complex non-linear atmospheric processes, even small errors in the initial analysis can lead to very large forecast errors. Ensemble forecasting attempts to use this sensitive dependence on initial conditions to define a range of probable initial analyses by carefully perturbing the original analysis. Then, multiple forecasts based on these new initial conditions are run, providing a range of forecasts. FNMOC's EFS consists of 10 members, each of which is a ten-day NOGAPS forecast. Initial conditions for 8 ensemble members are obtained by spectrally truncating the full resolution initial conditions and adding "bred" perturbations that represent the most rapidly growing analysis errors. Two additional members are the current and 12-hr old full resolution 6-day forecasts, extended to 10 days at the same truncated resolution as the other 8 members. The simple mean of the ensemble forecasts represents an intelligent filter, and generally demonstrates greater skill than any individual forecast. More importantly, the distribution of the several member forecasts allows probability forecasts and estimates of forecast reliability.

The following EFS products (table 9-4) are accessible via FNMOC's SIPRNET and NIPRNET World Wide Web (WWW) home pages.

Products	Areas
Gale Probability	N. Pacific, N. Atlantic, Australia and N. Indian Ocean
Precipitation Probability	N. America, N. Pacific, N. Atlantic, Australia and N. Indian Ocean
500 hPa 5640 m Contour Probability	North Hemisphere, South Hemisphere and Indian Ocean
Bahrain Shamal/Monsoon Support Probability 850 hPa N winds 25 kt Probability 500 hPa N winds 50 kt Probability 250 hPa N winds 50 kt	Indian Ocean
NLMOC Support 500 hPa Standard Deviation 500 hPa Spaghetti Diagram 2 m Temperature 1000-500 hPa thickness & SLP	N. America
Plumes - 500mb height and thickness, mslp, 2m air temp., 12hr precip. accumulation	FNMOC, CNMOC, NLMOC, NEMOC, NPMOC Pearl, NPMOC Yokosuka, NCMOC Bahrain, Point Mugu

Table 9-4. EFS Products and Areas

9.9.4 Geophysical Fluid Dynamics Navy (GFDN)

The Navy version of the Geophysical Fluid Dynamics Laboratory Tropical Cyclone Model provides synoptic flow, track, and intensity forecasts for tropical cyclones in the West Atlantic, East Pacific, South Pacific and Northwest Pacific basins and the Indian Ocean. The model includes a moving triply nested grid, second order turbulence closure, convective adjustment, infrared and solar radiation, and parameterization of land surface characteristics by vegetation type. The model is initialized from a special analysis constructed by removing the tropical cyclone component from the NOGAPS analysis and replacing it with a synthetic vortex generated from the observed location and structure of the storm. Forecast lateral boundary conditions for the GFDN forecasts are provided by NOGAPS.

9.9.5 Derived Atmospheric Fields (DAF)

The Derived Atmospheric Fields (DAF) model derives diagnostic atmospheric fields and sensible weather parameters (e.g., relative humidity, clear air turbulence, freezing level, fog probability, rain rate, etc.) from the basic output produced by NOGAPS. Displays of clear air turbulence probability are included with NOGAPS WxMAP.

9.10.0 Oceanographic Models

The oceanographic models run at FNMOC include: WAM, OTIS, TOPS, PIPS and OCN_MVOI.

9.10.1 Wave Model (WAM)

The Third-Generation Wave Model (WAM) (Figure 9-2) contains state-of-the-art non-linear physics for forecasting the evolution of directional wave energy spectra and derived wave height, period and direction fields. WAM is run in both global coarse-resolution (1.0°) and regional high-resolution (0.2-0.25°) implementations at FNMOC. All COAMPS implementations (except the land-locked SW Asia and CONUS) include a regional WAM.

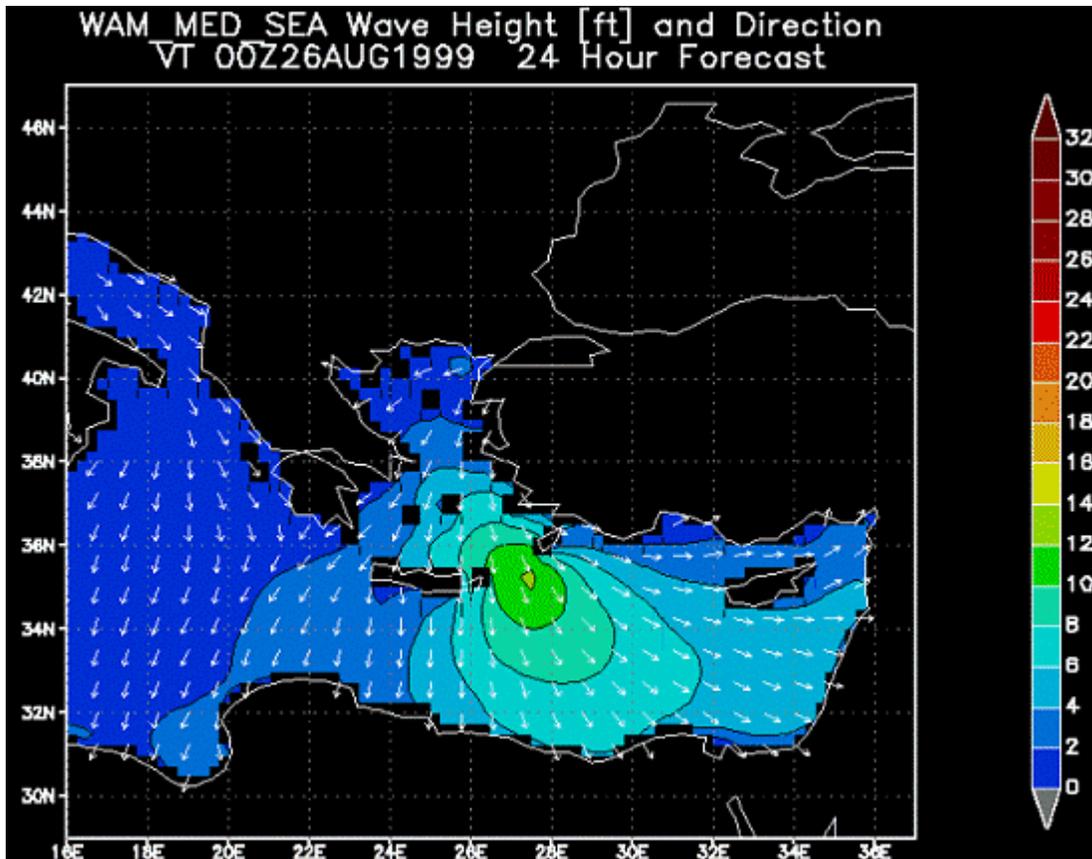


Figure 9-2. Regional WAM for the Eastern Mediterranean

The regional implementations generally include shallow water physics to account for refraction and bottom friction effects, although these formulations begin to lose validity at depths shallower than about 10m. WAM uses wind stress forcing from NOGAPS or 10m winds from COAMPS. WAM provides crucial support for Optimum Track Ship Routing (OTSR), the issuance of high-seas warnings, and many other applications.

- a. Model Specifications: Brief summary of the physics and parameterizations used in WAM.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_SPEC/gwa_m4.0.html

b. Global WAM Products

In addition to NODDS and JMV, Global WAM products are available as graphic (.gif) images via the FNMOC website. For comparison purposes, the Global WAM is displayed with the ERS-2 satellite wave-height data; these images are valid time images and are created approximately 8 hours after valid time (based on arrival time of ERS2 data). A table of product areas and forecast/valid times is given below.

Product Areas	Forecast/Valid Times	
	GWAM	ERS2/GWAM
Global	00 – 144	00Z/06Z/12Z/18Z
North Atlantic	00 – 144	00Z/06Z/12Z/18Z
South Atlantic	00 – 144	00Z/06Z/12Z/18Z
North Pacific	00 – 144	00Z/06Z/12Z/18Z
South Pacific	00 – 144	00Z/06Z/12Z/18Z
Indian Ocean	00 – 144	00Z/06Z/12Z/18Z

c. Regional WAM Products

Regional WAM products are also available as graphic (.gif) images via the FNMOC website, as given below.

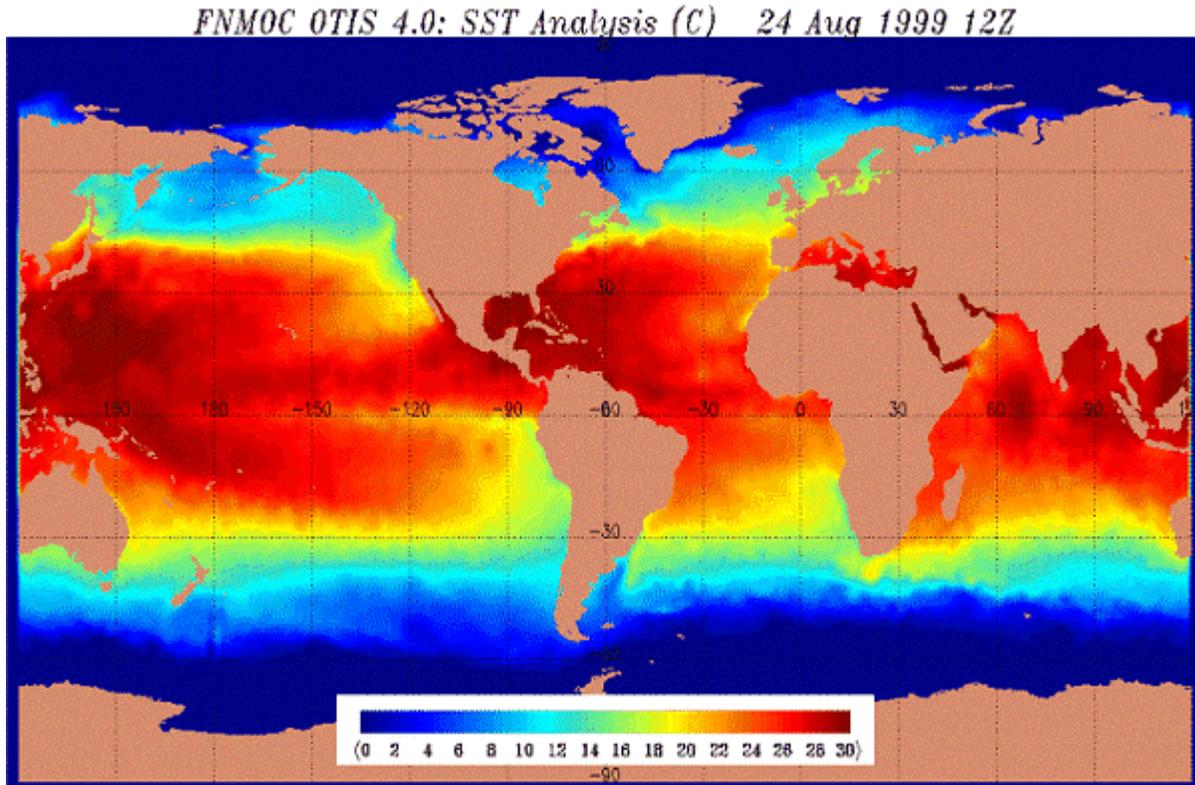
Product Areas	Forecast Times
Full Mediterranean	00 – 72
Western Mediterranean	00 – 48
Eastern Mediterranean	00 – 48
Black Sea	00 – 48
Adriatic	00 – 48
Arabian Gulf	00 – 48
Baltic Sea*	00 – 48
Caribbean Sea	00 – 48
Western Pacific	00 - 72
Eastern Pacific	00 - 48
Western Atlantic	00 - 72

* This regional output is not from the COAMPS driven Regional WAM.

9.10.2 Optimum Thermal Interpolation System (OTIS)

OTIS (Figure 9-3) is the primary ocean thermal analysis used at FNMOC; the current version is v4.0, which has been operational since 1994. Global, coarse-resolution, and regional, high-resolution, versions are in use. A special version of OTIS called Ice OTIS analyzes sea ice for use in the PIPS and WAM models. All of the OTIS implementations use the Optimum Interpolation (OI) technique to assimilate real-time data. The real-time data includes, ships, fixed and drifting buoys, satellite derived sea surface temperatures, and bathythermograph and buoy subsurface temperatures. All observations are quality controlled prior to being assimilated by OTIS. The OTIS global SST analysis is produced every 12 hours using the previous analysis as the first guess field. Regional OTIS further employs water-mass-based representation of ocean thermal climatology and ocean front and eddy "feature models" to produce "synthetic" data to supplement the "real" data. This allows a detailed and accurate depiction of subsurface thermal

structure associated with fronts and eddies whose surface positions are depicted in operational ocean front and eddy analyses derived primarily from satellite imagery by analysts at the Naval Oceanographic Office.



a. **OTIS Products.** FNMOC provides OTIS products via the web page as graphical images. The products available are listed below.

Product
Sea Surface Temperature Analysis
Sea Surface Temperature Anomaly
Sea Surface Temperature Climatology
Southern Ice Concentration
Northern Ice Concentration
OTIS Archive – back to Jan 97

The following link is useful for learning more about OTIS:

Model Specifications: Brief summary of the physics and parameterizations used in OTIS.
http://www.fnmoc.navy.mil/PUBLIC/MODEL_REPORTS/MODEL_SPEC/otis4.0.html

9.10.3 Thermodynamic Ocean Prediction System (TOPS)

TOPS is a synoptic ocean mixed-layer model. Both global coarse-resolution and regional high-resolution versions are in use. It is initialized by temperature and salinity fields from OTIS and includes sophisticated turbulence closure physics and radiation absorption calculations. TOPS produces forecasts of upper-ocean thermal structure and currents driven by surface wind stresses and heat fluxes predicted by NOGAPS.

9.10.4 Polar Ice Prediction System (PIPS)

PIPS is a dynamic and thermodynamic sea-ice model with an underlying dynamic ocean model designed to forecast ice thickness, concentration, and drift in the Arctic, and surface ocean current and temperature in the surrounding seas. PIPS is driven by surface wind stresses and heat fluxes from NOGAPS. It is updated daily from an objective analysis of ice concentration data from the Special Sensor Microwave/Imager (SSM/I) instrument aboard the Defense Meteorological Satellite Program (DMSP) satellite.

9.10.5 Ocean Multi-Variant Optimum Interpolation System (OCN_MVOI)

OCN_MVOI (Figure 9-4) is the new ocean analysis system that is expected to replace OTIS. Currently, OCN_MVOI analyzes sea surface temperatures (SST), altimeter sea surface heights (SSH) and sea ice from buoy, ship and satellite observations. The SST and sea ice analyses are used in NOGAPS and COAMPS. OCN_MVOI will soon add a full 3-D (surface to 5000 meters) analysis of temperature and salinity. As in OTIS, OCN_MVOI will use "synthetic" data to supplement actual observations. However, instead of using an ocean feature model and the fronts and eddy bogus, this new system will derive temperature and salinity profiles from analyzed SST and SSH data combined with a sophisticated ocean database developed at the Navy Research Laboratory. OCN_MVOI will be more flexible in that it can quickly be relocated to new regions without development of specialized feature models as is required by OTIS.

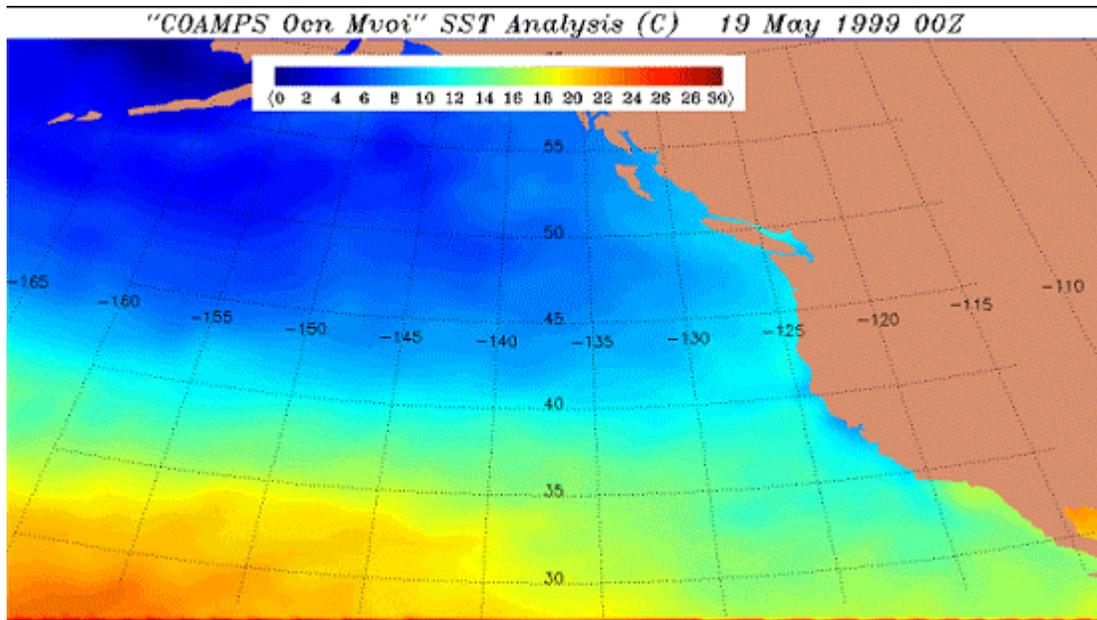


Figure 9-4. Sea surface temperature from COAMPS Ocean MVOI data analysis for East Pacific

Integration of OCN_MVOI with atmospheric models will provide better lower boundary conditions, therefore improving meteorological products.

9.11.0 Distributed Atmospheric Mesoscale Prediction System (DAMPS)

FNMOCC shares the responsibility of providing theater size mesoscale models with the USN regional centers, which can execute the Distributed Atmospheric Mesoscale Prediction System (DAMPS) locally. DAMPS is a fully functional automated, portable atmospheric nowcast/forecast/data assimilation system. It allows the forward-deployed user to make use of the growing volume of atmospheric data available on-scene. This is done by using either large-scale or mesoscale model gridded data fields as a first-guess field that can be augmented with observations, satellite data, etc., in order to provide an accurate initial field for a numerical weather prediction model run. The core of DAMPS is built around the atmospheric component of the non-hydrostatic Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS). The DAMPS GUI allows the user to easily tailor numerical weather analyses/nowcasts and forecasts for areas of tactical interest and to set up customized output data sets.

The DAMPS hardware system is composed of three UNIX workstations connected to either the classified (SIPRNET) or unclassified (NIPRNET) Internet networks, most systems are connected to the SIPRNET. The three workstations are:

- a) The Tactical Environmental Data Server (TEDS) database server, a Sun Enterprise E250 multiprocessor server with the TEDS relational database management scheme installed on top of the commercial Informix product.
- b) The COAMPS computational server, a multiprocessor Silicon Graphics, Inc. (SGI) Origin 2000 server with the COAMPS software installed. This includes

world-wide databases of static surface parameters, such as the 400 m resolution coastlines, 1 km resolution terrain height, 1° resolution albedo, and land use, among others.

c) A SGI O2 graphics console/workstation that provides the graphical console for the Origin 2000 and E250 servers, allowing the operator to easily set up, modify, and automatically execute a forecast. In addition, the O2 workstation hosts a web server. Products are built and posted automatically to the server, thus providing graphical products over the network. The system also has the capability to interactively visualize the forecast results using the Vis5D program developed at the University of Wisconsin.

NOGAPS provides the lateral boundary conditions and initial background fields for COAMPS, the NOGAPS data is downloaded, in WMO GRIB format, from FNMOC using the METCAST system. In addition to decoding the NOGAPS fields, the TEDS component of DAMPS can also automatically decode, store, and quality control observational data from both serial and network data feeds, allowing the initial analysis/nowcast field to be as accurate as possible. The output data field products from COAMPS are designed to support operational interests and include products from wind fields to visibility and refractivity.

In essence, the system uses as much real-time observational data as possible with a consistent previously run forecast to produce an accurate analysis that is used by one of the most sophisticated non-hydrostatic atmospheric models in the world to produce a high resolution 3D forecast for direct ingestion to tactical decision aids in order to support operational commanders at the front-line. This is done near on-scene for the area of operational interest, that is flexible enough such that it may be changed at a moments notice.

9.12.0 Satellite Products

FNMOC receives, processes, and distributes a wide variety of METOC satellite data for both internal and external customers. This section describes data available to external customers. These data are distributed using three primary methods; 1) METCAST, used for customized requests by specialized client applications (e.g. JMV, ATCF), 2) the Web, used for traditional web browser clients, and 3) DRP (Data Request Processing), used to provide standardized BUFR data to traditional ftp based customers. Most of the products described in the following document can be provided to new external customers via one or all of the distribution methods upon approval by FNMOC OPS.

9.12.1 DMSP Vis/IR & SSM/I Image Products

From predefined selected areas of interest (AOI) around the globe, FNMOC provides Defense Meteorological Satellite Program (DMSP) Vis/IR and Special Sensor Microwave/Imager (SSM/I) image mosaic products to SIPRNET, NIPRNET, NSDS-E, FNMOC Web Page (www.fnmoc.navy.mil) and JMV/METCAST users for image displays. Predefined characteristics such as map projections, satellite(s), geographic boundaries, and resolution can be selected for each image area of interest (AOI). Customers should forward image product AOI requests to FNMOC.

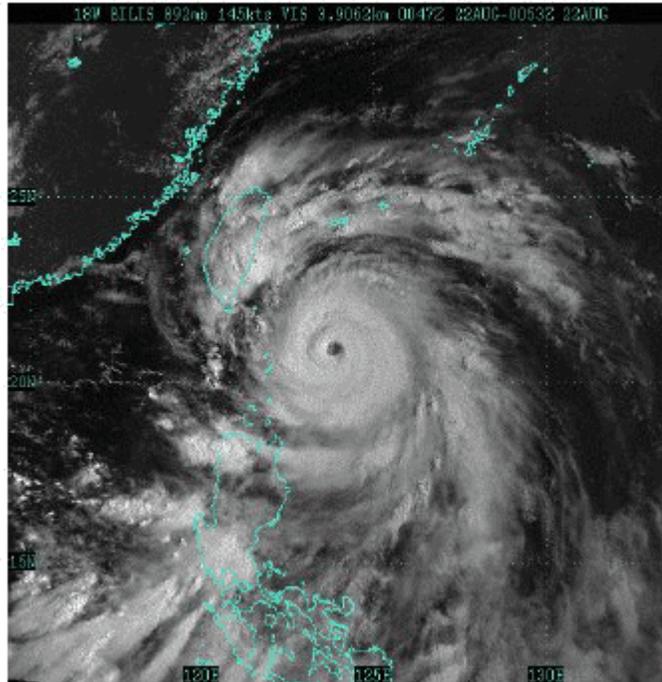


Figure 9-6. Typhoon Bilis visible image

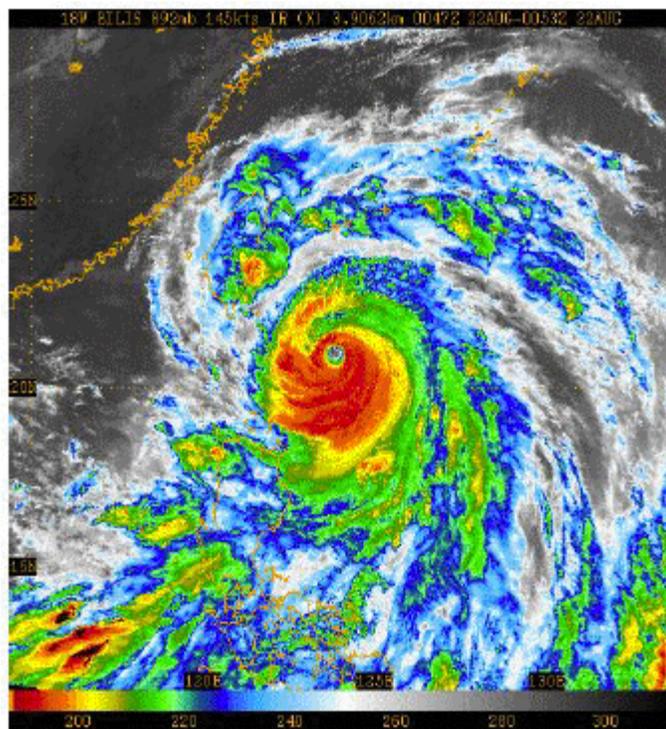


Figure 9-7. Typhoon Bilis IR image

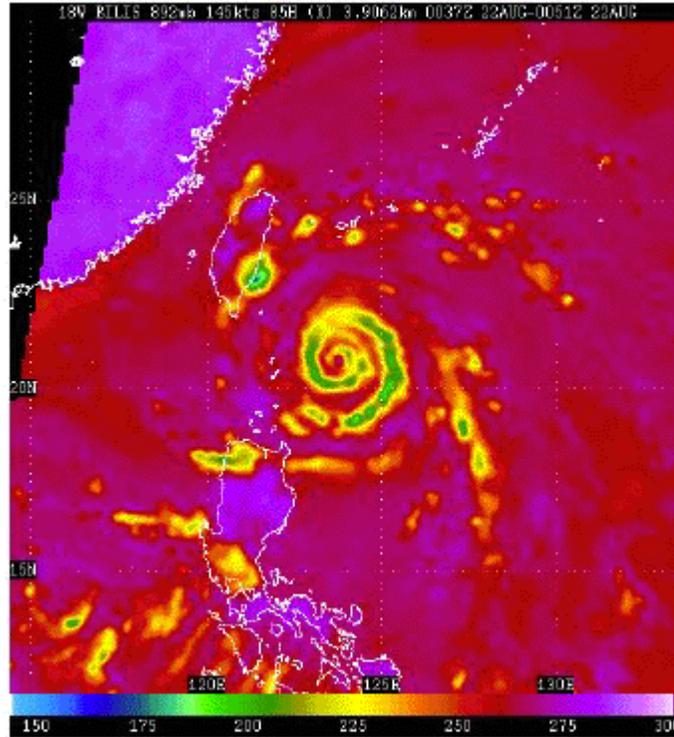


Figure 9-8. Typhoon Bilis 85GHz image

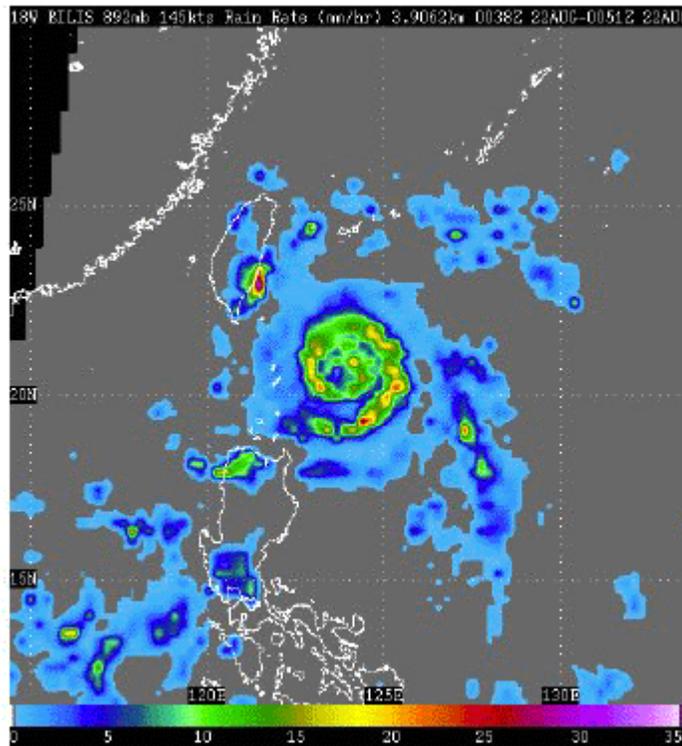


Figure 9-9. Typhoon Bilis Rain Rate image (892 mb 145 kts)

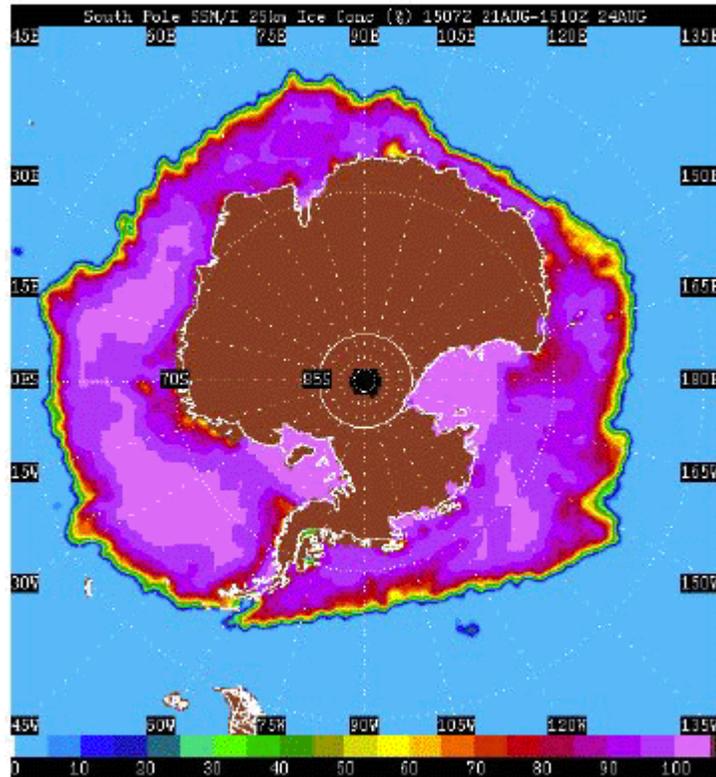


Figure 9-10. Southern Hemisphere SSM/I Ice Concentration

9.12.2 DMSP SSM/I Products

In addition to the SSM/I imagery products discussed above, FNMOC provides SSM/I Environmental Data Records (EDR) (e.g., wind speed, etc.) for environmental numerical models including NOGAPS, COAMPS and DAMPS. In addition, FNMOC provides SSM/I antenna temperatures (TDRs), Brightness Temperatures (SDRs) and EDRs to Shared Processing Program (SPP) partners and NRL's Tropical Cyclone Web Page.

NESDIS archives SPP data (e.g., SSM/I TDRs, SDRs, and EDRs). FNMOC provides selected SSM/I data in BUFR format. Upon DMSP F-16 launch, FNMOC will transition from SSM/I to Special Sensor Microwave Imager Sounder (SSMIS) data processing for continued passive microwave products.

9.12.3 Shared Processing Program (SPP) Products

Through DoC (Department of Commerce)/DoD Interagency agreement, SPP Partners (NESDIS, FNMOC, AFWA, and NAVO) share satellite data processing responsibilities and exchange products. FNMOC provides (transmits) SSM/I products (non-image) discussed above. Selected data is available in BUFR.

From NESDIS, FNMOC receives SSM/T-1 temperature sounder, SSM/T-2 moisture sounder, RTOVS/ATOVS temperature and moisture sounder, including radiance measures and temperature/moisture retrievals for assimilation into numerical models, including NOGAPS, COAMPS and DAMPS.

From NESDIS, FNMOC also receives QuikSCAT and ERS-2 Scatterometry data for generating sea surface vector winds for assimilation into these models. Selected scatterometer data is available in BUFR. Scatterometer and SSM/I composite data plots are available on FNMOC Web Page.

From NESDIS, FNMOC also receives Meteosat-5 and INSAT Vis and IR data. Data is used in the NRL Tropical Cyclone Web Page being transitioned to FNMOC operations and for evaluation of future AFWA Feature Track Winds. Data may also be used to backup Regional Centers (i.e., NSDS-E).

From AFWA, FNMOC receives gridded RTNEPH (cloud analysis) data including Total Cloud Amount and up to four levels of cloud amounts, tops, bases and types. Also, FNMOC receives gridded SNOW depth, age and climatology for input to NOGAPS.

From AFWA, FNMOC also receives GMS (Japan) geosynchronous Vis, IR and Water Vapor data. Again, data is used within NRP Tropical Cyclone Web Page being transitioned to FNMOC operations and for evaluation of future AFWA Feature Track Winds. Data may also backup Regional Centers (i.e. NSDS-E).

From NAVO, FNMOC receives MCSST data from AVHRR/HIRS processing. FNMOC also receives ERS-2 and TOPEX Altimetry as Surface Winds, Significant Wave Height and dynamic Sea Surface Height (SSH). SSH data is used to generate synthetic bathythermograph observations in numerical ocean models to infer density of the water column and to assist in location of ocean fronts and eddies. Again, selected wind and wave data is available in BUFR.

9.12.4 QuikScat & ERS-2 Scatterometry Web Page Products

As discussed in the SPP Section, the FNMOC Web Page includes scatterometer sea surface vector winds as current and historical images with optional SSM/I data fusion. Figures 9-11 through 9-14 are examples of the global coverage, ocean basin and zoom displays available for this type of data.

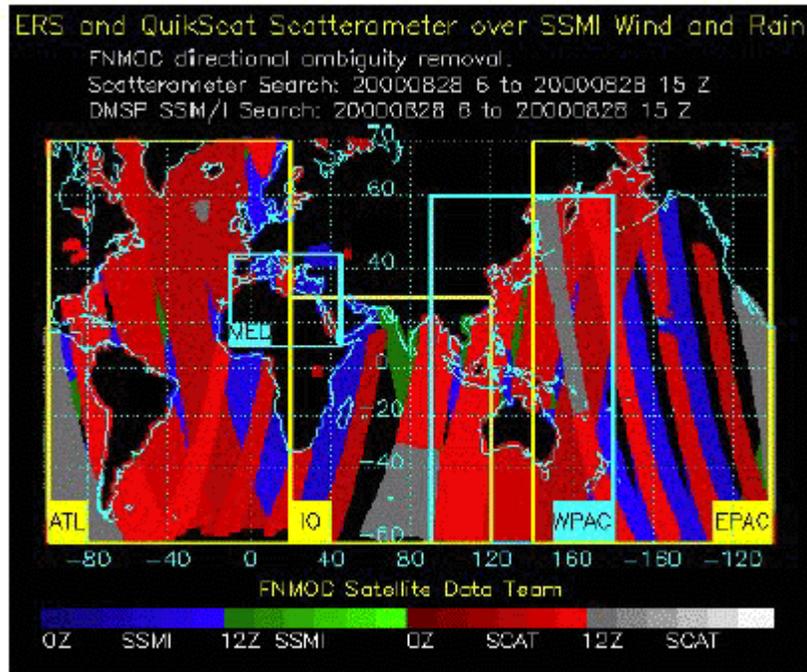


Figure 9-11. QuikScat and ERS-2 Scatterometer coverage plots

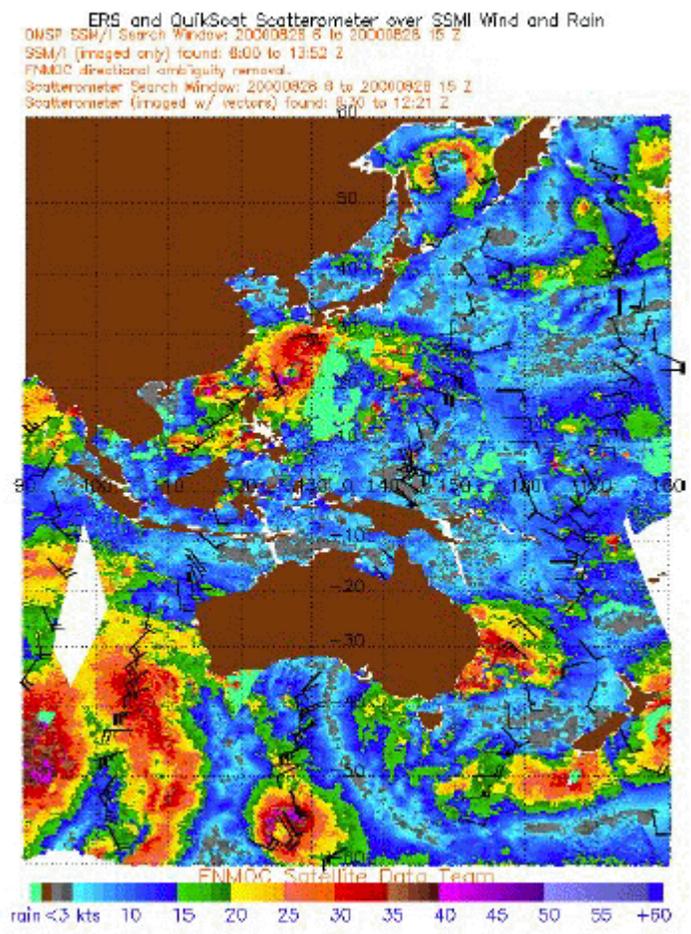


Figure 9-12. ERS and QuikScat Scatterometer over SSM/I Wind and Rain Rate

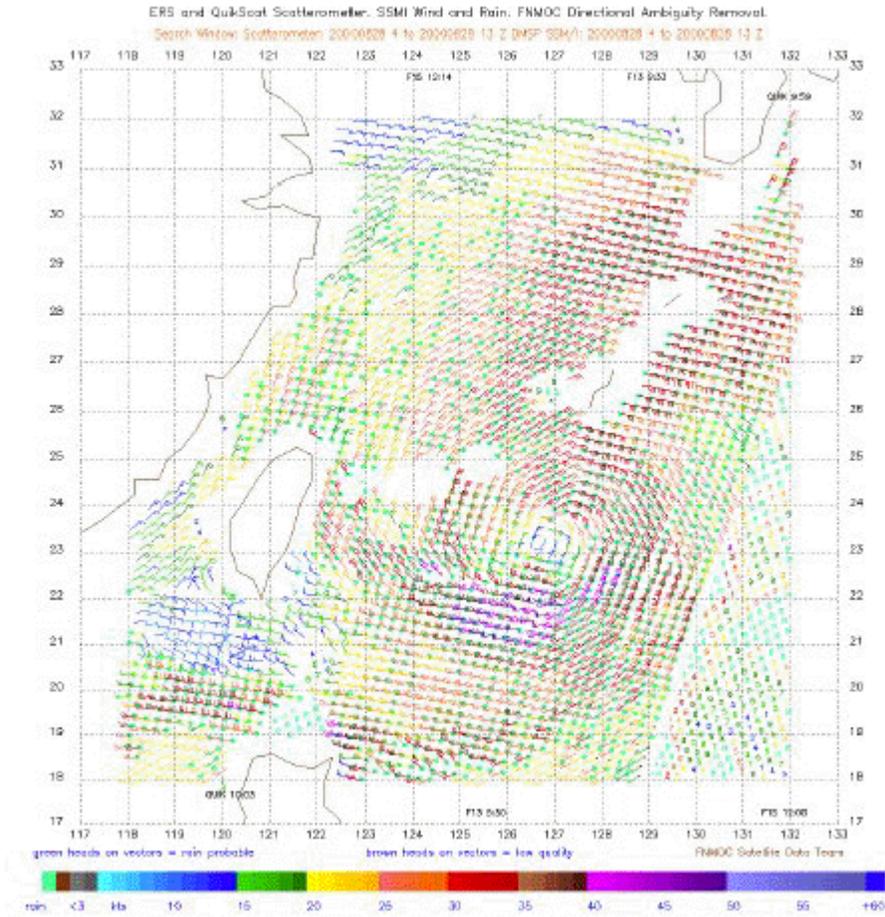


Figure 9-13. ERS and QuikScat Scatterometer over SSM/I Wind and Rain Rate, showing Tropical Storm 20W Propiroon (28 Aug 12Z, 35 G 40kts)

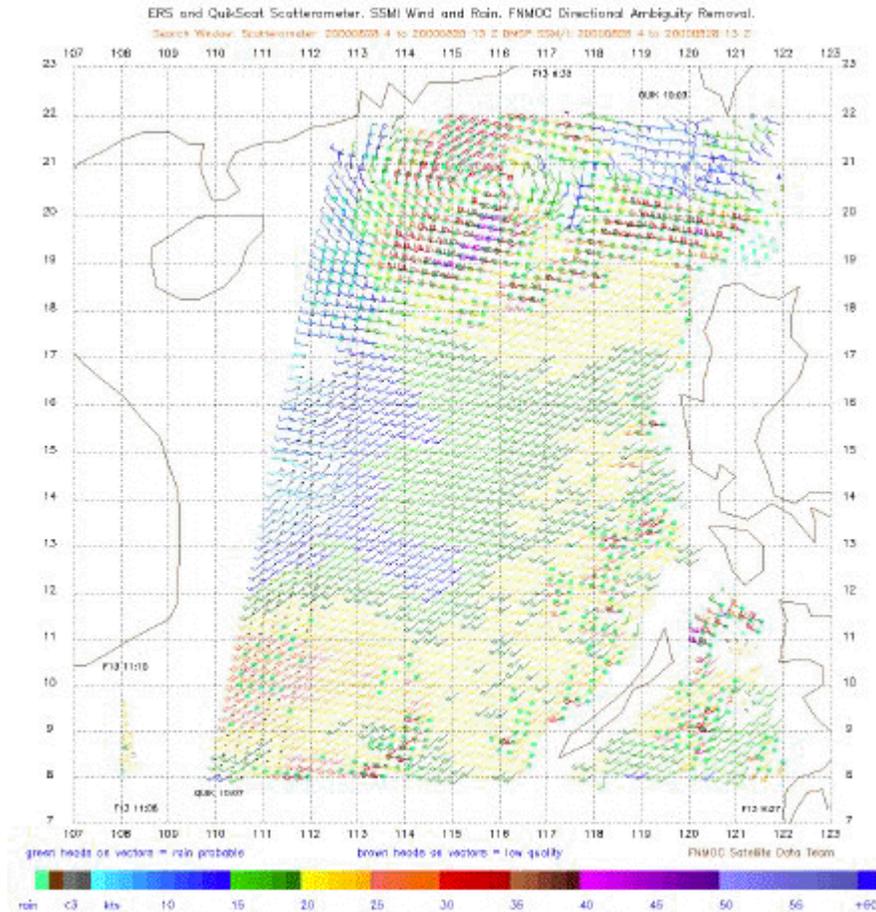


Figure 9-14. ERS and QuikScat Scatterometer over SSM/I Wind and Rain Rate, showing Tropical Storm 21W Maria (28 Aug 12Z, 25 G 35kts)

9.12.5 Tropical Cyclone (TC) Web Page Products

FNMOC is transitioning NRL's TC Web Page to FNMOC operations. Phase I includes implementing TeraScan Data Format (TDF) products for NSDS-E sector displays including 37GHz H , 85GHz V & H, PCT, wind speed, water vapor and rain rate from both SSM/I and Tropical Rainfall Measurement Mission (TRMM) Microwave Imager (TMI) sensors.

Following phases integrate these products with geosynchronous satellite data (e.g., GMS, METEOSAT, GOES) as part of the NRL Web Page transition to FNMOC operations. Selected sectors can be associated with named storms or special INVESTigation (INVEST) areas. For NRL Monterey Web Page, see http://kauai.nrlmry.navy.mil/sat-bin/tc_home. Figure 9-15 is a sample product.

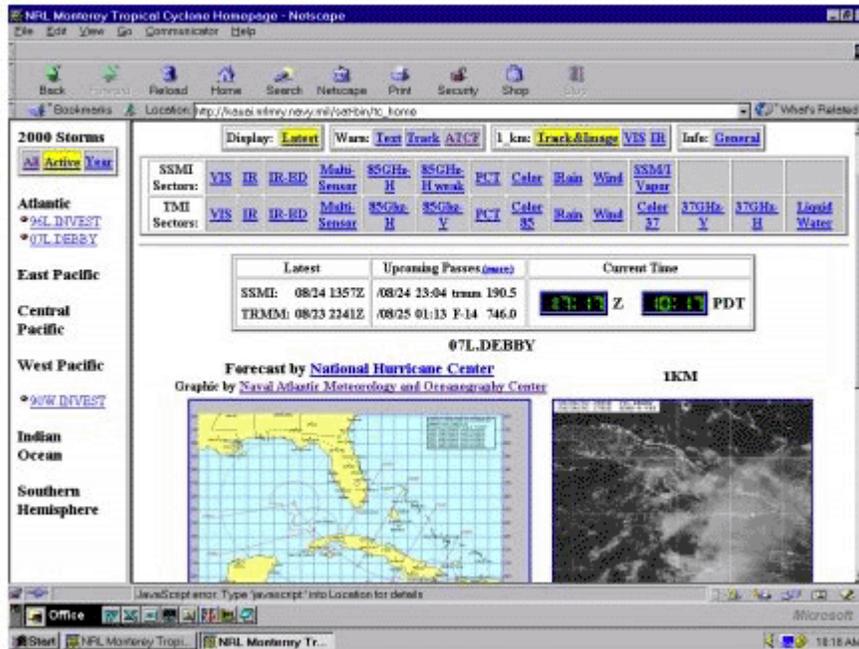


Figure 9-15. NRL Tropical Cyclone (TC) Web Page showing information for Hurricane Debby (07L)

9.12.6 Feature Tracking Wind Products

From NESDIS, FNMOC receives cloud track and water vapor track winds from GOES-E, GOES-W, GMS, METEOSAT-7 (0 E/W) METEOSAT-5 (63E). These Feature Tracking Winds (FTWinds) data are assimilated into NOGAPS, COAMPS and DAMPS. Selected multi-level wind vectors are available in BUFR.

CHAPTER 10

METEOROLOGICAL MATERIAL

10.1.0 Allowances of Material

Navy and Marine Corps shore activities and Navy ships are assigned basic and augmenting allowances of METOC equipment and material in support of existing requirements. Specific allowances of METOC equipment for each ship, command or activity are listed in NAVMETOCCOMINST 13950.1L. Requests for new, additional, or modified METOC allowances shall be submitted in the following manner:

a. NAVMETOCCOM units ashore and NAVMETOCCOM Mobile Environmental Teams shall submit requests for new, additional, or modified METOC allowances to COMNAVMETOCCOM via the originator's chain of command.

b. Other Navy and Marine Corps units shall submit requests for new, additional, or modified METOC allowances to CNO (N096). Navy units afloat shall submit requests via their appropriate Type Commander (TYCOM). Marine Corps units shall submit requests via CMC (ASL-37).

All requests should be submitted via standard Naval Letter, but message communications may be used, depending on the urgency of the requirement.

10.2.0 Validation of Requirements

Requirements for new, additional, or modified METOC allowances are validated by CNO (N096), COMNAVMETOCCOM, or CMC (ASL-37) for the USMC. A basic allowance, if appropriate, is assigned following validation:

a. Requests by NAVMETOCCOM activities for systems/equipment under COMSPAWARSYSCOM (PMW-185) cognizance will be validated by COMNAVMETOCCOM and forwarded to COMSPAWARSYSCOM (PMW-185) via CNO (N096).

b. Requests by other Navy units for systems/equipment under COMSPAWARSYSCOM (PMW-185) cognizance will be validated by CNO (N096) and forwarded to COMSPAWARSYSCOM (PMW-185).

c. Requests by Marine Corps units for systems/equipment under COMSPAWARSYSCOM (PMW-185) cognizance will be validated by CMC (ASL-37) and forwarded to COMSPAWARSYSCOM (PMW-185) via CNO (N096).

d. Validated requests for systems/equipment under COMNAVMETOCCOM cognizance will be forwarded by CNO (N096) to COMNAVMETOCCOM. Adequate justification, such as changing mission requirements/needs, must accompany each request in order to expedite the validation process without requiring further correspondence.

10.3.0 Classification of Allowances

Various classifications of both basic and augmenting allowances to support various types of operations are provided in NAVMETOCCOMINST 13950.1L.

10.4.0 Initial Outfitting

METOC systems/equipment in the initial production pipeline which are under the acquisition and installation control of the Hardware Systems Command, COMSPAWARSYSCOM (PMW-185), will be "pushed" to ship and shore activities based on the initial installation schedule; NAVMETOCCOMINST 13950.1L basic and augmenting allowances; and/or as previously assigned by COMNAVMETOCCOM. Other METOC equipment and material shall be provided to support newly established units as follows:

10.4.1 Ships

New construction ships and those being re-commissioned under the conversion or activation program must requisition the allowance equipment and material via the Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP) for the designated ship class at the shipyard in which the new construction or conversion is being performed. The quantities of equipment on which the SUPSHIP requisitions are based are indicated on the Navy Inventory Control Point (NAVICP) generated Coordinated Shipboard Allowance List (COSAL), NAVMETOCCOMINST 13950.1L for the ship's basic and augmenting allowances, and/or as previously assigned by COMNAVMETOCCOM. The allowance for repair parts must also be requisitioned by SUPSHIP for major METOC equipment in accordance with the Allowance Parts Lists (APL), Allowance Equipage Lists (AEL), and/or Preliminary Allowance Lists (PAL) indicated in the COSAL.

10.4.2 Shore Activities

Initial outfitting of METOC activities ashore is accomplished on an individual basis. The assigned tasks and operational requirements of a new activity are reviewed and validated by COMNAVMETOCCOM, who then assigns the appropriate basic and augmenting equipment and material allowances and forwards a request to COMSPAWARSYSCOM (PMW-185) via CNO (N096). COMSPAWARSYSCOM (PMW-185) then provides the necessary major METOC systems/equipment. COMNAVMETOCCOM provides funding for minor equipment and consumable material within the claimancy.

10.5.0 Equipment Installation

Assistance with preliminary installation planning and site surveys is available from COMSPAWARSYSCOM (PMW-185) and COMNAVMETOCCOM (N5).

10.6.0 Material Support

The basic responsibility for Navy METOC material support is assigned to COMSPAWARSYSCOM (PMW-185). Functions relating to this responsibility include research and development, equipment and initial spares procurement, installation, and maintenance. These

functions are performed under the supervision of the COMSPAWARSYSCOM Assistant Program Manager - Logistics (APM-L) (PMW-185L).

10.6.1 Supply Procedures

All items of standard Navy METOC systems/equipment are listed in NAVMETOCCOMINST 13950.1L. The associated repair parts are identified in the individual APL, AEL, or PAL. This information as well as data about required consumable items is also found in the User's Logistics Support Summary (ULSS) for the individual systems/equipment. Items not otherwise designated for life-cycle support by the assigned In-Service Engineering Agent (ISEA), or supplied directly under contractor or organic government Performance Based Logistics (PBL) agreements are stocked and issued through the Naval Supply System. COMSPAWARSYSCOM and NAVICP have primary cognizance over the routine supply and replenishment of most METOC material in the Supply System.

10.6.2 Requisition

Routine METOC supply and replenishment requests are processed through the local supply office following standard supply procedures. The cognizant Inventory Control Point (ICP) should be notified whenever these efforts are unsuccessful. All requirements for replacement of major systems/equipment, major deviations in quantity requirements for repair parts or consumable items, and/or requests for items in the absence of an authorized allowance shall be submitted to COMNAVMETOCCOM (N3) with thorough justification of the requirement. METOC publications and administrative forms are requisitioned in accordance with instructions contained in COMNAVMETOCCOM, COMSPAWARSYSCOM, or Naval Supply Systems Command (NAVSUP) publications or directives. Copies of METOC Commercial-Off-The Shelf (COTS) publications or software beyond those received with the as-installed system/equipment are requisitioned in accordance with procedures in the applicable ULSS. Activities requiring these items in excess of, or in addition to, the authorized allowance shall submit their requests to COMNAVMETOCCOM (N3) with justification.

10.6.3 Turn-in of Failed Material

The turn-in of failed Lowest Replaceable Units (LRU) of METOC systems/equipment follows standard Navy supply system procedures. Depot Level Repairable (DLR) items identified with a National Stock Number (NSN) or Temporary-Navy Item Control Number (T-NICN) which have a "7G", "2Z", or "0U" cognizance symbol preceding the NSN or T-NICN will be turned-in according to the procedures in FEDLOG. Field Level Repairable (FLR) items identified by a cognizance symbol beginning with "1" or "3" and a Material Control Code of "D" may be repaired at the organizational or intermediate level, if appropriate. Consult FEDLOG to determine turn-in procedures for FLRs. Repairable items with no NSN or T-NICN will be turned-in according to the procedures in the applicable ULSS. Processing of warranted material, and spare and repair parts for METOC systems/equipment supported through a PBL arrangement, will be transparent to fleet users. These items will be turned-in for repair in the same manner as non-warranted, non-PBL supported items.

CHAPTER 11

METEOROLOGICAL AND OCEANOGRAPHIC EQUIPMENT MAINTENANCE

11.1.0 General

The accurate measurement of atmospheric and oceanographic parameters is vital to optimum Naval operations in the total environment, and is possible only with properly installed, operated, and maintained METOC equipment. METOC equipment is sometimes unique, and varies from relatively simple but precise instruments to highly complex electronic devices.

11.2.0 Responsibility

With few exceptions, Commanding Officers of ships and shore stations assume full responsibility for all maintenance and repair actions on SPAWARSYSCOM METOC equipment assigned to their commands. Electronic Technicians (ET) receive specialized training in maintenance and repair of METOC equipment at the Meteorological Equipment Maintenance (METEM) course at NAVTECHTRAU Keesler AFB, MS, for which the Navy Enlisted Classification (NEC) ET-1413 is assigned. Follow-on training can be obtained through SPAWARSYSCEN Charleston SC (J318) or SPAWARSYSCEN San Diego CA (D642). Activities without an allotment of Navy ET-1413 billets utilize qualified civilian electronic maintenance technicians with appropriate skill levels to perform this maintenance. Aerographer's Mates (AG) assigned to Naval METOC Command (NAVMETOC COM) activities are tasked to operate, but not maintain or repair (except for operator preventive maintenance), METOC equipment.

11.3.0 Maintenance Assistance

The METOC Systems Program Office (PMW-185) of SPAWARSYSCOM is ultimately responsible for the acquisition and management of all METOC equipment. PMW-185 is also responsible for the maintenance and repair of all METOC systems/equipment until the Material Support Date (MSD) is reached, or a PBL support activity is established to perform these functions. A central point providing trouble resolution for all METOC systems worldwide is the METOC Systems Knowledge Center (MSKC). The MSKC operates on a 24 hour/day, 365 day/year schedule, and has a goal of providing an average forty-eight hour problem resolution time. MSKC assistance is available to METOC users, ISEAs, and Software Support Activities (SSA); and is set up to receive phone calls, E-mail, and Internet Relay Chat (IRC). The MSKC also responds to trouble tickets from the SPAWAR Consolidated Call Center and coordinates with Fleet System Engineering Teams (FSET) along with other in-house assets to provide remote technical assistance for both ship and shore METOC sites. The MSKC does not function as a supply support or requisition processing/tracking activity.

The MSKC can be contacted for support via internet web site, E-mail, fax, telephone, or IRC as follows:

- a. NIPRNET/INTERNET E-mail: metoc@spawar.navy.mil
- b. SIPRNET E-mail: metoc@spawar.navy.smil.mil
- c. NIPRNET/INTERNET Web page: <https://mskc.spawar.navy.mil>
- d. SIPRNET Web page: Pending
- e. Telephone: DSN: 524-3888 or COMM: 619-524-3888. Both of these phone numbers have STU-III capabilities for secure connections.
- f. Fax: DSN: 524-3240 or COMM: 619-524-3240.
- g. Classified IRC: Use IRC Servers mako.npmoc.navy.smil.mil and irc.ismc.sgov.gov.

METOC users are to info the MSKC on all CASREPS involving METOC systems at the following PLAD: SPAWARSYSCEN SAN DIEGO CA//D642//.

Fleet Technical Support Centers Atlantic and Pacific (FTSCLANT and FTSCPAC) will continue to be the first point of contact for waterfront technical and logistics support requests in accordance with Commander-in-Chief Atlantic and Pacific (CINCLANTFLT and CINCPACFLT) and TYCOM directives. SPAWARSYSCEN Charleston SC (J318), SPAWARSYSCEN San Diego CA (D642) and Raytheon Services Company, Indianapolis, IN are field activities of COMSPAWARSYSCOM (PMW-185) and designated as ISEAs for METOC systems/equipment as identified in NAVMETOCCOMINST 13950.1L. These field activities are available for technical assistance as well as for furnishing on-the-job training and classroom instruction to Navy/Marine Corps personnel on the installation, operation, maintenance, and repair of METOC equipment for which they are assigned responsibility.

APPENDIX A

NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND ADDRESS AND TELEPHONE LOCATOR

NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND

COMMANDER,
NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND
1100 BALCH BLVD.
STENNIS SPACE CENTER, MS 39529-5005
UIC 00065
(DSN) 485-xxxx (COMM) (228) 688-xxxx

00	Commander	4189
0T	Technical/Deputy Director	4015
01	Chief of Staff	4189
00E	Flag Lieutenant	5247
00FW	Flag Writer	5757
002	Command Master Chief	4001
N1	ACOS Command Management/IG	5004
N11	Admin Officer	4582
N12	Counsel	5867
N13	Public Affairs Officer	4188
N3	ACOS Operations	5003
N313	USAF Operations	5051

N314	USMC-USN Operations	4897
N4	ACOS Resources	4803
N43	Military Resources	4233
N5	ACOS Program Integration	4500
N51	Fleet Systems	4326

FAX Numbers

00 4880 **N1** 5743 **N3** 5332 **N4** 5790 **N5** 5791

PLA: COMNAVMETOC COM STENNIS SPACE CENTER MS

E-mail: CNMOC@cnmoc.navy.mil

NIPRNET: <https://www.cnmoc.navy.mil/> SIPRNET: <https://www.cnmoc.navy.smil.mil>

NAVAL METEOROLOGY AND OCEANOGRAPHY CENTERS

www.cnmoc.navy.mil/nmosw/links.htm

BAHRAIN

COMMANDING OFFICER

NAVAL CENTRAL METEOROLOGY AND OCEANOGRAPHY CENTER

PSC 451 NSA

FPO AE 09834-2800

(DSN) 318-439-4845 (COMM) 011-973-734-039 (FAX) 4035

PLA: NAVCENTMETOC BAHRAIN

E-mail: weather@cusnc.navy.mil

SIPRNET: <http://www.ncmoc.navy.smil.mil>

GULFPORT

COMMANDING OFFICER

NAVAL METEOROLOGY AND OCEANOGRAPHY PROFESSIONAL DEVELOPMENT
CENTER

5802 CBC 6th STREET, BLDG 60

GULFPORT, MS 39501-5042

DSN 868-2086/2342 (FAX) 2874

PLA: NAVMETOCPRODEV CEN GULFPORT MS

E-mail: training@nmopdc.navy.mil

NIPRNET: <http://www.nmopdc.navy.mil>

NAVMETOC COMINST 3140.1L
15 SEP 2000

MONTEREY

COMMANDING OFFICER
FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY CENTER
7 GRACE HOPPER AVE., STOP 1
MONTEREY, CA 93943-5501
(DSN) 878 (COMM) 831-656 (CDO) 4325 (FAX) 4489
PLA: FLENUMMETOCEN MONTEREY CA
E-mail: cdo@fnmoc.navy.mil
NIPRNET: <http://cdo@fnmoc.navy.mil/> SIPRNET: <http://204.34.146.33>

NORFOLK

COMMANDING OFFICER
NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY CENTER
9141 THIRD AVE
NORFOLK, VA 23511-2394
(DSN) 564 (COMM) 757-444 (CDO) 7750 (FAX) 4479
PLA: NAVLANTMETOCEN NORFOLK VA
E-mail: Cdo@nlmoc.navy.mil
NIPRNET: <http://www.nlmoc.navy.mil> SIPRNET: 206.36.246.98

PEARL HARBOR

COMMANDING OFFICER
NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY CENTER/JOINT TYPHOON
WARNING CENTER
425 LUAPELE RD
PEARL HARBOR, HI 96860-3103
(DSN) 471 (COMM) 808-471 (CDO) 0004 (FAX) 4581
PLA: NAVPACMETOCEN/JTWC PEARL HARBOR HI
E-mail: Cdo@npmoc.navy.mil
NIPRNET: <http://www.npmoc.navy.mil> SIPRNET: 198.97.106.240

ROTA

COMMANDING OFFICER
U.S. NAVAL EUROPEAN METEOROLOGY AND OCEANOGRAPHY CENTER
PSC 819, BOX 31
FPO AE 09645-3200
REQ 314-727-2410 (COMM) 011-34956-822410 (FAX) 2963
PLA: NAVEURMETOCEN ROTA SP
E-mail: Cdo@nemoc.navy.mil
NIPRNET: <http://www.nemoc.navy.mil> SIPRNET: 199.10.143.131

SAN DIEGO

COMMANDING OFFICER
NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY CENTER
P.O. BOX 357076
BLDG 14, NAVAL AIR STATION, NORTH ISLAND
SAN DIEGO, CA 92135-7076
(DSN) 735 (COMM) 619-545 (CDO) 4650 (FAX) 0291
PLA: NAVPACMETOCCEN SAN DIEGO CA
E-mail: Cdo@npmoc-sd.navy.mil
NIPRNET: <http://www.npmoc-sd.navy.mil> SIPRNET: www.npmoc-sd.navy.smil.mil

STENNIS SPACE CENTER

COMMANDING OFFICER
NAVAL OCEANOGRAPHIC OFFICE
1002 Balch Blvd.
STENNIS SPACE CENTER, MS 39522-5001
(DSN) 485 (COMM) 228-688 (CDO) 4357 (FAX) 5701
PLA: NAVOCEANO STENNIS SPACE CENTER MS
E-mail: Cdo@navo.navy.mil
NIPRNET: <http://www.navo.navy.mil/> SIPRNET: <http://199.208.205.50>

SUITLAND

COMMANDING OFFICER
NAVAL ICE CENTER
4251 SUITLAND ROAD FOB#4
WASHINGTON, DC 20395-5180
(DSN) 290-0183 (COMM) 301-457-5306 (CDO) x236 (FAX) 5300
PLA: NAVICECEN SUITLAND MD
E-mail: liaison@natice.noaa.gov NIPRNET: <http://www.natice.noaa.gov>

YOKOSUKA

COMMANDING OFFICER
U.S. NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY CENTER
PSC 473, BOX 68
FPO AP 96349-2902
(DSN) 315-243 (COMM) 011-81-311-743 (CDO) 5595 (FAX) 7386
PLA: NAVPACMETOCCEN YOKOSUKA JA
E-mail: Cdo@yoko.npmoc.navy.mil
NIPRNET: <http://www.yoko.npmoc.navy.mil/> SIPRNET:
<http://www.yoko.npmoc.navy.smil.mil>

NAVAL METEOROLOGY AND OCEANOGRAPHY FACILITIES

JACKSONVILLE

COMMANDING OFFICER
NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY FACILITY
P.O. BOX 85, NAVAL AIR STATION
JACKSONVILLE, FL 32212-0085
(DSN) 542 (COMM) 904-542 (CDO) 2535 (FAX) 4248
PLA: NAVLANTMETOCFAC JACKSONVILLE FL
E-mail: cdo@nlmof.navy.mil
NIPRNET: <http://www.nlmof.navy.mil/> SIPRNET: <http://206.39.107.71>

PENSACOLA

COMMANDING OFFICER
NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY FACILITY
280 SKYHAWK DR., SUITE C, NAS
PENSACOLA, FL 32508-5514
(DSN) 922 (COMM) 850-452 (CDO) 2386 (FAX) 2248
PLA: NAVTRAMETOCFAC PENSACOLA FL
E-mail: Cdo@ntmof.navy.mil
NIPRNET: <http://www.ntmof.navy.mil/>

NAPLES

U.S. NAVAL EUROPEAN METEOROLOGY AND OCEANOGRAPHY FACILITY
PSC 817, BOX 13
FPO AE 09622-0800
(DSN) 314-626 (COMM) 01139081568 (CDO) 5507 (FAX) 5334
PLA: NAVEURMETOC DET NAPLES IT
E-mail: cdo@nemof.naples.navy.mil
NIPRNET: <http://www.naples.navy.mil/nemof/>

WHIDBEY ISLAND

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY FACILITY
3730 N CHARLES PORTER AVE
BUILDING 385
NAVAL AIR STATION, WHIDBEY ISLAND
OAK HARBOR, WA 98278-5301
(DSN) 820 (COMM) 360-257 (CDO) 2244 (FAX) 1294
PLA: NAVPACMETOCFAC WHIDBEY ISLAND WA
E-mail: wxmaster@naswi.navy.mil
NIPRNET: <http://wx1.naswi.navy.mil>

NAVAL METEOROLOGY AND OCEANOGRAPHY DETACHMENTS

ASHEVILLE

OFFICER IN CHARGE
FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY DETACHMENT
FEDERAL BUILDING, ROOM 563
151 PATTON AVE
ASHEVILLE, NC 28801-5014
(COMM) 828-271-4232 (FAX) 4672, RECORDING 252-7865
PLA: FLENUMMETOC DET ASHEVILLE NC
E-mail: Navy@ncdc.noaa.gov
NIPRNET: <http://navy.ncdc.noaa.gov>

ATSUGI

OFFICER IN CHARGE
U.S. NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT
PSC 477, BOX 77
U.S. NAVAL AIR FACILITY
FPO AP 96306-2977
(DSN) 315-264 (COMM) 011-81-3117-64 (CPO) 3646 (FAX) 3497
PLA: NAVPACMETOC DET ATSUGI JA
E-mail: Npmodatsugi@yoko.npmoc.navy.mil
NIPRNET: <http://www.atsugi.navy.mil/npmod/index.html>

BRUNSWICK

OFFICER IN CHARGE
NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT
2 SEAHAWK AVE, BOX 57, NAS
BRUNSWICK, ME 04011-5000
(DSN) 476 (COMM) 207-921 (FDO) 2356/7 (FAX) 2952
PLA: NAVLANTMETOC DET BRUNSWICK ME
E-mail: Fdo@nlmod-brunswick.navy.mil
NIPRNET: <http://www.nlmod-brunswick.navy.mil/>

CORPUS CHRISTI

OFFICER IN CHARGE
NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT
651 BATAAN ST., SUITE 116, NAS
CORPUS CHRISTI, TX 78419-5250
(DSN) 861 (COMM) 512-939 (FDO) 2124/5 (FAX) 3774
PLA: NAVTRAMETOC DET CORPUS CHRISTI TX
E-mail: Cdo@ntmod-corpuschristi.navy.mil
NIPRNET: <http://www.ntmod-corpuschristi.navy.mil/>

NAVMETOC COMINST 3140.1L
15 SEP 2000

DIEGO GARCIA

OFFICER IN CHARGE

U.S. NAVAL CENTRAL METEOROLOGY AND OCEANOGRAPHY DETACHMENT
BOX 10

FPO AP 96595-0010

(DSN) 315-370 (COMM) 011-246-370 (FDO) 3590 (FAX) 3592

PLA: NAVCENTMETOC DET DIEGO GARCIA

E-mail: Metoc@nsfdg.navy.mil

NIPRNET: <http://metoc.nsfedg.navy.mil>

EL CENTRO

CHIEF PETTY OFFICER IN CHARGE

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT
WEATHER

NAVAL AIR FACILITY

1605 THIRD STREET, BUILDING 214

(DSN) 958 (COMM) 760-339-2523 (FDO) 8523 (FAX) 2316

PLA: NAVPACMETOC DET EL CENTRO CA

E-mail:

NIPRNET: <http://www.npmod-elcentro.navy.mil/>

FALLON

OFFICER IN CHARGE

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT
NAVAL AIR STATION

FALLON, NV 89406-5000

(DSN) 890 (COMM) 775-426 (FDO) 2816 (FAX) 2461

PLA: NAVPACMETOC DET FALLON NV

E-mail: fdofallon@npmoc-sd.navy.mil

NIPRNET: <http://www.fallon.navy.mil/npmod.htm>

FORT WORTH

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT
1425 CARSWELL AVENUE

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH

FORT WORTH, TX 76127-1425

(DSN) 739 (COMM) 817-782 (FDO) 7066 (FAX) 7903

PLA: NAVTRAMETOC DET FORT WORTH TX

E-mail: Cdo@ntmod-fortworth.navy.mil

NIPRNET: <http://www.ntmod-fortworth.navy.mil/>

GUANTANAMO BAY

OFFICER IN CHARGE

U.S. NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 1001, BOX 35-W

FPO AE 09508-0014

(DSN) 723-3960 (COMM) 011-5399 (FDO) 6440 (FAX) 6094

PLA:NAVLANTMETOC DET GUANTANAMO BAY CU

E-mail: Fdo@nlmod-guantanamobay.navy.mil

NIPRNET: <http://www.nlmod-guantanamobay.navy.mil/>

KADENA

OFFICER IN CHARGE

U.S. NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 480 BOX METOC

FPO AP 96370-0051

(DSN) 315-634 (COMM) 01181611734 (FDO) 8380 (FAX) 8381

PLA: NAVPACMETOC DET KADENA JA

E-mail: Npmodkadena@yoko.npmoc.navy.mil

NIPRNET: <http://npmod.cfao.navy.mil> SIPRNET: <http://206.36.216.84>

KANEOHE BAY

OFFICER IN CHARGE

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

BOX 64010 KANEOHE BAY

MCBH, HI 96863

(DSN) 457 (COMM) 808-257 (FDO) 0243 ext 240/1 (FAX) 0422

E-mail: kbay@npmoc.navy.mil

NIPRNET: SIPRNET: <http://tsc-barbers.navy.smil.mil>

KEFLAVIK

OFFICER IN CHARGE

U.S. NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 1003, BOX 26

FPO AE 09728-0326

(DSN) 450 (COMM) 011-354-425 (FDO) 7829 (FAX) 6195

PLA:NAVLANTMETOC DET KEFLAVIK IC

E-mail: Fdo@nlmod-keflavik.navy.mil

NIPRNET: <http://205.67.212.10/>

NAVMETOC COMINST 3140.1L
15 SEP 2000

KEY WEST

OFFICER IN CHARGE

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

NAVAL AIR STATION

P.O. BOX 9048

KEY WEST, FL 33040-9048

(DSN) 483 (COMM) 305-293 (FDO) 2524 (FAX) 2105

PLA: NAVLANTMETOC DET KEY WEST FL

E-mail: Fdo@nlmod-keywest.navy.mil

NIPRNET: <http://www.nlmod-keywest.navy.mil/>

KINGSVILLE

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

311 NORTH MITSCHER AVE, STA 102, NAS

KINGSVILLE, TX 78363-5003

(DSN) 876 (COMM) 512-516 (FDO) 6186 (FAX) 6131

PLA: NAVLANTMETOC DET KINGS BAY GA

E-mail: Cdo@ntmod-kingsville.navy.mil

NIPRNET: <http://www.ntmod-kingsville.navy.mil/>

LEMOORE

OFFICER IN CHARGE

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

001 K STREET ROOM 108

LEMOORE, CA 93246-5056

(DSN) 949 (COMM) 559-998 (FDO) 1020 (FAX) 1022

PLA: NAVPACMETOC DET LEMOORE CA

E-mail:

NIPRNET: <http://www.lemoore.navy.mil/weather/lemore>

MAYPORT

OFFICER IN CHARGE

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

BOX 280043, NAVAL AIR STATION

MAYPORT, FL 32228-0243

(DSN) 960 (COMM) 904-270 (FDO) 6196 (FAX) 5324

PLA: NAVLANTMETOC DET MAYPORT FL

E-mail: Fdo@nlmod-mayport.navy.mil

NIPRNET: <http://www.nlmod-mayport.navy.mil/>

MERIDIAN

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

100 FULLER RD., SUITE 106, NAS

MERIDIAN, MS 39309-5411

(DSN) 637 (COMM) 601-679 (FDO) 2726 (FAX) 2372

PLA:NAVTRAMETOC DET MERIDIAN MS

E-mail: Cdo@ntmod-meridian.navy.mil

NIPRNET: <http://www.ntmod-meridian.navy.mil/>

MISAWA

OFFICER IN CHARGE

U.S. NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 76, BOX 5052

APO AP 96319-5052

(DSN) 315-226 (COMM) 01181176535181 (FDO) 3298 (FAX) 3282

PLA: NAVPACMETOC DET MISAWA JA

E-mail: Npmodmisawa@yoko.npmoc.navy.mil

NIPRNET: <http://www.misawa.af.mil/orgs/NPMOD/npmod.htm>

NEW ORLEANS

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

400 RUSSELL AVE, NAS

NEW ORLEANS, LA 70143-5012

(DSN) 678 (COMM) 504-678 (FDO) 3559 (FAX) 3241

PLA:NAVTRAMETOC DET NEW ORLEANS LA

E-mail: Cdo@ntmod-neworleans.navy.mil

NIPRNET: <http://www.ntmod-neworleans.navy.mil/>

NEWPORT

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

686 CUSHING ROAD, NETC

NEWPORT, RI 02841-1207

(DSN) 948 (COMM) 401-841 (FDO) 4399 (FAX) 3257

PLA:NAVTRAMETOC DET NEWPORT RI

E-mail: Metoc_det@nwc.navy.mil

NIPRNET: <http://www.nwc.navy.mil/weather/>

NAVMETOC COMINST 3140.1L
15 SEP 2000

OCEANA

OFFICER IN CHARGE

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

701 OPERATIONS DR.

VIRGINIA BEACH, VA 23460-5120

(DSN) 433 (COMM) 804-433 (FDO) 2177 (FAX) 2602

PLA: NAVLANTMETOC DET OCEANA VA

E-mail: Fdo@nlmod-oceana.navy.mil

NIPRNET: <http://www.nlmod-oceana.navy.mil/>

PATUXENT RIVER

OFFICER IN CHARGE

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

NAVAL AIR STATION, BLDG 103

PATUXENT RIVER, MD 20670-5103

(DSN) 342 (COMM) 301-342 (FDO) 3174 (FAX) 7537

PLA: NAVLANTMETOC DET PATUXENT RIVER MD

E-mail: Fdo@nlmod-patuxentriver.navy.mil

NIPRNET: <http://140.29.150.66/>

POINT MUGU

OFFICER IN CHARGE

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

NAVAL AIR STATION

POINT MUGU, CA 93042

(DSN) 351 (COMM) 805-989 (FDO) 8508 (FAX) 7915

PLA: NAVPACMETOC DET PT MUGU CA

E-mail:

NIPRNET: <http://www.nawcwpns.navy.mil/~weather> SIPRNET:

<http://nites.mugu.navy.smil.mil>

ROOSEVELT ROADS

OFFICER IN CHARGE

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 1008, BOX 84

FPO AE 34051-0084

(DSN) 831 (COMM) 757-865 (FDO) 4017 (FAX) 4146

PLA: NAVLANTMETOC DET ROOSEVELT ROADS RQ

E-mail: Nlmodrr@navtap.navy.mil

NIPRNET: <http://www.nlmod-rooseveltroads.navy.mil/>

SASEBO

PETTY OFFICER IN CHARGE

U.S. NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 476 BOX 92

FPO AP 96322-1100

(DSN) 315-252 (COMM) 011819562246111 (FDO) 3285 (FAX) 3838

PLA: NAVPACMETOC DET SASEBO JA

E-mail: Npmodsasebo@yoko.npmoc.navy.mil

NIPRNET: <http://weather.cfas.navy.mil>

SIGONELLA

OFFICER IN CHARGE

U.S. NAVAL EUROPEAN METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 812 BOX 3380

FPO AE 09627-3380

(DSN) 314-624 (COMM) 01139009586 (FDO) 6020 (FAX) 6008

PLA: NAVEURMETOC DET SIGONELLA IT

E-mail: Cdo@Nemod.sicily.navy.mil

NIPRNET: <http://www.nemoc.navy.mil/nemoc/dets/nemodsig/index.htm>

SOUDA BAY

OFFICER IN CHARGE

U.S. NAVAL EUROPEAN METEOROLOGY AND OCEANOGRAPHY DETACHMENT

PSC 814 BOX 22

FPO AE 09865-0109

(DSN) 314-266 (COMM) 0113082166200 (FDO) 1284 (FAX) 1315

PLA: NAVEURMETOC DET SOUDA BAY GR

E-mail: Cdo@nemod.souda.navy.mil

NIPRNET: <http://aphrodite.souda.navy.mil/nemod>

TINKER

OFFICER IN CHARGE

FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY DETACHMENT

7940 5TH STREET L-10

TINKER AFB, OK 73145-9195

(DSN) 339 (COMM) 405-739 (OIC) 7638/39 (FAX) 7641

PLA: FLENUMMETOC DET TINKER AFB OK

E-mail: Nav@tinker.af.mil

NIPRNET: <http://www.fnmoc.navy.mil/~tinker/>

NAVMETOC COMINST 3140.1L
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WHITING FIELD

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

7755 USS ENTERPRISE ST., SUITE 201, NAS

MILTON, FL 32570-6154

(DSN) 868 (COMM) 850-623 (FDO) 7101 (FAX) 7243

PLA: NAVTRAMETOC DET WHITING FIELD FL

E-mail: Cdo@ntmod-whitingfield.navy.mil

NIPRNET: <http://www.ntmod-whitingfield.navy.mil/>

WILLOW GROVE

OFFICER IN CHARGE

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT

P.O. BOX 8 SKYTRAIN AVE.

NAVAL AIR STATION

WILLOW GROVE, PA 19090-5010

(DSN) 991 (COMM) 215-443 (FDO) 6578 (FAX) 6581

PLA: NAVTRAMETOC DET WILLOW GROVE PA

E-mail: Cdo@ntmod-willowgrove.navy.mil

NIPRNET: <http://www.ntmof.navy.mil/nxx/>

MOBILE ENVIRONMENTAL TEAMS

BAHRAIN

NAVAL CENTRAL METEOROLOGY AND OCEANOGRAPHY CENTER

MOBILE ENVIRONMENTAL TEAM

PSC 451 ASU/SWA

FPO AE 09834-2800

(DSN) 318-439 (COMM) 973-724-039 (CPO) 4039

E-mail: Metoc2@cusnc.navy.mil

NIPRNET: <http://metoc.nsfedg.navy.mil>

JACKSONVILLE

COMMANDING OFFICER

NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY FACILITY

MOBILE ENVIRONMENTAL TEAM

BLDG 1886 MASSEY AV

P.O. BOX 280116, NAVSTA

MAYPORT, FL 32228-0116

(DSN) 960-7800 (C) 904-270-7800

PLA: MET JACKSONVILLE FL E-mail: cdo@nlmof.navy.mil

NIPRNET: <http://www.nlmof.navy.mil/>

NORFOLK

COMMANDING OFFICER
NAVAL ATLANTIC METEOROLOGY AND OCEANOGRAPHY CENTER
MOBILE ENVIRONMENTAL TEAM
9141 THIRD AVE
NORFOLK, VA 23511-2394
(DSN) 564 (COMM) 804-444 (CPO) 8730
E-mail: Cdo@nlmcc.navy.mil
NIPRNET: <http://www.nlmcc.navy.mil/>

PEARL HARBOR

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY CENTER
MOBILE ENVIRONMENTAL TEAM
425 LUAPELE RD
PEARL HARBOR, HI 96860-5050
(DSN) 471 (COMM) 808-471 (CPO) 4594
E-mail: Cdo@npmcc.navy.mil
NIPRNET: <http://www.npmcc.navy.mil/>

PENSACOLA

NAVAL TRAINING METEOROLOGY AND OCEANOGRAPHY DETACHMENT
280 SKYHAWK DR, SUITE C, NAS
PENSACOLA, FL 32508-5514
(DSN) 922 (COMM) 850-452 (CPO) 3117
E-mail: Cdo@ntmof.navy.mil
NIPRNET: <http://www.ntmof.navy.mil/>

ROTA

NAVAL EUROPEAN METEOROLOGY AND OCEANOGRAPHY CENTER
MOBILE ENVIRONMENTAL TEAM
PSC 819, BOX 31
FPO AE 09645-3200
(REQ) 314-727-2494 (COMM) 011-345-682 (CPO) 2494
E-mail: Cdo@nemcc.navy.mil
NIPRNET: <http://www.nemcc.navy.mil/>

SAN DIEGO

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY FACILITY
MOBILE ENVIRONMENTAL TEAM
P.O. BOX 357076, NAS NORTH ISLAND
SAN DIEGO, CA 92135-5130
(DSN) 735 (COMM) 619-545 (CPO) 2189
E-mail: Cdo@npmcc-sd.navy.mil
NIPRNET: <http://www.npmcc-sd.navy.mil/>

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YOKOSUKA

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY FACILITY
MOBILE ENVIRONMENTAL TEAM
PSC 473, BOX 68
FPO AP 96349-2902
(DSN) 315-243 (COMM) 011-81-311-734 (CPO) 7915
E-mail: Cdo@yoko.npmoc.navy.mil
NIPRNET: <http://www.yoko.npmoc.navy.mil/>

WHIDBEY ISLAND

NAVAL PACIFIC METEOROLOGY AND OCEANOGRAPHY FACILITY
MOBILE ENVIRONMENTAL TEAM
NAVAL AIR STATION, WHIDBEY ISLAND
OAK HARBOR, WA 98278-5100
(DSN) 820 (COMM) 360-257 (CPO) 0384
E-mail: Whidbeyisland@npmof-sd.navy.mil
NIPRNET: <http://wx1.naswi.navy.mil>

APPENDIX B

MARINE CORPS AIR STATIONS AND FACILITIES ADDRESS AND TELEPHONE LOCATOR

ASL-37

COMMANDANT OF THE MARINE CORPS
ATTN: ASL 37
HEADQUARTERS, UNITED STATES MARINE CORPS
FEDERAL BUILDING NO.#2 (PENTAGON 5C721)
WASHINGTON DC 20380-1775
PLA: CMC WAHSINGTON DC//ASL-37//
DSN 224-1133/1028/1835/2237
(Comm) 703-614-1133/1028/1835/2237

MCAS YUMA

COMMANDING OFFICER
ATTN: WXO
H&HS MCAS
P. O. BOX 99160
YUMA, AZ 85369-9160
PLA: MCAS YUMA AZ//AOPS/WXO//
(DSN) 951-3230/3571
(Comm) (520) 341-3230/3571

MAWTS-1

COMMANDING OFFICER
ATTN: AGS/WXO
MAWTS 1 MCAS
P. O. BOX 99200
YUMA , AZ 85369-9200
PLA: MAWTS ONE YUMA AZ//AGS/WXO//
(DSN) 951-2534
(Comm) (520) 341-2534
NIPRNET: <http://www.tecom.usmc.mil/mawts1/>

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MCAS CAMP PENDLETON
COMMANDING OFFICER
ATTN: WEATHER SERVICE OFFICER
HQ HQ RON
BOX 555151
CAMP PENDLETON, CA 92055-5151
PLA: MCAS CAMP PENDLETON CA//OPS/WXO//
(DSN) 365-8373/8026
(Comm) (760) 725-8373/8026

MCAS MIRAMAR
COMMANDING OFFICER
ATTN: WXO
H&HS, MCAS MIRAMAR
P.O. BOX 452013
SAN DIEGO, CA 92145-2013
PLA: CG MCAS MIRAMAR CA//G3/WXO//
(DSN) 267-4029/4030
(Comm) (858) 577-4029/30

MCAF KANEOHE BAY
COMMANDING OFFICER
ATTN WXO
MCAF
P.O. BOX 63061
MCBH KANEOHE BAY, HI 96863-3061
PLA: MCAF KANEOHE BAY HI//AOPS/WXO//
(DSN) 315 457-2839/0404
(Comm) (808) 257-0404/2839
NIPRNET: <http://www.mcbh.usmc.mil/mcaf>

*CBIRF
COMMANDING OFFICER
ATTN CHIEF METEOROLOGIST
CBIRF
P.O. BOX 20165
CAMP LEJEUNE NC 28542
PLA: CBIRF//S-2//
(DSN) 751-9092/9108
***Note: Pending relocation to Indian Head, MD.**

MCAS CHERRY POINT
COMMANDING GENERAL
ATTN WXO
OPERATIONS MCAS
P.O. BOX 8011
MCAS CHERRY POINT, NC 28533-0011
PLA: CG MCAS CHERRY POINT NC//AOPS/WXO//
(DSN) 582-4442/2761
(Comm) (252) 466-4442/2761
NIPRNET: <http://weather.cherrypoint.usmc.mil>

MCAS NEW RIVER
COMMANDING OFFICER
ATTN WXO
MCAS NEW RIVER
PSC BOX 21001
JACKSONVILLE, NC 28545-1001
PLA: MCAS NEW RIVER NC//AOPS/WXO//
(DSN) 750-6179/6615

MCAS BEAUFORT
COMMANDING OFFICER
ATTN WXO
H&HS MCAS
P.O. BOX 55010
BEAUFORT, SC 29904-5010
PLA: MCAS BEAUFORT SC//AOPS/WXO//
(DSN) 335-7868/7974

MCAF QUANTICO
COMMANDING OFFICER
ATTN WEATHER SERVICE NCOIC
MCAF
2100 ROWELL RD
QUANTICO, VA 22134-5064
PLA: MCAF QUANTICO VA//AOPS/WXO//
(DSN) 278-1475

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MCAS FUTENMA

COMMANDING OFFICER

ATTN WXO

H&HS MCAS FUTENMA

UNIT 35202

FPO AP 96372-5202

PLA: MCAS FUTENMA JA//AOPS/WXO//

(DSN) 636-3071/3177

(Comm) 011-81-611-736-3177

NIPRNET: <http://www.futenma.usmc.mil/Weather/main.htm>

MCAS IWAKUNI

COMMANDING OFFICER

AIRFIELD & HARBOR OPERATIONS

ATTN: WEATHER SERVICE OFFICER

H&HS MCAS IWAKUNI

PSC 561 BOX 1876

FPO AP 96310-1876

PLA: MCAS IWAKUNI JA//AOPS/WXO//

(DSN) 253-4453/3005

(Comm) 011 81 611 753 4435

MARINE CORPS DETACHMENT

COMMANDING OFFICER

ATTN: WXO

MARINE CORPS DETACHMENT

824 HERCULES STREET, SUITE 104

KEESLER AFB MS 39534-2099

PLA: MARCOREP KEESLER AFB MS/WXO//

(DSN) 597-3788/8762

FLEET MARINE FORCE (FMF) WEATHER SERVICE ACTIVITIES
ADDRESS AND TELEPHONE LOCATER

I MEF

COMMANDING GENERAL

ATTN: G-2/SWO

I MEF

BOX 555300

CAMP PENDLETON CA 92055-5300

PLA: CG I MEF//G-2/SWO//

(DSN) 365-9121

(Comm) (760) 725-9121

II MEF

COMMANDING GENERAL
ATTN: G-2/SWO
II MEF
PSC BOX 20080
CAMP LEJEUNE NC 28542-0080
PLA: CG II MEF//G-2/SWO//
(DSN) 751-8558

III MEF

COMMANDING GENERAL
ATTN: AC/S G-2 (WEATHER)
III MARINE EXPEDITIONARY FORCE
UNIT 35601
FPO AP 96606-5601
PLA: CG III MEF//G-2/G-3/SWO//
(DSN) 622-9325/9566
(Comm) 011 81 6117 22 9325 or 9566
Fax: extension 7738
NIPRNET: <http://www.iiimef.usmc.mil/wx/metoc.htm>
SIPRNET: <http://www-g2.iiimef.usmc.smil.mil/wx/metoc.htm>

MWSG-17

COMMANDING OFFICER
MARINE WING SUPPORT GROUP 17
ATTN: WEATHER SERVICE OFFICER
UNIT 37190
FPO AP 96603-7190
PLA: MWSG SEVENTEEN//S-3/WXO//
(DSN) 645-2752
(Comm) 011 81 6117 53 4435

MWSS-171

COMMANDING OFFICER
ATTN S-3/WXO
MWS 171
UNIT 37201
FPO AP 96310-7201
PLA: MWSS ONE SEVEN ONE//S-3/WXO/MST//
(DSN) 253-4453/3005
(Comm) 011 81 6117 53 4435

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MWSS-172

COMMANDING OFFICER
MARINE WING SUPPORT SQUADRON 172
ATTN: WEATHER SERVICE OFFICER
UNIT 37206
FPO AP 96603-7206
PLA: MWSS ONE SEVEN TWO//S-3/WXO/MST//
(DSN) 636-3177/3071/3302
(Comm) 011 81 611 736 3177

MWSG-27

COMMANDING OFFICER
ATTN S-3/WXO
MWSG 27 2DMAW
PSC BOX 8082
CHERRY POINT, NC 28533-0082
PLA: MWSG TWO SEVEN//S-3/WXO//
(DSN) 582-2358
(Comm) (252) 466-2358

MWSS-271

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 271 2DMAW
PSC P.O. BOX 8078
CHERRY POINT, NC 28533-0078
PLA: MWSS TWO SEVEN ONE//S-3/WXO/MST//
(DSN) 582-0603/0616
(Comm) (252) 466-0603/0616
NIPRNET (MIDDS PAGE) 205.67.216.66
SIPRNET (METMF(R)) 204.223.248.118

MWSS-272

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 272 MWSG 27
PSC BOX 21032
JACKSONVILLE, NC 28545-1032
PLA: MWSS TWO SEVEN TWO//S-3/WXO/MST//
(DSN) 750-6828/6322
(Comm) (910) 450-6828/6322
NIPRNET (MIDDS PAGE) 158.237.241.34
SIPRNET 205.54.173.226

MWSS-273

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 273 MWSG 27
PSC BOX 66038
BEAUFORT, SC 29904-6038
PLA: MWSS TWO SEVEN THREE//S-3/WXO/MST//
(DSN) 335-7868/7974
NIPRNET: (MIDDS) 204.223.64.3

MWSS-274

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 274 MWSG 27
PSC BOX 8079
CHERRY POINT, NC 28533-0079
PLA: MWSS TWO SEVEN FOUR//S-3/WXO/MST//
(DSN) 582-4442/5737
(Comm) (252) 466-4442/5737

MWSG-37

COMMANDING OFFICER
ATTN S-3/WXO
MWSG 37, MCAS MIRAMAR
PO BOX 452047
SANTA DIEGO, CA 92145-2047
PLA: MWSG THREE SEVEN//S-3/WXO//
(DSN) 267-8430/7210
(Comm) (858) 577-8430/7210 Fax: 7211

MWSS-371

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 371
BOX 99210
YUMA, AZ 85369-9210
PLA: MWSS THREE SEVEN ONE//S-3/WXO/MST//
(DSN) 951-3230/3751

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MWSS-372

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 372
BOX 555861
CAMP PENDLETON, CA 92055-5861
PLA: MWSS THREE SEVEN TWO//S-3/WXO/MST//
(DSN) 365-8373/8026
(Comm) (760) 725-8373/8026

MWSS-373

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 373 MCAS MIRAMAR
BOX 4520049
SAN DIEGO, CA 92145-2049
PLA: MWSS THREE SEVEN THREE//S-3/WXO/MST//
(DSN) 267-1444/1443

MWSS-374

COMMANDING OFFICER
ATTN S-3/WXO
MWSS 374 MCAGCC
PO BOX 788285
TWENTY NINE PALMS, CA 92278-8285
PLA: MWSS THREE SEVEN FOUR//S-3/WXO/MST//
(DSN) 957-7820/7831

APPENDIX C

METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT REFERENCES

This appendix is a list of pertinent references for oceanographic and meteorological support. However, copies of all listed publications are not required to be held by every ship and station, nor does this list necessarily include all environmental support references that may be required to meet individual unit needs. Procurement and minimum publication requirements are specified in Chapter 10.

<u>PUBLICATION</u>	<u>TITLE</u>	<u>PURPOSE</u>	<u>SOURCE</u>
NAVMETOCCOMINST 1001.1E	Naval Meteorology and Oceanography Reserve Program	Provides information on NMOC Naval Reserve Program matters.	COMNAVMETOCCOM https://www.cnmoc.navy.mil
NAVMETOCCOMINST 1500.2H	Naval Meteorology and Oceanography Command Training and Certification Program	Set policy, assign responsibilities and procedures for training and certification of NMOC personnel.	COMNAVMETOCCOM https://www.cnmoc.navy.mil
NAVMETOCCOMINST 1500.3F	Procedures for Qualification and Certification of Navy & Marine Corps Air Traffic Controllers as Tower Visibility Observers	Provides basic guidelines and standardized procedures for units with the responsibility to train and certify local air traffic controllers in observing recording and disseminating tower visibility information.	COMNAVMETOCCOM https://www.cnmoc.navy.mil
NAVOCEANCOMINST 3100.2D	Special Incident Reporting (OPREP-3) and Unit SITREP Procedures	Promulgates procedures for Reporting (OPREP-3) Incidents by NMOC activities.	COMNAVMETOCCOM https://www.cnmoc.navy.mil

NAVMETOCCOMINST 3140.1L
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NAVMETOCCOMINST 3140.2E	Local Area and Area of Responsibility Forecaster's Handbooks	States a continuing requirement for the maintenance of up-to-date forecasters and provides basic specifications thereto.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3142.1A	Procedures Governing Pilot Weather Reports (PIREPS)	Establishes procedures and instructions for collecting, encoding, disseminating, and using domestic and overseas PIREPS.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3143.1F	Terminal Aerodrome Forecast (TAF) Code	Promulgates instructions for using the Terminal Aerodrome Forecast (TAF).	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3144.1D (Change 1)	U. S. Navy Manual for Ship's Surface Weather Observations	Provides U.S. Navy ships with instructions for observing and recording surface weather observations.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVOCEANCOMINST 3146.2A	Environmental Data Requirements	Sets forth standardized procedures for the establishment and maintenance of environmental data requirement listings for the Automated Weather Network (AWN).	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3161.4D	Navy Policy on Submission and Dissemination of Oceanographic Data	Describes policy and procedures of DON pertaining to the submission and dissemination of oceanographic data by Navy activities and contractors.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil

NAVOCEANCOMINST C3500.2A	Uniform System of Alert Conditions (LERTCONS)	Promulgates information regarding the alert system of the JCS as outlined by CNO and implements the system within NMOC.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 5040.1N	Naval Meteorology and Oceanography Command Inspection Program (NMOCIP)	Establishes & promulgates NMOCIP objectives and assigns responsibilities.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVOCEANCOMINST 5070.1E	Department of Defense Mapping Charting and Geodesy (MC&G) Libraries	Promulgates information and guidance to Naval activities which operate or have requirements to use DoD MC&G Libraries or are engaged in producing or acquiring MC&G data.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVOCEANCOMINST 3140.4C	Atmospheric Turbulence and Icing Criteria	Sets forth a common set of Turbulence and Icing Criteria describing the meteorological characteristics with which the respective classes of turbulence and icing are typically associated.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVOCEANCOMINST 3140.7G	Fleet Liaison Program	Establishes the NMOC Fleet Liaison Program and promulgates its organization and objectives.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil

NAVMETOCCOMINST 3140.1L
15 SEP 2000

NAVMETOCCOMINST 3140.13F	Employment of Mobile Environmental Teams (MET)	Promulgates guidance for the deployment of Mobile Environmental Teams and the priorities for their employment.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3140.14D	Procedures Governing Flight Weather Briefings and Preparing DD Form 175 1 and U.S. Navy Flight Forecast Folder	Promulgates information concerning Flight Weather Briefing Form DD 175-1 and prescribes procedures for entering weather data and forecasts thereon and standard procedures for the preparation of the U.S. Navy Flight Weather Folder.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3140.17A	Policies concerning the provision of METOC products and services.	Promulgates guidance regarding the provision of environmental services by NMOC activities to various requestors.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVOMETOCCOMINST 3140.23B (Change 1)	METOC Post-Deployment Reports	Establishes uniform procedures for submission of METOC post-deployment reports by afloat units with permanently assigned oceanography personnel.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil

NAVMETOCCOMINST 3140.24B	Procedures Governing Development and Input of Synthetic Observation (BOGUS) METOC Models.	Promulgates guidelines, procedures and formats for preparing and submitting bogus data inputs to METOC models.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 3141. 1B	Earthquake Observation and Reporting Program	Promulgates instructions for the observing and reporting of earthquakes by NMOC and USMC Environmental activities.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 5232.1F	Geophysics Fleet Mission Program Library (GFMPL)	Provides guidance for the operation and management of the GFMPL and promulgates procedures for the technical review of GFMPL software under the cognizance of the Navy Tactical Support Activity and the GFMPL model managers.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 5450.9F	Mission Organization and Functions of the Naval Meteorology and Oceanography Command	Provides information concerning the organization, missions, and functions of NMOC.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil
NAVMETOCCOMINST 13950.1L	Meteorological Equipment Management and Planning Policy	Provides policy and guidance for the planning Life Cycle Management (LCM) (conception through disposal) and operation of meteorological equipment.	COMNAVMETOCCOM Https://www.cnmoc.navy.mil

NAVMETOC COMINST 3140.1L
15 SEP 2000

NAVOCEANOINST 4900.1	Dissemination of Technical Data	Establishes policy and procedures, and assigns responsibility for the dissemination of technical data originated by NAVOCEANO.	NAVOCEANO http://www.navo.navy.mil
NAVOCEANO RP-51	Catalog of Naval Oceanographic Office Publications	Provides listing of available NAVOCEANO unclassified publications.	NAVOCEANO http://www.navo.navy.mil
NAVOCEANO RP-52	Catalog of Classified Naval Oceanographic Office Publications	Provides listing of classified publications produced by NAVOCEANO.	NAVOCEANO http://www.navo.navy.mil
NAVOCEANO RP-33	Fleet Oceanographic and Acoustic Reference Manual	Provides familiarization with the acoustic properties of the ocean and their operational use.	NAVOCEANO http://www.navo.navy.mil
P-3140	Products Manual	Summarizes the products and services available from FLENUMMETOC CEN.	FLENUMMETOC CEN Http://www.fnmoc.navy.mil
P-3146	Data Request Product (DRP) Manual	Summarizes the Data Request Products available from FLENUMMETOC CEN.	FLENUMMETOC CEN Http://www.fnmoc.navy.mil
P-3710	Optimum Path Aircraft Routing System (OAPRS) Users Manual	Provides procedural guidance for requesting automated flight planning from the Optimum Path Aircraft Routing System.	FLENUMMETOC CEN Http://www.fnmoc.navy.mil

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P-3148	Joint METOC Viewer (JMV) 3.0 Manual	Provides procedural guidance on the use of JMV 3.0	FLENUMMETOCEN Http://www.fnmoc.navy.mil
P-3147	NODDS Users Manual	Provides procedural guidance on the use of NODDS	FLENUMMETOCEN Http://www.fnmoc.navy.mil
FNMODASHEVILLENOTE 3146	Available Atmospheric Climatic Publications	Publishes a list of atmospheric climatic publications prepared by FLENUMMETOC DET Asheville, NC.	FLENUMMETOC DET ASHEVILLE Http://navy.ncdc.noaa.gov
OPNAVINST 3140.24E	Warnings and Conditions of Readiness Concerning Hazardous or Destructive Weather Phenomena	Promulgates information concerning destructive weather phenomena and establishes conditions of readiness in anticipation of hazardous or destructive weather.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html
OPNAVINST 3140.54A	Submission of Meteorological and Oceanographic, Astrometry, and Precise Time and Time Interval (PTTI) Requirements	To establish procedures for submitting requirements for new or modified oceanographic and meteorological products, services and support equipment; and for requesting technical guidance concerning oceanographic and meteorological support.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html

OPNAVINST 3140.55	Submission of Requirements for Geospatial Information and Services	Promulgates Department of Navy policy and procedures for submitting requirements for GI&S.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html
OPNAVINST 3141.1	Collection and Reporting of Balhythermograph Observations	To set forth responsibilities and procedures for the observation and reporting of BT data by Fleet units.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html
OPNAVINST 3710.7 Series	NATOPS General Flight and Operating Instructions	Provides policy and procedural guidance applicable to a broad spectrum of users in a positive approach toward improving combat readiness and achieving a substantial reduction in aircraft mishap rate.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html
SECNAVINST 5510.30A	Department of the Navy Personnel Security Program	To provide all Department of the Navy (DON) commands, activities and personnel with regulations and guidance governing the DON Personnel Security Program (PSP).	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html

SECNAVINST 5510.36	Department of the Navy Information Security Program (ISP) Regulation	To achieve uniform implementation of ISP policy and procedures throughout the DON by pro-active command programs. This regulation and SECNAVINST 5510.30A complement each other and have been coordinated to achieve compatibility.	Navy Directives: http://neds.nebt.daps.mil/Directives/dirindex.html
ATP 17(B)	Naval Arctic Manual	Discusses influence of the environment on cold weather operations.	NOTE 1
ATP 32(A)	NATO Handbook of Military Oceanographic Information Services	Contains all of the military oceanographic information normally required in ships and maritime patrol aircraft within NATO.	NOTE 1

ATP 45	Reporting Nuclear Detonations, Biological and Chemical Attacks, and Predicting and Warning of Associated Hazards and Hazard Areas	Prescribes procedures and reports required between NATO forces, national military, and civil authorities and agencies reporting nuclear detonations, radioactive contamination; and, enemy biological or chemical attacks and resulting contamination and for predicting and warning of fall out areas and chemical hazard areas.	NOTE 1
NTP-3 Supp-1(K)	U.S. Navy Address Indicating Group and Collective Address Designator (CAD)	Provides AIG and CAD assignments to USN, USMC and USCG activities.	NOTE 1

NTP-4 (D)	Fleet Communications	Provides world-wide guidance for afloat commands and activities in communications procedures such as Broadcasts, Ship/Shore and Ship/Ship communications, COMSEC, Special Message Handling, Standards for Activation and Operation of Specified Circuits, Explanation of Communications Training Requirements and Records Maintenance, Equipment Capabilities and Frequency Usage, etc. Procedural information unique to particular communication areas are promulgated as Communication Information Bulletins (CIB) and in Area Fleet Telecommunication Publications (FTP).	NOTE 1
NTP 6 (D)	Spectrum Management Manual	Provides guidance in obtaining radio frequencies.	NOTE 1
NTP-1O (D)	Communications Instructions for Ships Controlled by Military Sealift Command and U.S. Flag Merchant Fleet	Provides communications instructions for ships controlled by Military Sealift Command and U.S. Flag Merchant Fleet.	NOTE 1

NWP 6-01	Basic Operational Communications Doctrine	Contains information on weather communications.	NOTE 1
NWP 1-03.1	Operational Reports	Contains information on environmental reports and procedures for requesting enroute weather forecasts (WEAX).	NOTE 1
NWP 1-03.19	Joint Reporting System	Provides General Purpose Reporting procedures for COMMSPOTS, SITREPS, Requests for Information, Message Changes, etc.	NOTE 1
NWP 5-01	Naval Operational Plans	Discusses certain weather factors and provides guidance in evaluating their influence on Naval operations.	NOTE 1
Joint Pub 3-59	Joint Doctrine, Tactics, Techniques, and Procedures for METOC Operations.	Provides overview of Joint METOC Support organization, doctrine and principals.	JCS Publications Web Site: http://www.dtic.mil/doctrine/jel/c_pubs.htm
FCM-H1-1995 (Change 1)	FMH #1 Surface Weather Observations and Reports	Provides meteorological personnel information on federal standards on surface weather METAR observations.	

NAVORD OP-3784	Ballistic Winds and Densities for Naval Gunfire	Provides a ready source of ballistic wind and density information for use by fire control gunnery personnel.	NAVSUP P-2002
National Weather Service Forecasting Handbook No. 1	Facsimile Products	Explains the method of production of facsimile products by the National Weather Service and what the facsimile product intended to depict or show.	NOTE 2
National Weather Service Forecasting Handbook No. 6	Satellite Imagery Interpretation for Forecasters	Designed as a satellite applications guide for the working meteorologist.	NOTE 2
NAVOCEANO/USCG/NOAA/NIMA Joint Pub 606	Guide to Marine Observing and Reporting	Provides guidance to shipboard personnel for reporting oceanographic, hydrographic and navigational information.	NOTE 3
National Ocean Survey (NOS)	Tide Tables Tidal Currents and Coastal Pilot Charts	Provides information on tides and currents.	NOTE 3
Volume I Nautical Charts and Publications April 98			NOTE 4 NIMA Ref: CATP2V01U
Hydrographic Products Semiannual Bulletin Digest March 99			NOTE 4 NIMA Ref: CATP2V01UBD

NIMA	Geodesy for the Layman	The publication attempts to develop an appreciation of the scope of geodesy and to generate some understanding of the problems encountered in the science. The basic principles are presented through discussions of various geodetic topics such as: ellipsoids, geoid, horizontal surveying, leveling, geodetic datums and gravity.	NOTE 3
NOAA/NWS	Selected Worldwide Marine Weather Broadcasts	This is a publication of the Department of Commerce. It is the principal source of available frequencies for weather teletype and facsimile broadcasts worldwide.	NOTE 2

DISAC 310-130-1	Submission of Telecommunications Service Requests (TSR)	Provides instructions for preparation and submission of TSRs applicable to requirements for DISA service and for non DISA service leased by the Defense Commercial Communications Office (DECCO) and DECCO activities for DoD and other government departments, offices and agencies.	DISA
NAVCOMTELCOMINST 2880.1B	Naval Telecommunications System (NTS) Management Procedures – Telecommunications Service Requests (TSRS)	Provides procedures and guidance to assist Naval activities in submitting requests for telecommunications service DISA.	
DISAC 310-70-1 DII Tech Control	Operational Procedures TCF/PTF/MTC's	Describes practices methods and procedures for technical control facilities and supporting maintenance activities of the DISA. Describes the responsibilities of the DCS users.	DISA

USCINCPACINST 3140.1W	Tropical Cyclone Operations Manual	Publish procedures for tropical cyclone warnings and weather reconnaissance in the U.S. Pacific Command.	USCINPAC
COMNAVSURFLANT/ COMNAVSURFPACINST 3840.1B	Joint Surf Manual	Provides environmental support guidance for surf observations and forecasting to support amphibious operations.	COMNAVSURFLANT
COMNAVSURFPACINST 3140.2	Tropical Cyclone Evasion	A convenient reference which describes tropical cyclone evasion techniques and depicts climatology storm tracks.	COMNAVSURFPAC
NRL Monterey Articles, Papers, and Reports 1990-1998	Directory of Research Publications	Lists annual reports published by this facility.	NRL Monterey http://www.nrlmry.navy.mil/
NAVENVPREDRSCHFAC Tech. report TR 82-03	Hurricane Havens Handbook for the North Atlantic Ocean	Contains Hurricane haven studies for selected North Atlantic Ocean ports.	NRL Monterey http://www.nrlmry.navy.mil/
NRL/PU/7543-96-0025	Typhoon Havens Handbook for the Western Pacific and Indian Oceans	Contains typhoon haven studies for selected Pacific and Indian Ocean ports.	NRL Monterey http://www.nrlmry.navy.mil/
SSC San Diego Technical Document 3028, April 1998	Advanced Refractive Effects Prediction System (AREPS) Version 1.0 User's Manual,"	Introduces basic principles of electromagnetic radiation its use in object detection systems such as RADAR, FLIR electromagnetic wave propagation.	SPAWARSYSCEN San Diego, CA http://sunspot.nosc.mil/543/books.html

CNO (N096)	Strategic Plan	Roadmap to guide organizational progress into the 21st century (next 5-10 years)	CNO (N096) http://oceanographer.navy.mil/strategicplan.html
COMNAVMETOCCOM	Concept of Operations	Outlines the basis for Naval METOC support. It establishes the foundation for operational METOC support, guides the direction for modernization, and provides vision for planners and program managers.	COMNAVMETOCCOM https://www.cnmoc.navy.mil
United States Marine Corps MCWP 3-35.7	MAGTF METOC Support-	Outlines procedures and principles for supporting a MAGTF.	MCWP 3-35.7

NOTES:

1. ATP, NTP, NWP, JCS Publication Allowances & ordering instructions are found in OPNAVINST 5605.19J. After Joint Publication approval and prior to receipt of the Joint Electronic Library (JEL) CD-ROM, commands may download the publication from the Joint Doctrine Internet Homepage: [Http://www.dtic.mil/doctrine](http://www.dtic.mil/doctrine)
2. Some National Weather Service (NWS)/NOAA/NESDIS Publications are distributed by NAVOCEANO (Code N16) if warranted. Requests for NWS/NOAA/NESDIS publications should be directed to the Commanding Officer, Naval Oceanographic Office, Code N16, Stennis Space Center, MS 39522-5001 or by calling DSN 485-4558 with complete identification and justification.
3. These publications are available at NIMA or by submitting a DD Form 1348; through normal supply channels or by downloading from NIMA Publications homepage: <http://164.214.2.59/GandG/pubs.html>. NIMA's 24-hour General Help Desk is the Agency's primary entry point for questions about information, products or services, and is their primary customer advocate.

NAVMETOC COMINST 3140.1L

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NIMA General Help Desk (CODH/J-52)

3200 South Second Street

St. Louis, MO 63118-3399

DSN: 490-5032

Toll free: 1-800-455-0899

Commercial: (314) 260-5032

Fax: (314) 260-5024

DSN Fax: 490-5024

e-mail: chdesk@nima.mil

4. Defense Logistics Information Service (DLIS) Catalog volumes with product descriptions and graphics can be ordered just as any other GI&S product. Questions concerning catalog usage, availability, and ordering should be addressed to DSCR-JNB at DSN 695-6500, commercial (804) 279-6500, toll free 1-800-826-0342, fax - 6510.

APPENDIX D

IDENTIFICATION AND REPORTING PROCEDURES **FOR TROPICAL STORMS, HURRICANES AND** **TYPHOONS**

D1.0 Identification through Radar-Scope procedures

a. The radar-scope picture of a tropical storm or a hurricane or typhoon varies with distance from the cyclone, cyclone intensity and orientation, and radar in use. Some radars are capable of detecting tropical cyclones at ranges out to 250 miles. Because of the curvature of the earth, initial radar returns are from the upper portions of the cyclone, and lower level features are progressively revealed as the range closes. It is the lower levels which contain the heaviest precipitation, thus providing the strongest radar echoes and the greatest detail of the cyclone structure.

b. The initial radar indication of a cyclone will often be the detection of pre-hurricane squall lines. These may be curved or relatively straight lines of sharp-edged echoes, and they may be located as far as 400 to 500 miles from the cyclone center. They do not, however, provide sufficient information to accurately estimate the center location.

c. As the range closes, outer convective cloud cells are detected. These appear as two or three lines of sharp-edged echoes, 50 to 75 miles apart, which are curved or spiral in shape. They may be located as far as 300 miles from the center, but they likewise do not provide sufficient information to fix the center.

d. Finally, as the range is further reduced, a nearly continuous rain area becomes visible on the radar scope. It appears as a large, bright, fuzzy-edged echo without any distinctive shape. If the radar receiver gain is reduced, however, the spiral precipitation bands which are characteristic of mature tropical cyclones may become visible within the rain shield. The bands are oriented counter-clockwise around the center (in the northern hemisphere), with an inclination toward the center. It is at this point that an estimate of the location of the cyclone's center (eye) may first become possible.

e. The center may be a clear area (eye), or it may appear to be masked by precipitation echoes (center). It is generally circular in shape, but may be elliptical or somewhat deformed. Its diameter may vary from three miles to 30 miles or more. The center or eye is confirmed only after sufficient radar-scope observation has established that cyclonic (counter-clockwise in the northern hemisphere) movement of the echoes exists through an arc of 180° or more about it. Several "holes" or areas of weak echoes may appear in the rain shield area, and care must be taken that one of these "false eyes" is not reported as a true eye or center.

D2.0 Reporting Tropical Storms, Hurricanes and Typhoons detected by radar at sea.

a. Location and Evaluation of the Center (Eye).

Determine the position of the center or eye by observing the circulation of the radar echoes around it - not by a single, instantaneous observation. A fix should not be reported unless a cyclonic circulation (counter-clockwise in the northern hemisphere) is observed through more than 180° around the center. A center area devoid of radar echoes is reported as an "eye" - otherwise as a "center". The intensity classification, Tropical Storm or Hurricane/Typhoon, will be established from existing warnings. If no known warning exists, the classification, "tropical storm," shall be used.

b. Reports

1. This report (Report Symbol 3140-8) will be made on contact, hourly thereafter as conditions permit, by message, using IMMEDIATE precedence. It is to be addressed, using the appropriate Environmental CAD indicated in paragraph 5.4.1.

2. The message will contain the following information:

(1) **Identification** - Tropical Storm or Hurricane (Typhoon) Radar Report.

(2) **Time** - Time of Observation (GMT).

(3) **Evaluation** - Eye, Possible Eye, Center, or Possible Center.

(4) **Location of the Eye or Center** - Latitude and Longitude in Degrees and Tenths.

EXAMPLE: HURRICANE RADAR REPORT X 1704Z X POSSIBLE EYE 25.3N 70.4W

c. Definitions

1. **Convective Cells** - An organized, upward air motion characterized by the presence of convective (cumulus) clouds, usually with upward motion in the central portion of the cell, and sinking or down flow in the cell's outer regions.

2. **Eye (Center)** - The roughly circular area of comparatively light winds and fair weather at the center of severe tropical cyclones.

3. **Squall Line** - Any non-frontal line or band of active thunderstorms.

4. **Tropical Cyclone** - A non-frontal low pressure system of synoptic scale developing over tropical or subtropical waters and having definite organized circulation.

a. **Tropical Storm** - A warm-core tropical cyclone in which the maximum sustained wind ranges from 34 to 63 knots, inclusive.

b. **Hurricane or Typhoon** - A warm-core tropical cyclone in which the maximum sustained winds are 64 knots or greater. (Western North Pacific: sustained winds of 64 to 129 knots.)

c. **Super Typhoon** - In Western North Pacific denotes a warm-core tropical cyclone in which the maximum sustained winds are 130 knots or greater.

APPENDIX E

PRODUCT DESCRIPTIONS

Product Type	Name	Description	Production Site
Atmospheric Models			
	NOGAPS	Global spectral model, T159L24 resolution, MVOI analysis, normal mode initialization. Makes 6-day forecasts of all fundamental atmospheric parameters. Runs twice daily.	FNMOOC
	COAMPS	Multiple nested grids, nonhydrostatic dynamics, explicit moist physics, self-cycling atmospheric and SST data assimilation. Runs twice daily.	FNMOOC
	Ensemble Forecast System (EFS)	Ensemble of 10 reduced resolution NOGAPS runs, each with slightly different initial conditions. Allows probabilistic forecasts to 10 days	FNMOOC
	Derived Atmospheric Fields (DAF)	Diagnostic products based on NOGAPS forecasts--Clear Air Turbulence, Contrail Probability, Fog, Freezing Level, Frontal Positions, Relative Humidity, Rain Rate. Runs twice daily.	FNMOOC
	Nuclear/Biological/Chemical (NBC) Support	Hazard dispersion modeling using COAMPS fields	Regional Centers
Ocean Models			
	WAM - Wave Model	Global and regional forecasts of wave energy spectra, sea/swell height, period, and direction. Runs twice daily.	FNMOOC
	Regional WAM	Deep water, relocateable, variable resolution wave model producing an analysis and twice daily forecast out to 72 hours. Outputs include wave heights and directions.	FNMOOC
	STWAVE	Shallow water, relocateable, high resolution wave model producing an analysis and twice daily forecasts out to 72 hours	NAVO/WSC
	SWAFS	Variable resolution circulation model producing an analysis and twice daily forecasts out to 48 hours. Outputs include currents, tides and thermal/salinity data	NAVO/WSC
	OTIS	Global and regional univariate optimum interpolation analyses of surface and 3D ocean thermal fields and ice. Runs twice daily.	FNMOOC

	TOPS	Ocean surface mixed-layer model. Predicts upper ocean response to wind forcing. Runs twice daily.	FNMOC
	PIPS	Forecasts sea ice parameters--thickness, coverage, drift, divergence. Runs twice daily.	FNMOC, NAVICECEN
	ADCIRC	2-D, barotropic, shallow water advanced circulation model utilizing a finite element grid to produce an analysis and twice daily forecasts of sea surface elevations and currents	NAVO/WSC
	MODAS	Relocateable, variable resolution data assimilation system with analysis and daily forecasts. TDA and regional program support.	NAVO/WSC, Regional Centers
	Sonic Layer Depth	Sonic Layer Depth from GDEM	
Ice Products			
	West Arctic 90-Day Outlook	A long-range forecast prepared 90 days in advance of the shipping season. Narrative description of the regional climatology, the forecast ice edge, and the inner pack boundaries for the shipping lane along the north slope of Alaska.	NAVICECEN
	Fractures, Leads & Polynyas (FLAP) Product	The annotated Imagery describes the location and orientation of exploitable openings or thin ice features in the ice pack.	NAVICECEN
	Antarctic Iceberg Updates and Database	The large tabular icebergs calving from the numerous ice shelves in Antarctica are identified and tracked by NIC. Due to the enormous numbers of icebergs in this region, candidate icebergs must measure at least 10 nautical miles along the long axis.	NAVICECEN
	Ice Hazard/Edge	Depicts current ice edge, 100% concentration boundary and a 72 or 96-hour line of maximum extent of sea ice, which is available in message text format sent over AUTODIN.	NAVICECEN
	Great Lakes 30-Day Forecast	Depicts forecast ice edge and inner pack boundaries.	NAVICECEN
Warnings/Forecast Products			
	Special Weather Advisory	Plain language description of high interest hazardous weather situations	Regional Centers
	STOIC - Special Tactical Oceanographic Information Chart	Composite of bathymetry and EEI for an area approximately 8nm by 8nm. Users can specify what EEI they want.	NAVO/WSC
	SAIL - Special Annotated Image Littoral	Product produced when no bathymetry is available for a STOIC or when a product is needed in less time for a STOIC to be produced.	NAVO/WSC
	Route Weather Forecast (WEAX)	Tailored ship weather forecast	Regional Centers
	Aviation Route Weather Forecast	Tailored ship weather forecast with embarked aviation units	Regional Centers

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	(AVWX)		
	Flight Weather Briefing (DD 175-1)	Details Weather Conditions Expected During Take Off, En-route, and Destination.	Detachments, Facilities
	48/84-hour Prog Blend	48/84-hour blend of meteorological model forecasts	Regional Centers
	Front and Eddy Analysis	Digital representations of locations of surface thermal features as identified via analysis of 1.1km resolution AVHRR imagery	NAVO/WSC
	Horizontal Weather Depiction (Aviation HWD)	Surface or upper level weather depiction for 12/24hr forecast period	Regional Centers
	Terminal Aerodrome Forecast (TAF)	Forecast weather conditions for air terminal	Detachments, Facilities
	High Wind Warnings	Issued for areas with winds >35kts	Regional Centers
	High Sea Warnings	Issued for areas with Seas > 12ft	Regional Centers
	Tropical Cyclone Warning	72-Hour Forecast of Tropical systems position and intensity	NLMOC, NPMOC/JTWC
	Electro-Optic Support	Detection Ranges to different targets using Tactical Decision Aids (TAWS / WINEOTDA).	METS, Regional Centers
	Local Wind Warnings	Issued when small craft, gale or storm-force winds are forecasted or detected.	Regional Centers
	Thunderstorm/ Severe Thunderstorm Warnings	Issued when thunderstorms/severe thunderstorms are detected or forecast to be in the local area.	Regional Centers
	Sea Height Anal	Significant Sea Height Analysis	Regional Centers
	Aviation Hazard Charts	Charts showing icing, turbulence, winds, and thunderstorm hazards.	Regional Centers
	Sea Height Analysis	Blended analysis of model and observed combined sea heights	Regional Centers
	OPAREA Forecasts	24hr forecast/48hr outlook for coastal Opareas.	Regional Centers
	10 Day Energy Conservation Forecast	10 day temperature forecast for heating/air conditioning planning	NLMOC
	Climatology Request	Any environmental parameters requested (both oceanography and meteorology), for any requested time period, for any region in AOR.	Regional Centers, Facilities, Detachments
Satellite Support			
	DMSP	Process SSM/I data for input to models, SPP & tactical users. Provide SSM/I & Vis/IR images to NIPRNET/SIPRNET & JWICS	FNMO
	Fused Imagery	Provide meteorological model data overlaid on satellite imagery for model initialization and performance verification	Regional Centers
	MCSST 10km Composite	Global multi-channel sea surface temperature data collected via 4.4km AVHRR polar orbiting satellite and processed into 10km graphics	NAVO/WSC

	Annotated AVHRR	Near real-time 1.1km resolution satellite IR image enhanced to display sea surface temperatures and frontal boundaries	NAVO/WSC
	Marine Wind Speed from Altimetry	Near real-time 7km resolution wind speed observations along the nadir-track of operational altimetry satellites	FNMOCC
	Significant Wave Height from Altimetry	Near real-time interactive access to global satellite altimeter derived significant wave height with zoom capabilities.	FNMOCC
Services			
	Afloat Training Group	METOC Presentation and Training	
	Fleet Liaison Program	PCO tours; Ship Visit Program; Mobile Environmental Teams; Ocean Services; and SPECWAR support.	Regional Centers
	OPARS - Optimum Path Aircraft Routing System	Pre-flight planning aid that provides optimized flight plans in order to minimize fuel consumption and time enroute, and to maximize safety, for each leg.	FNMOCC
	OTSR - Optimum Track Ship Routing	Recommended optimal route to meet operational weather restrictions and minimize fuel consumption	Regional Centers
Equipment/ Software			
	RAWS - Remote Automated Weather System	Automated sensor suite which measures, records and transmits METOC information.	Detachments, Facilities
	NEXRAD PUP	Doppler Weather Radar Graphics	Detachments, Facilities
	WXMAP	Web-based interface to view set images containing MET data; updated during each model run.	FNMOCC
	PC-NODDS: Navy Oceanographic Data Distribution System	PC-DOS based software which displays products via standard telecommunication circuits.	FNMOCC
	NMOSS - Mobile Meteorology and Oceanography Support Products	Receive environmental data via AUTODIN message, E-mail, or other means of data transfer. The transmission of data via AUTODIN will result in a message with multiple sections.	FNMOCC
	Joint METOC Viewer (JMV)	Software which utilizes web technology to make FNMOCC environmental products available to users.	FNMOCC, Regional Centers
	DAMPS - Distributed Atmospheric Mesoscale Prediction System	Provides METOC numerical weather prediction analysis and forecasting capabilities to Regional METOC Centers.	Regional Centers

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	ASOS - Automated Surface Observing System	Automated sensor suite which measures, records and transmits METOC information..	Detachments, Facilities
	SWR - Supplemental Weather Radar	High resolution doppler weather radar.	Detachments, Facilities
	NSDS-E : Navy Satellite Display System-Enhanced	Geo-Stationary Satellite images posted to homepages.	Regional Centers, Detachments, Facilities
	PC-IMAT Personal Computer - Interactive Multisensor Analysis Training (PC-IMAT)	An ASW TDA and concept/context based trainer/ Tactical Decisional Aid	METS, Regional Centers
	Critical Factors Chart	Oceanographic Critical Factors Chart	NAVO/WSC
	Submarine Support Packages	Submarine Pre-deployment Environmental Package	NAVO/WSC
	Data Request Products (DRP)	DRPs provide numerical METOC prediction output, and quality controlled and raw data via standard telecommunication circuits.Run when necessary.	FNMOG
	AREPS - Advanced Refractive Effects Prediction System	Issued to exploit an EM advantage of the environment	METS, Regional Centers, Facilities
	GFMP - Geophysics Fleet Mission Program Library	Collection of utilities/TDAs to support warfighter	METS, Regional Centers, Facilities

APPENDIX F

COMMUNICATIONS ARCHITECTURE

F1.0 Introduction

The current NAVMETOCCOM communications architecture consists of both Defense Information Systems Network (DISN) and dedicated circuits ranging from 1.2 Kbps to 155 Mbps. The communications infrastructure for the Navy, and consequently for NAVMETOCCOM is in constant transition. New and changing METOC products/services coupled with technology advances in information transfer capabilities are the catalysts for change in the way NAVMETOCCOM does business. The current architecture continues to be a mix of dedicated and switched systems.

F1.1 METOC Data and Product Flow

From an operational perspective, the primary data flow is downward from the Production Center to the Regional Center and then to the Customer. Global and regional models, data, and products are sent from a production center to the regional centers where they are analyzed and tailored to meet situational requirements. As shown in Figure F-1, there is a small data flow, consisting primarily of local observations moving up the chain.

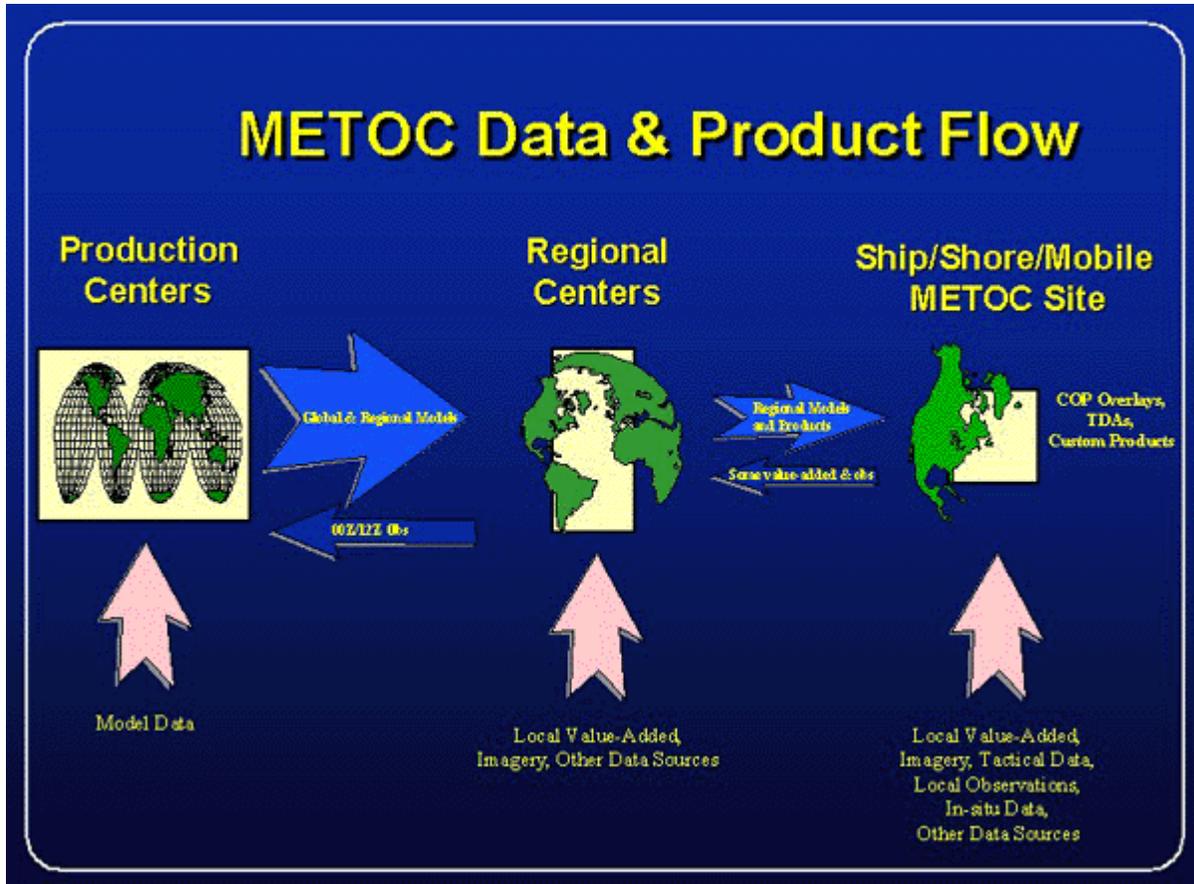


Figure F-1. METOC Data and Product Flow

In order to perform its duties, the Regional Centers provide a regional focus as they identify, collate, assemble, assimilate, and fuse METOC information available from all sources, including Navy, DOD, other national/governmental, civilian, and international. In this role, the Regional Center chooses the best information, from the best sources, merges or fuses the data as appropriate, and produces effective visualization products to match the needs of the operation.

The Regional Center manages the routine data flow from the Major Production Centers to METOC activities in the region. In most cases, this data flow management involves "hands off" supervision, ensuring that the correct information flows smoothly to the customer. Regional Centers have the automated on-scene ability to fuse in-situ observations and measurements with centrally-produced forecast data to produce re-analysis/nowcast fields.

At afloat platforms that have a METOC officer, the data and products are further analyzed and tailored to local mission requirements.

Data flow among the centers are generally land based connectivity using the NIPRNET and the SIPRNET. Data flow to the afloat and mobile units are most often transported through satellite.

F1.2 METOC to the Warfighter

Technically, METOC data flows through several networks (Figure F-2). All METOC production centers, Navy, Air Force, and the National Weather Service are interconnected by an Asynchronous Transfer Mode (ATM) network to exchange large amounts of data, images, and grids. These data, images and grids are used by the production centers to develop a myriad of products for fleet, air, and mobile customers.

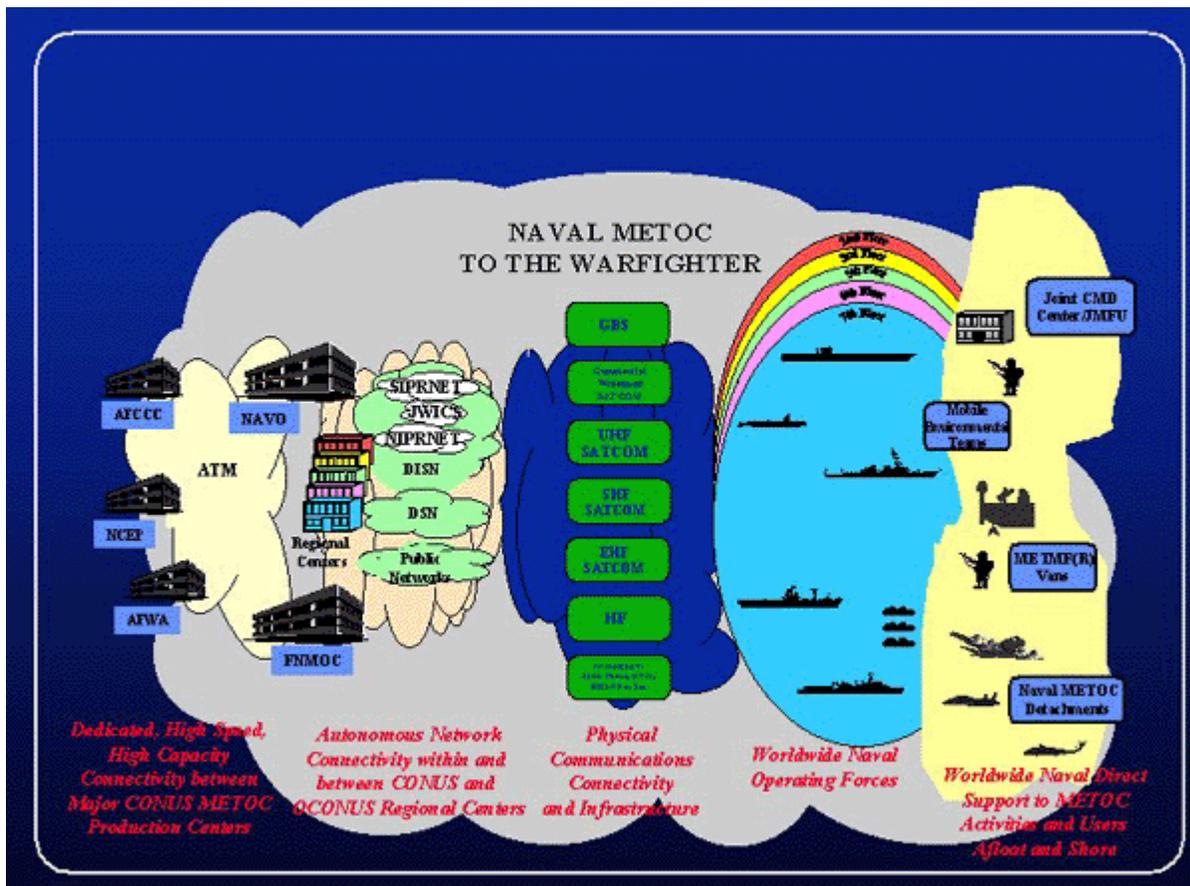


Figure F-2. Naval METOC to the warfighter

The NIPRNET and SIPRNET are the primary data transport media used to move data between the production centers and among the regional centers, facilities and detachments. The Joint Worldwide Intelligence Communications System (JWICS) is used, specifically, for providing and receiving data and information to/from the Intelligence Community. Public networks are accessed to obtain information from a variety of other, non-governmental information.

COMNAVCOMTELCOM operates and maintains all communications connectivity to afloat platforms. The bulk of that connectivity is satellite based today with some HF still in use. The fleet multi-channel broadcast is used primarily to feed necessary information to smaller afloat platforms and mobile customers.