



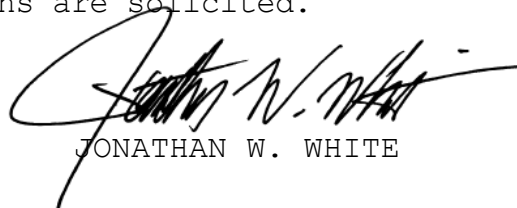
DEPARTMENT OF THE NAVY
COMMANDER
NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND
1100 BALCH BOULEVARD
STENNIS SPACE CENTER MS 39529-5005

COMNAVMETOCOMINST 3140.1M
N3
15 Aug 11

COMNAVMETOCOM INSTRUCTION 3140.1M

From: Commander, Naval Meteorology and Oceanography Command
Subj: U.S. NAVY METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT MANUAL
Encl: (1) U.S. Navy Meteorological and Oceanographic Support Manual

1. Purpose. To promulgate a revised edition of the subject manual. This instruction contains extensive revisions and should be reviewed in its entirety.
2. Cancellation. COMNAVMETOCOMINST 3140.1L
3. Discussion. The purpose of this manual is to describe the environmental services and support available to all operational Fleet and Joint activities 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.

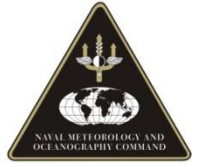


JONATHAN W. WHITE

Distribution:

Electronically via the Naval Oceanography Administrative Portal
<https://www.portal.navy.mil/cnmoc/default.aspx>
and via the Naval Enterprise Portal Oceanography at
<https://nepoc.oceanography.navy.mil/catalog/index.html>

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



UNITED STATES NAVY METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT MANUAL



AUGUST 2011

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COMNAVMETOCOMINST 3140.1M

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CHAPTER 1**NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND MISSION**

1. General Mission. The Naval Meteorology and Oceanography Command provides Meteorology and Oceanography (METOC), Bathymetry and Hydrography (Bathy/Hydro), Precise Time and Astrometry (PTA), products and services that enable effective decision-making for operational safety, warfighting success by Naval and Joint forces, and security cooperation.

2. Organization

a. The Commander, Naval Meteorology and Oceanography Command (COMNAVMETOCINCOM), both the Type Commander and operational arm of the Naval Oceanography Program, is an Echelon III command reporting to the Commander, United States Fleet Forces Command (COMUSFLTFORCOM). COMNAVMETOCINCOM is located at Stennis Space Center, Mississippi.

(1) The Assistant Chief of Staff for Operations (COMNAVMETOCINCOM N3) is charged with the responsibility of maintaining operational oversight of all Naval Meteorology and Oceanography (NAVMETOCINCOM) Echelon IV and subordinate activities. The COMNAVMETOCINCOM Oceanography Operational Watch (COOW) assists N3 in providing the Commander with 24/7 global situational awareness on environment-based conditions which bears upon the safety and operability of Naval personnel, facilities, and equipment through daily briefs and reports.

(2) COMNAVMETOCINCOM meets the needs of today's Combatant Commanders and Components, Naval and Joint Force warfighters through warfare directorates primarily aligned under four major Directors of Oceanography Operations (DOO):

(a) Undersea Warfare

- 1 Anti-submarine Warfare (ASW)
- 2 Mine Warfare (MIW)

(b) Expeditionary Warfare

- 1 Naval Special Warfare (NSW)
- 2 Expeditionary Warfare (EXW)
- 3 United States Marine Corps

(c) Weather Services

- 1 Fleet Operations (FltOps)
- 2 Aviation Weather Operations (AVN)
- 3 Maritime Weather Operations (MAR)

(d) Positioning, Navigation, and Timing

- 1 Navigation (NAV)
- 2 Precise Time and Astrometry (PTA)

(3) All directorates are aligned to support Naval Oceanography Operations Command (NAVOCEANOPSCOM). NAVOCEANOPSCOM is the service delivery portion of NAVMETOCCOM, providing tailored products and services in direct support to Navy and Joint force decision makers, staffs, and operators. Three production centers provide the directorates with product generation and in-depth technical expertise. The production centers include Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCCEN) in Monterey, CA. providing atmospheric production, the Naval Oceanographic Office (NAVOCEANO) in Stennis Space Center, MS., providing oceanographic production and, the U. S. Naval Observatory (USNAVOBSY) in Washington, D.C., for precise time and astrometric production. The Naval Meteorology and Oceanography Professional Development Center is the training activity supporting NAVMETOCCOM.

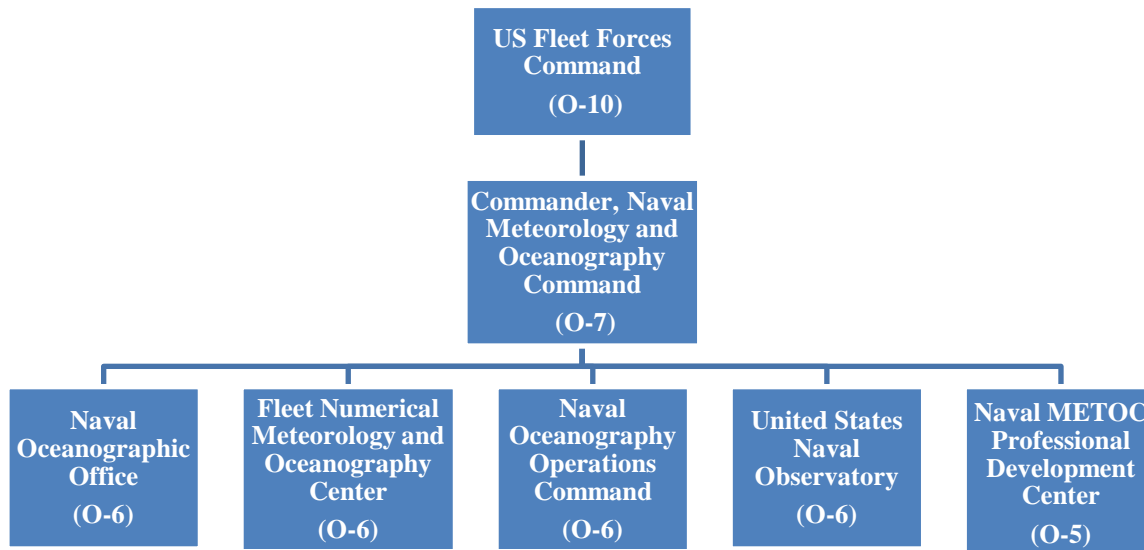


Figure 1: Echelon II to Echelon IV Organizational Structure

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b. Naval Oceanographic Office (NAVOCEANO). NAVOCEANO's core competencies include the disciplines of hydrography, bathymetry, geophysics, acoustics, physical oceanography, and geospatial intelligence. NAVOCEANO acquires and analyzes global ocean and littoral data to provide specialized, timely, and operationally relevant products and services for Department of Defense warfighters as well as other civilian, national and international customers. Utilizing space-based, airborne, surface, and subsurface platforms, as well as state-of-the-art computing and modeling techniques, NAVOCEANO synthesizes this data into products and services tailored to the individual warfighter's needs. These products and services support virtually every type of Fleet operation, providing mission-essential environmental information to the warfighter. NAVOCEANO is the parent command of the Naval Ice Center and the Fleet Survey Team.

c. Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCEN). FLENUMMETOCEN maintains core expertise in meteorology, oceanography and information technology to provide the necessary foundation for on demand support to Naval, Joint, Coalition, and National missions. FLENUMMETOCEN leverages this expertise to host a suite of "state of the art" meteorological and oceanographic models and decision aids to provide scheduled and on demand products specific to Fleet and Joint Operations. FLENUMMETOCEN and the National Center for Environmental Prediction (NCEP) are the only dedicated numerical prediction production centers (*i.e.*, run models to produce global METOC forecasts) in the United States.

d. Naval Oceanography Operations Command (NAVOCEANOPSCOM). NAVOCEANOPSCOM is NAVMETOCCOM's operational Echelon IV Command responsible to support safe operations, enhance dominance of the battlespace, and optimize warfighting resources and readiness to naval and joint forces through superior understanding and exploitation or mitigation of the physical environment. NAVOCEANOPSCOM provides the warfighter tailored METOC, GI&S, Mapping, Charting, and Geodesy products and services through seven warfighter specific commands.

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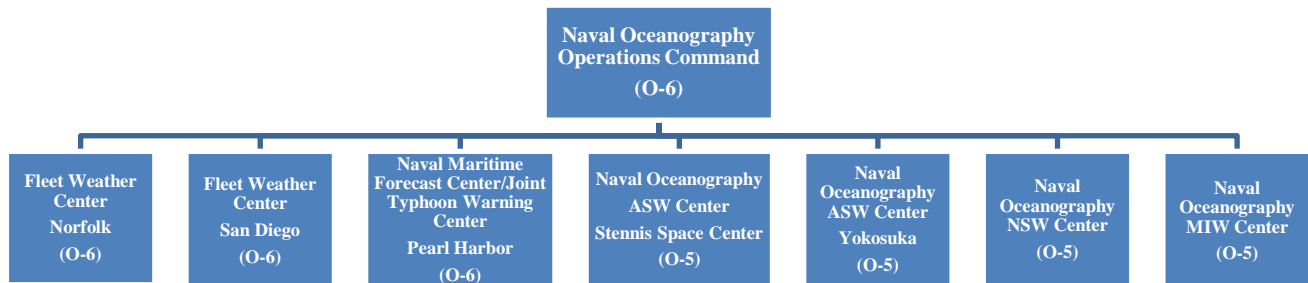


Figure 2 NAVOCEANOPSCOM (Ech IV) Subordinate Commands (Ech V)

e. Directors of Oceanographic Operations (DOOs). Directors of Oceanographic Operations are assigned to the NAVOCEANOPSCOM staff and assigned additional duty to the COMNAVMETOCOM staff. These DOOs collect both operational and research and development (R&D) requirements from the fleet and the Oceanography Echelon V commands, then coordinate with the COMNAVMETOCOM staff and acquisition activities to ensure that those requirements are documented, solutions funded, and capabilities developed to provide the Oceanography commands with the capabilities needed to meet those requirements. The DOOs also collaborate with the U.S. Navy warfare centers of excellence to ensure the latest environmental support capabilities are reflected in appropriate Navy doctrine. They also keep abreast of evolving doctrine to ensure that necessary environmental support capabilities are implemented to support that doctrine.

f. United States Naval Observatory (USNAVOBSY). USNAVOBSY provides a wide range of critical astronomical data and timing products. The products are available as hardcopy publications such as the *Nautical Almanac*, stand-alone computer applications, and data services accessible via the Internet. The USNAVOBSY Master Clock serves as the country's official time keeper, and USNAVOBSY is the sole provider of Precise Time and Time Interval (PTTI) for all DoD services. Although GPS is the primary method of UTC time transfer for the majority of DoD users, the most demanding time transfer requirements can be met through two-way satellite time transfer. Additionally, USNAVOBSY is responsible for establishing, maintaining, and coordinating the astronomical reference frame(s) for celestial navigation and orientation of space systems. USNAVOBSY is responsible for Earth orientation parameters (EOP) predictions for all DoD services, agencies, and contractors, as well as the international community. Earth orientation parameters link the terrestrial reference system, WGS-84, to the celestial reference frame, and are essential to

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determine spacecraft orbital information and geolocation of data and imagery derived from space systems. USNAVOBSY is the only organization making EOP predictions operationally.

g. Naval Meteorology and Oceanography Professional Development Center (NAVMETOC PRODEV CEN). The Professional Development Center (PDC) conducts training for active and reserve Naval Oceanographers and Aerographer's Mates (AG) in meteorology, oceanography, mapping, charting, and geospatial information and services. In addition, the PDC provides technical guidance and METOC training materials to ensure development and technical accuracy of METOC portions of the warfare pipeline training.

3. Battlespace on Demand (BonD) Concept. The Battlespace on Demand (BonD) operational concept fully embraces the guiding principles outlined in *The U.S. Navy's Vision for Information Dominance* and supports the vision set forth in the *Naval Operations Concept 2010* and *A Cooperative Strategy for 21st Century Seapower*. It supports the long-range Naval Oceanography strategy for linking environmental data to timely and informed decisions – a key aspect of decision superiority. It focuses on the acquisition of environmental data, transformation of the data and fusion with other data sources into information and knowledge, and providing knowledge to future Naval forces during the 2011-2020 timeframe. It describes how the acquisition and analysis of environmental data and information from Navy, joint, interagency, and international sources allows for an accurate understanding of complex operational environments. It also identifies required capabilities for the further examination of potential Naval Oceanography doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions.

a. Developing knowledge of the current and future physical environment is essential to a knowledge-based, net-enabled Fleet capable of situational understanding and decision superiority. BonD is the Naval Oceanography execution strategy for optimizing the U.S. Navy's sea power by providing tailored decision-support products that enable warfighters to exploit the physical environment to their tactical, operational and strategic advantage. This strategy for delivering BonD is depicted in the four-tiered, environment face of pyramid in Figure 3.

(1) **The Data Layer**. Tier 0 consists of data collected while observing the atmosphere and the ocean using a vast range of in-situ sensors and remote sensors, including satellites, altimeters, gliders, buoys, and master clocks. This data is

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assimilated and fused to provide initial and boundary conditions that accurately describe the current ocean and atmosphere environment, as well as the celestial and temporal reference frames. The output is a collection of raw observation data on the state of the physical environment.

(2) **The Environment Layer.** In Tier 1, the Tier 0 data are analyzed, processed, and merged into databases and/or prediction systems or numerical models operated on High Performance Computing (HPC) systems to forecast the future state of the environment. The output is a set of predictions, in space and time, of the expected physical environment for whatever operation is under consideration. The output can also contain a 'confidence factor'.

(3) **The Performance Layer.** In Tier 2, the predicted environment is used in conjunction with information about the operational environment to predict how forces, sensors, weapons systems, and platforms will perform over time in a given operational situation. This information is analyzed to provide meaning with respect to implications for the operation, such as influences on planning, force structure, targeting, timing, maneuver, tactics, techniques and procedures. The output of this fusion of information about the predicted environment and the friendly and enemy situation is an impact assessment in terms the operator understands, again with a confidence factor if appropriate. Situational awareness is the desired outcome at this level.

(4) **The Decision Layer.** In Tier 3, the situational awareness gained in Tier 2 is applied to specific situations to quantify risk and opportunity at strategic, operational, and tactical levels. Here, actionable recommendations are made to the decision-maker regarding force allocation and employment that directly enhance safety and warfighting effectiveness. In Tier 3, the performance predictions made in Tier 2 are considered with alternative scenarios to develop optimal solutions, i.e., courses of action (COAs), and to understand probabilities of success and elements of risk. The intent is to make recommendations that take maximum advantage of asymmetric opportunities in the changing physical environment, to provide the most advantage to our forces, and the most disadvantages to the enemy. The output is a decision recommendation with compelling rationale, based on our best understanding of the physical environment. The decision-maker combines knowledge of

the present and future situation with their judgment into situational understanding to facilitate superior decision-making.

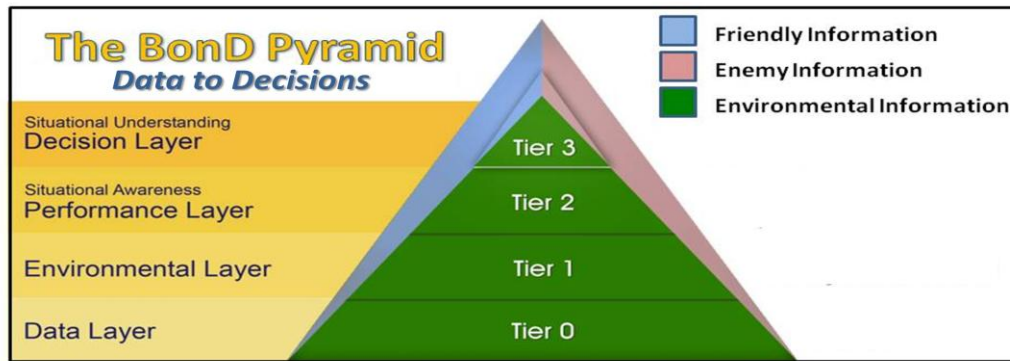


Figure 3: The BonD Pyramid

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CHAPTER 2**NAVY ENTERPRISE PORTAL - Oceanography**

1. General. The Navy Enterprise Portal - Oceanography (NEP-Oc) has been created as the Naval Oceanography mission extension to the Navy Enterprise Portal. NEP-Oc will serve as a single access point for all METOC web-accessible information on the NIPRNet and SIPRNet.

a. The NEP-Oc will have the characteristics and capabilities of multiple web sites, including the following types of traditional web sites:

(1) Product/service site: providing information about, and access to, METOC web products/services.

(2) Portal site: supporting the visual/interactive aggregation of products/services from multiple METOC and external partner provider sites and supporting user personalization of the interface.

(3) Web application site: hosting key enterprise applications (e.g. Enterprise Catalog, Managers Console, Mission Console, etc.) and that launches independent provider site web-accessible applications.

(4) Collaboration site: where users can publish back into the site and have interactions with multiple distributed users, about multiple distributed products.

2. Products and Services

a. If a required product is not available on the NEP-Oc, submit a Request for Support (RFS) or Request for Information (RFI) to the appropriate NAVMETOCCOM activity, if known. If not known, then submit the RFS or RFI to the COMNAVMETOCCOM Product Support Coordinator (PSC), the COMNAVMETOCCOM Operational Oceanography Watch (COOW). The COOW will route the request to the appropriate NAVMETOCCOM activity for action. The COOW will also assist customers with contacting the appropriate operational support center, production center, or subject matter experts for additional assistance as required.

b. Special support and exercise web pages may be requested. The COOW will create the page and have the necessary NAVMETOCCOM activities populate the pages.

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c. The uniform resource locator (URL) for the NEP-Oc and other pertinent web-sites are:

- (1) NIPRNet - <https://nepoc.oceanography.navy.mil/>
- (2) SIPRNet - <http://nepoc.oceanography.navy.smil.mil>
- (3) Public Facing Portal - <http://www.usno.navy.mil>
- (4) Navy Flight Weather Briefer -
<https://fwb.metoc.navy.mil>
- (5) Administrative -
<https://www.portal.navy.mil/cnmoc/default.aspx>
- (6) Public Affairs - <http://www.navmetocom.navy.mil>
- (7) Intellipedia -

https://www.intelink.gov/wiki/Naval_Meteorology_and_Oceanography_Command

3. Points of Contact

a. Products/Special Support Pages - COMNAVMETOC COM Operational Oceanography Watch

- (1) Phone
COM: (228) 688-4019
DSN: 828-4019
Cell: (228) 342-1449
- (2) E-mail
NIPR: coow.fct@navy.mil
SIPR: COOW_SIPR.fct@navy.smil.mil

b. Technical Support - METOC Systems Knowledge Center

- (1) Phone
COM: (619) 524-3888
DSN: 524-3888
- (2) E-mail
NIPR: metoc@spawar.navy.mil
SIPR: metoc@metoc.spawar.navy.smil.mil

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CHAPTER 3**MARITIME SUPPORT**

1. General. The mission of METOC maritime support is to enable fleet safety and readiness through accurate and timely weather forecasts, warnings and recommendations. This support is provided by the Fleet Weather Center (FWC), Norfolk and Fleet Weather Center, San Diego. The typhoon warning functions of the Joint Typhoon Warning Center (JTWC) Pearl Harbor are discussed in Chapter Four. FWC Norfolk supports operations in the C2F, C4F, C6F AORs, and Arctic Fleet Operations. FWC San Diego supports operations in the C3F, C5F, and C7F AORs.

2. Products and Services

a. Optimum Track Ship Routing (OTSR). A weather advisory service for safety and damage avoidance, spanning long-range planning to enroute surveillance. The primary method of dissemination is via message traffic; E-mail is also available for units without message capabilities. Daily messages will not be sent when conditions are forecast to be less than ship's limits.

(1) OTSR Route Surveillance Message. Issued upon receipt of MOVREP requesting service, it confirms OTSR surveillance will be provided.

(2) OTSR Weather Advisory. Issued when conditions are forecast to approach/meet wind or seas limits as determined by supported unit.

(3) OTSR Divert Recommendation. Issued when conditions are forecast to exceed wind or seas limits as determined by supported unit.

(4) OTSR Route Recommendation. Planning route issued upon request that considers ship's limits, operational constraints, currents, icebergs, time/fuel savings. Planning routes must be requested 72 hours before getting underway.

(5) Special Weather Advisory (FWC, Norfolk). Issued for prolonged periods of heavy weather in high-traffic areas of the AOR, 72+ hours in advance.

b. Enroute Weather Forecast (WEAX). A tailored weather and sea state forecast along a unit's Points of Intended Movement (PIM), MODLOC, or OCONUS port. Requested via the ship's MOVREP,

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the WEAX is produced once daily (twice daily for special circumstances or upon request). Disseminated via message traffic or E-mail, the WEAX includes a 24-hour forecast and 48-hour winds/seas outlook.

(1) Aviation Enroute Weather Forecast (AVWEAX). WEAX including the aviation parameters of ceilings, turbulence, icing, flight-level winds, and divert field terminal aerodrome forecast (TAF).

(2) Graphical Enroute Weather Forecast (GWEAX). Includes the same data as text product, but in an easy-to-read/easy-to-brief graphical format. This graphical product can also include aviation parameters. The graphic includes model data with ship track overlaid for 24 and 48-hours. Disseminated as a .jpg via E-mail, the approximate file size is 150 kb.

c. Submarine WEAX (SUBWEAX). A tailored weather and sea state forecast at various classification levels for U.S. and allied submarines. U.S. submarines utilize OPAREA forecasts exclusively and switch to SUBWEAX support upon departing local OPAREAs. SUBWEAX is produced by FLENUMMETOCEN. Requested via SUBNOTE, the SUBWEAX is produced once daily for submarines in a favorable status. Submarines in a marginal or unfavorable status are provided twice daily forecasts. Disseminated via message traffic or email, the SUBWEAX includes a 24-hour forecast and 48-hour winds/seas outlook.

d. High Winds and Seas Warnings. Depicts areas of forecasted winds \geq 35 kts and seas \geq 12 ft twice daily (00Z and 12Z). The text warning and graphical product are posted to the NEP-Oc and an overlay is transmitted on GCCS-M.

e. OPAREA Forecasts. Produced once a day for major operating areas, the forecasts are transmitted via message traffic and posted to the NEP-Oc. The product includes a 24-hour forecast and 48-hour outlook.

f. Arctic Support

(1) Standard WEAX support provided.

(2) FWC, Norfolk will coordinate daily with Naval Ice Center for dissemination of appropriate ice analysis and forecasts.

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g. Google Earth Products. Downloadable via SIPRNet NEP-Oc, RSS subscription, Google Globe Base Layer, GeoServer. Visit the SIPRNet NEP-Oc to see the latest products available.

h. Miscellaneous Products (Atlantic only)

(1) Forecast Charts. Depict satellite image, high and low pressure systems, fronts, and high winds and seas areas. The analysis, 36-hour forecast and 72-hour forecast are produced twice daily (00Z and 12Z) and posted to the NEP-Oc.

(2) Submarine Homeport Forecast Atlantic. Provides a 24-hour and 48-hour forecast (winds, seas, visibility, and temperature) for CONUS submarine ports. The forecast is sourced from the National Weather Service with impact assessments provided by FWC Norfolk.

(3) Sea Height Analysis. Produced twice daily (00Z and 12Z) for North Atlantic, East Atlantic, GOMEX/Caribbean and posted to the NEP-Oc.

i. Miscellaneous Products (Pacific only)

(1) Submarine Port Forecast for Pacific - CONUS: provides a 24-hour and 48-hour forecast (winds, seas, visibility, and temperature) for CONUS submarine ports. The forecast is sourced from the National Weather Service with impact assessments provided by FWC San Diego.

(2) Submarine Port Forecast for Pacific - OCONUS: provides a 24-hour and 48-hour forecast (winds, seas, visibility, and temperature) for OCONUS submarine ports. The forecast is sourced from the National Weather Service with impact assessments provided by FWC San Diego.

(3) Pacific Area Forecast. Provides a broad area forecast of 24-hour and 48-hour significant wave heights and wind strengths. The product is produced by FLENUMMETOCEN.

3. Product Requests/Dissemination

a. Product Request

(1) OTSR and WEAX: requested via MOVREP

(a) Include FLEWEACEN NORFOLK VA, FLEWEACEN SAN DIEGO CA and FLENUMMETOCEN DATA as INFO ADDEES in MOVREP.

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(b) Place flag words "OTSR" and/or "WEAX" in first line of MOVREP Ex: PPP MOVREP XXX, WEAX/OTSR/01//.

(c) Include head/beam/following sea limits, wind limits, and point of contact information in Remarks.

(d) If requesting GWEAX, include email addresses for distribution.

(e) OTSR request does not automatically include WEAX services.

(f) Units not using MOVREPS can request via NEP-Oc or contact CDO directly to request services.

(2) OTSR Route Request: Requested via message, email, or NEP-Oc

(a) Include FLEWEACEN NORFOLK VA and FLEWEACEN SAN DIEGO CA as INFO ADDEES in request.

(b) Requires 72 hours lead time

(c) Include POC, ETD/ETA, limits, constraints, special operations

(3) SUBWEAX: requested via SUBNOTE for boats operating outside local OPAREA forecast coverage.

(a) A request line is inserted in the SUBNOTE by the SUBOPAETH with operational authority. FLENUMMETOCEN is copied on all SUBNOTES.

(b) Message is sent to the designated SUBOPAETH, who then provides the forecast via the submarine broadcast.

(c) SUBWEAX does not include OTSR divert recommendations.

(d) Favorability notices are not provided to foreign submarines.

(4) Special Support Request: Contact CDO

b. Navy Enterprise Portal - Oceanography (NEP-Oc)

(1) NIPRNet - <https://nepoc.oceanography.navy.mil/>

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- (2) SIPRNet - <http://nepoc.oceanography.navy.smil.mil>
- (3) Public Facing Portal - <http://www.usno.navy.mil>

4. Points of Contact

a. Fleet Weather Center, Norfolk, VA

(1) PLA: FLEWEACEN NORFOLK VA

(2) Command Duty Officer

(a) E-mail

NIPR: CDO.FWC.NRFK.FCT@NAVY.MIL

SIPR: CDO.NMFA_N.001.FCT@NAVY.SMIL.MIL

(b) Phone

COM: (757) 444-7750

DSN: (312) 564-7750

(3) Ship Routing Officer

(a) E-mail

NIPR: SRO.FWC.NRFK.FCT@NAVY.MIL

SIPR: SRO.NMFA_N.001.FCT@NAVY.SMIL.MIL

(b) Phone

COM: (757) 444-4044

DSN: (312) 564-4044

b. Fleet Weather Center San Diego

(1) PLA: FLEWEACEN SAN DIEGO CA

(2) Command Duty Officer

(a) E-mail

NIPR: fwcsd-cdo.fct@navy.mil

SIPR: fwcsd-cdo.fct@navy.smil.mil

(b) Phone

COM: (619) 767-1271

DSN: (312) 577-1271

(3) Ship Routing Officer

(a) E-mail

NIPR: fwcsd-sro.fct@navy.mil

SIPR: fwcsd-sro.fct@navy.smil.mil

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(b) Phone

COM: (619) 545-2193

DSN: (312) 735-2193

d. Fleet Numerical METOC Center

(1) PLA: FLENUMMETOCEN MONTEREY CA

(2) Command Duty Officer

(a) E-mail

NIPR: fnmoc.cdo@navy.mil

SIPR: cdo@fnmoc.navy.smil.mil

(b) Phone

COM: (831) 656-4325

DSN: (312) 878-4325

5. Governing Instructions

NAVMETOCINST 3140.4D	Atmospheric Turbulence and Icing Criteria
NAVMETOCINST 3140.14F	Flight Weather Briefing Manual
NAVMETOCINST 3141.2A	Surface Weather Observation Procedures
NAVMETOCINST 3142.1A	Procedures Governing Pilot Weather Reports (PIREPS)
NAVMETOCINST 3143.1G	Terminal Aerodrome Forecast (TAF) Code
OPNAVNIST 3710.7U	Naval Air Training and Operating Procedures Standardization (NATOPS) General Flight and Operating Instructions
OPNAVINST 3140.24F	Warnings and Conditions of Readiness Concerning Hazardous or Destructive Weather Phenomena
CNATRANINST 3140.4Q	Aircraft Hurricane Evacuation (HUREVAC)
CNATRANINST 3710.8J	Restriction of Flight into, through, or within CNATRA Aviation Weather Warnings (CAWW)
ATP 17C	Naval Arctic Manual

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CHAPTER 4**TROPICAL CYCLONE SUPPORT**

1. General. The Joint Typhoon Warning Center (JTWC) is responsible for providing tropical cyclone support to all DoD assets in the USPACOM AOR. JTWC will re-host forecasts issued by the Central Pacific Hurricane Center (CPHC) for the Central North Pacific and the National Hurricane Center (NHC) for the Eastern North Pacific. Fleet Weather Center, Norfolk is responsible for providing tropical support to U.S. Navy assets in the Atlantic Ocean, re-hosting forecasts from the NHC.

2. Products and Services

a. Tropical Cyclone Products (Pacific and Indian Oceans)

(1) Tropical Cyclone (TC) Warning. Will include development level; storm ID information; current warning number; position of the low level center; movement over the last six hours; speed of maximum sustained winds; radius of 34, 50 and 64 knot surface winds; 12, 24, 36, 48, 72, 96, and 120 hour forecast positions (unless dissipation or extratropical transition is expected earlier); intensities and forecast wind radii; and a remarks section. JTWC forecasts are for conditions over the ocean. DoD and other U.S. government meteorologists will use JTWC warnings as guidance to forecast local weather conditions (wind, precipitation, storm surge, etc.).

(a) Western North Pacific Ocean. Will be issued when maximum sustained surface winds are assessed to be 25 knots or greater. Warnings will be issued every six hours not later than 03Z, 09Z, 15Z, and 21Z.

(b) North Indian Ocean. Will be issued when maximum sustained surface winds are assessed to be 35 knots or greater. Warnings will be issued every six hours not later than 03Z, 09Z, 15Z, and 21Z.

(c) South Indian Ocean. Will be issued when maximum sustained surface winds are assessed to be 35 knots or greater. Warnings will be issued at an interval not to exceed every twelve hours and not later than 03Z and 15Z or 09Z and 21Z.

(d) South Pacific Ocean. Will be issued when maximum sustained surface winds are assessed to be 35 knots or greater. Warnings will be issued at an interval not to exceed every twelve hours and not later than 03Z and 15Z or 09Z and 21Z.

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(e) North Central and Eastern North Pacific Ocean. Will be issued every six hours when maximum sustained surface winds are assessed to be 25 knots or greater. JTWC will re-host these advisories as tropical cyclone warnings for the DoD as soon as possible after receipt (not later than 04Z, 10Z, 16Z, and 22Z). In the event that CPHC or NHC does not issue a warning on a cyclone, or if JTWC disagrees with a CPHC or NHC forecast, and the differences cannot be resolved, JTWC will issue its own warning.

(2) Tropical Cyclone Warning Graphic Forecasts. Issued by JTWC will include a graphical depiction of each text warning. In addition to the position, intensity, and wind radii information, the graphical warning will also provide the error swath (defined as the 5 year average track error plus the forecast radius of 35 knot winds), closest point of approach (CPA) and bearing/distance information from significant DoD installations.

(3) Prognostic Reasoning. JTWC will issue a prognostic reasoning message in conjunction with tropical cyclone warnings in the Western North Pacific Ocean every 12 hours. The message is intended for DoD meteorological and oceanographic personnel and is a discussion of the synoptic environment, forecast reasoning, and any alternate scenarios under consideration. It will be issued NLT 03Z and 15Z.

(4) Three-hourly Updated Position. When a TC is threatening certain DoD installations in the Western North Pacific Ocean, JTWC will issue a three-hourly updated position. The update is a graphic depiction of the latest best track, forecast track, and estimated current position to give situational awareness of the storm motion for DoD units.

(5) Conference Call. JTWC will host a conference call at 2130Z when a Western North Pacific tropical cyclone is forecast to impact a DoD area of interest within 72 hours.

b. Tropical Cyclone Formation Alerts (TCFA). Issued when conditions are favorable for tropical cyclone formation within 24 hours. The alert consists of a graphic and text description of the area that development is expected to occur, along with a brief meteorological description of the disturbance.

c. Tropical Support Products (Pacific and Indian Oceans)

(1) Significant Tropical Weather Advisory. JTWC issues two narrative messages each day describing existing tropical

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cyclones and tropical disturbances being monitored for development in the next 24-hour period. The bulletin for the Western North Pacific and South Pacific is issued not later than 06Z daily. The bulletin for the North and South Indian Ocean is issued NLT 18Z.

(2) Satellite Reconnaissance Bulletins. JWC Satellite Operations (SATOPS) will issue an estimate of the physical characteristics of each tropical cyclone or disturbance, including location and Dvorak intensity using meteorological satellite data. At a minimum, SATOPS will provide position and intensity fixes from satellite imagery every six hours at 00Z, 06Z, 12Z, and 18Z and position-only fixes every six hours at 03Z, 09Z, 15Z, and 21Z.

d. Tropical Cyclone Products (Atlantic Ocean)

(1) Tropical Cyclone Warnings. Include development level; storm ID information; current warning number; position of the low level center; movement over the last six hours; speed of maximum sustained winds; radius of 34, 50 and 64 knot surface winds; 12, 24, 36, 48, 72, 96, and 120 hour forecast positions (unless dissipation or extratropical transition is expected earlier); intensities and forecast wind radii; and a remarks section. Warnings are produced four times a day (03Z, 09Z, 15Z, and 21Z) for active tropical cyclones. FWC Norfolk will re-host warnings issued by the NHC.

(2) Destructive Winds Forecast. Produced four times a day (03Z, 09Z, 15Z, and 21Z) when an active tropical cyclone threatens DoD installations. The forecast includes intensity and duration of specified winds and timeline recommendations for setting Tropical Cyclone Conditions of Readiness.

(3) Tropical Cyclone Conditions of Readiness Recommendations. Briefed to Commander, Navy Installations Command (CNIC) Regional Commanders and base CO/EMs upon CNIC region request.

(4) Sortie coordination with numbered fleet oceanographers.

3. Product Requests/Dissemination

a. Product Request: All tropical support products are generated either on a routine basis or when conditions warrant and requests are not required.

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b. Dissemination

(1) Navy Enterprise Portal - Oceanography (NEP-Oc)

(a) NIPRNet - <https://nepoc.oceanography.navy.mil/>

(b) SIPRNet - <http://nepoc.oceanography.navy.smil.mil>

(c) Public Facing Portal - <http://www.usno.navy.mil>

4. Points of Contact

a. Joint Typhoon Warning Center

(1) PLA: NAVMARFCSTCEN PEARL HARBOR HI

(2) Typhoon Duty Officer

(a) E-mail

NIPR: TDO.NMFC_JTWC@NAVY.MIL

SIPR: TDO.NMFC_JTWC@NAVY.SMIL.MIL

(b) Phone

COM: (808) 474-2320

DSN: (315) 474-2320

b. Fleet Weather Center - Norfolk

(1) PLA: FLEWEACEN NORFOLK VA

(2) Command Duty Officer

(a) E-mail

NIPR: CDO.FWC.NRFK.FCT@NAVY.MIL

SIPR: CDO.NMFA_N.001.FCT@NAVY.SMIL.MIL

(b) Phone

COM: (757) 444-7750

DSN: (312) 564-7750

5. Governing Instructions

USPACOMINST 0539.1

Pacific Command Instruction describing the role of JTWC and the partnership between PACAF and PACFLT in providing tropical support in the AOR.

NAVMARFCSTCENPHINST 3140.2

JTWC Tropical Cyclone Operations Manual

COMNAVMETOCOMINST 3140.1M
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OPNAVINST 3140.24F

Warnings and Conditions of
Readiness Concerning Hazardous or
Destructive Weather Phenomena

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CHAPTER 5**FLEET OPERATIONS SUPPORT**1. General

a. The mission of Fleet Operations is to provide timely, comprehensive and tactically relevant METOC products and services in direct support of deploying Carrier Strike Group (CSG), Expeditionary Strike Group (ESG), and Amphibious Readiness Group (ARG) Commanders, assigned units, staff and other U.S. and Joint or Coalition forces, as directed. Strike Group Oceanography Teams (SGOTs) based out of Norfolk and San Diego provide deployable METOC personnel in the form of OA Division manning and Mobile Environmental Teams (METs). The SGOTs are departments within the Fleet Weather Centers (FWC) in Norfolk and San Diego.

b. All operational CVN and LHA/D class ships embark an SGOT to augment the ship's OA division underway. Teams typically consist of an Aerographer's Mate (AG) Chief, three AG Forecasters (NEC 7412), and four AG Apprentice Forecasters (NEC 0000). The role of an SGOT is to act as organic METOC support to the OA Division Officer and embarked staffs afloat, and to assist in the integration of METOC impacts into warfighter mission planning. Onboard LHA/Ds, the SGOT coordinates all METOC support with the embedded Marine Expeditionary Unit (MEU) forecasters to provide comprehensive support to their respective ARG.

c. AGs are also fully integrated into the Strike Fighter Advanced Readiness Program (SFARP) and Carrier Air Wing training process at the Naval Strike and Air Warfare Center (NSAWC) in Fallon, NV. Each CSG SGOT is augmented by a forecaster from FWC Strike Det Fallon, who is designated as the lead forecaster for all Strike Warfare support throughout the Fleet Readiness Training Program (FRTP) and deployment cycle.

d. When other classes of ships or deploying units require organic METOC services, a smaller MET is utilized to support specific warfighting missions. A MET Team typically consists of one AG Forecaster and one AG Apprentice Forecaster, but will flex based on the mission. METs are deployed based on the following prioritization, along with input from the Numbered Fleet Oceanographer:

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(1) JTF-Civil Support, Humanitarian Assistance/Disaster Relief (HA/DR) Missions

(2) Flag Staff, Maritime Headquarters, Major Fleet Exercise, and Surge Operations Support

(3) Maritime Security Operations and Theater Security Cooperation Support

(4) United States Coast Guard (USCG) Support

(5) North Atlantic Treaty Organization (NATO) Support

e. Reachback support for ships without embarked METOC personnel is available. The Advanced Refractive Effects Prediction System (AREPS) and Target Acquisition Weapons Software (TAWS) tactical decision aids are supported by FLENUMMETOCEN.

f. FWC San Diego supports operations in the C3F and C7F AORs. FWC Norfolk supports operations in the C2F, C4F and C6F AORs as well as all Arctic Fleet Operations. Responsibility for C5F is based on the origin of the afloat unit deploying to that AOR. Fleet Operations personnel may be deployed from either FWC to support any mission, anywhere, at any time.

g. Decisions to deploy personnel to a unique location or for a new mission type are made collaboratively between the Weather Services DOO, Numbered Fleet Oceanographer, FWC San Diego and FWC Norfolk. In all cases, these decisions are driven by the required timeline for support, the availability of fully qualified manpower on each coast (OPTEMPO/capacity) and cost.

h. The FWCs have access to both Active Component (AC) and Reserve Component (RC) personnel for resourcing and augmenting fleet operations requirements. FWCs will coordinate RC support with their respective Naval Meteorology and Oceanography Reserve Activity (NMORA) and the Fleet Operations Reserve Deputy Director of Oceanographic Operations (RDDOO). Additional information on the Naval Meteorology and Oceanography Reserve Program is contained in NAVMETOC COMINST 1001.1(series).

2. Products and Services

a. Fleet Operations personnel are trained and equipped to provide the below environmental support:

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(1) Meteorology

- (a) Observations/Sensing (1)
- (b) Analyses (1, 2)
- (c) Forecasts (1, 2, 3)
- (d) Impacts, Options, Recommendations (1, 2, 3)

(2) Oceanography

- (a) Observations/Sensing (1)
- (b) Analyses (1, 2)
- (c) Forecasts (1, 2, 3)
- (d) Impacts, Options, Recommendations (1, 2, 3)

(3) Climatological Forecasts (1, 3, 4)

(4) Environmental battlespace assessments/predictions for planning and tactical operations via the use of tactical decision aids and weather effects matrices. (1, 2, 3)

Key:

- 1 - Available while underway
- 2 - Available while in port in special circumstances
- 3 - Custom tailored for the specific operations
- 4 - Available while in port

b. Each OA Division and staff METOC officer are tasked to produce timely and relevant lessons learned for all phases of training and deployment in accordance with NAVMETOC COMINST 3140.8 (series). These lessons learned will be used throughout the METOC community to improve product accuracy and level of support to afloat units. Fleet Oceanographers, staff METOC Officers, SGOTs, and OA Division Officers will work together to produce a post-deployment report in accordance with NAVMETOC COMINST 3140.23 (series).

c. FLENUMMETOCEN supports the AREPS and TAWS tactical decision aids for surface assets not supported by on-scene METOC personnel and submarines as requested by the SUBOPAETH.

(1) AREPS predicts system performance of electromagnetic systems.

(2) TAWS determines atmospheric temperature and slant range visibility effects when calculating targeting solutions

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for missile systems.

3. Product Requests/Dissemination

a. Support to CVN/LHA/LHD will be coordinated between each ship's METOC officer and the FWC Operations Officer for that fleet concentration area.

b. MET support is requested through COMTHIRDFLT (West coast) or COMSECONDFLT (East coast) via Naval Message (preferred), SIPRNet or NIPRNet E-mail, telephone or chat. An example support request is provided as follows:

```

FM USS YOUR SHIP/ACTIVIITY
TO Appropriate Numbered Fleet (i.e. COMTHIRDFLT//METOC//)
INFO FLEWEACEN SAN DIEGO CA
FLEWEACEN NORFOLK VA
NAVOCEANOPSCOM STENNIS SPACE CENTER MS
BT
C L A S S I F I C A T I O N//N03140//
MSGID/GENADMIN/YOUR SHIP/ACTIVITY//
SUBJ: METOC SUPPORT REQUEST (U)//
REF/A/TEL/PHONCONS//
RMKS/1. ( ) AS COORDINATED IN REF A, REQUEST METOC
SUPPORT FOR (SHIP/ACTIVITY) IN SUPPORT OF (MISSION TYPE).
A. TYPE(S) OF SUPPORT REQUESTED (E.G. USW, IREPS,
AMPHIBIOUS OPS, ETC)
B. METOC DET EMBARK DATE AND LOCATION
C. METOC DET DEBARK DATE AND LOCATION
D. BERTHING AVAILABILITY FOR MALE/FEMALE TEAM MEMBERS
E. ACTIVITY POINT OF CONTACT.//
DECL/XXXX//

```

c. AREPS and TAWS support is requested from FLENUMMETOCEN via telephone or the form on the NEP-Oc.

4. Points of Contact

a. Norfolk

(1) PLA: FLEWEACEN NORFOLK VA

(2) Command Duty Officer

(a) E-mail

NIPR: CDO.FWC.NRFK.FCT@NAVY.MIL

SIPR: CDO.NMFA_N.001.FCT@NAVY.SMIL.MIL

(b) Phone
COM: (757) 470-9811
DSN: (312) 565-2591
FAX: (757) 444-7343

b. San Diego

(1) PLA: FLEWEACEN SAN DIEGO CA

(2) Command Duty Officer

(a) E-mail
NIPR: NMOC-SD.cdo@navy.mil
SIPR: nmocsd.cdo.ftc@navy.smil.mil

(b) Phone
COM: (619) 545-6027
DSN: (312) 735-6027
FAX: (619) 545-0291

c. Fleet Numerical METOC Center

(1) PLA: FLENUMMETOCEN MONTEREY CA

(2) Command Duty Officer

(a) E-mail
NIPR: fnmoc.cdo@navy.mil
SIPR: cdo@fnmoc.navy.smil.mil

(b) Phone
COM: (831) 656-4325
DSN: (312) 878-4325

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CHAPTER 6**AVIATION SUPPORT**1. General

a. Aviation weather support is provided by Fleet Weather Center (FWC), Norfolk, VA and Fleet Weather Center, San Diego. FWC Norfolk has an aviation detachment located in Sembach, Germany. FWC San Diego has aviation detachments located in Atsugi, Japan and Pearl Harbor, HI.

b. The two FWCs and their detachments/components are tasked with providing continuous, global weather support to naval aviation to include Terminal Aerodrome Forecasts (TAFs), Flight Weather Briefings, and Resource Protection to Naval Air Stations and other select Naval Installations.

c. The main hub for centralized aviation weather forecasting for CONUS Naval Air Station support for Texas and all areas east of the Mississippi River is FWC Norfolk. CONUS Naval Air Stations west of the Mississippi River, excluding Texas, are supported primarily by FWC San Diego. FWC AVN Det Atsugi, FWC AVN Det Pearl Harbor and FWC AVN Det Sembach provide OCONUS support.

d. The Marine Corps operates two Marine Corps Installation (MCI) Regional METOC Centers (RMC) for CONUS Marine Corps Air Station (MCAS) support. MCI-East RMC supports the east coast of the United States. MCI-West RMC supports the west coast of the United States.

2. Products and Services

a. Flight Weather Briefing (DD175-1)

(1) The flight weather brief is required for pilots by OPNAVINST 3710.7 (series).

(2) The brief provides weather information for the departure point, route-of-flight, destination(s), and alternate destination(s).

(3) Accurate and timely Horizontal Weather Depictions (HWDs) and other graphical data to support safety of flight are provided to pilots as needed or upon request.

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b. Flight Weather Briefing (Canned Route)

(1) The flight weather brief is required for pilots by OPNAVINST 3710.7 (series).

(2) This briefing provides readily available weather information for a particular area including departure point, route-of-flight, and destination(s).

(3) The majority of canned routes are used at major training bases throughout CONUS. Canned Route Weather Briefs are updated every two hours, and are valid for three hours. Pilots can utilize a Canned Route Weather Brief (where available) at any time. A temporary Canned Route can be created for a special event (i.e. HUREVAC, Air Show) upon request to the FWC Operations Officer.

c. Terminal Aerodrome Forecast (TAF)

(1) The TAF is a 24-hour forecast for each Naval Air Station which is updated periodically.

(2) TAFs are issued in accordance with NAVMETOC COMINST 3143.1(series). Amended or corrected TAFs are issued as needed based on changing weather conditions and forecasts.

(3) All TAFs are transmitted to the national meteorological database in a timely manner to ensure current and updated information is available to forecasters and pilots.

d. Meteorological Aviation Report (METAR)

(1) The METAR is an encoded weather observation routinely generated once an hour; if significant changes occur between routine hourly observations, special reports (SPECIs) are generated.

(2) Most locations use augmented observations, which are recorded by digital sensors (Automated Surface Observing System, ASOS), encoded via software, and are then reviewed by certified weather observers or forecasters prior to being transmitted.

(3) Observers record surface observations, and transmit all observations to the national meteorological database in a timely manner to ensure real-time data is available to forecasters and pilots.

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3. Product Requests/Dissemination

a. Flight weather briefs (DD175-1) are requested and disseminated over the internet via Flight Weather Briefer (FWB). FWB is the primary method of requesting and receiving a DD-175-1 and is a valid brief per OPNAV 3710.7 (series). A phone, fax or E-mail request is available for those without FWB access.

b. Canned route briefings are requested and disseminated over the internet via Flight Weather Briefer (FWB). FWB is the only method of requesting and receiving a canned route.

c. METARs and TAFs are available on NEP-Oc as well as commercially available sources for civilian airfields.

d. Procedures. For DD175-1 or canned route briefings, submit requests via Flight Weather Briefer (<https://fwb.metoc.navy.mil/>). If FWB is unavailable, contact the appropriate facility using the contact information below.

4. Points of Contact

a. Fleet Weather Center, Norfolk, VA

(1) Aviation Duty Officer

(a) E-mail: ADO.FWC.NRFK.FCT@navy.mil

(b) Phone

COM: (757) 445-4555 DSN: (312) 565-4555

FAX: (757) 444-4479 DSN: (312) 564-4479

b. Fleet Weather Center, San Diego, CA

(1) Aviation Duty Officer

(a) E-mail NIPR: NAFD-ADO.fct@navy.mil

(b) Phone

COM: (619) 545-2196 DSN: (312) 735-2196

FAX: (619) 545-2217

c. FWC Aviation Detachment, Pearl Harbor, HI

(1) Phone

(a) Lead Forecaster (808) 449-8335

(b) Tropics Zone (808) 449-9785

(c) MidLat Zone (808) 449-7929
(d) Alaska Zone (808) 449-7924
(e) Flight Weather Briefing (808) 448-3809

d. FWC Aviation Detachment, Atsugi, Japan

(1) Phone

(a) COM: 011-81-467-63-3208
011-81-467-63-4347
011-81-467-63-4348

e. FWC Aviation Detachment, Sembach, Germany

(1) Phone

(a) COM: 011-49(0)-6302-67-6146
011-49(0)-6302-67-6218

f. USMC MCI-East RMC

(1) Phone: COM 866-925-2523

g. USMC MCI-West RMC

(1) Phone: COM 800-470-6020

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CHAPTER 7**RESOURCE PROTECTION SUPPORT**1. General

a. Resource Protection (RP) includes the monitoring and dissemination of weather products to ensure that installations receive notification of inclement weather, enabling informed decisions to protect Navy resources. RP support is provided by Fleet Weather Center (FWC), Norfolk, VA; Fleet Weather Center, San Diego; Naval Oceanography Antisubmarine Warfare Center (NOAC), Yokosuka, Japan; and the FWC subordinate Detachments: FWC AVN Det Atsugi, Japan; FWC AVN Det Pearl Harbor at Hickam AFB HI; and FWC AVN Det Sembach, Germany.

b. FWC Norfolk provides RP support to Naval Installations located in Navy Region Southeast, Navy Region Midwest, Navy Region Mid-Atlantic and Naval District Washington. FWC San Diego provides RP support to Naval Installations located in Navy Region Northwest and Navy Region Southwest. NOAC Yokosuka, FWC AVN Det Atsugi, Pearl Harbor and Sembach provide OCONUS RP support.

2. Products and Services

a. Severe weather warnings are issued in the event that thunderstorms, tornadoes, high winds, winter weather, or tropical cyclones threaten installations.

b. All warning information is disseminated through multiple means including phone, record message traffic/command email, email and web-based formats to ensure all affected activities are notified.

3. Product Requests/Dissemination

a. Naval Air Station (NAS): the following advisories, watches and/or warnings are issued for all Naval Air Stations:

- (1) Thunderstorm Watch (Recommend T2)
- (2) Thunderstorm Warning (Recommend T1)
- (3) Severe Thunderstorm Watch (Recommend SVR T2)
- (4) Severe Thunderstorm Warning (Recommend SVR T1)
- (5) Airfield Wind Advisory
- (6) Small Craft Warning (where applicable)
- (7) Gale Warning

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- (8) Storm Warning
- (9) Freezing Precipitation Advisory
- (10) Freezing Precipitation Warning
- (11) Snow Advisory
- (12) Snow Warning

b. Fleet Concentration Area (FCA): the following watches and/or warnings are issued for all FCAs:

- (1) Thunderstorm Watch (Recommend T2)
- (2) Thunderstorm Warning (Recommend T1)
- (3) Severe Thunderstorm Watch (Recommend SVR T2)

In addition, the following National Weather Service (NWS) messages are readdressed via phone and unclassified record message traffic/command E-mail to affected installations and fleet units:

- (1) NWS Small Craft Warnings
- (2) NWS Gale Warnings
- (3) NWS Storm Warnings
- (4) NWS Tornado Warning
- (5) NWS Coastal Hazard Message
- (6) NWS Special Marine Warning
- (7) NWS Winter Weather Message
- (8) NWS Severe Thunderstorm Warning
- (9) NWS Tornado Notifications
- (10) NWS Severe Thunderstorm Watch Notifications
- (11) NWS Non-precipitation Warnings
- (12) NWS Urgent Weather Messages

c. All Other Installation Support: For CONUS and Hawaii installations that do not have an Airfield and/or are not designated as an FCA, the NWS messages in section (b) will be transmitted to CNIC designated functional email accounts.

d. Regional Operations Center Support: Particular significant weather events require advance coordination with the Regional Operations Center (ROC) for further dissemination within their AOR. The advance coordination includes an initial phone call between the ROC and the Resource Protection Duty Officer (RPDO), initiated by either party, to discuss the impending event. Additionally, the RPDO will e-mail the forecast to ensure criteria and times are accurately received. The ROC, at their discretion, will initiate Telephone Conference Calls (TELCON) between the ROC, RPDO and affected Region/Installation decision support personnel (i.e., Regional/Base Emergency

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Managers, etc.). Timelines of notification will be adhered to as closely as possible.

(1) Wind: All regions will be notified when Storm Force Winds (sustained winds \geq 48 kts) are forecast.

(2) Winter Weather Conditions: Regions will be notified when the following thresholds are forecast:

- (a) Freezing Precipitation $>1/2''$ accumulation in a 24 Hour Period
- (b) Snow in excess of 1" in a 24 Hour Period

Timelines of ROC Notification:

For Storm Force Wind and/or Winter Weather Conditions:

(Note: Not all systems will allow for 72 hours advance warning.)

72 Hours	Call to ROC to discuss possible inclement weather impacting Naval Installations in their AOR and timeline for anticipated warnings.
48 Hours	Update ROC. When requested by ROC, conduct TELCON and discuss anticipated conditions with affected Region leadership.* Commence issuing warnings for unit notification.
36 Hours	Update ROC.
24 Hours	Update ROC. When requested by ROC, conduct TELCON and discuss anticipated conditions with affected Region Leadership.*
12 Hours	Update ROC. When requested by ROC, conduct TELCON and discuss anticipated conditions with affected Region Leadership.*

* TELCONs will be conducted for anticipated Storm Force winds on station or when winter conditions approach thresholds upon request from the ROC. Storms of lesser magnitude may require a TELCON due to combination of multiple potentially destructive weather phenomena (i.e., sustained sub-storm force winds combined with a high flood risk or dangerous storm surge).

4. Points of Contacts

a. Fleet Weather Center, Norfolk, VA

(1) Resource Protection Duty Officer

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(a) E-mail: RPDO.FWC.NRFK.1.FTC@navy.mil

(b) Phone

COM: (757) 444-8692

DSN: (312) 564-8692

b. Fleet Weather Center, San Diego, CA

(1) Resource Protection Duty Officer

(a) E-mail: fwc-rpdo.fct@navy.mil

(b) Phone

COM: (619) 545-3165

DSN: (312) 735-3165

c. NOAC Yokosuka, Japan

(1) Resource Protection Duty Officer

(a) E-mail: M-YO-NMOC-CDO@fe.navy.mil

(b) Phone

COM: 011-81-46-816-5595

DSN: (315) 243-5595

d. FWC Aviation Detachment Pearl Harbor, HI

(1) Resource Protection Duty Officer

(a) Phone

COM: (808) 449-8335

DSN: (315) 449-8335

e. FWC Aviation Detachment Atsugi, Japan

Phone: 011-81-467-63-3208/4347/4348

f. FWC Aviation Detachment Sembach, Germany

Phone

COM: 49(0)-6302-67-6146/6218

DSN: (314) 496-6146/6218

5. Governing Instruction

OPNAVINST 3140.24F

Warnings and Conditions of
Readiness Concerning Hazardous
or Destructive Weather Phenomena

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CHAPTER 8**TSUNAMI SUPPORT**

1. General. The Joint Typhoon Warning Center (JTWC) Pearl Harbor, HI is responsible for providing tsunami information support to all DoD assets and will act as the Subject Matter Expert (SME) and operational liaison to NOAA for all Naval Meteorology and Oceanography Command (NMOC). Tsunami bulletins and products are issued by NOAA from the Pacific Tsunami Warning Center (PTWC) and the West Coast/ Alaska Tsunami Warning Center (WC/ATWC). The bulletins are auto-forwarded in record message traffic by Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCEN). JTWC provides tsunami-related Bond Tier 3 decision support for DoD areas of interest.

2. Products and Services

a. NOAA Tsunami Product Dissemination. FLENUMMETOCEN will disseminate NOAA tsunami bulletins via record message traffic as they are published and updated. The bulletins will include one or more of the following:

(1) Tsunami Warning. A tsunami warning is issued when a tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

(2) Tsunami Advisory. A tsunami advisory is issued when the threat of a potential tsunami exists which may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, but significant widespread inundation is not expected for areas under an advisory. Advisories are normally updated to extend the advisory, expand/contract affected areas, upgrade to a warning, or cancel the advisory.

(3) Tsunami Watch. A tsunami watch is issued to alert emergency management officials and the public of an event which

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may later impact the watch area. The watch area may be upgraded to a warning or advisory - or canceled - based on update information and analysis. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway.

(4) Tsunami Information Statement. A tsunami information statement is issued to inform emergency management officials and the public that an earthquake has occurred, or that a tsunami warning, watch or advisory has been issued for another section of the ocean. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami and to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. An information statement may, in appropriate situations, caution about the possibility of destructive local tsunamis. Information statements may be re-issued with additional information, though normally these messages are not updated. However, a watch, advisory or warning may be issued for the area after further analysis and/or updated information becomes available.

For examples of NOAA tsunami products, please see:
<http://wcatwc.arh.noaa.gov/Products/msgdefs.htm>.

b. NOAA Tsunami Travel Time Predictions. Based upon the source location of the seismic event, NOAA creates a travel time plot and table of estimated arrival times for potentially affected coastal locations, should a tsunami wave be generated. JTWC will disseminate this product with a list of estimated arrival times for specific DoD areas of interest.

c. Historical Impact Analysis. JTWC will review, assess and disseminate archived tsunami impact and inundation data for DoD areas of interest, when applicable, to provide a "first guess" of potential tsunami impact based on comparable historical tsunamis.

d. Tsunami observation and forecast verification. As the tsunami event progresses, JTWC will use the oceanic observing network to track and report observed versus predicted tsunami heights and arrival times. Characterization of the tsunami wave will be reported to operational/regional commanders and include wave period, maximum amplitude, and, when available, estimated duration of dangerous tsunami activity.

e. Hourly Tsunami Impact Updates. NOAA tsunami warning centers update tsunami bulletins hourly (or sooner, as

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necessary) based on observed conditions. JTWC will review NOAA updates, participate in WC/ATWC and PTWC Tsunami Conference Calls, and assess any specific changes to the predicted tsunami impact for DoD assets.

f. Inundation Forecasts. JTWC will disseminate available modeled inundation forecasts to include tsunami earliest arrival time, predicted offshore amplitude (sea level to crest), period, and port impacts (current and amplitude.)

g. Conference Call/Defense Connect Online. As required, JTWC will host a coordination meeting utilizing conference calls and/or Defense Connect Online to assist METOC professionals in advising local operational commanders and emergency managers when a tsunami is forecast to impact a Fleet Concentration Area or other significant DoD area of interest.

3. Product Requests/Dissemination

a. Product Request. All tsunami support products are generated when conditions warrant. Any specific Request for Information (RFI) beyond the standard products may be submitted via message, electronic mail, chat or telephone.

b. Dissemination

(1) SIPRNet Internet Relay Chat

(a) Command and Control Chat (Fleet, Battleground, CTF, etc.)

(b) Naval Oceanography Office METOC Chat

(2) Navy Enterprise Portal - Oceanography (NEP-Oc)

(a) NIPRNet - <https://nepoc.oceanography.navy.mil/>

(b) SIPRNet - <http://nepoc.oceanography.navy.smil.mil>

(c) Public Facing Portal - <http://www.usno.navy.mil>

(3) Navy Installations Command C4ISuite Chat

(4) Electronic Mail (SIPRNet and NIPRNet)

(5) Record Message Traffic

4. Points of Contact

a. Naval Maritime Forecast Center Pearl Harbor, HI

(1) PLA: NAVMARFCSTCEN PEARL HARBOR HI

(2) Command Duty Officer

(a) E-mail

NIPR: CDO.NMFC_JTWC@NAVY.MIL

SIPR: CDO.NMFC_JTWC@NAVY.SMIL.MIL

(b) Phone

COM: (808) 474-0004

DSN: (315) 474-0004

5. Governing Instruction

OPNAVINST 3140.24F

Warnings and Conditions of
Readiness Concerning Hazardous or
Destructive Weather Phenomena

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CHAPTER 9**PRECISE TIME AND ASTROMETRY SUPPORT**1. General

a. The Precise Time and Astrometry (PTA) Directorate provides the foundational data for positioning, navigation, and timing (PNT) operations. All PTA support and products are provided by the United States Naval Observatory (USNAVOBSY), located in Washington, D.C.

b. USNAVOBSY provides a wide range of astronomical data and timing products. The products are available as hardcopy publications such as the *Nautical Almanac*, stand-alone computer applications, and a number of IT-based means. The USNAVOBSY Master Clock serves as the country's official time keeper, and USNAVOBSY is the sole provider of Precise Time and Time Interval (PTTI) for all DoD services. Additionally, USNAVOBSY is responsible for establishing, maintaining, and coordinating the astronomical reference frame(s) for celestial navigation and orientation of space systems. USNAVOBSY is responsible for Earth orientation parameters (EOP) predictions for all DoD services, agencies, and contractors, as well as the international community. Earth orientation parameters are essential to determine spacecraft orbital information and geolocation of data derived from space systems. USNAVOBSY operates the Navy's dark-sky facility at the USNAVOBSY Flagstaff Station, where observations are collected in support of astrometry, spectrophotometry and space situational awareness.

2. Products and Services

a. Astronomical Data for Operational Applications

(1) System to Estimate Latitude and Longitude Astronomically (STELLA). Stand-alone PC software available directly from USNAVOBSY; provides basic almanac data for navigational bodies, full sight planning and reduction, times of twilight, sunrise, sunset, moonrise, and moonset for fixed sites or vessel underway, and moon illumination.

(2) *Nautical Almanac*. Annual hardcopy publication that provides basic almanac data for use in marine navigation and other applications.

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(3) *Air Almanac*. Annual hardcopy publication provides basic almanac data for use in air navigation and other applications.

(4) *Astronomical Almanac*. Contains precise positions (ephemerides) of most solar system objects, data for eclipses and other astronomical phenomena, and catalogs of selected celestial objects.

(5) Multi-year Interactive Computer Almanac (MICA). Stand-alone PC software that computes many of the quantities tabulated in *The Astronomical Almanac*, but covers the 250-year period, 1800-2050; allows the user to compute this information for specific locations and specific times.

(6) Solar-Lunar Almanac Core (SLAC). Source-code product that is the de facto DoD standard source for Sun and Moon positions and illumination information. Widely used in DoD tactical decision aids, missions schedulers, and simulators.

(7) Naval Observatory Vector Astronomy Software (NOVAS). NOVAS is an integrated package of subroutines and functions for computing various commonly needed quantities in positional astronomy.

(8) Information on astronomical standards, star catalogs, and astronomical reference frames is available on the Naval Oceanography Portal/USNAVOBSY Astronomical Applications website.

b. Precise Time and Time Interval (PTTI) Services. Dissemination of the DoD time reference standard from the USNAVOBSY Master Clock (UTC(USNO)).

(1) Global Positioning System (GPS). USNAVOBSY is the sole provider of time for the GPS system. Calibrated Precise Positioning Service (PPS) GPS timing receivers can receive time to an accuracy of approximately 10 nanoseconds and Standard Positioning Service (SPS) GPS timing receivers can receive time to an accuracy of better than 200 nanoseconds.

(2) Network Time Protocol (NTP). USNAVOBSY is the sole provider of NTP for the DoD SIPRNet. Network time can be acquired via the NIPRNet and SIPRNet to an accuracy of about 10 milliseconds.

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(3) Two-Way Satellite Time Transfer (TWSTT). USNAVOBSY time can be transferred to specially equipped users via geostationary communications satellites to an accuracy of 1 nanosecond.

(4) Time via telephone modem. USNAVOBSY time can be acquired via telephone modem to an accuracy of about 1/100 of a second.

(5) Telephone time voice announcer. USNAVOBSY time can be acquired via telephone time announcer to an accuracy of about 1/10 of a second.

(6) GPS and Galileo Timing Offset (GGTO). Interoperability between GPS, Galileo and any other global navigation satellite system requires that the timing reference difference between the systems be known.

c. Earth Orientation. Relates the celestial reference frame to the terrestrial reference frame for precise positioning, navigation, targeting, and ISR.

(1) Earth orientation parameters and predictions. Polar motion, UT1-UTC, precession, and nutation are updated daily and are available by file transfer protocol (ftp).

(2) International Earth Rotation and Reference Systems Service (IERS) Bulletin A. Reports of the latest determinations and predictions for polar motion, UT1-UTC, and nutation offsets at daily intervals are distributed weekly by email.

(3) Leap seconds. Announcements are via the USNAVOBSY Series 14 message as well as in IERS Bulletin C.

(4) UT1-UTC. Transmitted with timing signals and announced in IERS Bulletin D.

(5) EOP data are provided to the GPS Master Control Station via NGA.

d. Astrometry. Astrometry is the branch of astronomy concerned with the determination of positions, proper motions, and parallaxes of solar-system bodies, stars, and distant galaxies. Astrometric products include optical, infrared, radio, and celestial reference frames.

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(1) Naval Observatory Merged Astrometric Database (NOMAD). The primary aim of NOMAD is to help users retrieve the best currently available astrometric data for any star in the sky by providing these data in one place.

(2) USNAVOBSY CCD Astrograph Catalog (UCAC, UCAC2, UCAC3). An all-sky astrometric survey for stars in the 7-16 magnitude range with positions to accuracies of 20-70 mas, including proper motions. Current release is UCAC3.

(3) USNO-B1.0 Catalog. USNO-B1.0 is the latest stellar catalog from the USNAVOBSY Precision Measuring Machine project, providing positions, magnitudes, and proper motions for each object.

(4) Double Star Catalogs. Double star catalogs are maintained at the USNAVOBSY, including the USNAVOBSY Washington Double Star Catalog and the Double Star Library.

(5) The USNAVOBSY Image and Catalog Archive Server. Serves as the source of major USNAVOBSY astrometric catalogs including the NOMAD, USNO-B1.0 and USNO-A2.0 catalogs.

(6) Solar System bodies. Astrometric data for objects within our solar system including planetary satellites and minor planets.

(7) Reference Frames. Available products include positions of extragalactic radio sources that define an astrometric quasi-inertial Celestial Reference Frame (CRF), positions and velocities of radio antennas that define a Very Long Baseline Interferometry (VLBI) based Terrestrial Reference Frame (TRF) and the EOP that link the CRF and the TRF.

(8) The Radio Reference Frame Image Database (RRFID). Available products include PostScript format contour plots of Radio Reference Frame source images at frequencies of 2 GHz, 8 GHz, 15 GHz, 24 GHz and 43 GHz. Plots of visibility data in PostScript format are also available. These products are the results of an ongoing program to image International Celestial Reference Frame (ICRF) sources on a regular basis.

(9) Very Long Baseline Interferometry (VLBI)-based Product Information. Information regarding USNAVOBSY VLBI-based products including astrometry, reference frames, earth orientation, and imaging data.

3. Product Requests/Dissemination

a. Product and help requests can be made through the public facing portal (www.usno.navy.mil).

b. Additional information can be obtained from the POC listed below.

4. Points of Contact

a. Requirements Officer

(1) PLA: NAVOBSY WASHINGTON DC

(2) Phone

COM: (202) 762-1506/1467

DSN: (312) 762-1506/1467

Secure (DSN): 762-0901

FAX (DSN): 762-1461

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CHAPTER 10**NAVIGATION DATA AND PRODUCTION**1. General

a. Safety of navigation support is provided by the Naval Oceanographic Office (NAVOCEANO) located at Stennis Space Center, MS and its collocated subordinate command, Fleet Survey Team (FST).

b. NAVOCEANO acquires data through collection or international agreement for processing, analysis, and product generation in support of Fleet operations. The data collection aspect is Chapter 11. Bathymetric and hydrographic data (deep and shallow sounding data respectively) collected by NAVOCEANO is used by the National Geospatial-Intelligence Agency (NGA) and the National Atmospheric and Oceanic Administration (NOAA) to produce navigation-quality charts. NGA and NOAA are the recognized charting authorities for the United States for international waters and U.S. territorial waters respectively. NAVOCEANO and FST can produce navigation products for short-term use by U.S. Navy vessels when neither NGA nor NOAA can meet immediate operational requirements. Additionally, FST can provide an expeditionary safety of navigation capability that focuses on one-time use products that give the user qualitative vice quantitative information to support expeditionary ship-to-shore movement.

2. Products and Services

a. Tailored Safety of Navigation Hydrographic Products

(1) NAVOCEANO can provide tailored hydrographic products to support safety of navigation and operations in a wide variety of digital and hardcopy formats ranging from traditional navigation chart-type product to a digital animation of a three-dimensional bathymetric fly-thru of a transit lane.

(2) Hydrographic products may be tailored to answer specific operational questions, such as developing go/no go graphics based on a specific safety depth threshold. These products require a thorough understanding of operations to be conducted and requests should include a short description of the issue and a point of contact.

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b. Tailored Expeditionary Hydrographic Products

(1) NAVOCEANO and FST can provide situational awareness products for expeditionary and surface ship-to-shore operations. These products are for short-term use only as their depth information is not valid for navigational use.

(2) Tailored expeditionary hydrographic products are available in a wide variety of hardcopy and softcopy formats. These graphics typically use satellite imagery as a base, overlaid with hydrographic soundings from existing data holdings or recently collected data. Additional environmental data relevant to the mission or its intended timeframe may also be included. Detailed descriptions of expeditionary products can be found in Chapter 13, Expeditionary Warfare Operations.

(3) Beach reports may also be requested to accompany and augment the tailored expeditionary hydrographic products. These text reports are targeted at Beach Master Units and cover many of the key parameters necessary to determine the ability of the beach and its immediate surroundings to support amphibious operations. Detailed descriptions of expeditionary products can be found in Chapter 13, Expeditionary Warfare Operations.

3. Product Requests/Dissemination. Hydrographic products may be coordinated through the Naval Component Commander (NCC), Naval Oceanography Representative, or requested through the NAVOCEANO Customer Service Office (CSO). For those requests that require field data collection, hydrographic survey capabilities may be requested by record message traffic in accordance with COMUSFLTFORCOMINST 3140.55 (series). These requests should be coordinated with the Naval Oceanography Representative assigned to the governing NCC.

a. Procedures. The NAVOCEANO Customer Service Office (CSO) takes requests for products (RFPs), provides information on available products, and status of pending requests. RFPs should include as much information as possible about the operations being supported. The Naval Oceanography Representatives may assist in product request definition and generation.

b. A catalog of current oceanographic and hydrographic products with full descriptions is available on the NEP-Oc web site. To initiate a new product request of an existing product that is not available on the web page, choose the link under PRODUCT SUPPORT labeled REQUEST FOR PRODUCTS.

4. Points of Contact

a. NAVOCEANO Customer Service Office

(1) E-mail

NIPR: cso.navo.fct@navy.mil

SIPR: cso@ocean.navo.navy.smil.mil

(2) Phone

COM: (228) 688-5176

DSN: (312) 828-5176

b. Naval Oceanography Representative Supervisor

(1) Phone

COM: (228) 688-5336

DSN: (312) 828-5336

5. Governing Instruction

COMUSFLTFORCOMINST 3140.55 of 26 Jan 09

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CHAPTER 11**OCEANOGRAPHIC SURVEY OPERATIONS**1. General

a. Naval Meteorology and Oceanography Command provides the preponderance of oceanographic and hydrographic survey capabilities for the Department of the Navy (DoN) and the Department of Defense (DoD). COMNAVMETOCOM provides for the operation of multi-purpose ocean survey ships (T-AGS), the primary survey asset. The ships are assigned to Commander, Military Sealift Command for operations and to COMNAVMETOCOM for technical and scheduling control. Other assets capable of conducting ocean surveys include the Airborne Coastal Survey (ACS) and Fleet Survey Team.

b. NAVOCEANO operates the T-AGS multi-purpose oceanographic survey ships on behalf of COMNAVMETOCOM. The vessels are "high demand, low density" assets managed under the Global Force Management program. The T-AGS are configurable to conduct open ocean collection of physical oceanographic properties, deep water bathymetry, or shallow water hydrography. A number of Autonomous Underwater Vehicles (AUVs) are deployable from the T-AGS; however, the AUV's may be deployed independently with the proper support equipment. These AUVs are outfitted with a variety of sensors and are capable of collecting data from depths of 60 to 6000 meters. T-AGS are also capable of deploying gliders, drifting buoys and profiling floats that are capable of collecting oceanographic information.

c. Airborne Coastal Survey utilizes an integrated Light Detection and Ranging (LIDAR)/imaging system. The current system is installed in a King Air 200 (C-12 equivalent) aircraft and is capable of collecting hydrographic information in relatively clear, shallow waters as well as topographic data over land to produce seamless coastal charts and maps. The high-resolution imagery collected during ACS surveys is stitched together to make large image mosaics of the survey areas that enhance the hydrographic and topographic data.

d. FST's primary collection platform is a fully outfitted, C-130-transportable, rigid hull inflatable boat (RHIB) equipped with a suite of hydrographic sensors. FST has additional suites of sensors that may be installed on a "boat of opportunity" to allow rapid collection, analysis and dissemination of shallow water bathymetric data. FST also has an expeditionary

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hydrographic collection capability using its Expeditionary Survey Vehicles (ESV). Each ESV consists of a personal water craft augmented with a single beam echo sounder, side scan sonar, a global positioning system and data recording system. FST's expeditionary capability is focused on providing qualitative information to ensure safe ship-to-shore movement.

2. Oceanographic, Hydrographic and Bathymetric (OHB) Survey Requirements

a. The OHB requirements process is governed by OPNAVINST 3140.55 and USFLTFORCOMINST 3140.55. OHB requirements are submitted by the Combatant Commands and Naval Component Commands each year for prioritization. Requirement submissions provide details on functional need, intended use, geographic location, requested product(s), readiness assessment, and required delivery date. The final prioritized OHB requirements list is approved by STRATCOM. Emergent, or out of cycle, requirements are submitted to USFLTFORCOM for assessment IAW USFLTFORCOMINST 3140.55.

b. The prioritized requirements list is sorted by potential data collection platform (T-AGS, ACS, FST, etc.) and integrated into the annual data collection schedule. T-AGS, ACS and FST are normally assigned to the highest priority OHB missions.

c. A summary of T-AGS ship characteristics, present (and past) year OHB survey requirements, survey platform locations, survey schedule, survey CONOPS status, current T-AGS ship positions, glider operations, and the CDO daily brief are located on the NEP-Oc.

3. Points of Contact

a. COMNAVMETOCOM Ship Operations Officer

(1) Phone

COM: (228) 688-4591

DSN: (312) 828-4591

4. Governing Instructions

OPNAVINST 3140.55B of 15 Apr 08
COMUSFLTFORCOMINST 3140.55 of 26 Jan 09
NAVOCEANO document SS-PR-01 of Oct 2003
CJCSI 3250.1D of 04 Aug 2009
DoD 2005.1-M of 23 Jun 2005

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CHAPTER 12**INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE SUPPORT**

1. General. Environmental support for Intelligence, Surveillance, and Reconnaissance (ISR) missions is provided by Sensitive Compartmented Information Facility (SCIF) capable units in NAVMETOCCOM like the Naval Oceanographic Office (NAVOCEANO), Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCCEN), the Naval Ice Center (NAVICE), and the Naval Maritime Forecast Center/Joint Typhoon Warning Center Pearl Harbor (NMFC/JTWC PH). METOC professionals are also embedded at, and provide liaison with, Intelligence Community (IC) commands such as the Defense Intelligence Agency (DIA), National Geospatial-Intelligence Agency (NGA), National Security Agency (NSA), and the Office of Naval Intelligence (ONI).

2. Products and Services

a. Analyzed imagery. Features are derived from available source imagery (National Technical Means and Commercial). Examples of derived features are bathymetry, obstacles, reefs, fishing activity, ice edge and concentration. Warfare support includes operations in the littoral and riverine environments.

b. Forecasts for ISR sensors. Forecasts for sensible weather conditions that effect ISR collections such as clouds, precipitation, winds, and seas are produced to aid decision makers to determine optimum use of National and COCOM ISR assets.

c. Fused products. Products that integrate METOC with intelligence data (e.g. Piracy Performance Surface) can be produced to depict a more comprehensive operational picture for the decision maker rather than independent "stovepiped" and uncorrelated data layers.

3. Product Requests/Dissemination. Product support may be requested via Joint World-wide Intelligence Communications System (JWICS) using the contact information for each of the supporting commands. TS/SCI voice communications can be arranged on Secure Terminal Equipment (STE), Voice over Internet Protocol (VOIP), or Video Teleconference (VTC) if required after initial web/email contact.

4. Points of Contact

- a. Web site: www.cnmoc.navo.ic.gov
- b. ISR Oceanography PACOM JIOC Component
 - (1) E-mail
 - SIPR: isro.nmfc_jtwc@navy.smil.mil
 - JWICS: Grp-isr-npmoc-ph@pacom.ic.gov
 - (2) Phone
 - COM: (808) 471-7775
 - DSN: (315) 471-7775
- c. ISR Oceanography NAVOCEANO Component
 - (1) E-mail
 - SIPR: isr@navo.navy.smil.mil
 - (2) Phone
 - COM: (228) 688-4781/4566
 - DSN: (312) 828-4781/4566
- d. ISR Oceanography FLENUMMETOCCEN Component
 - (1) E-mail
 - SIPR: isr@fnmoc.navy.smil.mil
 - (2) Phone
 - COM: (831) 656-4599
 - DSN: (312) 878-4599

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CHAPTER 13**EXPEDITIONARY WARFARE SUPPORT**1. General

a. Naval Oceanography provides support to expeditionary warfare (EXW) via the unified capabilities of both forward-deployed personnel and shore-based meteorology and oceanography (METOC) production centers. This enables timely and relevant data and information to be incorporated into the decision-making process, resulting in a better understanding of the mission impacts.

b. The expeditionary capabilities and capacity of NAVMETOCCOM are organized to support four main warfighting forces: Naval Special Warfare Forces, Navy Expeditionary Combat Command Units, Amphibious Warfare Units, and Marine Air-Ground Task Forces.

c. Naval Oceanography Special Warfare Center (NOSWC) is located in San Diego, CA with detachments in Norfolk, VA; Pearl Harbor, HI; and Stennis Space Center, MS. Two additional components are located in Stennis Space Center, MS and Dam Neck, VA. NOSWC personnel are embedded within the force structure of all Naval Special Warfare components and support deploying Riverine Squadrons. Embedded METOC personnel (EM) conduct environmental reconnaissance (ER) and fuse tailored METOC data and forecasts to enable mission planning and execution. EMs specifically provide mission planning recommendations regarding:

- (1) gear selection
- (2) route planning
- (3) timeline execution
- (4) actions at the objective
- (5) sensor emplacement
- (6) platform selection

d. The Naval Oceanographic Office (NAVOCEANO) is the EXW shore-based production center for ocean prediction, oceanographic, hydrographic, bathymetric, and geophysical data and derived products. Fleet Numerical Meteorology and

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Oceanography Center (FLENUMMETOCEN) is the EXW shore-based production center for meteorological support.

2. Products and Services

a. Reach Back METOC support. METOC personnel within the Naval Special Warfare Mission Support Center (MSC) in San Diego, CA provide resource protection for all forward deployed NSW forces. They also serve as Request For Information (RFI) and Request For Support (RFS) managers for forward deployed elements requiring tailored products from NAVOCEANO or FLENUMMETOCEN. The MSC will provide METOC products to support NSW forces on demand. Examples include reach back forecasts, climatology support, solar and lunar effects data, tidal data, analyzed charts and analyzed imagery. Personnel within ONI's Kennedy Irregular Warfare Center provide METOC and geospatial intelligence support to all forward deployed Navy Expeditionary Combat Command (NECC) riverine forces, and coordinate with NAVOCEANO and other support entities to deliver products in response to RFI's and RFS's in support of riverine missions.

b. Naval Oceanography Special Warfare Center (NOSWC): NOSWC ER/EM personnel are capable of conducting a wide variety of METOC sensing and forecasting operations. ER/EM personnel employ land based as well as special METOC sensors on board Unmanned Aerial Vehicles, Unmanned Underwater Vehicles, and small boats. ER/EM personnel additionally deploy wave buoys, Field Riverine Analysis Kits (FRAK), water level monitors, and clandestine weather observation sensors to conduct littoral environmental characterization. The following describes the various capabilities of NOSWC EM/ER personnel:

(1) Characterization of atmospheric, ocean and fresh water features to include:

- (a) Tides, currents, and wave spectra
- (b) Sea temperature, salinity, and bioluminescence
- (c) Diver visibility and detection
- (d) Bathymetry - littoral and riverine
- (e) Beach gradient and composition
- (f) Surf forecasting

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- (g) Sea vegetation and biofouling (e.g. kelp and fishing nets)
- (h) Riverine hydrography, imagery, current speed/direction, water levels, and river conditions (stage, obstructions, and landing sites)
- (i) Atmospheric air temperature, pressure, aviation weather parameters, solar and lunar illumination, visibility, cloud cover, ceiling height, icing, precipitation and snow depth.

(2) Characterization of significant land features to include: vegetation, concealment and cover, obstacles, avenues of insertion/extraction, topography.

(3) Conduct sensor emplacement and operate remote water sensors and sensor networks in a semi-permissive environment.

(4) Conduct aviation forecasts supporting UAV and special operations aviation platform operations.

(5) Collect upper-atmosphere soundings. As required and at fixed base locations, EMs are capable of collecting vertical atmospheric profiles using electronic equipment.

c. Mission Impact Forecast. Forecasts of environmental parameters that will impact personnel, platforms, weapon, and sensor systems for a given mission. The mission impact forecast is always accompanied by recommendations for optimum route, gear, weapon, sensor, and platform selection.

d. NOWCASTING. A NOWCAST is an operationally focused forecast made in the field, often at the microscale, utilizing the current mission forecast, observed environmental trends, and in-situ sensed environmental data for the supported mission. The EM applies local terrain conditions, moisture sources, and local effects to more accurately describe the state of the environment for a period of at least 12 hours. The NOWCAST is usually an on-scene adjustment to mission forecast timing or conditions.

e. NAVOCEANO. NAVOCEANO provides ocean prediction, oceanographic, hydrographic, bathymetric, and geophysical data and derived products. A detailed product catalog, including product descriptions, is located on the NEP-Oc.

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f. FLENUMMETOCCEN. FLENUMMETOCCEN provides atmospheric models (global, regional, and mesoscale), satellite imagery, wave models, sea surface temperature, search and rescue and climatology data. Detailed product information is available on the NEP-Oc.

3. Product Requests/Dissemination

a. NSW forces desiring METOC support should submit an RFI through the MSC, via the NSW tactical portal:
<https://portal.msc.navsoc.socom.smil.mil>

b. NSW units requesting direct EM/ER support should contact the Executive Officer or Operations Officer of the NOSWC.

c. Riverine forces desiring METOC support should submit an RFI or RFS to the Kennedy Irregular Warfare Center, via the following SIPR address:
http://www.intelink.sgov.gov/wiki/Kennedy_Irregular_Warfare_Center

d. NAVOCEANO requests for support are submitted to the Customer Service branch via message, E-mail, phone call, chat, or Community On-Line Intelligence System for End Users and Managers (COLISEUM). Products are disseminated via the NEP-Oc, E-mail, FEDEX, registered mail, ftp, or hand carried.

e. FLENUMMETOCCEN requests for support are submitted to the Command Duty Officer via E-mail, phone call, or chat. Products are disseminated via the NEP-Oc, e-mail, FEDEX, or registered mail.

4. Points of Contact

a. Mission Support Center, Coronado, CA

(1) E-mail

NIPR: MSC_METOC@Navsoc.Socom.mil

SIPR: MSC_METOC@Navsoc.Socom.smil.mil

(2) Phone

COM: (619) 437-5016

DSN: (312) 577-5016

b. Naval Oceanography Special Warfare Center, Coronado, CA

(1) Commanding Officer: COM (619) 437-5196

(2) Executive Officer: COM (619) 437-2103

(3) Operations Officer: COM (619) 437-5788

c. Kennedy Irregular Warfare Center, Suitland, MD

(1) Phone: DSN (312) 659-2890

(2) SIPRNet:

http://www.intelink.sgov.gov/wiki/Kennedy_Irregular_Warfare_Center

d. COMNECC Staff METOC Officer

(1) Phone: DSN (312) 253-4316 x 195

e. NAVOCEANO Customer Service Branch, Stennis Space Center

(1) E-mail

NIPR: cso.navo.fct@navy.mil

SIPR: cso@navo.navy.smil.mil

(2) Phone

COM: (228) 688-5176

DSN: (312) 828-5176

f. FLENUMMETOCCEN Command Duty Officer, Monterey, CA

(1) E-mail

NIPR: fnmoc.cdo@navy.mil

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CHAPTER 14**ANTI-SUBMARINE WARFARE SUPPORT**

1. General. Support for Anti-Submarine Warfare (ASW) is comprised of three components: ASW Reachback Cell (RBC), Naval Oceanography ASW Teams (NOATS), and Naval Oceanography ASW Detachments (NOADS). These components are organized under two Echelon V commands: Naval Oceanography ASW Center (NOAC), Stennis Space Center (SSC), and Naval Oceanography ASW Center, Yokosuka, Japan.

a. The ASW RBC is a centralized, 24x7, support cell operated by NOAC SSC that provides detailed environmental analysis and modeling for ASW Forces. The ASW RBC, collocated with NAVOCEANO, is comprised of Military Oceanographers and Aerographer's Mates, Sonar Technicians, Naval Aircrewmen, and civilian scientific experts. The ASW RBC also leverages expertise from Fleet Numerical Meteorology and Oceanography Center in Monterey, CA and Naval Ice Center Suitland, MD as required.

b. NOATs are experts in ASW-related environmental analysis, forecasting, and planning. They complement the skills of other experts such as ACINT specialists, sonar system operators, and IMAT MTT TDA trainers. They deploy to provide direct support to ASW Commanders and staffs at the theater, strike group, DESRON, and MOCC levels. A team is typically composed of 2 to 3 personnel to provide on-scene planning and analysis support to ASW operations and to act as a forward liaison element to the ASW Reachback Cell. NOAC Stennis teams support all CONUS-based carrier strike group staffs through workups and deployments as well as fly-away teams for ASW operations and major exercises in the Second, Third, Fifth, and Sixth Fleets. NOAC Yokosuka deploys NOATS in support of forward deployed naval forces, and supports CTF-74, CTF-72, CTF-57, CTF-54, and CDS-15 planning. Most NOATs are continuously supporting multiple units and may provide support remotely via E-mail, chat, etc.

c. The NOADS are primarily collocated with Maritime Patrol and Reconnaissance Aircraft (MPRA) activities and provide support directly to those squadrons. NOADS are located in Jacksonville, FL; Kaneohe Bay, HI; Whidbey Island, WA; Misawa, Japan; and Kadena, Japan. NOAD Norfolk and NOAD San Diego are co-located with Naval Mine and Anti-submarine Warfare Command (NMAWC) and provide support to NMAWC as a part of NMAWC's mentoring and assessment function within the Fleet Readiness

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Training Plan (F RTP). NOAD Naples is co-located with CTF-69 and supports ASW exercises and operations in Sixth Fleet.

d. Requests for tailored or specialized support are prioritized as follows:

(1) Priority 1 - real-world ASW operations or planning studies to support contingency plans or operations.

(2) Priority 2 - deployed, multi-unit or multi-national major ASW exercises.

(3) Priority 3 - major ASW exercises in the F RTP for deployment certification and equivalent training (e.g. COMPTUEX, JTFEX, USWEX, FST-J, FST-F).

(4) Priority 4 - major experimental exercise series (e.g. Valiant Shield, SEASWITTI).

(5) Priority 5 - other ASW exercises in Seventh, Fifth, and Sixth Fleets designed for unit level proficiency or engagement.

(6) Priority 6 - Second and Third Fleet unit or single strike group level exercises early in the F RTP (e.g. FST-WC, FST-GC).

e. Requests for NOAT augmentation are prioritized as follows:

(1) Priority 1 - real world ASW operations in any fleet.

(2) Priority 2 - strike group deployments to Seventh Fleet.

(3) Priority 3 - major ASW exercises in the F RTP for deployment certification and equivalent training (e.g. COMPTUEX, JTFEX, FST-J, USWEX, IAC-2).

(4) Priority 4 - other major afloat ASW exercises (Valiant Shield, RIMPAC, SEASWITTI).

(5) Priority 5 - shore based ASW exercises in the F RTP (FST-GC, FST-WC, IAC-1/S) and deployments in fleets other than Seventh Fleet.

(6) Priority 6 - unit level ASW exercises.

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2. Products and Services

a. The ASW Reachback Cell provides direct environmental support to any unit engaged in ASW. The RBC complements detailed unit-level ASW planning, but does not provide specific sonar system lineup recommendations or detailed sonar search plans. Types of support include:

(1) Tailored and regional ocean modeling to support ASW planning and tactical decision aids, general assessments of acoustic conditions, and more detailed analyses of acoustic variability and overall probability of detection across multiple sensors.

(2) Analysis of ocean dynamics in particular areas of interest (e.g. tactical oceanographic feature assessments).

(3) Planning studies for theater and Strike Force/Group ASW Operations.

(4) Water sampling guidance based on analysis of oceanographic dynamics.

(5) Ocean feature (front and eddy) location reports and Oceanographic Model Data via DMS Broadcast.

(6) Ocean Current and Drift Modeling.

(7) Critical factor charts in certain areas world-wide for Theater ASW Commanders/SUBFOR.

b. In the event of a submarine rescue operation, International Submarine Escape and Rescue Liaison Office (ISMERLO) will contact ASW Reachback Cell with the last known datum of the submarine, port of embarkation, and airport of embarkation for rescue forces. The ASW Reachback Cell provides a rapid assessment of the bathymetry, sediment composition, ocean currents, ocean temperatures, and wave forecasts at the rescue datum. The ASW Reachback Cell coordinates with the appropriate Fleet Weather Center to provide an embarkation airport forecast. The ASW Reachback Cell will also coordinate with FLENUMMETOCEN to provide a forecast at both the rescue datum and the port of embarkation. All data will be compiled and posted on the ISMERLO Unclassified Website for rescue planning until the rescue operation is completed or secured.

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3. Product Requests/Dissemination

a. Requests for NOAT support. Requests for NOAT support should be made to NOAC Stennis Space Center by record message traffic. NOAC Yokosuka NOATs are permanently assigned to CTF-74 and CDS-15. The format for the request message is located on the "Global ASW Reference" section of the ASW Directorate portion of the NEP-Oc. Further information can be provided by the NOAC Stennis Space Center CDO (contact information in paragraph 4 below).

b. Requests for RBC support. Requests for RBC support can be made via telephone, email, chat, or message traffic. All requests should include as much of the following information as possible in order to ensure the most operationally relevant support:

- (1) Name of event to be supported
- (2) Event start and end dates
- (3) General description of event
- (4) Location (latitude and longitude coordinates) for region and operating areas
- (5) Assets:
 - (a) platform
 - (b) sensor
 - (c) sensor mode
 - (d) frequency (active only)
 - (e) depth constraints (ft)
- (6) Threats:
 - (a) nationality
 - (b) class
 - (c) hull number
 - (d) target strength

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- (e) tonal frequency (Hz)
- (f) tonal source level (db)
- (g) minimum operating depth (ft)
- (h) maximum operating depth (ft)

(7) Missions (all that apply):

- (a) active tracking
- (b) covert tracking
- (c) active search
- (d) passive search
- (e) barrier search
- (f) area pre-search
- (g) high value unit opposed transit
- (h) replenishment at sea
- (i) threat avoidance
- (j) deception
- (k) station keeping

(8) Expected tactical application of analysis:

- (a) course of action comparison
- (b) determine search areas
- (c) sensor placement
 - sonobuoy placement
 - force positioning
 - XBT placement

(9) General questions to be answered by analysis

c. Products can be disseminated via email, posted on the NEP-Oc, or directly briefed by the embarked NOAT.

4. Points of contact

a. ASW Reachback Cell

(1) PLA: NAVOCEANASWCEN STENNIS SPACE CENTER, MS

(2) Command Duty Officer

(a) E-mail

SIPR: asw-rbc@ocean.navy.navy.smil.mil

(b) Chat

asw_rbc_cdo

asw_rbc_fdo

(c) Phone

COM: (228) 688-5583 (Secure Capable)

DSN: (312) 828-5583 (Secure Capable)

b. NAVOCEANASWCEN Yokosuka, Japan

(1) PLA: NAVOCEANASWCEN YOKOSUKA, JA

(2) Command Duty Officer/Forecast Duty Officer

(a) E-mail

SIPR: M-YO-NMOC-CDO@fe.navy.smil.mil

NIPR: M-YO-NMOC-CDO@fe.navy.mil

(b) Phone

COM: 011-81-46-816-5595

DSN: (315) 243-5595

c. NAVOCEANO Acoustics Department

(1) E-mail

SIPR: acoustic-sme@ocean.navy.navy.smil.mil

d. NAVOCEANO Ocean Prediction Department

(1) E-mail

SIPR: ocean_forecaster@ocean.navy.navy.smil.mil

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CHAPTER 15**MINE WARFARE SUPPORT**1. General

a. The Naval Oceanography Mine Warfare Center (NOMWC) located at Stennis Space Center, Mississippi, is the primary organization that provides operational capabilities to Mine Warfare (MIW) and Mine Countermeasures (MCM) forces worldwide. NOMWC is comprised of four operational support elements:

(1) Unmanned Undersea Vehicle (UUV) Platoon: responsible for operational test and evaluation of new UUV technology for both Surface Mine Countermeasures (SMCM) and Underwater Mine Countermeasures (UMCM), providing MCM baseline and tactical surveys for strategic and operational Intelligence Preparation of the Operational Environment (IPOE), and mine hunting capability to MCM commanders.

(2) MIW Reach Back Cell (MIW-RBC) is the primary coordination node for the fleet MIW/MCM forces to request operational support from NOMWC and support from NAVMETOCCOM production centers. The MIW-RBC coordinates directly with Deputy Commander, Naval Mine and Anti-submarine Warfare Command and subordinate commands to provide all environmental data, from strategic planning to tactical METOC assessments.

(3) MIW-RBC Surge Teams provide on-scene support to MIW/MCM operating forces and deployed staffs. Surge teams consist of NOMWC and NAVOCEANO personnel with expertise in translating environmental knowledge into tactical advantage.

(4) NOMWC Embedded Components are collocated with MCM forces in key forward and CONUS locations. They provide commanders and operational units with organic METOC expertise and act as "eyes-forward" to ensure optimized support from NOMWC's other support elements. Embedded components are located in San Diego, CA; Norfolk, VA; Sasebo, Japan; and Bahrain.

b. NOMWC works in concert with NAVOCEANO to provide:

(1) MCM force-multiplication with UUV employment

(2) Environmental collection in confined operating areas in critical Naval ports and harbors

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(3) IPOE in critical forward theaters

(4) Evaluation of new oceanographic technologies in high priority theater engagements

2. Products and Services

a. UUV Platoon:

(1) Mine hunting and oceanographic surveys using UUVs in shallow and restricted waters. UUVs are ideal for port approaches, channels, harbors, sea walls and piers, oil platforms, and other enclosed areas.

(2) Post-mission analysis (PMA) of the resultant sonar imagery for initial tactical contact calls.

(3) Re-acquisition (RI) missions on high-confidence contacts.

(4) Environmental analysis for doctrinal bottom type, water temperature, salinity, underwater visibility, and currents, all of which can be provided as tactical overlays for battle space awareness and mission planning.

b. MIW-RBC:

(1) IPOE overlays and planning data in GIS and Mine Warfare and Environmental Decision Aid Library (MEDAL) formats. Available data includes: cloud ceilings, precipitation, winds, visibility, daylight hours, air temperature, doctrinal bottom type, burial, sediments, underwater visibility, sea temperature, salinity, tides, sea state, currents, underwater hazards, and bathymetry.

(2) Environmental Data Files tailored to mission operating areas.

(3) Tailored Tactical and Operational Oceanographic Assessments and METOC modeling support from NAVOCEANO and FLENUMMETOCEN (e.g., forecasted currents, dive windows and drift models) that assist with mission planning.

(4) Coordinate NAVOCEANO support for measuring critical MCM oceanographic parameters worldwide. Assets for conducting these measurements include:

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(a) Acoustic Doppler Current Profiler (ADCP). Provide current measurements throughout the water column at a single point.

(b) Ocean Gliders. Collect data throughout the water column. They record salinity, temperature, optical data and current measurements.

(5) Though not normally manned 24X7, the MIW-RBC will surge operating hours as necessary to support MIW operations.

c. Surge team support includes, but is not limited to, analysis of side scan sonar imagery (doctrinal bottom type determination), battle space profiler (BSP) analysis, weather forecasting, and model analysis.

3. Product Requests/Dissemination

a. Specific support request from the Fleet should be made to the MIW-RBC by telephone, E-mail, or the NEP-Oc. Product support requests should include as much of the following information as possible:

- (1) Name of event to be supported
- (2) Unit to be supported (provide POC)
- (3) General description of event
- (4) Event start and end dates
- (5) Product due date
- (6) Location (latitude and longitude coordinates) for region and operating areas
- (7) Product format (data files, .jpg, .ppt, etc.)
- (8) Release information (foreign disclosure)

b. Generally, products produced from existing databases can be made available within hours. Products requiring additional processing or analysis may take longer—depending on where they are being collected from and state of delivery or processing. Lead time is always paramount, so earliest possible notification is advised.

c. Products will be delivered via mail, email, NEP-Oc, or may be hand-carried if UUV or Surge Teams will be supporting the operation.

4. Points of Contact

a. MIW-RBC

(1) PLA: NAVOCEANMIWCEN STENNIS SPACE CENTER, MS

(2) E-mail

NIPR: miwrbc@navy.mil

SIPR: miwrbc@navy.smil.mil

(3) Phone

COM: (228) 688-4862

DSN: (312) 828-4862

CHAPTER 16

UNITED STATES MARINE CORPS SUPPORT

1. General

a. The mission of Marine Corps METOC is to provide meteorological, oceanographic, and space environmental information, products, and services required to Marine Corps and other military operations. The Marine Corps' METOC support infrastructure is designed to readily deploy and operate in austere expeditionary environments and support ground, aviation, and expeditionary maneuver warfare operational requirements.

2. Products and Services

a. The highest level of METOC support capability to Marine Air-Ground Task Force (MAGTF) and Aviation Combat Element (ACE) specific operations is the deployment of the Meteorological Mobile Facility - Replacement (MetMF-R). The MetMF-R provides the following capabilities:

- (1) Doppler Radar
- (2) Organic METOC Satellite Reception
- (3) Lightning Detection
- (4) Local Sensors
- (5) Remote Sensors
- (6) Upper Air Sensing Capability
- (7) Robust Communication Capability

(8) Characterization of atmospheric, ocean and fresh water features to include:

- (a) Tides and currents
- (b) Beach gradient and composition

(c) Air temperature, atmospheric pressure, aviation weather parameters, illumination, visibility, cloud cover, ceiling height, icing, precipitation and snow depth

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(9) Conduct sensor emplacement and operate remote water sensors and sensor networks in a semi-permissive environment

(10) Conduct aviation forecasts supporting UAV and standard aviation platform operations

b. METOC Support Teams (MST) are task organized and equipped to provide a limited level of METOC support. They are capable of rapidly deploying as a stand-alone asset in response to a crisis or as a first-in METOC capability to establish METOC support in anticipation of follow-on forces. The MST deploys with man-portable, ruggedized environmental collection and data processing equipment.

c. Marine Corps War Fighting Publication 3-35.7, MAGTF Meteorological and Oceanographic Support, provides more detailed information about the Marine Corps METOC Service. An electronic copy is available for viewing and downloading from the Marine Corps Combat Development Command, Doctrine Division Web site at <https://www.dctrine.quantico.usmc.mil/>.

d. The Marine Corps operates two Marine Corps Installation (MCI) Regional METOC Centers (RMC) for CONUS Marine Corps Air Station (MCAS) support. MCI-East RMC supports the east coast of the United States. MCI-West RMC supports the west coast of the United States.

3. Product Requests/Dissemination. Request for Marine Corps METOC support is via the MEF METOC Officers. Marine Corps METOC utilizes the same overall METOC dissemination architecture as Naval METOC.

4. Points of Contact

a. Headquarters, USMC APX-32

Phone: DSN (312) 223-9787

b. I Marine Expeditionary Force (MEF)

Phone: DSN (312) 340-1206

c. II Marine Expeditionary Force (MEF)

Phone: DSN (312) 751-0751

d. III Marine Expeditionary Force (MEF)

Phone: DSN (315) 622-9566

e. USMC MCI-East RMC

(1) Phone: COM 866-925-2523

f. USMC MCI-West RMC

(1) Phone: COM 800-470-6020

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CHAPTER 17**TRAINING AND READINESS**1. General

a. Total Force Readiness, Training & Education is the responsibility of COMNAVMETOCCOM who continually adjusts training requirements to correspond with new operational realities. NAVMETOCCOMINST 1500.2(series) outlines all policy, procedures, and responsibilities for the training, professional development, and certification of military METOC personnel and NAVMETOCCOMINST 12410.5(series) for civilian personnel.

b. The Naval Meteorology and Oceanography Professional Development Center (NMOPDC) is responsible for the execution and delivery of the NAVMETOCCOM strategy and policy for training, education, and professional development. NMOPDC develops, maintains, and implements long-range training plans aligned with NAVMETOCCOM objectives. All publications and related technical documents supporting NAVMETOCCOM training programs/pipelines for the various warfare areas are maintained by NMOPDC.

c. Center for Naval Aviation Technical Training Unit (CNATTU) Keesler develops skilled professionals through accredited technical training and personal growth in support of fleet readiness. Their training includes the electronic calibration of afloat and aviation equipment, physical dimensions, meteorological and oceanographic observing and forecasting, maintenance and repair of meteorological equipment, operation and repair of critical communications equipment, management and control of the radio frequency spectrum and air space management and control. CNATTU Keesler conducts the enlisted AG-A1 and AG-C1 Schools.

d. USMC Liaison. The Marine Corps entity within NMOPDC maintains liaison with intra/inter-service METOC organizations as it pertains to training and education of: METOC hardware systems, software applications, METOC Tactics, Techniques, and Procedures (TTPs), environmental impacts to the Marine Air Ground Task Force (MAGTF), advanced environmental sciences, emerging sensing techniques, and METOC integration into the geospatial realm. Marine Corps personnel also develop and instruct advanced follow-on and sustainment training and education, both formal and informal, required for Marine Corps METOC personnel.

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e. NAVMETOCCOM participates in the Cooperative Program for Operational Meteorology, Education and Training (COMET®), a cooperative program designed to promote a better understanding of mesoscale meteorology and to maximize the benefits of new weather technologies. The COMET mission is to support, enhance, and stimulate the communication and application of scientific knowledge of the atmospheric and related sciences for the operational and educational communities.

2. Products and Services

a. Training. Total Force pipelines are developed with each Director of Oceanography Operations to establish training tracks for both enlisted and officer. Civilian training pipelines are also created for leadership/managerial succession programs as well as for mandatory training to maintain professional standards and qualifications. This includes DoD Information Assurance Awareness and Personally Identifiable Information (PII) training.

b. Training Management. Organizational Training Pipelines represent plans for the effective use of METOC training opportunities aligned to job positions and the organizational mission. Training Pipelines are reviewed each year per NAVMETOCCOMINST 1500.2 (series). Pipelines are approved by the Echelon IV Commanding Officer or the DOO for each directorate. Pipelines serve as the baseline for Individualized Development Plans (IDP).

c. Training Opportunities. NMOPDC provides Navy METOC numbered and Navy course identification number (CIN) numbered courses, Marine Corps course identification numbers (CID), informal seminar training, COMET modules and MENTOR services. CIN/CID numbered courses are formal instructor-led courses. NMOPDC offers several of these courses. Appendix B is the list of METOC numbered courses and distance learning (DL) courses without Navy CIN numbers. Informal training options, such as seminars and workshops, are designed to address emergent customer requirements.

(1) NAVMETOCCOMINST Formal Courses (Appendix B).

(2) Joint Meteorology and Oceanography (METOC) Officer Course. Joint METOC Officers (JMO) course is designed to educate and train officers and senior enlisted METOC personnel to coordinate METOC capabilities supporting the Joint Task Force Commander. The course instructs METOC personnel in the fundamentals of Joint METOC support to Unified or Coalition

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Commands, or Combined Commands and Units. The course format will be group-paced lessons with demonstration of understanding through practical exercises.

(3) Fleet Synthetic Training (FST) is a CNO initiative to provide training to the Fleet (IAW the Fleet Response Training Plan), and to provide certification of warfighting competencies, all without having to operate at sea. FST provides testing of the Navy's critical warfare skills in a virtual synthetic training environment. METOC support is based on an archive of synthetic historical ocean and atmospheric fields to allow training scenarios to be built for the future.

(4) International Hydrographic Management and Engineering Program (IHMEP) is geared towards international and U.S. junior officers and provides practical, professional training in hydrographic survey management and engineering. The course provides students with a working knowledge of hydrography through a six-month course covering mathematics, computer science, the physical sciences, geodesy, the Global Positioning System, hydrographic data collection and processing, oceanography, meteorology, nautical cartography, photogrammetry, remote sensing, resource management and Law of the Sea. This course culminates in a two-week field project that allows students to plan and conduct a survey, process the data, and develop a navigation-quality field chart. This course is certified by the International Hydrographic Organization (IHO) to meet IHO Category B hydrographic training standards.

(5) International Hydrographic Science Application Program (IHSAP) is geared towards international and U.S. mid-grade officers and provides professional graduate education in hydrographic survey management and engineering. The course provides students with 36 semester hours of graduate education in hydrography through a one-year course covering mathematics, computer science, physics, geodesy, hydrographic data collection and processing, oceanography, meteorology, nautical cartography, remote sensing, resource management and Law of the Sea. This course culminates in a one-month field project that allows students to plan and conduct a survey, process the data, and develop a navigation-quality field chart. This course is certified by the International Hydrographic Organization (IHO) to meet IHO Category A hydrographic training standards.

(6) Fleet Survey Team Subject Matter Expert Exchange (SMEE)/Mobile Training Team (MTT) provides tailored and formal on-the-job training to partner nations while simultaneously collecting maritime geospatial and environment information to

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describe the coastal and littoral environment. Information from these surveys is used to generate interoperable products for rapid, safe maneuverability of commercial and military vessels during port and harbor egress and ingress.

(7) Enlisted Marine Science Education Program (EMSEP) is part of the STA-21 program leading to a direct commission in the 180X community. This two-year science and math intensive program leads to a Bachelor of Science degree in Marine Science from University of Southern Mississippi.

(8) USMC Courses

(a) Applied Environmental Sciences (AES) Course consists of the following units: environmental geology, physical geography, hydrology, oceanography, advanced meteorology, numerical weather prediction and space environment. This course expounds upon fundamental knowledge and skills gained at the initial accession level, providing an introduction to the geosciences critical to integrating METOC into the Intelligence Preparation for the Battlefield. AES is a prerequisite course for obtaining NMOS 6852 (METOC Impacts Analyst).

(b) METOC Impact Analyst Course (MIAC) is a requirement for obtaining the 6852 MOS and will refresh and/or introduce the student to the Marine Corps organizational structure and functions within, introduce Intelligence Preparation for the Battlefield, define METOC (environmental) impacts, and introduce the how and why environmental conditions impact capabilities and operations of each element within the MAGTF.

3. Quota/Product Requests

a. NMOPDC formal course quotas can be requested via the POC (paragraph 4) for the desired location.

b. Online Weather and Online Oceanography quota's can be requested via NKO,
<https://wwa.nko.navy.mil/portal/navaloceanographyprogram/home/navaloceanographyprogram>.

c. Training Requirement Requests (TRR) are used to ensure a standardized process to request formal training development in support of validated fleet requirements. Refer to NAVMETOCCOMINST 1500.2 (series) for submission.

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d. CNATTU Keesler AG C-SCHOOL SEATS. Candidate's Leading Chief Petty Officer should reserve a seat nine months from their PRD. This can be done by submitting a 1306/7 requesting a seat, Perform to Serve (PTS) Zone A/B approval, OBLISERVE intention (42 months from class start date) to execute orders and pre-requisite completion to the AG rating detailer (PERS-404).

4. Points of Contact

a. Naval METOC Professional Development Center

Phone: COM (228) 871-2916
DSN (312) 868-2916

b. USMC Liaison to NMOPDC

Phone: COM (228) 871-3386
DSN (312) 868-3690

c. NMOPD Detachment Atlantic, Norfolk, VA

Phone: COM (757) 444-0129
DSN (312) 564-0129

d. NMOPD Detachment Pacific, San Diego, CA

Phone: COM (619) 767-7301
DSN (312) 577-7301

e. NMOPDD Pacific Component, Yokosuka, Japan

Phone: INTL 011-81-46-816-5595
DSN (315) 243-5393

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APPENDIX A

ACRONYM LIST

AC	Active Component
ACE	Aviation Combat Element
ADCP	Acoustic Doppler Current Profiler
ADO	Aviation Duty Officer
AES	Applied Environmental Sciences
AFRICOM	United States African Command
AG	Aerographer's Mate
AOR	Area of Responsibility
AREPS	Advanced Refractive Prediction System
ARG	Amphibious Readiness Group
ASOS	Automated Surface Observing System
ASW	Anti-Submarine Warfare
AUV	Autonomous Underwater Vehicles
AVN	Aviation Weather Operations
AVWEAX	Aviation Enroute Weather Forecast
BonD	Battlespace on Demand
BSP	Battle Space Profiler
CAAW	CNTRA Aviation Weather Warning
CASREP	Casualty Report
CHARTS	Compact Hydrographic Airborne Rapid Total Survey
CCDR	Combatant Commander
CDO	Command Duty Officer
CJCSI	Chairman, Joint Chiefs of Staff Instruction
CID	Course Identification Number
CIN	Course Identification Number
CM	Conditional Means
CNATTU	Center for Naval Aviation Technical Training Unit
CNIC	Commander, Naval Installations Command
CNRMA	Commander, Navy Region Mid-Atlantic
CNRMW	Commander, Navy Region Midwest
CNRNW	Commander, Navy Region Northwest
CNRSE	Commander, Navy Region Southeast
CNRSW	Commander, Navy Region Southwest
COCOM	Combatant Command
COMET	Cooperative Program for Operational Meteorology, Education and Training
COMNAVMETOCOM	Commander, Naval Meteorology and Oceanography Command
COMSC	Commander Military Sealift Command
COMUSFLTFORCOM	U.S. Fleet Forces Command
CONOPS	Concept of Operations
CONUS	Continental United States
CPHC	Central Pacific Hurricane Center
CRF	Celestial Reference Frame

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CSG	Carrier Strike Group
CSO	Customer Service Office
CWO	COMNAVMETOCCOM Watch Officer
DIA	Defense Intelligence Agency
DL	Distance Learning
DMS	Defense Message System
DoD	Department of Defense
DoN	Department of the Navy
DOO	Director of Oceanography Operations
DSN	Defense Switched Network
EM	Embedded METOC personnel
EMSEP	Enlisted Marine Science Education Program
EOP	Earth Orientation Parameters
ER	Environmental Reconnaissance
ESG	Expeditionary Strike Group
ESV	Expeditionary Survey Vehicles
EUCOM	United States European Command
EXW	Expeditionary Warfare
FCA	Fleet Concentration Area
FLENUMMETOCCEN	Fleet Numerical Meteorology and Oceanography Center
FltOps	Fleet Operations
FRAK	Field Riverine Analysis Kit
FWB	Flight Weather Briefer
FWC	Fleet Weather Center
FWC AVN Det	Fleet Weather Center Aviation Detachment
FST	Fleet Survey Team
FTP	File Transfer Protocol
GCCS	Global Command and Control System
GGTO	GPS and Galileo Timing Offset
GI&S	Geospatial Information and Services
GOMEX	Gulf of Mexico
GPS	Global Positioning System
GTS	Global Telecommunication System
GUI	Graphical User Interface
GWEAX	Graphical Enroute Weather Forecast
HA/DR	Humanitarian Assistance/ Disaster Relief
HUREVAC	Aircraft Hurricane Evacuation
IERS	International Earth Rotation and Reference Systems Service
IC	Intelligence Community
ICRF	International Celestial Reference Frame
IHMEP	International Hydrographic Management and Engineering Program
IHO	International Hydrographic Organization
IHSAP	International Hydrographic Science Application Program
IIP	International Ice Patrol

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IMETOC	Integrated METOC Support Concept
IPOE	Intelligence Preparation of the Operational Environment
ISR	Intelligence, Surveillance and Reconnaissance
JDEIS	Joint Doctrine, Education, & Training Electronic Information System
JFC	Joint Force Commander
JMO	Joint METOC Officer
JMV	Joint METOC Viewer
JP	Joint Publication
JMCC	Joint METOC coordination cell
JMCO	Joint METOC coordination organization
JOAF	Joint operations area forecast
JTWC	Joint Typhoon Warning Center
JWICS	Joint World-wide Intelligence Communications Systems
LIDAR	Light Detection and Ranging
LTM	Long Term Means
MAGTAF	Marine Air-Ground Task Force
MAR	Maritime Weather Operations
MCM	Mine Countermeasures
MEDAL	Mine Warfare and Environmental Decision Aids Library
MEF	Marine Expeditionary Force
MET	Mobile Environmental Team
METAR	Meteorological Aviation Report
MetMF-R	Meteorological Mobile Facility - Replacement
METOC	Meteorology and Oceanography
MIAC	METOC Impact Analysis Course
MICA	Multi-year Interactive Computer Almanac
MIW	Mine Warfare
MIW-RBC	Mine Warfare METOC Reachback Cell
MIZ	Marginal Ice Zone
MOSC	METOC operations support community
MPRA	Marine Patrol and Reconnaissance Aircraft
MSC	Mission Support Center
MST	METOC Support Teams
MTT	Mobile Training Team
NAFC	Naval Aviation Forecast Center
NAFD	Naval Aviation Forecast Detachment
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
NATOPS	Naval Air Training and Operating Procedures Standardization
NAV	Navigation
NAVICECEN	Naval Ice Center
NAVOCEANO	Naval Oceanographic Office
NAVOCEANOPSCOM	Naval Oceanography Operations Command

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NCC	Naval Component Commander
NCEP	National Center for Environmental Prediction
NDW	Commander, Navy District Washington
NECC	Naval Expeditionary Combat Command
NEP-Oc	Navy Enterprise Portal - Oceanography
NGA	National Geospatial Intelligence Agency
NHC	National Hurricane Center
NIC	Naval Ice Center
NMFC	Naval Maritime Forecast Center
NMOPDC	Naval Meteorology and Oceanography Professional Development Center
NMORA	Naval Meteorology and Oceanography Reserve Activity
NMWAC	Naval Mine and Anti-submarine Warfare Command
NOAA	National Atmospheric and Oceanic Administration
NOAC	Naval Oceanography ASW Center
NOAD	Naval Oceanography ASW Detachment
NOAT	Naval Oceanography ASW Team
NOMAD	Naval Observatory Merged Astrometric Database
NOMWC	Naval Oceanographic Mine Warfare Center
NOOC	Naval Oceanography Operations Command
NOSWC	Naval Oceanography Special Warfare Center
NOVAS	Naval Observatory Vector Astronomy Software
NSA	National Security Agency
NSAWC	Naval Strike and Air Warfare Center
NSW	Naval Special Warfare
NTP	Network Time Protocol
NWS	National Weather Service
OCONUS	Outside Continental United States
OHB	Oceanographic, Hydrographic, and Bathymetric
OHBRMS	OHB Requirements Management System
ONI	Office of Naval Intelligence
OPAREA	Operating Area
OTSR	Optimum Track Ship Routing
OPTEMPO	Operational Tempo
OWS	Operational Weather Squadron
PACFLT	Pacific Fleet
PACOM	United States Pacific Command
PDC	Professional Development Center
PII	Personally Identifiable Information
PIM	Points of Intended Movement
PIREP	Pilot Weather Report
PLA	Plain Language Address
PMA	Post Mission Analysis
PNT	Positioning, Navigation, and Timing
POC	Point of Contact
PPS	Precise Positioning Service
PTA	Precise Time and Astrometry

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PTS	Perform To Serve
PTTI	Precise Time and Time Interval
R&D	Research and Development
RBC	Reach Back Cell
RC	Reserve Component
RDDOO	Reserve Deputy Director of Oceanographic Operations
RFI	Request for Information
RFP	Request for Product
RFS	Request for Service
RHIB	Rigid Hull Inflatable Boat
RI	Reacquisition Mission
ROC	Regional Operations Center
RP	Resource Protection
RPDO	Resource Protection Duty Officer
RRFID	Radio Reference Frame Image Database
SATOPS	Satellite Operations
SCIF	Sensitive Compartmented Information Facility
SFARP	Strike Fighter Advanced Readiness Program
SGOT	Strike Group Oceanography Team
SLAC	Solar-Lunar Almanac Core
SLOSH	Sea, Lake and Overland Surges from Hurricanes
SMCM	Surface Mine Countermeasures
SMEE	Subject Matter Expert Exchange
SMO	Senior METOC Officer
SPAROS	Special Arctic Oceanographic Synopsis
SPECI	Special Report
SPS	Standard Positioning Service
SSC	Stennis Space Center
STE	Secure Terminal Equipment
STELLA	System to Estimate Latitude and Longitude Astronomically
SUBFOR	Submarine Forces
SUBOPAETH	Submarine Operational Authority
SUBWEAX	Submarine Enroute Weather Forecast
T1	Thunderstorm Condition 1
T2	Thunderstorm Condition 2
TAF	Terminal Aerodrome Forecast
TAWS	Target Acquisition Weapons Software
T-AGS	Military Sealift Command-Auxiliary General Survey
TC	Tropical Cyclone
TCCOR	Tropical Cyclone Condition of Readiness
TCFA	Tropical cyclone Formation Alert
TDO	Typhoon Duty Officer
TELCON	Telephone Conference Call
TRF	Terrestrial Reference Frame
TRR	Training Requirement Request
TTP	Tactics, Techniques and Procedures

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TWSTT	Two-Way Satellite Time Transfer
UCAC	USNO CCD Astrograph Catalog
UMCM	Underwater Mine countermeasures
URL	Uniform Resource Locator
USFF	United States Fleet Forces
USJFCOM	U.S. Joint Forces Command
USNAVOBSY	U.S. Naval Observatory
USNO	U.S. Naval Observatory
UT1	Universal Time 1
UTC	Coordinated Universal Time
UUV	Unmanned Undersea Vehicle
VLBI	Very Long Baseline Interferometry
VOIP	Voice Over Internet Protocol
VTC	Video Teleconference
WEAX	Enroute Weather Forecast

APPENDIX B

LIST OF EFFECTIVE NAVMETOCCOM INSTRUCTOR-LED AND CORRESPONDENCE COURSES

COMET modules available on the MetEd Website
(http://www.meted.ucar.edu/resource_modlist.php)

<u>COURSE NO.</u>	<u>TITLE</u>
METOC 50-1T-0301	Basic Surface Chart Analysis
METOC 50-1T-0304	Tropical Synoptic Models
METOC 50-1T-0302	Encoding, Decoding and Plotting the Synoptic Report
METOC 50-1T-9607	Tropical Streamline Analysis
METOC 50-1T-9610	A Workbook on Tropical Clouds and Cloud Systems Observed in Satellite Imagery, Volume I
METOC 50-1T-9611	A Workbook on Tropical Clouds and Cloud Systems Observed in Satellite Imagery, Volume II
METOC 60-1T-0203	Evaluating and Encoding Bathythermograph (BT) Data
METOC-045-792-106-001	Wave Lifecycle II: Propagation & Dispersion
METOC-045-792-106-002	Shallow-Water Waves
METOC-045-816-106-003	Forecasting Aviation Icing: Icing Type and Severity
METOC-045-800-106-004	Remote Sensing of Ocean Wind Speed and Direction: An Introduction to Scatterometry
METOC-045-838-106-005	Webcast: Introduction to Ensembles
METOC-045-809-106-006	Introduction to Ocean Tides
METOC-045-838-106-007	Jet Stream Circulations
METOC-045-792-106-008	Rip Currents: Forecasting
METOC-045-833-106-009	Skew-T Mastery
METOC-045-838-106-011	Landfalling Fronts and Cyclones
METOC-045-803-106-012	Dust Enhancement Techniques Using MODIS and SeaWiFS

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METOC-045-809-106-015	Unit Hydrograph Theory
METOC-045-841-106-015	Low-Level Coastal Jets
METOC-045-792-106-016	Ten Common NWP Misconceptions
METOC-045-809-106-016	Understanding the Hydrologic Cycle
METOC-045-841-106-018	Streamflow Routing
METOC-045-838-106-036	How Models Produce Precipitation and Clouds
METOC-045-833-106-042	Intelligent Use of Model-Derived Products
METOC-045-838-106-076	Runoff Processes
METOC-045-871-107-078	Introduction to Ocean Models
METOC-51T-0602	Polar Satellite Products for the Operational Forecaster: Microwave Analysis of Tropical Cyclones
METOC-51T-0603	Mesoscale Convective Systems
METOC-61T-0601	Wave Lifecycle I: Generation
METOC-62T-0603	Antisubmarine Warfare Sensors and Platforms
METOC-SMRDHR-1	Supporting Military Emergency Response during Hazardous Releases
NMOPDC-BAC-1.0	Buoyancy and CAPE
NMOPDC-DFE-1	Dynamically Forced Fog
NMOPDC-FDS-1.0	Forecasting Dust Storms
NMOPDC-FIWT-2.0	Flow Interaction with Topography
NMOPDC-FRF-2.0	Forecasting Radiation Fog
NMOPDC-MBP-1.0	Mesoscale Banded Precipitation
NMOPDC-MWADW-1.0	Mountain Waves and Downslope Winds
NMOPDC-NSF-1.0	Nearshore Fundamentals
NMOPDC-SACS-1.0	Shear and Convective Storms
NMOPDC-UH-1.0	Using Hodographs
NMOPDC-WTC-1.0	Wave Types and Characteristics
CNET12007	Sea Breezes
CNET12010	Mountain Valley Winds
CNET12013	Cold Air Damming
CNET12016	Coastally Trapped Wind Reversals
CNET12022	Gap Winds

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CNET12025	Definition of the Mesoscale
CNET12031	How Mesoscale Models Work
METOC-045-792-106-001	Wave Life Cycle II: Propagation and Dispersion
METOC-045-838-106-005	Webcast: Introduction to Ensembles
METOC-045-833-106-009	Skew-T Mastery
METOC-045-833-106-010	Using the WRF Mesoscale Model
METOC-045-843-106-013	Supporting Military Emergency Response during Hazardous Releases
METOC-045-792-106-014	Wind in the Marine Boundary Layer
METOC-045-809-106-015	Unit Hydrograph Theory
METOC-045-840-106-016	Understanding the Hydrologic Cycle
METOC-045-841-106-018	Streamflow Routing
METOC-045-838-106-019	A Convective Storm Matrix Buoyancy/Shear Dependencies
METOC-045-833-106-020	An Introduction to POES Data and Products
METOC-045-841-106-021	Applying Diagnostic and Forecast Tools: Forecasting Fog and Low Status
METOC-045-841-106-022	Assessing Climatology in Fog/Stratus Forecasting
METOC-045-841-106-023	Basic Terminal Forecast Strategies
METOC-045-841-106-025	Case Study: A New England Fog Event
METOC-045-841-106-026	Case Study: A Northern Plains Cold-Air Outbreak Event
METOC-045-841-106-027	Challenges of Forecasting the West
METOC-045-841-106-028	Customer Impact: Forecasting Fog and Low Stratus
METOC-045-838-106-029	Dynamics & Microphysics of Cool-Season Orographic Storms
METOC-045-841-106-030	Ensemble Forecasting Explained
METOC-045-833-106-031	Feature Identification Exercises: Clouds, Snow, and Ice using MODIS
METOC-045-833-106-032	Feature Identification from Environmental Satellites
METOC-045-841-106-033	Fog and Stratus Forecast Approaches
METOC-045-833-106-034	Freezing and Melting, Precipitation Type, and Numerical Weather Prediction

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METOC-045-841-106-035	Heavy Banded Snow
METOC-045-813-106-037	Icing Assessment Using Observations and Pilot Reports
METOC-045-813-106-038	Icing Assessment Using Soundings and Wind Profiles
METOC-045-833-106-039	Imaging with NPOESS VIIRS: A Convergence of Technologies and Experience
METOC-045-833-106-040	Impact of Model Structure & Dynamics
METOC-045-833-106-041	Influence of Model Physics on NWP Forecasts
METOC-045-045-106-043	Inverted Troughs and Their Associated Precipitation Regimes
METOC-045-813-106-044	Inverted Troughs Case Exercise
METOC-045-813-106-045	Isentropic Analysis
METOC-045-833-106-046	Local Influences on Fog and Low Stratus
METOC-045-833-106-047	Mesoscale Convective Systems Squall Lines and Bow Echoes
METOC-045-833-106-048	Model Fundamentals
METOC-045-833-106-052	Polar Satellite Products for the Operational Forecaster, Module 3: Case Studies
METOC-045-833-106-053	Polar Satellite Products for the Operational Forecaster, Module 4: Soundings
METOC-045-838-106-054	Predicting Supercell Motion Using Hodograph Techniques
METOC-045-813-106-055	Quantitative Precipitation Forecasting Overview
METOC-045-838-106-056	Radiation Fog
METOC-045-814-106-057	Remote Sensing of Land, Oceans, and Atmosphere with MODIS
METOC-045-814-106-058	Remote Sensing Using Satellites
METOC-045-833-106-059	Review of GOES IR Imagery Including Winter and Icing Applications
METOC-045-833-106-060	Satellite Meteorology: GOES Channel Selection
METOC-045-838-106-061	Synoptic Weather Considerations: Forecasting and Fog and Low Stratus

METOC-045-838-106-062 The Balancing Act of Geostrophic Adjustment

METOC-045-841-106-063 Topics in Lake Effect Snow Forecasting

METOC-045-841-106-064 Topics in Polar Low Forecasting

METOC-045-813-106-065 Understanding Data Assimilation: How Models Create Their Initial Conditions

METOC-045-838-106-066 Visible and Infrared Dust Detection Techniques

METOC-045-838-106-067 West Coast Fog

METOC-045-838-106-068 Writing Effective TAFs

METOC-045-814-106-069 Advances in Microwave Remote Sensing: Ocean, Wind Speed and Direction

METOC-045-807-106-070 Anticipating Hazardous Weather and Community Risk

METOC-045-842-106-071 Hurricane Strike!

METOC-045-880-106-072 Space Weather Basics

METOC-045-880-106-073 Space Weather: Welcome, SEC

METOC-045-813-106-074 Topics in Precipitation Type Forecasting

METOC-045-841-106-075 Mesoscale Aspects of Winter Weather Forecasting Topics

METOC-045-871-107-077 Flash Flood Process

METOC-045-871-107-078 Introduction to Ocean Models

METOC-045-871-107-079 River Forecasting Case Study

METOC-045-804-107-080 Introduction to Ocean Currents

METOC-045-813-107-081 Operation Models Matrix: Characteristics of Operational MWP Models

METOC-045-833-107-082 Forecast Process

METOC-045-879-107-083 Operational Satellite Derived Tropical Rainfall Potential (TraP)

METOC-045-879-107-084 Satellite Meteorology - Case Studies Using GOES Imager Data

METOC-045-880-107-085 Satellite Meteorology - Remote Sensing Using the New GOES Imager

METOC-045-880-107-086 Satellite Meteorology - Using the GOES Sounder

METOC-045-792-108-090 Wave Ensembles in the Marine Forecast Process

METOC-045-841-108-091	North Wall Effects on Winds and Waves
METOC-045-841-108-092	The Impact of Weather on Air Traffic Management
METOC-045-811-108-093	Operational Use of the Wavewatch III
METOC-045-792-106-094	Analyzing Ocean Swells
METOC-045-819-508-001	ATC Tower Visibility Observations
METOC-045-805-307-001	Atmospheric Effects on EO Propagation
METOC-045-818-308-002	Meteorological Refresher for Instrument Ground School
METOC-045-827-206-002	NITES IV

TAUGHT BY NAVMETOCPRODEV CEN GULFPORT

S-5A-0011	Basic Oceanography Accession Training (BOAT)
METOC-045-809-407-001	Survey Watchstander - Training Workbook
METOC-045-809-407-002	Military Hydrography Level II (MH-2)
METOC-045-809-407-003	Introduction to Fledermaus for Hydrographic Surveyors
METOC-045-809-407-004	Introduction to Unix-Linux for Hydrographic Surveyors
METOC-045-809-407-005	Linux System Administration for Hydrographic Surveyors
METOC-045-809-407-006	Introduction to Oracle SQL for Hydrographic Surveyors
METOC-045-809-407-007	Introduction to Unix-Linux Shell Scripting for Hydrographic Surveyors
METOC-045-809-407-008	International Hydrographic Management and Engineering Program (IHMEP)

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C-5B-0011	Senior METOC Officer Afloat (SMOA)
C-5B-0012	Antisubmarine Warfare Primer
C-5B-0013	METOC Support for Air Defense/Surface Warfare and Information Warfare
C-5B-0014	METOC Support for Strike Warfare
C-5B-0015	METOC Support for Search and Rescue
C-5B-0016	NITES Basic User
C-5B-0017	METOC Support for Amphibious Warfare

C-5B-0018	AN/SMQ-11 Basic User
C-5B-0019	Basic OA Division Tactical Team Trainer
C-5B-0020	METOC Support for Chemical, Biological, Radiological, Nuclear and High Explosive Effects (CBRNE)
C-5B-0021	METOC Support for Special Warfare
C-5B-0022	METOC Support for Mine Warfare
C-5B-0023	Intermediate OA Division Tactical Team Trainer
C-5B-0024	Basic Remote Sensing
C-5B-0025	Advance OA Division Tactical Team Trainer
S-5B-0001	Target Acquisition Weapons Software Primer
S-5B-0002	METOC Support for Non-Acoustic Antisubmarine Warfare
S-5B-0003	METOC Support for Mediterranean Weather
S-5B-0004	Joint METOC Forecast Unit
S-5B-0005	Central Command Area of Responsibility Forecasting
S-5B-0006	Imagery Science in Meteorology and Oceanographic Analysis (ISMOA)
S-5B-0011	Antisubmarine Warfare Oceanography Tactical Team Trainer
S-5B-0012	Advanced Refractive Effects Prediction System (AREPS) Primer
S-420-0001	Southeast Region Area of Responsibility

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Appendix C

ENTERPRISE IT SERVICES

1. General

a. Enterprise Information Technology (IT) Services are provided by the Enterprise Engineering Department (EED). The EED is the project management and execution agent of COMNAVMETOCOM N6, Assistant Chief of Staff (ACOS) for Information Architecture. The EED is a virtual organization supported by varying levels of effort from personnel throughout the enterprise. EED core functions are primarily staffed by NAVOCEANO N6 personnel, with support from other NAVMETOCOM activities, SPAWAR Systems Centers, contractors, and other sources.

b. The EED roles and responsibilities are governed by COMNAVMETOCOM instructions 5230.4, 5232.2, 5233.1, and 5234.1.

2. Products and Services

a. The EED provides services to the METOC community on two levels. One level is in direct support with products and services in response to user IT needs which is described below by activity. The other is indirect support in maintaining the compliance and viability of our IT assets in response to frequent DoD IT directives and instructions.

b. The EED Customer Interface Managers (CIM) are responsible for the business analysis and management of METOC Information System (METOCSYS) customer IT requirements. This includes requirements submission assistance, assessment, elicitation, refinement, validation and implementation. The EED-CIM will also conduct application portfolio management for METOCSYS customer application requirements to ensure Functional Area Manager (FAM) endorsement.

c. The EED Engineering Support Group (ESG) is responsible for the formulation and implementation of IT solutions based on the validated requirements. The CIM and ESG work together to address customer's IT needs by balancing those needs against funding, information assurance and IT constraints.

d. The EED Configuration Management (CM) is responsible for the global configuration management of all METOCSYS IT hardware and software. This includes the establishment of the configuration identification information baselines in the

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Enterprise Architecture Framework (EAF). This service is provided for the centers, detachments, and components within the EED area of responsibility; which currently include approximately 91 sites.

e. Life Cycle Support (LCS) coordinates delivery of material, technical, and tailored support to METOC activities worldwide through the Enterprise Casualty Process. LCS efforts are focused on the sustainment of existing systems and processes, and restoration of those systems and processes after a casualty. Support methods include traditional DD Form 1348 requisitioning in support of Program of Record Systems, commercial procurement, contracting of materials and services, coordination of distance support with SPAWAR and NAVOCEANO engineering agents and other external agencies, on-site tech assists, and centralized Casualty Reporting (CASREP) support.

3. Product Request/Procedures

a. Submit an Enterprise Change Request (ECR) (i.e. an IT requirement) - login to the EAF at <https://itas.navy.mil/EA/login/index.html> and go to ECR Tracking and select to add a new ECR. For ECR submission help or to check on the status of a submitted ECR contact one of the EED Customer Interface Managers. The EED-CIM team can be reached at EED-CIM@navy.mil.

CIM Lead - CONUS / OCONUS METOCSYS, NMCI and ONE-Net IT Requirements:

Gregory Noll, COM (228) 688-4054 / DSN 828-4054,
gregory.noll@navy.mil

CIM - On-Site Stennis Commands & local area Training Commands METOCSYS and NMCI IT Requirements:

Ms. Kim Maddox, COM (228) 688-4082 / DSN 828-4082,
kim.maddox@navy.mil

CIM - Enterprise Services NMCI Assistant Contract Technical Representative (ACTR) & Move, Add, Change (MAC) initiator for METOCSYS Component and Detachment Commands:

Ms. Kelley Lee, COM (228) 688-5162 / DSN 828-5162,
kelley.lee.ctr@navy.mil

CIM - Application Portfolio Management of METOCSYS application requirements: Ms. Carole Fowler, COM (228) 688-5310 / DSN 828-5310 carole.fowler.ctr@navy.mil

b. Submit a *Customer Service Request (CSR)* for life cycle support by going to the METOC Systems Knowledge Center

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(MSKC). Call the MSKC at DSN 524-3888 or Commercial (619) 524-3888 to get started, or visit the MSKC online at <https://mskc.spawar.navy.mil>. The MSKC is your 24/7 access to the Enterprise resources you need. MSKC analysts will work with you to document, track, and resolve your issue. The MSKC will also capture enterprise-wide metrics on METOC Systems performance and cost.

c. More information on the EED, processes and status of projects and products can be found through Navy Knowledge Online at <https://www.nko.navy.mil/portal/enterpriseengineering/home/eedenterpriseengineering>.

4. Point of Contact. Tash Solangi, Enterprise Services Branch Head, (228) 688-5084 (DSN 828), E-mail: tashfeen.solangi@navy.mil.