CHAPTER 10

SPECIAL OBSERVATIONS AND FORECASTS

In this chapter we will discuss a few special observations and forecasts generated to ensure the safety of U.S. Navy ships, aircraft, shore-based commands, and personnel.

The first topic to be discussed will be those products disseminated by theater METOCCENS and METOCFACS. The warnings and advisories presented are further described in the *U.S. Navy Oceanographic and Meteorological Support System Manual*, NAVMETOCCOMINST 3140.1, as well as local command standard operating procedures.

SIGNIFICANT WEATHER, SEA ADVISORIES, AND WARNINGS

LEARNING OBJECTIVES: Describe the content of various warnings, advisories, and forecasts issued by NAVMETOCCOM and USMC units.

Advisories and warnings of potentially destructive weather are routinely issued by NAVMETOCCOM and USMC weather activities. These services are provided in direct support of Navy requirements outlined in OPNAVINST 3140.24, *Warnings and Conditions of Readiness Concerning Hazardous or Destructive Weather Phenomena.* Conditions of readiness are set by the local area commander or designated representative. NAVMETOCCOM does not set these conditions.

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

- *Wind velocity.* Because of its variability, wind velocity is usually expressed in a 10-knot range in speed and 45-degree range indirection. Wind speed forecasts are not averages over the forecast period, but are rather the sustained wind speeds (2-minute average) expected over the period and area of the forecast. Amplifying remarks, such as backing, veering, shifting, and so forth, are added to wind advisories and warnings, as appropriate.

- *Significant wave height.* Significant wave height is defined as the average of the highest one-third of all waves observed in the sea, which includes both short-period and long-period waves. Short-period waves (seas) are normally generated by local winds, while long-period waves (swells) are generated by winds at a distance.

WIND WARNINGS

Wind warnings are characterized by the origin of the disturbance and the wind speed.

Extra-tropical Systems

The following warnings pertain to extra-tropical systems, or tropical systems other than closed cyclonic circulations.

- *Small Craft Warnings.* Small craft warnings are issued in harbors, inland waters, and coastal OPAREAS, as well as other coastal inshore regions prescribed by the local area commander. The lower limit of the sustained wind speed used to set this warning varies by region and is defined by the local area commander. The local NAVMETOCCOM or USMC aviation weather activity can provide further information.

- *Gale Warnings.* Area(s) experiencing sustained wind speeds of 35 knots or higher will be bounded and a gale warning issued.

- *Storm Warnings.* Area(s) experiencing sustained wind speeds of 50 knots or higher will be bounded and a storm warning issued.

- *Wind Warnings.* Wind warnings for the Northern Hemisphere are automatically disseminated via the Fleet Multichannel Broadcast or Automatic Digital Network (AUTODIN). Automatic dissemination of warnings in the Southern Hemisphere are limited to specifically defined areas designated by fleet commanders due to limited naval operations and sparsity of observations. Wind warnings are normally issued every 12 hours.

Cyclonic Circulations of Tropical Origin

Table 10-1 lists tropical warnings and associated wind speeds where applicable:

Issuance of Advisories and Warnings

Tropical Cyclone Formation Alert (TCFA) advisories are issued whenever conditions are right for the development of a tropical cyclone.

Tropical depression/storm and hurricane/typhoon warnings are issued via AUTODIN and the Fleet Multichannel Broadcast every 6 hours for storms in the Northern Hemisphere. They originate from three places:

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

2. NAVPACMETOCCEN Pearl Harbor issues warnings for storms in the eastern and mid-Pacific.

3. NAVPACMETOCCEN WEST Guam issues warnings for storms in the western Pacific and the Indian Ocean.

HIGH SEAS WARNINGS

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

THUNDERSTORM WARNINGS

These warnings are issued as warranted. If there is information received from the National Severe Storms Center with regard to threat of tornadic activity, the information is reviewed, and if warranted, disseminated as a Severe Thunderstorm Watch/Warning.

ADDITIONAL WARNINGS/ADVISORIES

We will now briefly discuss two additional warnings/advisories that, if conditions warrant, would be included in forecasts/travel advisories.

Freezing Rain

If the synoptic situation is conducive to freezing rain, the information would be reflected in all forecasts/travel advisories until the likelihood ceases.

Table 10-1.-Tropical Warning and Associated Wind Speeds

TYPE OF WARNING	WIND SPEED
Tropical Cyclone Formation Alert (TCFA)	N/A
Tropical Depression	Up to 33 knots
Tropical Storm	34 to 63 knots
Hurricane/Typhoon/ Tropical Cyclones	64 knots or more

Extreme Temperatures

When conditions warrant, Heat Index and Wind-Chill are reflected in all forecasts/travel advisories until the likelihood ceases.

VERIFICATION OF WARNINGS, ADVISORIES, AND FORECASTS

LEARNING OBJECTIVES: Verify all warnings, advisories, and forecasts for accuracy to determine whether or not conditions occurred as forecasted.

To provide the optimum product it is very important that all forecasts and warnings be verified after the fact. All NAVMETOC and USMC commands have procedures in place to verify the accuracy of all products, whether they be Small Croft, Gale/Storm, or High Seas Warnings.

By monitoring observations from underway units and closely monitoring weather features, enroute weather forecasts can be fine tuned.

The following are products that are routinely verified for accuracy:

- High Seas Warnings
- Gale/Storm Warnings
- Small Craft Warnings
- Optimum Track Ship Routing (OTSR) Requests
- Enroute weather forecasts

In the next section we will discuss evaporative ducts and their importance to weather analysis and forecasting; specifically, the Atmospheric Refractivity Profile Generator.

REFRACTIVITY FORECASTS USING ATMOSPHERIC REFRACTIVITY PROFILE GENERATOR (ARPGEN)

LEARNING OBJECTIVES: Identify applications, limitations, assumptions, and functional description of the ARPGEN product.

The ARPGEN is used for two purposes:

1. To create a refractivity data set (RDS)

2. To place it into the RDS for use by the various electromagnetic propagation programs

The RDS displays a profile of modified refractive index (M) with respect to height, the height of the evaporation duct, and the surface wind speed.

The operator directly enters the necessary surface observation data for all except the historical option of the program; the historical option is retrieved from the permanent data base (PDB) files.

APPLICATION

ARPGEN is used to create RDS. These data sets describe the effects of the environment on the propagation of electromagnetic (EM) energy in the microwave portion of the spectrum.

LIMITATIONS AND ASSUMPTIONS

The restrictions as well as principles taken for granted in using the ARPGEN product are as follows:

- ARPGEN allows a maximum entry of 30 M-unit versus height pairs. Levels with heights >10,000 m are discarded due to insignificant refractive effects at higher altitudes.

- The standard atmospheric lapse rate is used to extrapolate for a sea-surface M-unit value.

- The evaporation duct-height algorithm assumes that entered surface weather observations are at a height of 6 m above the sea surface.

- The RDS menu selection can accommodate up to 10 refractivity data sets. As these sets are created, they are placed into higher numbered positions in the RDS. When 10 data sets are present, a newly created data set takes the place of the data set not accessed for the longest period of time.

- M-unit profiles must be entered in ascending order.

- For historical data sets, the M-unit profile is retrieved for the closest radiosonde station to the operator-selected location; the surface data are retrieved for the closest Marsden square containing data in the PDB. In many instances, these locations for data may be several hundred miles apart. Data base coverage maps are provided in the TESS (3) Operators Manual.

- Four types of historical profiles can be created by this function; standard, surface-based duct, elevated duct, and combined surface-based and elevated duct.

- The position of the RDS (for nonhistorical profiles) is specified when the operator selects to compute rather than enter an evaporation duct height. This location will be associated with the operator-selected refractivity profile.

- The RDS (with the airborne microwave refractometer [AMR]) option accommodates five flights containing refractivity information. Different portions of a particular flight can be accessed to generate different refractivity profiles. This function will not appear in the menu if an AMR tape-reading device is not connected.

FUNCTIONAL DESCRIPTION

ARPGEN provides four methods in which refractivity data sets can be created:

1. M-Unit Profile Entry - This option allows the operator to create refractivity data sets by entering M-unit profiles directly. After the M-unit profile and the appropriate surface observation and location information are entered, the profile is checked to determine if an M-unit value at the sea-surface level is present. If one is not present, a surface value is determined by extrapolation, assuming a standard atmosphere gradient.

The evaporation duct height is calculated using the operator-entered air temperature, relative humidity, wind speed, and sea-surface temperature. These parameters are used to determine the bulk-Richardson number, the vapor pressure at the sea surface and at the observation altitude, and the near-surface N-unit gradient. If the N-unit gradient is positive, the evaporation duct is zero. When the N-unit gradient is zero or negative and the atmosphere is stable (positive bulk-Richardson number), the evaporation duct height is a linear function of the N-unit gradient and the atmospheric stability; when the atmosphere is unstable, the evaporation duct height is a power function of the N-unit gradient and the atmospheric stability. When the computed value of the evaporation duct height is >40 m, it is set to 40 m.

2. Radiosonde Data Set Selection - Using this option, an M-unit profile is entered by operator selection of a radiosonde data set from the atmosphere environmental file (AEF). M-unit versus height pairs are extracted for the first 30 levels of the sounding or for levels between 0 and 10,000 m heights. When the lowest sounding level is not at the 0 m height, a sea-surface M-unit value is extrapolated using the lowest M-unit value/height pair in the profile, assuming a standard atmospheric gradient.

The surface wind speed and evaporation height complete the information required to generate an RDS. The evaporation duct height is computed in the same manner as when an M-unit profile is entered. The location and the date and time of the RDS are specified by the operator on the Evaporation Duct-Height Parameters Input form.

3. Historical Refractivity Data Set - Using this option, a historical RDS is generated for an operator-specified location, month, and profile type (standard atmosphere, surfiace-hosed duct, elevated duct, or combined surface-based and elevated duct). The upper air data used to specify the M-unit profile with respect to height are retrieved from the Radiosonde Data file. The mean surface wind speed and evaporation duct height are retrieved from the Surface Observation Data tile. Note that the closest long-term mean radiosonde observation location and Marsden square containing the information desired are retrieved from the PDB. In some data-void regions, this may result in an inappropriate RDS being created. Use the climatological electromagnetic propagation conditions summary function to evaluate the general climatologic electromagnetic propagation conditions before using this option. The use of climatological refractivity data sets should be limited to planning functions.

4. Analysis of an AMR tape - This option allows the operator to create an RDS by analyzing a tape generated by the AN/AMH-3 electronic refractometer set. These devices are routinely flown on E-2C aircraft. Refer to the functional description for additional information.

FORECASTING ALTIMETER SETTINGS

LEARNING OBJECTIVES: Discuss the basic considerations in forecasting altimeter settings. Determine altimeter setting errors due to surface pressure variation and nonstandard temperatures. Describe the forecasting of altimeter settings.

Under certain conditions it may be necessary to forecast or develop an altimeter setting for a station or a location for which an altimeter setting is not received. There is also a possibility that an altimeter setting may be required for an area not having a weather station. A forecast of the lowest altimeter setting (QNH) for the forecast period is required. For these reasons it is import ant that forecasters have a basic understanding as to the importance of correct altimeter settings and a knowledge of procedures for forecasting altimeter settings.

The altimeter is generally corrected to read zero at sea level. A procedure used in aircraft on the ground is to set the altimeter setting to the elevation of the airfield.

BASIC CONSIDERATIONS

An altimeter is primarily an aneroid barometer calibrated to indicate altitude in feet instead of units of pressure. An altimeter reads accurately only in a standard atmosphere and when the correct altimeter setting is used. Since standard atmospheric conditions seldom exist, The altimeter reading usually requires corrections. It will indicate 10,000 feet when the atmospheric pressure is 697 hectopascals, whether or not the altitude is actually 10,000 feet.

Altimeter Errors (Pressure)

The atmospheric pressure frequently differs at the point of landing from that of takeoff; therefore, an altimeter correctly set at takeoff maybe considerable y in error at the time of landing. Altimeter settings are obtained in flight by radio from navigational aids with voice facilities. Otherwise, the expected altimeter setting for landing should be obtained by the pilot before takeoff.

To illustrate this point, figure 10-1 shows an example of altimeter errors due to change in surface pressure. The figure shows the pattern of isobars in a cross section of the atmosphere from New Orleans to Miami. The atmospheric pressure at Miami is 1019

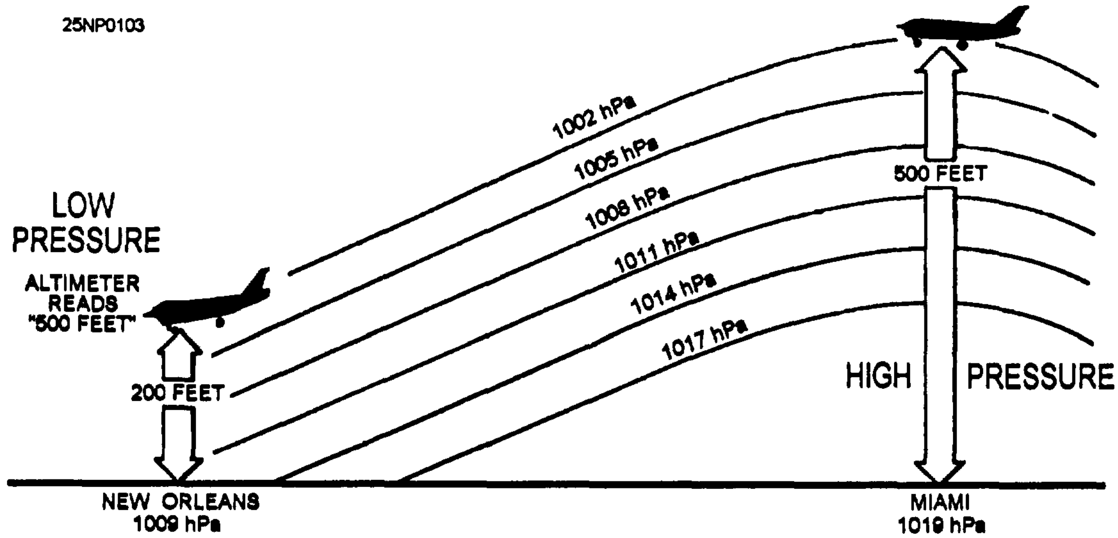

Figure 10-1.-Altmeter errors due to change in surface pressure.

hectopascals and the atmospheric pressure at New Orleans is 1009 hectopascals, a difference of 10 hectopascals. Assume that an aircraft takes off from Miami on a flight to New Orleans at an altitude of 500 feet. A decrease in the mean sea level pressure of 10 hectopascals from Miami to New Orleans would cause the aircraft to gradually lose altitude, and although the altimeter indicates 500 feet, the aircraft would be actually flying at approximately 200 feet over New Orleans. The correct altitude can be determined by obtaining the correct altimeter from New Orleans and resetting the altimeter to agree with the destination adjustment.

NOTE: The following relationships generally hold true up to approximately 15,000 feet:

34 hectopascals = 1 in. (Hg) = 1,000 feet of elevation, Since 1 hectopascal is equal to about 30 feet (below 10,000 feet altitude), a change of 10 hectopascals would result in an approximate error of 300 feet.

Altimeter Errors (Temperature)

Another type of altimeter error is due to nonstandard temperatures. Even though the altimeter is properly set for surface conditions, it will often be incorrect at higher levels. If the air is warmer than the standard for the flight altitude, the aircraft will be higher than the altimeter indicates; if the air is colder than standard for flight altitude, the aircraft will be lower than the altimeter indicates. Figure 10-2 shows an example of altimeter errors due to nonstandard air temperatures.

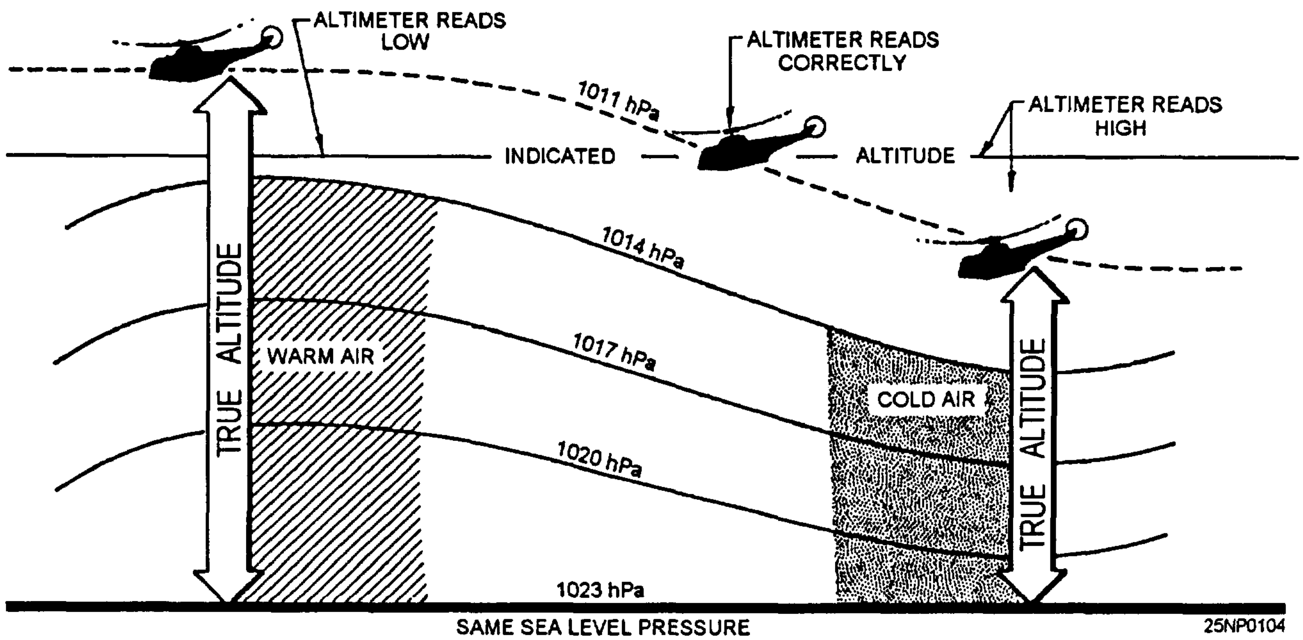

Figure 10-2.-Altimeter errors due to nonstandard air temperatures.

For more information, refer to *The Airman's Information Manual,* which is the official guide to flight information and air traffic control (ATC) procedures, and is used primarily by pilots, naval flight officers, and air traffic controllers. This publication is promulgated quarterly by the Federal Aviation Administration and contains useful information from a pilot's perspective. All forecasters should be familiar with this publication.

FORECASTING PROCEDURES

The first step in the forecasting of altimeter settings is to forecast the sea level pressure for the valid time of the desired altimeter reading. This may be done by using the recommended procedures of prognosis presented in earlier chapters of this training manual.

The next step is modification of the sea level pressure. After the value for the expected sea level pressure has been obtained, it is modified to reflect the diurnal pressure change at the location in question, Pressure tendency charts, locally prepared diurnal curves, and other available information may be used to obtain representative diurnal changes.

The final result of the first two steps will normally be expressed in hectopascals since it is conventional to work in these units on related charts. If this is the case, then the resultant pressure in hectopascals must be converted into inches of mercury before it can be used for an altimeter setting.

In the next section, we will consider the use of electro-optical (EO) systems by the Department of Defense. Because EO systems are being used more and more, it becomes important that Aerographers know about the problems associated with these systems.

FORECASTING ENVIRONMENTAL EFFECTS ON ELECTRO-OPTICAL (EO) SYSTEMS

LEARNING OBJECTIVES: Identify how the environment affects EO systems, and state the problems associated with these systems, Explain the lessons learned with EO systems.

EO systems are concerned with millimeter-wave, IR optical, and UV wavelengths, As these wavelengths decrease, resolution increases, but at the same time there is a decrease in penetration and range. Typically, these systems are line of sight.

BASIC EO PROBLEMS

The following problems should be considered when dealing with EO systems:

- You must assess the environment's effect on the ability of a line of sight instrument to detect or track a target. The view of the instrument might be obscured by material in the atmosphere or may be distorted by refraction.

- There maybe some limited range over which the EO sensor will work.

- Cloud layers affect some sensors.

- Battle-induced smoke or dust restrict ranges.

- Time-of-day will be a limiting factor, if the sensor relies on reflected sunlight or distinct contrasts (visual or thermal).

- Radiative transfer - as electromagnetic energy travels through the air.

  — Some of the energy may go unimpeded, directly from the source to the detector,

  — Some energy may be scattered away (loss); energy not associated with the source may be scattered toward the sensor (noise).

  — Some energy may be absorbed before it ever gets to the sensor (loss).

  — Some energy may even be emitted from particles within the path (more noise).

  — These effects, along with signal loss due to spherical spreading, all contribute to attenuation of the desired signal.

- Spreading - The energy going from the target back to the sensor undergoes further loss due to spreading. This is true even for the return trip (reflection) for an active sensor, although the spreading of the transmitted energy is focused or beamed.

- Contrast - For adequate detection on tracking, sufficient contrast must exist between the intended target and its background. Background might be the sea surface, sky, or terrain. The EO sensor may use thermal, textural, color, light intensity, or pattern contrasts as the method for detection. Insufficient contrast between the intended target and the background causes no acquisition or tracking. Radiative crossover is a key example. The temperature between a metallic object and the ground has different rates of heating and cooling.

Twice a day both will be at about the same temperature and will provide no contrast to IR sensors.

- Wavelength dependence - Each of these loss phenomena is dependent upon wavelength. Sensors operating in certain bands have markedly different characteristics. Remember, the compromise is usually between better resolution and less susceptibility to atmospheric phenomena. While resolution increases with decreasing wavelength, so does weather sensitivity. Table 10-2 shows how environmental elements affect wavelengths.

- Lessons learned from the field
  - Battle experience in desert areas has shown that the operation of optical instruments suffers greatly in these environments. Rapid changes in the index of refraction can result in the shimmering of images, causing optical instruments to lose lock-on tracked targets.
  - Mirages and other refractive phenomena also add to the confusion.
  - Frequent airborne haze, dust, sand, and smoke from both naturally occurring winds and storms, and horn the battle, can hamper guidance or surveillance systems operating in, at, or near optical wavelengths. The effects are more severe at these wavelengths than at microwave, UHF, or VHF.

WEAX AND AVWX

LEARNING OBJECTIVES: Familiarize yourself with the procedures for obtaining route weather forecast (WEAX) or aviation route weather forecast (AVWX) support. Recognize the standard format of the two products.

Consider the obstacles a ship underway in the Pacific in July may have to overcome. The CO feels uneasy; it is tropical storm season and there isn't a weather division on board. Knowledge of this subject area may help the CO accomplish a successful mission.

WEAX or AVWX information is useful to ships receiving OTSR support as well as for independent steaming units, since the OTSR service does not include specifically tailored weather forecasts. WEAX forecasts are designed for ships without embarked aviation units, while AVWX is tailored for ships with an embarked aviation unit.

PROCEDURES

WEAX/AVWX support services are requested in the movement report (MOVREP) in accordance with NWP 10-1-10. Once WEAX/AVWX has been requested on the initial MOVREP, units should continue entering the WEAX/AVWX notation to any subsequent MOVREP to ensure support is continued.

Table 10-2.-How Environmental Elements Affect Wavelengths

WEATHER PARAMETERS					
	Visible and Near IR	Shortwave IR	Midwave IR	Longwave IR	Millimeterwave
Low Visibility	severe	moderate	low	low	none
Rain/Snow	moderate	moderate	moderate	moderate	moderate/low
High Humidity	low	low	moderate	moderate	low/none
Fog/Clouds	severe	severe	moderate/severe	moderate/severe	moderate/low
Phosphorous/Dust	severe	severe/moderate	moderate	moderate/low	low/none
Fog Oil/Smoke	severe	moderate	low	low	none

Frequency of Issuance

WEAX/AVWX service is available for both in port and underway periods. In port WEAX/AVWX will only be issued if requested and if the unit is not in a port supported by one of the NAVMETOCCOM activities listed in NAVMETOCCOMINST 3140.1. In port WEAX/AVWX are issued once daily.

As a ship passes from one NAVMETOCCOM center's area of responsibility to another, the forecast responsibility is automatically passed between the centers. Ships will be advised when this occurs in the Remarks section of the WEAX/AVWX message.

When WEAX/AVWX service is requested, forecasts will be provided at least once per 24-hour period and updated whenever a significant change in the forecast occurs, whether caused by atmospheric changes or changes in the ship's operating area or route.

WEAX/AVWX will be issued to a unit twice daily when located within areas bounded by wind and high sea warnings, and when conditions exceed those specified by a unit involved in towing, salvage, or other unique operations that require tailored support.

During *minimize,* only units experiencing conditions listed in the previous paragraph will receive routine WEAX/AVWX. All other units will receive an initial WEAX/AVWX when *minimize* is imposed. Updates will be provided only when conditions are forecast to exceed those listed in the previous paragraph during the 48-hour outlook period.

Product Consideration

Wind, sea, and tropical cyclone warnings, and so forth will be referenced in the WEAX/AVWX message when applicable. For more information in this area, see NAVMETOCCOMINST 3140.1.

WEAX/AVWX STANDARD FORMAT

Table 10-3 shows the standard format used by NAVMETOCCOM activities responsible for providing WEAX/AVWX services.

The WEAX/AVWX meteorological situation will include the locations of pertinent high-and low-pressure centers. The bearing and range from a geographical reference point or from the unit receiving the forecast will be specified.

Appropriate items in subparagraph 2G of table 10-3 will be included when the MOVREP indicates an aviation unit is embarked, or if otherwise requested. Significant convective activity within 100 nmi of the ship will be included. AVWX forecasts will be issued twice daily when visibility and/or ceiling is at, or decreases below 3 nmi or 1,000 ft. If the difference between sea and swell direction and/or height is significant, it will be indicated.

An Alfa index forecast will be included in subparagraph 2H of table 10-3 for light airborne multipurpose system (LAMPS) capable ships, When refractivity data based on upper air soundings are available, information regarding radar/radio performance predictions and/or refractive index structure data tailored to the ship's radar configuration may be included in this paragraph. Requests for refractivity data should, when possible, include a current upper air sounding. For more information on WEAX and AVWX support, see the *U.S. Navy Oceanographic and Meteorological Support System Manual*, NAVMETOCCOMINST 3140.1. Refer to NWP's 65-0-1 and 65-0-2, *Characteristics and Capabilities of U.S. Navy Combatant Ships,* which list the types and characteristics of radar on USN ships.

AIRCRAFT DITCH HEADING FORECASTS

LEARNING OBJECTIVES: Be familiar with the procedures for obtaining the ditch heading product. Recognize the characteristics of the product. Identify its uses.

Navy aircraft are routinely involved in oceanic flights. In the event of an in-flight emergency, a pilot must make a decision on which direction to ditch the aircraft.

PRODUCT DESCRIPTION

The NODDS ditch headings product provides a graphic depiction, using arrows, to show the recommended direction *into* which an aircraft should land on a water surface. Directions are calculated from 0 to 359 degrees relative to magnetic north.

ENROUTE WEATHER FORECAST (WEAX/AVWX) STANDARD FORMAT

P/O (Precedence)
FM: NAVMETOCCEN
TO: ______________________
INFO: (Include appropriate NAVMETOCCOM activities)
BT
(Classification)//N03145//
SUBJ: WEAX or AVWX (U)
MSGID/GENADMIN/NAVMETOCCEN//
REF/A/(MOVREP reference)//
REF/B/(OTSR Divert MSG reference)//
REF/C/(Wind/Tropical Warning reference)//
REF/D/(High Seas Warning reference)//
REF/E/(Passing MSG reference)//
AMPN/NARR/As Required//
RMKS/1. ( ) Meteorological situation at: ______. See ref(s) ________ for warnings affecting your track.
2. ( ) 24 hour forecast commencing ______UTC along track from ______N(S) to______ E(W) ______ N(S) ______E(W) as indicated ref(s) A and ______.
A. Sky, weather: ______
B. VSBY (NM): ______
C. Surface Winds (KTS): ______
D. Max/Min Temps (°F): ______
E. SST (°F): ______
F. Combined Sea (FT): ______
G. Aviation Parameters:
(1) Cloud Tops/Ceilings: ______
(2) Winds Aloft: 1000 FT ______
3000 FT ______
5000 FT ______
(3) Turbulence: ______
(4) Freezing LVL (FT): ______
(5) Icing: ______
(6) Lowest Expected Altimeter Setting: ______
(7) (Additional information, e.g., PA/Da forecasts):
(8) Divert Fields: ______
H. Remarks: (e.g., radar refraction) ______
3. ( ) Outlook to 48 hours: ______
4. ( ) OTSR Update as required
5. ( ) (Select as appropriate)
(NAVY) REQ 6 HRLY WX REPORTS IAW NAVMETOCCOMINST 3140.1J
(USCG) REQ 6 HRLY WX OBSERVATION REPORTS IAW INTERNATIONAL SHIP WEATHER CODE
(MSC) REQ 6 HRLY WX OBSERVATION REPORTS IAW COMSCINST 3141.1
THIS IS MY FINAL FORECAST UNOREQ
TIMELY OBS RECEIVED FROM YOUR COMMAND GREATLY APPRECIATED
NEXT FORECAST WILL BE ISSUED BY (Appropriate Center).
REQ (Appropriate Center) ACK.
OUTLOOK FOR ARRIVAL AT YOUR DESTINATION: ______
DECL: (If appropriate) ________//

PRODUCT AVAILABILITY

The ditch headings product is available as an analysis and as a forecast at 12-hour increments to 72 hours. See figure 10-3.

PRODUCT EXPLANATION

The Global Spectral Ocean Wave Model (GSOWM) primary swell direction and primary wave height fields and Navy Operational Global Analysis and Prediction System (NOGAPS) marine wind direction and velocity fields are used to calculate the optimal direction to land an aircraft. The earth's magnetic variations are used in the final calculation of the heading.

PRODUCT USE

The ditch headings product is generally used in preparation of a transoceanic flight weather packet. In case of distress, the pilot must make a decision on which direction to land an aircraft to minimize impact damage to the aircraft and loss of life. Except in calm seas, ditching an aircraft is more complicated than landing into the wind. Large waves can severely damage aircraft upon impact. Ditch headings are used primarily in instrument flight rule (IFR) conditions when a pilot cannot observe the sea conditions. The general considerations when ditching becomes necessary are as follows:

- If only one swell is present, landing should take place parallel to the swell, preferably on the top or backside of the swell.
- If two or more swell systems are present, and the primary system is significantly higher, landing should take place parallel to the primary swell. If the swell systems are comparable in height, landing should take place at a 45-degree angle to both swell systems on the downside of the swell.
- If the secondary swell system is in the same direction as the wind, landing should take place parallel to the primary swell with the wind and secondary-system at an angle. The choice of whether to land with the angle of the wind upwind or downwind to the plane depends on the wind speed and height of the secondary swell system.
- In all cases, if the swell system is huge, it is advisable to accept more cross wind than to land into the swell.

PRODUCT LIMITATION

The ditch headings product does not take into account secondary swell conditions. For further information, refer to the *NODDS Products Manual,* FLENUMMETOCCENINST 3147.1.

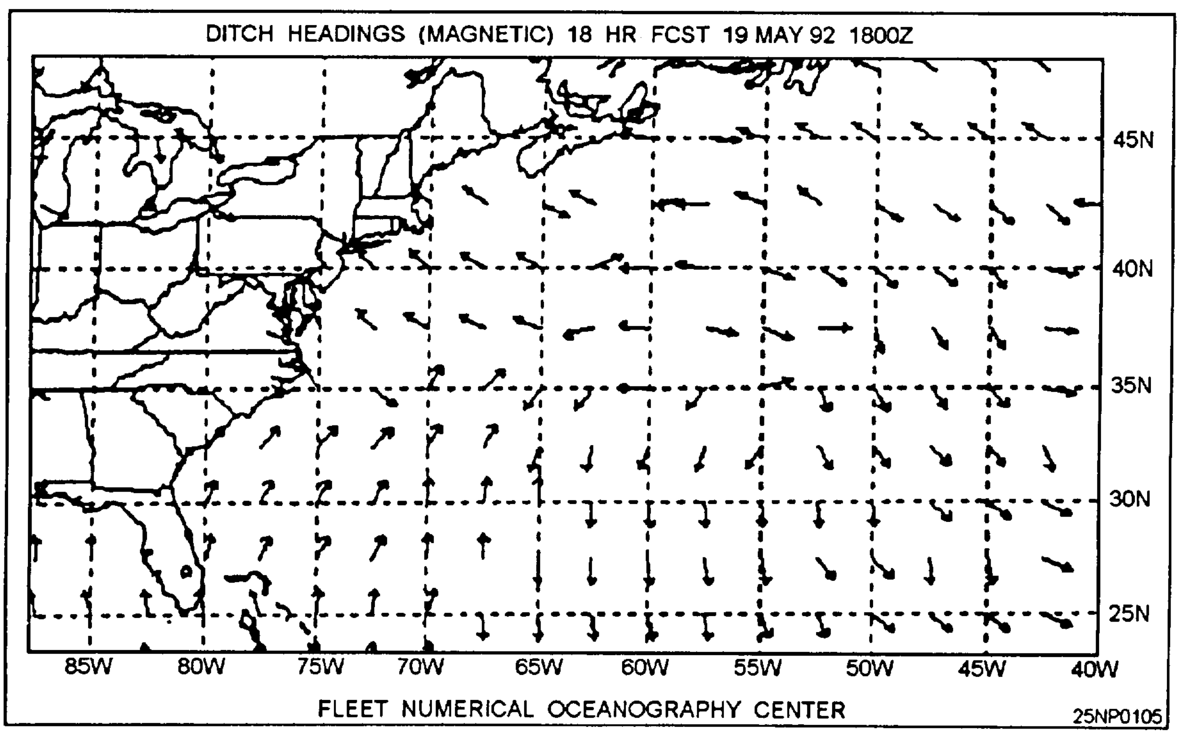

Figure 10-3.-Example of the ditch headings product.

AVIATION FORECAST PRODUCT VERIFICATION

LEARNING OBJECTIVES: Verify Optimum Path Aircraft Routing System (OPARS) requests, Horizontal Weather Depictions (HWDs), Airmen's Meteorological Information (AIRMETs)/Significant Meteorological Information (SIGMETs), and Terminal Aerodrome Forecasts (TAFs) for accuracy.

VERIFICATION OF OPARS

The *OPARS User's Manual*, FLENUMMETOCCENINST 3710.1, and the *AG2* TRAMAN, volume 2, list procedures and the format for OPARS requests.

VERIFICATION OF HWDs

Procedures governing flight weather briefings and preparing DD Form 175-1 and *U.S. Navy Flight Forecast Folders* are outlined in NAVMETOCCOMINST 3140.14. Both the *AG2* TRAMAN, volume 2, and NAVMETOCCOMINST 3140.14 list procedures and formats for the preparation and dissemination of flight weather packets.

VERIFICATION OF AIRMETS AND SIGMETS

The *Airman's Information Manual*, Official Guide to Basic Flight Information, and ATC Procedures briefly discuss in-flight weather advisories disseminated by the National Weather Service (NWS) as well as foreign nations.

VERIFICATION OF TAFs

Commands throughout the claimancy having aircraft on station prepare and update TAFs. Information on the TAF code is presented in the *AG2* TRAMAN, volume 2. NAVMETOCCOMINST 3143.1 promulgates instructions for using the code.

As discussed earlier in this chapter, Aerographers should be familiar with the format and encoding of OPARS, HWDs, AIRMETs/SIGMETs, and TAFs. But these products serve little value unless there is a procedure in place to verify them for accuracy. By verifying these products we take into consideration lessons learned when preparing them in the future.

The last area discussed in this chapter covers sources of climatic information.

CLIMATOLOGY

LEARNING OBJECTIVES: Recognize available sources of climatic information for the planning of exercises.

In preparing for operations or exercises, the officer-in-tactical command (OTC) and commanding officers must be briefed regarding the climatic conditions expected to occur during the operation or exercise. Climatology is normally used for long range planning only and should not be used when reliable, real-time data becomes available. However, in certain situations, it maybe *the only* forecast data available. For more information on this subject refer to NAVMETOCCOMINST 3140.1.

Climatology generally refers to summarizations and/or studies of historical data. Climatology data can be presented in a variety of forms (tabular, graphical, narrative, or analytical charts). When summaries and studies are used for planning, it should be kept in mind that statistical averaging causes smoothing of the observed data. Additionally, the mean or average of a given parameter may be a value that is seldom actually observed.

Units should review their climatology publications on a routine basis to ensure they have the necessary publications for their area of responsibility (AOR) plus any other areas as may be required during contingency operations.

Reference material, which may be used in the preparation of forecaster's handbooks and independent studies in the fields of oceanography and meteorology, is available through the Naval Research Laboratory (NRL Monterey).

PUBLICATIONS AND SUMMARIES

Existing climatological publications and summaries can satisfy many requirements. They should be consulted as a primary source in order to avoid unnecessary or duplicative data processing efforts. Included among these are the following:

- Navy publications of the NAVAIR 50-1C-series (listed in *SPAWM* [Space Warfare Systems Command] *Meteorological Allowance Lists*, EEOOO-AA-MAL-101/W141-QL22 and EEOOO-AB-MAL-101/W141-QL23.)

- Defense Mapping Agency (DMA) publications, including *Sailing Directions and Planning Guides* (listed in Catalog P2V10). For ordering instructions refer to NAVMETOCCOMINST 3140.1.

- Special studies and summaries for marine and land stations and areas (listed in FLENUMMETOCDET Asheville Notice 3140 - Atmospheric Climatic Publications). For ordering instructions refer to NAVMETOCCOMINST 3140.1.

- Various Navy and Air Force station and area climatological summaries, which are periodically updated and provide world coverage - (listed in NAVAIR 50-1C-534, *Guide to Standard Weather Summaries).*

- Various National Oceanographic and Atmospheric Administration (NOAA) summaries for stations and areas in the United States (listed in NOAA Pub. No. 4.11)

- Monthly local area climatological summaries that are routinely prepared and distributed to local commands and activities by NAVMETOCCOM.

- Special atlas-type publications entitled Environmental Guides that provide oceanographic information for various regions of the world's oceans. For ordering instructions, refer to NAVMETOCCOMINST 3140.1.

- Routine climatological products available from FLENUMMETOCCEN include:

  — Monthly wind and direction frequency tables

  — Monthly means of Northern Hemispheric polar stereographic fields for atmospheric and oceanographic parameters

SPECIAL CLIMATOLOGICAL STUDIES

Special studies or summaries are sometimes necessary to meet specific support. FLENUMMETOCDET Asheville can provide assistance in planning specific climatology requirements. *Atmospheric Climatic Publication*, FLENUMMETOCDET ASHEVILLENOTE 3146 outlines procedures for obtaining climatic publications and also has a concise list of available climatic publications.

REQUESTS FOR SPECIAL CLIMATOLOGICAL STUDIES

NAVMETOCCOMINST 3140.1 lists procedures for obtaining special climatological studies.

HISTORICAL DATA REQUESTS

All requests for meteorological and oceanographic historical (climatological) data should be forwarded by letter as listed in NAVMETOCCOMINST 3140.1.

SUMMARY

In this chapter, we have discussed selected significant weather warnings and sea advisories. The importance of verifying these warnings and advisories was also presented. Means for forecasting evaporative ducts and altimeter settings was then presented. We also discussed how aerosols in the atmosphere affect EO sensors, weapons, and communications. We discussed WEAX and AVWX formats as well as procedures for obtaining them. We listed publications used in identifying ship-class radars, and then discussed a means for obtaining aircraft ditch heading products. Next, we discussed the importance of verifying TAFs, OPARs, HWDs, and AIRMETs and SIGMETs. Finally, we outlined the various climatological publications, their content, and a means for obtaining them.