

CHAPTER 2

ENVIRONMENTAL SOFTWARE PROGRAMS

INTRODUCTION

In the Navy and Marine Corps fields of meteorology and oceanography, the use of desktop and laptop computers is common. In chapter one, we discussed several of the most widely used environmental computer systems. In this chapter, we will discuss many of the software programs and products associated with these systems.

Most environmental software programs are run on one of several computer systems, such as TESS, IMOSS, and MIDDS. These systems provide a wide range of environmental products. In this chapter, we will discuss the following programs:

- Oceanographic and Atmospheric Master Library (OAML)
- Geophysics Fleet Mission Program Library (GF MPL)
- Tactical Environmental Support System (TESS) software
- Refractive effects prediction programs
- Electro-Optical Tactical Decision Aid (EOTDA)
- Naval Oceanography Data Distribution System (NODDS)
- Joint METOC Viewer (JMV)
- Optimum Path Aircraft Routing System (OPARS)
- Data Request Product (DRP)

Our intent is to provide you with a basic overview of the purpose of these programs and their output products. You will study more about the applications of these products in later training modules.

OCEANOGRAPHIC AND ATMOSPHERIC MASTER LIBRARY (OAML)

LEARNING OBJECTIVES: Describe the purpose of the Oceanographic and Atmospheric Master Library (OAML). Identify the agency responsible for maintaining OAML. Identify the publication that describes OAML.

The U.S. Navy has produced several oceanographic and atmospheric models and data bases over the last few decades. With similar environmental programs operating on different computer systems, small changes in program output can be realized by various warfare communities using the same products. In 1984, the Oceanographic and Atmospheric Master Library (OAML) was developed to provide consistency and standardization for all oceanographic and meteorological programs used by the Navy. *It is now the Navy standard library for meteorological and oceanographic data bases, models, and algorithms.* OAML thus eliminates large-scale differences in output from the various environmental computer systems that are used throughout the fleet.

The responsibility for maintaining the models and data bases in OAML rests with the Naval Oceanographic Office (NAVO) located at the Stennis Space Center, Mississippi. General descriptions of the various oceanographic and atmospheric models and data bases are provided in the *Oceanographic and Atmospheric Master Library (OAML) Summary* published by NAVO. The OAML summary discusses the applications and limitations of the OAML models and data bases. It also provides data base coverage maps as well as ordering instructions for OAML programs.

While OAML discusses many of the processing models and output products contained in the Geophysical Fleet Mission Program Library (GF MPL),

it is not intended to discuss all of the various GF MPL programs available, only those commonly used by several warfare communities. Table 2-1 lists the most widely used OAML models and table 2-2 lists the data bases contained in OAML.

The OAML data bases and models are used in TESS, IMOSS, MIDDs, and many other environmental prediction systems used throughout the fleet. You will learn much more about the use of OAML models and

data bases as you progress into a senior Aerographer's Mate.

REVIEW QUESTIONS

- Q1. *What is the purpose of OAML?*
- Q2. *What agency is responsible for maintaining OAML environmental data bases and models?*

Table 2-1.—OAML Models

OAML MODELS	
OCEAN MODELS	ELECTROMAGNETIC (EM) MODELS
Modular Ocean Data Assimilation System (MODAS) Naval Search and Rescue (NAVSAR)	Surface-Search Radar (SSR) Model Radar Sea Clutter (CLUTTER) Model Standard Electromagnetic Propagation (Standard EM Prop) Model Evaporation Duct Height (EDH) Model Radar Free-Space Detection Range (RFSDR) Model Radio Physical Optics (RPO) Model
ACOUSTIC MODELS	OTHER MODELS
Passive RAYMODE Model Active RAYMODE Model Parabolic Equation (PE) Model Passive ASTRAL Range-Dependent Prop Loss Model Active Sensor Performance Model (ASPM) Colossus II Model Computer-Aided Sonar Tactical Recommendations (CASTAR) Model Low-Frequency Bottom-Loss (LFBLTAB) Model Surface-Loss (SRFLOS) Model System-Loss (SYSLOS) Model	High-Frequency (HF) Maximum Usable Frequency (MUF) Model High-Frequency (HF) Lowest Usable Frequency (LUF) Model Forward-Looking Infrared (FLIR) Range Prediction System Model Chaff Trajectory (CHATRA) Function Model Chaff Corridor Density (CCD) Model Chaff Dispersion (CHADIS) and Density Model Solar/Lunar Almanac Program (SLAP) Model
METEOROLOGICAL MODELS	
Radiological Fallout (RADFO) Model Meteorological Ballistic (METBAL) Winds and Densities Model Multivariable Optimal Interpolation (MVOI) Model Radiosonde Initial Analysis (RIA) Model	

Table 2-2.—OAML Data Bases

OCEAN DATA BASES	METEOROLOGICAL DATA BASES
Geophysical Data Base	Surface Marine Gridded Climatology (SMGC) Data Base
Ocean Floor Depth Digital Bathymetric Data Base Variable Resolution (DBDB-V)	Upper Air Gridded Climatology (UAGC) Data Base
Icecap Data Base	Global Tropical Cyclone Tracks (GTCT) Data base
Ocean Floor Depth Digital Bathymetric Data Base One-Half Minute Resolution (DBDB-0.5)	Northern Hemisphere Extratropical Cyclone Tracks (NHECT) Data Base
ACOUSTIC DATA BASES	ELECTROMAGNETIC DATA BASES
High-Frequency Bottom-Loss (HFBL) Data Base	Historical Electromagnetic Propagation Conditions (HEPC) Data Base
Low-Frequency Bottom-Loss (LFBL) Data Base	
Generalized Digital Environmental Model (GDEM) Data Base	
Shipping Noise (SN) Data Base	
Wind And Residual Noise (WRN) Data Base	
Historical Temporal Shipping (HITS) Data Base	
GDEM Province Subset (GDEMPS) Data Base	
Volume Scattering Strength (VSS) Data Base	
Vertical Line Array DIFAR (VLAD) Noise Gain Data Base	

GEOPHYSICS FLEET MISSION PROGRAM LIBRARY (GF MPL)

LEARNING OBJECTIVES: Recognize how the Geophysics Fleet Mission Program Library (GF MPL) relates to the environmental analysis and prediction systems in use. Identify the different versions of GF MPL and associated publications. Describe the functions of GF MPL. Identify the major environmental software programs of GF MPL.

The Geophysics Fleet Mission Program Library (GF MPL) is a collection of atmospheric and oceanographic software applications similar to OAML. It provides meteorological, electromagnetic, oceanographic, hazard avoidance, and acoustic software for fleet air, surface, amphibious, and undersea warfare (USW) operations. Other than being a collection of software, GF MPL is also a program sponsored and directed by the Commander, Naval Meteorology and Oceanography Command (CNMOC)

to collect, evaluate, and incorporate new software developments for any meteorological or oceanographic application. Basic guidance on the software evaluation program is contained in NAVMETOCCOMINST 5232.1, *Geophysics Fleet Mission Program Library (GF MPL)*.

GF MPL contains software designed for use on many different types of desktop computer systems, including TESS, IMOSS, and MIDDs. Currently, there are three major versions of GF MPL. The GF MPL NT is the latest version and is distributed on CD-ROM. It is designed to work with the Windows NT operating system by using a Windows-type graphical user interface. Information describing the use of GF MPL NT is contained in the *Geophysics Fleet Mission Program Library New Technology (GF MPLNT) User's Manual*, published by NAVO. A second version, known as GF MPL PC, is designed to run on DOS-based PC systems. It is distributed in both floppy diskette and CD-ROM. A users manual is provided with the disks. The latest and final version of GF MPL PC was released in January 1998. In addition to the NT and PC versions of GF MPL, a Unix-based version has been integrated

into the Global Command and Communications System-Maritime (GCCS-M), which was discussed in chapter one. Information describing the status of all GF MPL environmental programs and software versions is contained in the *Geophysics Fleet Mission Program Library (GF MPL) Summary*, also published by NAVO. Both the NT and PC versions of GF MPL are released as either unclassified or classified CD-ROMs. The classified GF MPL CD-ROMs contain detailed electromagnetic and acoustic models and data bases.

GF MPL FUNCTIONS

GF MPL is a rapid-response, on-scene, environmental prediction system used to quickly determine the effects of the environment on fleet platforms, sensors, and weapon systems. Locally collected environmental information is used to prepare analyses of present atmospheric and electromagnetic (EM) propagation conditions. Locally collected oceanographic information is combined with archived data to prepare an analysis of existing oceanographic and acoustic conditions. Analyses and predictions are based upon on-scene data, historical data, platform characteristics, and weapon/sensor characteristics. GF MPL comprises four basic functions as described below.

Environmental Data Assimilation

GF MPL accepts locally acquired environmental data from various sources, catalogs and processes the data, and then writes the data to available files for use by the various programs. This data includes operator-entered surface, radiosonde, refractivity, bathythermograph, and nearshore bathymetry data. This function also incorporates quality control checks of environmental data input.

Environmental Analysis

GF MPL generates analyses of existing environmental conditions affecting air, surface, amphibious, and USW operations. These analyses are provided by atmospheric, meteorological, and oceanographic application programs. The analyzed data is presented in the form of graphic and tabular displays, which can also be hardcopied and used for performance predictions and briefings.

Sensor Detection Range/Coverage Prediction

GF MPL computes acoustic and electromagnetic (EM) sensor range predictions based on oceanographic

and meteorological environmental profiles. Output is used for detection/counter detection of threat/force platforms. Platform and sensor data base parameters can be modified as necessary (both acoustic and atmospheric). Output is provided in either spreadsheet, graphical, or tabular format.

Data File Maintenance

This function provides the capability to create, maintain, and/or delete data files. This function also ensures the integrity of the data files and provides adequate safeguards for any classified information in the files.

GF MPL PROGRAMS

There are numerous environmental software programs available from GF MPL, and each version comes loaded with a different suite of programs. The environmental programs provided with GF MPL NT can be divided into seven broad categories, which are summarized below:

- **Environment**—This option contains general programs, such as Historical Electromagnetic Propagation Conditions (HEPC) and Propagation Conditions Summary (PCS). It also contains an ocean Sound Speed Profile (SSP) program.
- **Meteorology**—This option contains programs that calculate pressure altitude and density altitude data, wind chill and heat stress values, and astronomical data (sunrise, lunar illumination, civil twilight, etc.).
- **Electromagnetics**—This option contains programs that predict radar performance and calculate radar ranges. Electromagnetic programs include surface-search radar range predictions and electronic countermeasure effectiveness displays. Electromagnetic path-loss curves and radar coverage diagrams can also be produced.
- **Oceanography**—This option contains programs such as the Tidal Prediction and Analysis (TIDES), Surf Forecasting (SURF), and Beach Survey Chart (BSC). The BSC program allows for the creation, display, and editing of a digital beach chart as surveyed by Special Forces personnel.
- **Acoustic**—The Acoustic option contains the Generic Acoustic Prediction (GAP) program and the Tactical Oceanographic/Acoustic Spreadsheet (TOAS) program. GAP is used to produce horizontal contours of ocean temperature, sound speed, and salinity. It also

provides acoustic raytrace diagrams and propagation loss curves. TOAS computes active and passive USW range predictions by using operator-input data and a sensor/platform data base.

- **Hazard Avoidance**-This option contains the Naval Search and Rescue (NAVSAR) program and the Tropical Cyclone program. NAVSAR provides information and planning assistance for search and rescue incidents at sea, such as search probability maps (fig. 2-1). The Tropical Cyclone program tracks tropical cyclone movements and conditions on an operator-specified map. Input data is provided by tropical cyclone messages.

- **Utilities**-The Utility option contains a map utility function that provides the user with a geographical map. These maps are available in different projections. The utilities option also provides a briefing support tool (only with GF MPL NT).

REVIEW QUESTIONS

Q3. What is the purpose of GF MPL?

- Q4. What publication provides a description of the various GF MPL software versions?
- Q5. The analyses and predictions of GF MPL are based upon what inputs?
- Q6. The electromagnetic programs in GF MPL are used to provide calculations for what type of system?
- Q7. What programs are contained in the Hazard Avoidance option of GF MPL NT?

TACTICAL ENVIRONMENTAL SUPPORT SYSTEM (TESS) SOFTWARE PROGRAMS

LEARNING OBJECTIVE: Identify the various software programs available in the Tactical Environmental Support System, Version 3.0 (TESS 3); TESS-Next Century (NC) Transition; and TESS-Next Century.

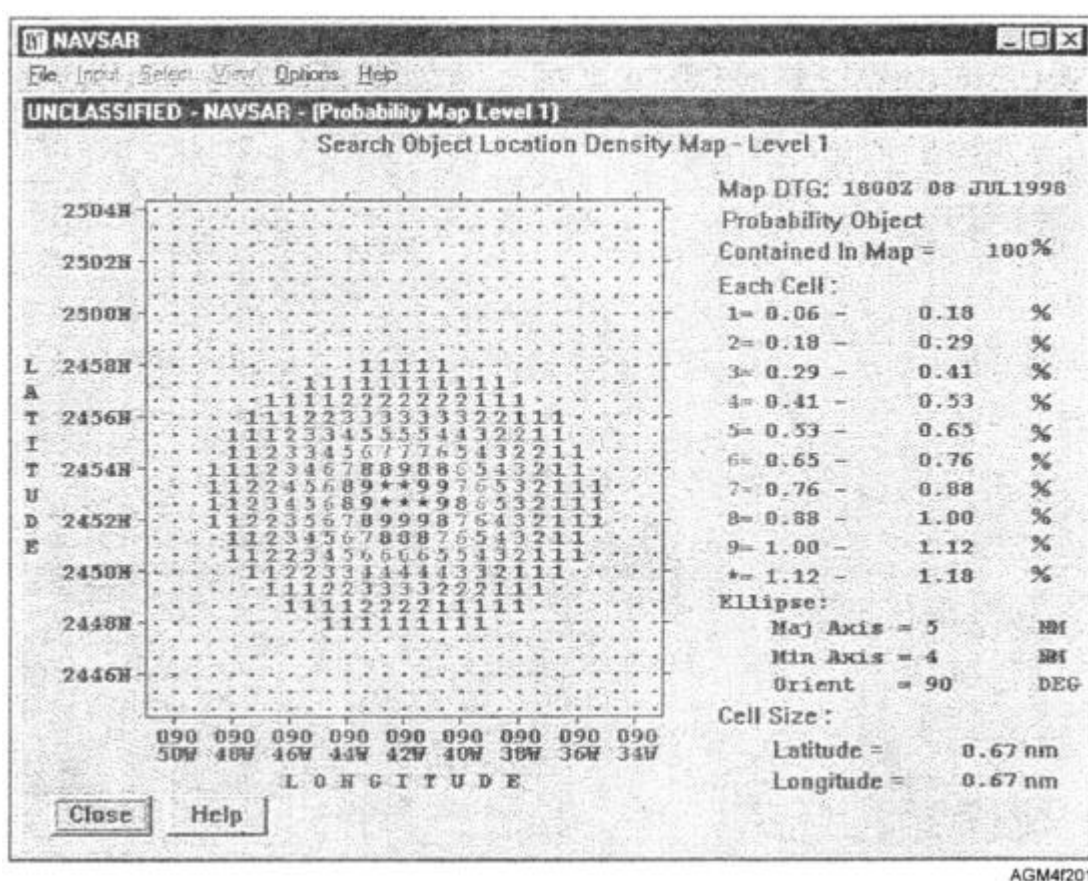


Figure 2-1.—Example of a NAVSAR search probability map from GF MPL NT.

As discussed in chapter one, the Tactical Environmental Support System (TESS) is designed to provide tailored meteorological, oceanographic, electromagnetic propagation, acoustic, and satellite products. The analyses and predictions from TESS are based mainly upon information obtained from various telecommunications channels, on-scene reports, and environmental software programs. Since its introduction, TESS has undergone major hardware changes and significant software improvements. We will discuss the environmental software programs available with the TESS (3), TESS-Next Century (NC) Transition, and TESS-Next Century (TESS-NC).

TESS (3)

The Tactical Environmental Support System, Version 3.0 (TESS 3), retained essentially the same

stand-alone workstation concept of earlier versions of TESS. However, TESS (3) was the first environmental workstation that provided connectivity between ships and shore-based METOC activities. An automatic shipboard observation system known as the Shipboard Meteorological and Oceanographic Observing System (SMOOS) was introduced in conjunction with this system. SMOOS is discussed in module 1 of this series.

TESS (3) was installed with a wide variety of environmental applications software, most of which come from the OAML and GF MPL models and data bases. Table 2-3 explains the application of several of these programs. Access to all programs is directed by screen menus, with user input via trackball or keyboard. Additional information is provided in the TESS (3) operator's manuals. All remaining TESS (3) systems will eventually be replaced by the TESS-Next Century system.

Table 2-3.—TESS (3) Environmental Programs

PROGRAM	APPLICATION	CONSIDERATIONS
Solar/Lunar Almanac Program (SLAP)	Produces monthly or daily summaries of ephemeral data for the sun and the moon. Data includes rise and set times, daylight and twilight periods, moon phase, etc.	Data only accurate for dates between 1985 to 2015. Potential for erroneous data above 60° latitude. Displayed times do not consider political and geographical limits.
Warning plot	Three subprograms plot tropical cyclones, high winds, and high seas.	No significant considerations.
Atmospheric Environmental File (AEF)	View atmospheric soundings prior to use in an environmental application. Holds a maximum of 10 soundings.	No significant considerations.
Radiosonde Initial Analysis (RLA)	Processes radiosonde data into arrays of parametric data. Determines significant altitude levels such as the freezing level, condensation level, and contrail formation levels, etc.	Requires the entry of latitude, longitude, and balloon release height.
D-values (DVAL)	Computes D-value profiles. A D-value compares the differences between the actual height above mean sea level (MSL) and the height of the same pressure surface in the U.S. standard atmosphere. The D-value is used to correct altitude settings for pressure-bomb detonations.	Maximum altitude of approximately 11,000 meters. Cautionary use for radiosonde data when the balloon is released at heights greater than 50 meters.

Table 2-3.—TESS (3) Environmental Programs—Continued

PROGRAM	APPLICATION	CONSIDERATIONS
Sound Focus (SOCUS)	Computes the focusing of atmospheric sound waves caused by an explosive blast. Normally used to determine liability for complaints or unintentional damage.	Computing sound focusing requires highly accurate environmental data. Prediction model was based on data collected from over-water and over-flatland explosions. May not be accurate for mountain terrains.
Ballistic Winds and Densities Corrections (BALWIN)	Computes ballistic wind and density correction factors for naval gunfire support.	Radiosonde data for the selected gunfire area must be used.
Radiological Fallout (RADFO)	Forecasts the pattern of accumulated radiation dose from a nuclear fallout. Used to determine ship and unit maneuvering to avoid potential nuclear radiation hazards.	Assumes meteorological conditions are constant throughout the fallout. Requires an accurate estimate of either the nuclear weapon yield or the height of the nuclear cloud. Does not assess thermal radiation, electromagnetic effects, or initial nuclear radiation. Used for only near-surface blasts.
Aircraft Icing Analyses (AIRICE)	Analyzes radiosonde data to determine the potential for ice accumulation on aircraft.	Computes the probability and the type of ice that may form. Icing may occur in between different radiosonde levels.
Ship Ice Accretion (SHIP ICE)	Estimates ship ice accretion based on time, wind speed, and air/sea temperatures.	More applicable for smaller ships. Does not consider the physical structure of the ship.
Tomahawk Environmental Calculation Aid (TECA)	Calculates weighted mean averages of wind speed, wind direction, and temperature for the overland flightpaths of Tomahawk strike missions.	Data is averaged for 1° square areas.
Atmospheric Refractivity Profile Generator (ARPGEN)	Creates or retrieves refractivity data sets for use by the various other EM programs.	Limited to 30 M-unit entries below 10 km in altitude. Refractivity data may be several hours old. Historical refractive data sets are retrieved for closest radiosonde station.
Electromagnetic (EM) Device Editor (EMDED)	Produces, edits, and maintains EM files (platforms, jammers, and ESM receivers) used in different EM programs.	The platform file can contain a maximum of 30 platforms of 15 EM systems each. Generic emitter files may be created. Provides maximum detection range for radars assuming the radar is operating.

Table 2-3.—TESS (3) Environmental Programs—Continued

PROGRAM	APPLICATION	CONSIDERATIONS
Electromagnetic Propagation Conditions Summary (PCS)	Graphically depicts refractive conditions of EM energy in the atmosphere. Describes in narrative the generalized refractive effects.	Not applicable for frequencies below 100 MHz or above 20 GHz.
Historical EM Propagation Conditions (HEPC)	Produces a historical summary of EM propagation conditions for a specific location and month.	No significant considerations.
Electromagnetic Coverage Diagram (COVER)	Provides the capability to determine how an EM system will perform in either detecting or communicating with a given target or receiver.	Does not account for horizontal changes in refractivity. Valid only for signals between 100 MHz and 20 GHz. Does not consider sea or land clutter. Accounts for ducting.
Electromagnetic Path Loss Versus Range (LOSS)	Produces an EM path loss for a user-specified EM system with respect to range. Program computes either an airborne- or surface-based path.	Does not account for horizontal changes in refractivity. Valid only for signals between 100 MHz and 20 GHz. Does not consider sea or land clutter. Accounts for ducting.
Surface-search Radar Range Tables	Determines SPS-10 and SPS-55 detection ranges for predefined U.S. and Russian-built naval platforms.	Does not account for horizontal changes in refractivity. Accounts for ducting. Requires accurate refractivity data.
Electronic Support Measures (ESM) Range Tables	Calculates and displays the maximum intercept ranges of U.S. and Russian-built surface emitters by a user-specified ESM receiver.	Maximum ranges limited to 541 nmi. Emitters are limited to the preset list. Use the Platform Vulnerability program for other emitters. Valid only for signals between 100 MHz and 20 GHz. Assumes the emitter is on and operating at peak power. Accounts for ducting and sea reflection.
Platform Vulnerability (PV)	Estimates the vulnerability of various emitters to a specified ESM system under varying environmental conditions.	Maximum range limited to 541 nmi. Valid only for signals between 100 MHz and 20 GHz. Assumes the emitter is on and operating at peak power. Accounts for ducting.
Battle Group Vulnerability (BGV)	Estimates the emitter vulnerability to a specified ESM system. Plots intercept ranges for surface-to-air, air-to-air, and air-to-surface geometries. The object is to minimize the BG vulnerability to counter-detection	Maximum range limited to 541 nmi. Valid only for signals between 100 MHz and 20 GHz. Assumes the emitter is on and operating at peak power. Accounts for ducting

Table 2-3.—TESS (3) Environmental Programs—Continued

PROGRAM	APPLICATION	CONSIDERATIONS
Electronic countermeasure (ECM) Effectiveness Display	Measures airborne jammer effectiveness against surface-based (victim) radars. Determines optimum locations and flight paths of attacking aircraft.	Does not account for horizontal changes in refractivity. Valid only for signals between 100 MHz and 20 GHz. Does not consider sea or land clutter. Accounts for ducting. The victim radar must be surface-based.
Chaff	Aids in the planning of chaff usage in tactical air-strike missions and shipboard defense. Displays chaff frequency response, optimum chaff corridors, and recommendations for chaff defense against cruise missiles.	Does not consider refractive effects.
Forward-Looking Infrared (FLIR) System Prediction	Determines the operational ranges of airborne FLIR devices against surface targets.	Assumes the environmental data is representative of the entire search area. Computed range is for detection, not categorization. Under high-visibility and/or dry-air conditions, predictions are often farther than the actual detection range.
Laser Range Prediction (LRP)	Displays range information for exposures to low-level laser radiation. Includes height vs. range and day vs. night calculations. Additionally, displays range vs. time of exposure for different levels of laser radiation exposure.	Computes average laser power for a 1-sec period. No power increase is computed for magnification effects (e.g., binoculars). Program works on a wavelength-specific basis. Not applied to air-to-air cases.
Ocean Environmental File (OEF)	Contains recently input and frequently used BT observations, associated sound speed profiles (SSPs), passive propagation loss (PL) curves, and environmental data.	No significant considerations.
Sound Speed Profile (SSP) Generator	Computes SSPs for specific ocean conditions.	Cautionary use of product with no BT data that extends below 200 m.
Ocean Data Analysis (ODA)	Provides automated on-scene analysis of ocean thermal structure and acoustic properties. Also displays historical information. Provides methods for displaying historical bottom depth, bottom loss, and water mass data.	May contain a maximum of 1,000 observations. Approximately 500 observations can be stored on a floppy disk. A specific area ranging from 0.1° to 20° square can be analyzed. Analysis can be performed on a maximum of 50 BT observations at a time.

Table 2-3.—TESS (3) Environmental Programs—Continued

PROGRAM	APPLICATION	CONSIDERATIONS
Raytrace	Graphically displays the interaction between the environment and the sound energy propagating through it. Traces and displays paths of individual sound rays.	Raytrace uses a single SSP thus the sound speeds generated by this program are controlled by depth but not range. Ray diagrams are sensitive to user's selection of launch angle, source depth, bathymetry, and sound speed.
Tidal Prediction (TIDES)	Forecasts tidal heights for any location for which observed tide data is available.	Tidal currents are not predicted. Impacts of storm surge and surf conditions are not addressed. Tidal height extremes predicted to the nearest 6 minutes.
Naval Search and Rescue (NAVSAR)	Provides search assistance by assessing the probability of the search object location. Recommends specific search plans.	Search plans include the type of object, density of the search area, and sweep paths for visual and electronic sensors.
Surf Forecasting (SURF)	Provides predictions of surf conditions as ocean waves move from deep water through the surf zone and onto shore. Modified Surf Index (MSI) is also calculated.	Tidal data may not be complete. Variable bottom features can invalidate earlier data.
Passive Acoustic Propagation Loss (PPL)	Calculates transmission loss as a function of range, frequency, source depth, and receiver depth. These calculations are used to predict USW sensor system performance.	Systems are preset for an omnidirectional sonobuoy. Minimum range and range increments are preset to 1,000 yards. Horizontal homogeneity of the watermass is assumed.
Generalized Range-dependent Acoustic Driver (GENRAD)	Aids the use of the Navy Standard range-dependent passive prop loss models. Provides a means to position on-scene and historical SSPs along a specific line of bearing for further acoustic calculations.	Many considerations; refer to <i>TESS 3.0 User's Guide</i> .
Sensor Performance Predictions (SPP)	Calculates sensor performance predictions using platform and sensor characteristics.	Noise characteristics of U.S. and Russian-built platforms are class averages. Can be used for counter-detection. Each threat platform can be characterized by a maximum of 20 narrowband and/or broadband signature frequencies. Many considerations; refer to <i>TESS 3.0 User's Guide</i> .

Table 2-3.—TESS (3) Environmental Programs—Continued

PROGRAM	APPLICATION	CONSIDERATIONS
Ambient Noise (AN)	Provides noise predictions. Corrects for local, seasonal, directional, and omnidirectional levels.	Designed for deep water. Unreliable predictions for water depths less than 300 m deep.
Tactical Oceanographic Acoustic Spreadsheet (TOAS)	Computes sensor prediction data using platform/sensor data bases, the propagation loss model, and associated data bases. Requires minimal user response.	Many considerations; refer to <i>TESS 3.0 User's Guide</i> .
Edit Orbital Element Set (EDORD)	Allows editing of satellite orbital data.	Few limitations for satellite orbital data.
Orbital Satellite Prediction (ORBSAT)	Provides satellite-pass summaries consisting of rise and set time, pass duration, ship position during the pass, and maximum elevation.	Rise and set time error ranges from 1 to 5 sec. Predictions limited by the number of satellites for a specific latitude area.
Geostationary Satellite (GSAT) Prediction	Computes antenna-aiming data based on operator-specified ship location and bearing, and the satellite longitude.	Assumes a stationary platform.

TESS-NEXT CENTURY (NC) TRANSITION

The TESS-Next Century (NC) Transition was released as an interim system to fill the void between TESS (3) and the full deployment of TESS-Next Century. As discussed in chapter 1, significant changes to TESS were introduced with this system, with Internet access being the most important advantage. In addition to Internet access, the TESS-NC Transition includes a wide variety of commercial and government software programs. Commercial software programs include the Windows NT operating system, Microsoft Office, and commercial web browsers. Government software includes the Joint METOC Viewer (JMV), the Electro-Optical Tactical Decision Aid (EOTDA), and SMOOS interface software. In addition, several of the environmental programs in MIDDs are installed with the TESS-NC Transition.

TESS-NEXT CENTURY

TESS-Next Century (TESS-NC) retains several of the same software packages as the TESS-NC Transition system. As of this writing, the total complement of software programs has not been fully developed. TESS-NC operates using the Windows NT Server and Workstation Operating System and maintains SMOOS

interface capability. Commercial word processing and graphics programs center around Microsoft Office programs. Commercial web browsers are also included with the system. Government software programs include the JMV program, the EOTDA program, and refractivity prediction programs, which are discussed shortly. Additional government software includes various GF MPL programs, such as TIDES and SURF, and software programs from MIDDs, such as the SAND application (discussed in chapter 1).

As mentioned in chapter 1, TESS-NC also includes a data base server and workstation that operate using an HP-UX (UNIX) Operating System. This workstation is used to access tactical applications programs via the Global Command and Control System-Maritime (GCCS-M). In addition, the SPPED/ICAPS II Integrated Product (SIIP) is run from this workstation. SIIP is a series of several integrated environmental programs that access historical and tactical data bases. SIIP products include sound speed profiles (SSPs), acoustic raytraces, ocean data analysis products, passive acoustic propagation loss (PAPL) displays, sensor performance prediction (SPP) profiles, and ambient noise (AN) data.

REVIEW QUESTIONS

- Q8. *What is the purpose of the COVER program?*
- Q9. *What are the limitations of the SSP program?*
- Q10. *What is the major software advantage with the TESS-NC Transition as compared to the TESS (3)?*
- Q11. *Which government environmental software programs are provided with the TESS-NC?*
- Q12. *What is the purpose of the TESS-NC Unix-based workstation?*

REFRACTIVE EFFECTS PREDICTION PROGRAMS

LEARNING OBJECTIVES: Identify the purpose of refractive effects prediction programs. Identify the refractive effects displays available with the Integrated Refractive Effects Prediction System (IREPS) and the Advanced Refractive Environmental Prediction System (AREPS). Describe the major advantages of AREPS.

Refractive effects prediction programs are designed to provide Aerographer's Mates with the capability of assessing the refractive effects upon naval surveillance, communications, electronic warfare, and weapon-guidance systems. Either historical or real-time upper-air sounding data is used as input.

INTEGRATED REFRACTIVE EFFECTS PREDICTION SYSTEM (IREPS)

The first refractive assessment software program was the Integrated Refractive Effects Prediction System (IREPS) developed in the late 1970s. IREPS is designed for use over open ocean areas only. The program assumes the homogeneity of the atmosphere (single airmass) based on the input of a single upper-air sounding. Output options include various refractive effects products such as electromagnetic propagation conditions summaries (PCS), radar coverage display diagrams (COVER), path-loss versus range displays (LOSS), surface-search radar range tables (SSR), and Electronic Support Measures (ESM) radar intercept-range tables. The applications and limitations of these programs were covered with TESS (3) in the previous section. Although IREPS is resident software on TESS (3), it is no longer issued as a stand-alone program. In

addition, most of the products produced by IREPS have been incorporated into GF MPL.

ADVANCED REFRACTIVE ENVIRONMENTAL PREDICTION SYSTEM (AREPS)

The most current refractive effects assessment program is the Advanced Refractive Environmental Prediction System (AREPS). AREPS computes basically the same refractive tactical decision aids as IREPS. However, AREPS uses a more advanced prediction model that produces more accurate data. The most significant advantage of AREPS is that it can produce refractive effects predictions *over land* using terrain data obtained from either the National Imagery and Mapping Agency (NIMA) or the users own sources. In addition, AREPS is able to evaluate range-dependent scenarios, and can also compute radar detection ranges for multiple bearings simultaneously. As of this writing, users must build their own electromagnetic files as there is no electromagnetic data base provided with the program. Figure 2-2 is an example of an AREPS radar coverage diagram. The *AREPS User's Manual*, SSC San Diego Technical Document 3028 provides a detailed description of the AREPS program.

AREPS is designed to run using Windows 95 or Windows NT and is normally obtained as part of the GF MPL NT package. You can also download the AREPS program and the AREPS manual from the SPAWARS website at: <http://sunspot.spawar.navy.mil>. CD-ROM versions of AREPS are available from SPAWARS on a request-only basis.

REVIEW QUESTIONS

- Q13. *What is the purpose of refractive effects prediction programs?*
- Q14. *What is the most significant advantage of AREPS over IREPS?*

ELECTRO-OPTICAL TACTICAL DECISION AID (EOTDA)

LEARNING OBJECTIVES: Define the term *Electra-Optics*. Identify the purpose of the Electra-Optical Decision Aid (EOTDA) program. Recognize the output options available from the EOTDA program.

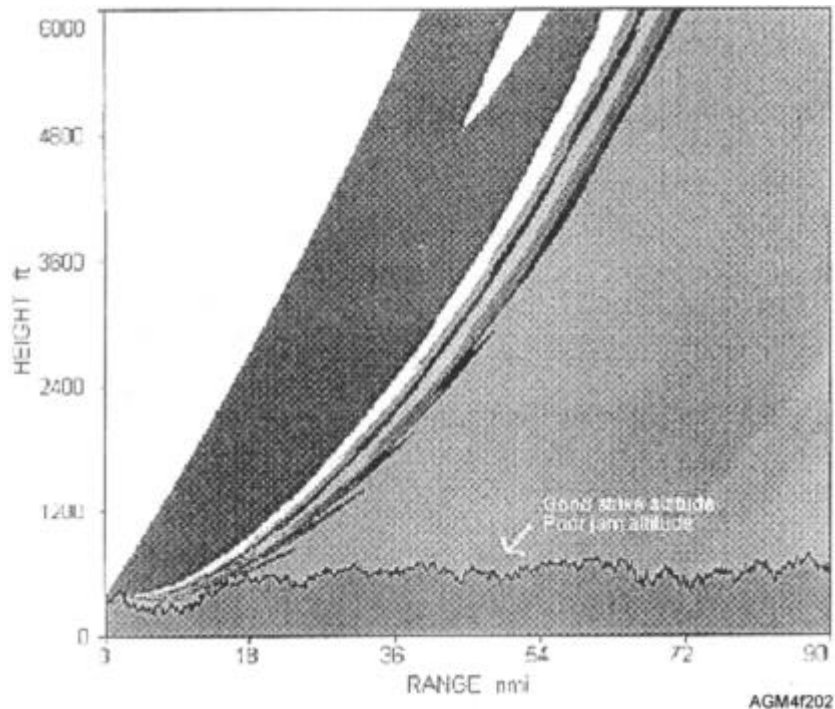


Figure 2-2.—Example of an AREPS radar coverage diagram.

As applied to military operations, the term *Electro-Optics*, or EO, refers to those weapons that require the propagation of electromagnetic energy through the atmosphere for their operation. Although EO systems can operate throughout the entire electromagnetic spectrum, most systems operate in the visible or infrared portions of the spectrum. EO systems are greatly affected by 'environmental conditions, such as precipitation, haze, and other aerosols. In addition, infrared systems are affected by differences between the temperature of the target and the temperature of the surrounding environment (background).

In the early 1980's, computer programs were developed to aid the Aerographer's Mate in predicting the affects of various environmental parameters on EO systems. The most recent model is known as the *Electra-Optical Tactical Decision Aid (EOTDA)*. EOTDA is a software program whose main function is to predict the performance of air-to-ground weapon systems and direct view optics based on the latest environmental and tactical information. EOTDA supports systems operating in three regions of the electromagnetic spectrum: infrared, visible, and laser. Predictions are based upon meteorological forecasts, target characteristics, the components of the EO system, and tactics. The performance of each system is

expressed primarily in terms of maximum detection or lock-on range. Prediction data is displayed in either alphanumeric or graphic format. Figure 2-3 is a sample infrared (IR) visualization display (tank with vegetation background).

EOTDA is a DOS-based program contained on floppy disks that can be loaded on virtually any PC. However, it is a large program that requires much hard disk space. Additional hard disk space is required if several generic targets must be created. The EOTDA program is outlined in the *Electra-Optical Tactical Decision Aid (EOTDA) User's Manual*, prepared by Phillips Laboratory in conjunction with the U.S. Air Force. As of this writing, a Windows NT version of EOTDA is being developed for use with TESS-NC.

Keep in mind that the EOTDA software itself is unclassified. When a user adds operational data that makes the output classified, such as times, locations, etc., the user must then take precautions to protect the information at the appropriate level. Appendix B of the Users Manual provides a detailed listing of sensor names, identifications, and classification information. It is classified SECRET and must be ordered separately. You will learn more about the tactical application of electro-optical products in later modules.

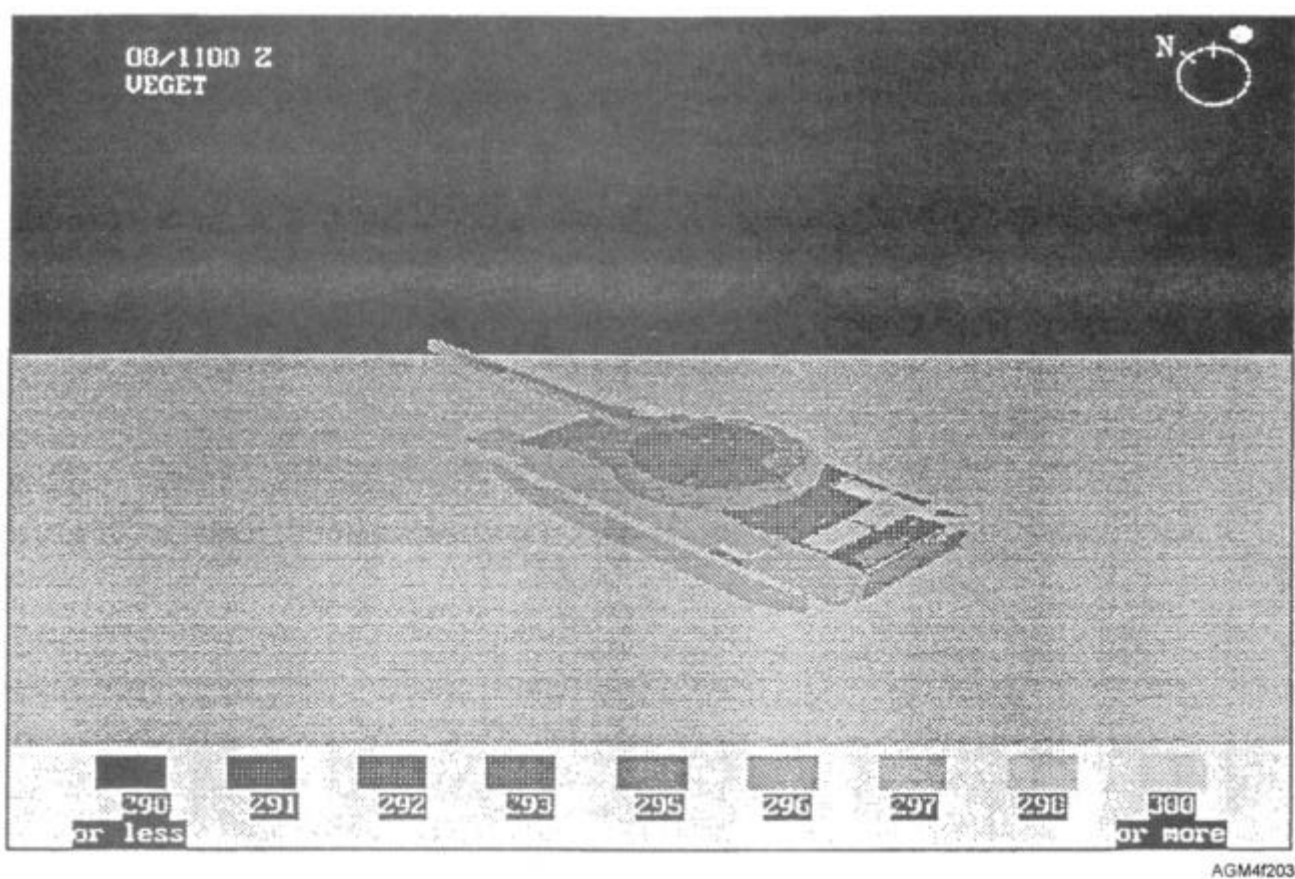


Figure 2-3.—EOTDA infrared (IR) visualization display (tank with vegetation background).

REVIEW QUESTIONS

- Q15. EOTDA supports systems that operate in what part of the electromagnetic spectrum?
- Q16. EOTDA predictions are based on what input?

NAVY OCEANOGRAPHIC DATA DISTRIBUTION SYSTEM (NODDS)

LEARNING OBJECTIVES: Describe how Navy Oceanographic Data Distribution System (NODDS) products are obtained. Identify the products that are available from NODDS. Identify the processing and display features of NODDS.

The Navy Oceanographic Data Distribution System (NODDS) is a DOS based software program which makes environmental products from the Fleet

Numerical Meteorology and Oceanography Center (FNMOC) available to DOD activities. NODDS products are normally obtained using standard telecommunications circuits (commercial/DSN/STU-III) but can also be obtained via NIPRNET, and e-mail. Data processing and display are accomplished using standard PC hardware. Users require ID and passwords to access the system.

NODDS was first developed in 1982 as a means to make FNMOC environmental products available to METOC facilities and detachments that had no direct access to this data. Through the years, the system has grown in use, and product support has expanded. The latest software version is NODDS 4.1. The program is normally installed on MIDDS, but can also be installed on any standard 486 (or better) CPU with a VGA color monitor, hard disk, and mouse. A minimum 9.6 kilobytes per second (KBPS) modem is required, but a 28.8 KBPS modem or greater is recommended.

NODDS PRODUCTS

There are numerous environmental products available from NODDS. Meteorological products include surface pressure, pressure heights (up to 200 hPa), cloud cover and precipitation data, high wind and high seas warnings, and tropical cyclone warnings. Oceanographic products include sea/swell height, period, and direction data, sea surface temperature data, mixed layer depth data, fronts and eddies data, and various acoustic path range products. Satellite imagery (DMSP only) can also be downloaded. Figure 2-4 is an example of a surface pressure analysis with a horizontal weather depiction (HWD) overlay.

NODDS PROCESSING AND DISPLAY FEATURES

NODDS allows users to select the geographical area of interest and desired products via mouse point and click options. Once the area and data selections are complete, automatic access to the FNMOC model data base is made via a dial-in connection. Since the geography information is resident in the user's PC, only gridded environmental data covering the area of interest is downloaded. This data is compressed, thus keeping tile size, access time, and communications costs to a minimum.

There are several processing, display, and annotation options as NODDS gives the user the flexibility to view data in the way most appropriate for the application. Display options allow for contouring,

shading, 3-dimensional plots, and synoptic station model plots. In addition, Skew-T diagrams, streamlines, oceanographic temperature profiles, and ocean temperature cross sections can also be plotted. HWD charts can be constructed by simply clicking on the applicable weather symbol icons that are provided with the program.

As mentioned, a significant advantage of NODDS is that it provides the capability to define an area of interest and display different types of data for that area. All standard meteorological fields available from FNMOC can be displayed along with a wide number of oceanographic and acoustic products. NODDS has the capability to overlay up to three different fields, or display individual sequence loops. Fields can also be zoomed for more detail, and sent to a graphics capable printer. The *Navy Oceanographic Data Distribution System (NODDS) Manual*, FLENUMETOCEN Publication 3147, can be downloaded from the FNMOC website. The *Navy Oceanographic Data Distribution System Products Manual* describes the applications and limitations of various products available from NODDS. A list of available NODDS products is also contained in the *FNMOC Products Manual*, FLENUMETOCEN P-3140.

In rare instances, NODDS may be obtained via AUTODIN message. The ship or activity requests the area of coverage and the desired products. FNMOC then incorporates the data into a composite file and transmits the information via radio message (or e-mail). This data can then be saved to diskette and uploaded on a PC.

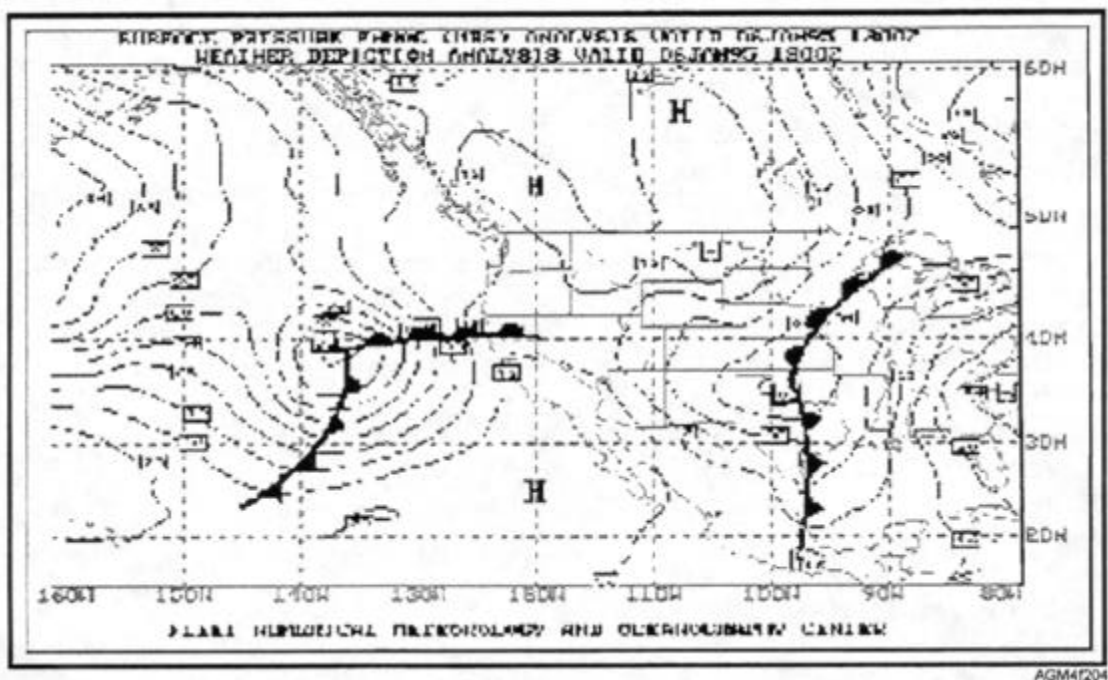


Figure 2-4.—Example of NODDS surface pressure analysis with HWD overlay.

REVIEW QUESTIONS

- Q17. *How are NODDS products obtained?*
- Q18. *What types of products can be obtained from NODDS?*
- Q19. *What is a significant processing advantage of NODDS?*

JOINT METOC VIEWER (JMV)

LEARNING OBJECTIVES: Identify how products are obtained from the Joint METOC Viewer (JMV). Identify the manual that explains the use of JMV. Describe the major features of the Joint METOC Viewer (JMV). Identify the types of products available from JMV.

The Joint METOC Viewer (JMV) is an easy-to-use tool for displaying and annotating meteorological and oceanographic data. JMV is quite similar to NODDS, although JMV products are obtained exclusively via the Internet. JMV consists of software that utilizes web technology (INTERNET/NIPRNET/SIPRNET) as a means to make FNMOC environmental products available to regional METOC centers. These products can then be obtained by facilities, detachments, and other DOD users who have web access. The computer hardware and operating system combination necessary to run JMV is a PC with Windows 3.1, Windows 95, or Windows NT. In any case, the user must have a working knowledge of Windows. Products for display in JMV are accessed only from Naval METOC regional centers or directly from FNMOC. Once downloaded, products can be viewed, customized, exported, or archived. There are far more display options and graphics tools available with JMV than with NODDS.

Detailed information concerning JMV is provided in the *Joint METOC Viewer User Manual*, FLENUMETOCEN P-352, which can be downloaded from the FNMOC website. A list of products from JMV is also contained in the *FNMOC Products Manual*. To request an account for JMV and the web page, users must be members of the Department of Defense or authorized DOD contractors. All requests for accounts should be sent to the FNMOC web master at: <http://www.webmaster@fnoc.navy.mil> (accessible through the FNMOC web page). Routine requests for new areas or changes to the data contained in an area can also be made by contacting the FNMOC web master.

JMV FEATURES

JMV is unique in its approach to environmental data communications. A JMV thumbnail (defined regional area) and associated product list is defined on the host computer at the regional center. The data is then stored on the host computer and any authorized user can download it to their computer using the JMV software package. Once the raw data is received by the computer, the required contouring, streamlining, shading, etc., is performed automatically until all products are in a ready-to-display format. The user has the ability to select contour intervals, change colors (both screen and printer), and can also select unit preferences (Metric/English). JMV has the ability to overlay up to three different fields at once and display individual sequence loops. Figure 2-5 is an example of a surface pressure analysis from JMV.

JMV PRODUCTS

JMV currently provides only the regional centers (host computers) with the capability to define areas of interest and select the different gridded products for the defined areas. Other users must notify the appropriate regional center of their area and product requirements via telephone or email. The obvious limitation to this process is that the geographical areas and associated product lists are predefined by the regional centers and by FNMOC. This problem will eventually be eliminated as more powerful servers are introduced. Software upgrades to JMV will also allow for slide show presentations, tropical cyclone warning plots, a "ship route" display feature, and other graphics improvements. A list of JMV products is detailed in section 2.3.5. of the JMV Users Guide. Watch personnel at each of the regional centers provide 24-hour support for JMV.

There are several other products that are currently available from FNMOC via the NIPRNET. These include various satellite products, meteorological and oceanographic forecast products, and forecast model reports, summaries, and tendency reviews. Check the FNMOC website for details.

REVIEW QUESTIONS

- Q20. *How are JMV products obtained?*
- Q21. *What is the easiest method to obtain the "Joint METOC Viewer User's Manual"?*
- Q22. *JMV defined-areas are established by what activity(s)?*

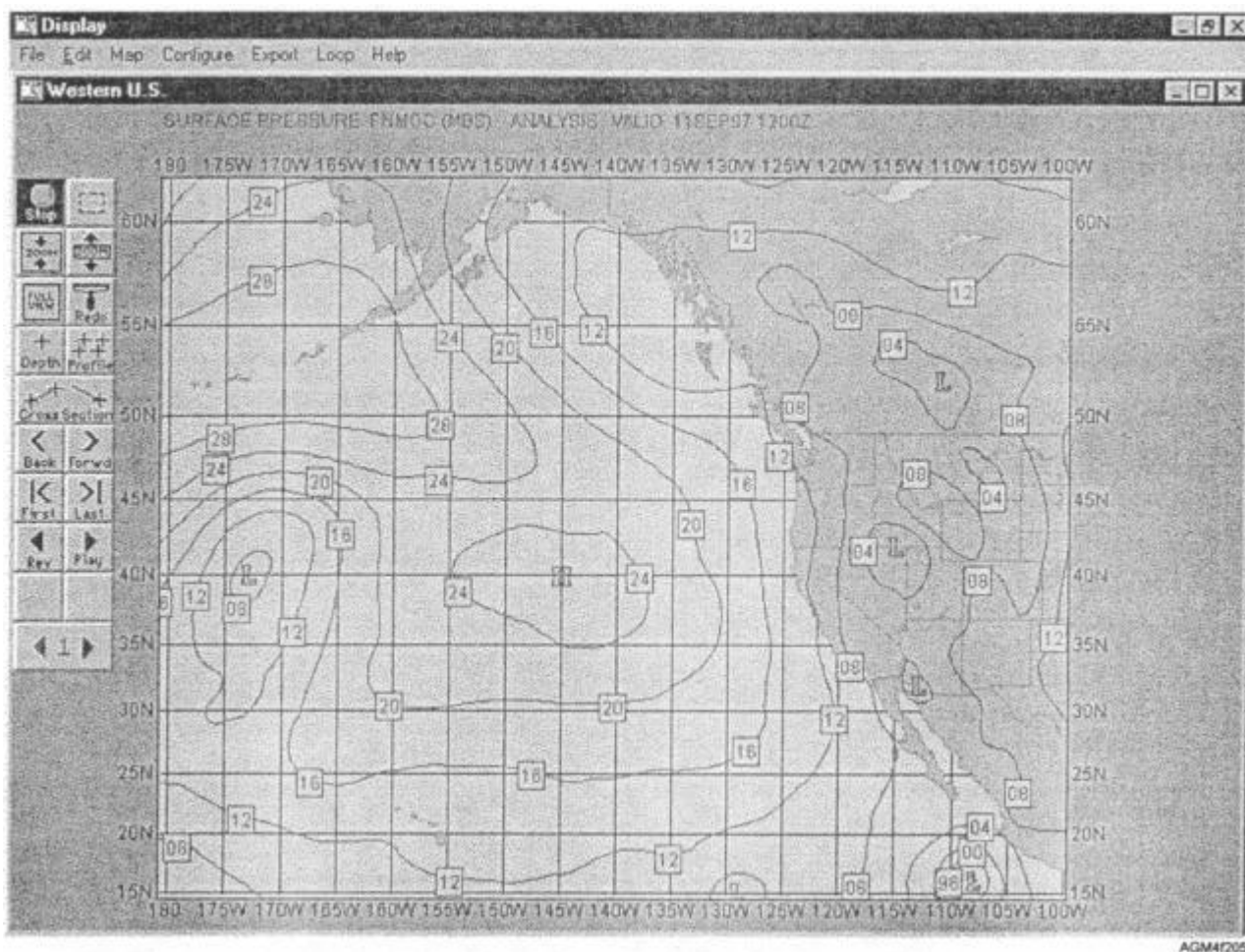


Figure 2-5.—Example of a surface pressure analysis from JMW.

OPTIMUM PATH AIRCRAFT ROUTING SYSTEM (OPARS)

LEARNING OBJECTIVES: Identify the purpose of the Optimum Path Aircraft Routing System (OPARS). Recognize the OPARS subsystems. Describe the information required to process OPARS flight plans. Identify the publication that outlines OPARS processing procedures.

The Optimum Path Aircraft Routing System (OPARS) is a computer program that selects the best (optimum) route and altitude for an aircraft to reach a destination. The primary purpose of OPARS is to provide a flight planning service to the Naval Aviation

community that minimizes time enroute and fuel consumption. The system combines the latest environmental data with the most fuel efficient flight profile for a specific aircraft, and then produces a customized *flight plan* for the pilot. An OPARS flight plan acts as a preflight planning aid that serves as a supplement to the DD Form 175-1 Military Flight Weather Brief. OPARS users connect with the host system at FNMOC via computer modem.

OPARS SUBSYSTEMS

OPARS is comprised of three sub-systems briefly described as follows:

- *OPARS User Interface:* Provides a communications interface for the OPARS user to generate and submit OPARS requests. This is primarily

accomplished at remote PC terminals or workstations (such as MIDDs) using conventional telephone lines. OPARS requests may also be submitted via the Internet and NIPRNET.

- *OPARS Data Base:* Consists of aircraft performance characteristics, route structure, and restricted area information required for the satisfactory performance of the OPARS program. The OPARS data base comes preloaded with each OPARS release. Keep in mind that updates to this data base are issued by FNMOC every 28 days and can be downloaded from the FNMOC website.

- *Flight Planner/Environmental Data Base:* The computer system at FNMOC produces a flight plan for the optimum route and performance parameters for each aircraft. Wind and temperature fields for flight level winds are produced twice daily and are derived from the FNMOC Naval Operational Global Atmospheric Prediction System (NOGAPS) forecast model. Wind and temperature data is available from 1,000 feet to 55,000 feet.

OPARS FLIGHT PLAN PROCESSING

The OPARS user is the individual interacting through a personal computer linked with the computer system at FNMOC. The OPARS user builds a flight plan request at the terminal and submits the flight plan request to the FNMOC computer for processing. The latest version of the system, OPARS 2.12, can run from any PC workstation, but is normally installed on MIDDs. This program operates using a Windows-based software program with a graphical interface. It allows users to build and *error-check* their flight plan request on their PC before submitting the job to FNMOC. OPARS 2.0 and later versions contain a built-in communication capability that can automatically access and log into FNMOC via commercial telephone, DSN, STU-III secure telephone, and INTERNET/NIPRNET.

Nearly every weather office accepts OPARS requests either over-the-counter or by telephone. Many individual military pilots are frequent users of OPARS, and these pilots may prefer to enter their own OPARS requests. However, most pilots prefer to have the base weather personnel process OPARS requests. The observer normally uses a locally prepared form to ensure that the necessary information is obtained, and then enters the information into the OPARS program. Each request must include information such as aircraft

type, point of departure, time of departure, point of arrival, number of different flight routes (legs), fuel weight, and air-routing type. After processing at FNMOC, the information is formatted into a flight plan and transmitted back to the office.

The OPARS program works with the Windows NT operating system or Windows 95. Users select the flight plan parameters by clicking on a series of menus. The program provides "help" menus that explain individual elements. A jet-route data base is included with the software and lets users visually work out air routes on their PC. Once selected, an air route can be saved for future use. These commonly used air routes are known as "canned" routes. Flight requests can also be saved and made available at a future time.

Once users obtain a flight plan from FNMOC, they can display it in many different formats, as a variety of tools are available to customize and enhance the display. Wind fields, navigational aids (navaids), and other features may be overlaid on any flight route. The flight plan is then downloaded to a printer and delivered to the pilot. Figure 2-6 is an example of just one of several OPARS input screens.

The Optimum Path Aircraft Routing System User's Manual, FLENUMETOCEN P-3710, provides detailed information for processing OPARS flight plans. This manual is published by FNMOC and is provided with MIDDs. It can also be downloaded from the FNMOC website. Information on how to interpret the different flight plan formats can also be found on the FNMOC website.

REVIEW QUESTIONS

- Q23. *What is the primary purpose of OPARS?*
- Q24. *Where is the OPARS data base located?*
- Q25. *What publication provides detailed information on processing OPARS requests and how can it be obtained?*

DATA REQUEST PRODUCT (DRP)

LEARNING OBJECTIVES: Identify how Data Request Products (DRPs) are obtained. Describe the various products that are available from the Data Request Product (DRP) system. Identify the publications that provide guidance on DRP products.

OPARS Request Editor (Aircraft) Leg #1 Of 1

Aircraft Type <input type="text" value="P3C"/>	<input type="button" value="O.K."/> <input type="button" value="Options..."/> <input type="button" value="Spert..."/> <input type="button" value="Cancel"/>		
Operational Weight <input type="text" value="72000"/>	Climb <input type="text" value="950 DEGREE C TIT"/>	Cargo Change Options <input checked="" type="radio"/> Do Not Use <input type="radio"/> Cargo Change Entered <input type="radio"/> OPARS Calculate	
Drag Count <input type="text" value="156"/>	Cruise <input type="text" value="925 DEGREE C TIT"/>	Cargo Change <input type="text"/>	
Descent <input type="text" value="FLIGHT IDLE"/>			
Help <div style="border: 1px solid black; padding: 5px; min-height: 100px;"> <p>AIRCRAFT TYPE is mandatory entry (is entered on the first leg only). Choose the appropriate aircraft from the list of supported aircraft. If your aircraft is not on the list, then select SPERF (Special Performance). You will be required to provide values for:</p> <p style="text-align: center;">Time to Climb</p> </div>			

AGM4f206

Figure 2-6.—OPARS input screen.

Data Request Products (DRPs) contain various computer-generated environmental information that is produced by the Fleet Numerical Meteorology and Oceanography Command (FNMOC) at Monterey. DRP products are usually requested only when locally produced environmental products are unobtainable. DRP products can be ordered via AUTODIN message or by telephone. AUTODIN requests are normally sent to the nearest regional center where the information is encoded in a special format and then retransmitted to FNMOC for processing. The collective address designator (CAD) *OCEANO WEST* or *OCEANO EAST* is used for all AUTODIN requests. Complete instructions for ordering DRP information as well as a breakdown of each product output can be found in the *DRP User Manual*, FLENUMETOCEN P-3146, and the *United States Navy Meteorological and Oceanographic Support System Manual*, NAVMETOCCOMINST 3140.1. The DRP Manual can be downloaded from the FNMOC website. Figure 2-7 is an example of an AUTODIN DRP request message.

```

O 311345Z AUG 98
FM USS NEVERDOCK
TO OCEANO WEST
BT
C O N F I D E N T I A L //N03140//
SUBJ: PRODUCT REQUEST (U)
1. Classification: Confidential
2. Product: BTXT
3. Time Period: 0000Z 02 SEP
4. Required NLT: 010600Z SEP 98
5. Area: 24.0N 141.0E, 22.0N 139.0E
6. Output: English
DECL/05 DEC 98
BT

```

Figure 2-7.—Sample AUTODIN DRP request message.

All DRP products are available for immediate processing and transmission from FNMOC via AUTODIN, NIPRNET/SIPRNET, and facsimile, 24 hours a day. We will explain the use of each DRP product in the following text.

SEARCH AND RESCUE PRODUCT (SAR)

The Search and Rescue (SAR) product is designed for open-ocean SAR situations and provides computer-generated historical (60 hour) and forecast (72 hour) outputs for probable error of position and search radius. SAR provides target location maps and search recommendations. It is available to all SAR coordinators for operational and training missions. FNMOC requires the following input from each SAR request: type of object, time object began to drift, latitude and longitude where object began to drift, and the estimated navigational error of the object's position. Average product turnaround time is less than 30 minutes from time of receipt to time of transmit at FNMOC.

BATHYTHERMOGRAPH DATA EXTRACT (BTXT)

The Bathythermograph Data Extract (BTXT) product provides bathy observations extracted from FNMOC synoptic data bases. The output consists of an alphanumeric product in the JJYY format in English or Metric units as desired.

ENVIRONMENTAL DATA LINES (ENVR)

The Environmental Data Lines (ENVR) product is a concise alphanumeric product that is used as input to onboard acoustic prediction systems. It provides a BT/SVP profile for a specific location, based on historical data. A BT or SVP observation may be provided as input by the user. This data is then blended with historical data to complete the profile from the surface to the ocean bottom. ENVR also provides the following information:

- Depth required/depth excess (DRX)
- Temperature gradient below sonic layer depth
- Low frequency/high frequency bottom loss
- Significant wave height
- Wind speed
- Bottom depth
- Sonic layer depth

GENERAL ENVIRONMENTAL MESSAGE (GEM)

The General Environmental Message (GEM) product provides the user with analyzed (synoptic) or forecast environmental data for specified locations or grid points (latitude/longitude) within an area. GEM data includes such products as pressure surface heights, wind direction and speed, altimeter settings, ditch headings, wave direction, wave period and height, freezing level data, and sea surface temperatures.

POINT DATA EXTRACT (PNTDT)

Point Data Extract (PNTDT) provides selected environmental data extracted from METOC model fields. Output for various parameters include marine wind speed, marine wind direction, sea surface temperature, significant wave height, primary and secondary wave period, and primary and secondary wave direction.

REFRACTIVE INFORMATION BY STATION (RIBS)

The Refractive Information by Station (RIBS) product provides an analysis of upper air soundings from requested upper air reporting stations. RIBS output provides pressure, temperature, dew point depression, M unit, gradient of M per 1,000 feet, and height and type of refraction. Users may choose up to 25 stations per request. RIBS data can be input into JOTS, TESS or IMOSS to extract on-site refractive products.

SPOUT OUTPUT (SPOUT)

Spout Output (SPOUT) provides surface land, surface ship, radiosonde, pilot balloon, aircraft, satellite infrared spectrometer, and/or hourly report observations extracted from the FNMOC data base in an easy-to-read format. Spout observations may be requested for a specific date and time and/or for a specific set of hours. Observation reports up to 72 hours prior to the current Date-Time Group (DTG) can be obtained.

OCEAN MODEL TEMPERATURE PROFILES (JJPRO)

The Ocean Model Temperature Profiles (JJPRO) was developed to provide computer-generated ocean analysis temperature profiles extracted from global

model vertical temperature profiles. JJPRO produces an alphanumeric product in the JJYY format. The profiles will extend from the surface to 400 meters or to the ocean floor depth, whichever is shallower. JJPRO may be requested for a grid area or for a specific latitude and longitude.

BALLISTIC WIND AND DENSITY (BALW)

The Ballistic Wind and Density (BALW) product provides surface-to-surface, surface-to-air, or rocket-assisted projectile forecasts for applications like naval gunfire operations. The product is a tabular listing of wind direction, speed, and air density for up to 15 altitude zones. It is derived from various atmospheric analysis and forecast data fields that can be combined with a user-provided upper air sounding.

SOUND FOCUSING (SNDFO)

Sound Focusing (SNDFO) provides atmospheric sound propagation loss for bomb blasts or sonic booms at selected altitudes and bearings. The output uses

alphanumeric characters to represent loss magnitude-out at specified ranges.

REVIEW QUESTIONS

- Q26. How are DRP products obtained?*
- Q27. What two publications contain information concerning DRP products output format?*
- Q28. What are the required inputs for an AUTODIN SAR request?*
- Q29. What is the purpose of the ENVR product?*

SUMMARY

We have provided just the briefest overview of the highly sophisticated software programs that you will use as an Aerographer's Mate. Although several schools are available to provide instruction on the actual use of some of these programs, you will find that the manuals for these programs provide excellent instructions. In addition, the menu-driven command functions inherent in these programs will provide easy access and operability to even the most complex processing functions.

ANSWERS TO REVIEW QUESTIONS

- A1. *OAML provides consistency and standardization for all oceanographic and meteorological programs used by the Navy.*
- A2. *Naval Oceanographic Office, Stennis Space Center, Mississippi.*
- A3. *GF MPL provides meteorological, electromagnetic, oceanographic, hazard avoidance, and acoustic software for fleet air, surface, amphibious, and undersea warfare (USW) operations.*
- A4. *Geophysics Fleet Mission Program Library (GF MPL) Summary.*
- A5. *Analyses and predictions of GF MPL are based upon on-scene data, historical data, platform characteristics, and weapon/sensor characteristics.*
- A6. *The electromagnetic programs of GF MPL are used to predict radar performance (effectiveness) and calculate radar range.*
- A7. *Naval Search and Rescue (NAVSAR) and Tropical Cyclone.*
- A8. *The COVER program provides the capability to determine how an electromagnetic (EM) system will perform in either detecting or communicating with a given target or receiver.*
- A9. *The SSP program must be used with caution in situations where no BT data extends below 200 meters.*
- A10. *Internet access.*
- A11. *JMV, EOTDA, refractivity prediction programs, GF MPL, programs, and MIDD S application programs.*
- A12. *The TESS-NC Unix-based workstation is used to access the Global Command and Control System-Maritime (GCCS-M) and run the SPPED/ICAPS II Integrated Product (SIIP).*
- A13. *To assess the refractive effects upon naval surveillance, communications, electronic warfare, and weapon-guidance systems.*
- A14. *The most significant advantage of AREPS is that it can produce refractive effects predictions over land.*
- A15. *Visible, infrared, and laser.*
- A16. *EOTDA predictions are based upon meteorological forecasts, target characteristics, the components of the EO system, and tactics.*
- A17. *NODDS products are normally obtained using standard telecommunications circuits (commercial/DSN/STU-III). They may also be obtained via NIPRNET and Email.*

- A18. *NODDS meteorological products include surface pressure, pressure heights, and high wind/high seas warnings. NODDS oceanographic products include sea/swell data, sea surface temperature data, and various acoustic path range products.*
- A19. *A significant processing advantage of NODDS is that it allows users to define an area of interest and display different types of data for that area.*
- A20. *JMV products are obtained via the NIPRNET*
- A21. *The FNMOC website.*
- A22. *JMV defined areas are defined by the regional METOC centers and by FNMOC*
- A23. *The primary purpose of OPARS is to provide a flight planning service to the Naval Aviation community that minimizes time enroute and fuel consumption.*
- A24. *The OPARS data base is located at the user's PC terminal (normally MIDDs).*
- A25. *The Optimum Path Aircraft Routing Systems User's Manual P-3710. This can be obtained from the FNMOC website.*
- A26. *DRP products can be ordered via AUTODIN message or by telephone.*
- A27. *DRP User's Manual, FLENUMETOCEN P-3146, and United States Navy Meteorological and Oceanographic Support System Manual, NAVMETOCCOMINST 3140.1.*
- A28. *Type of object, time object began to drift, latitude/longitude where object began to drift, and the estimated navigational error of the object's position.*
- A29. *The ENVR product is an alphanumeric BT/SVP profile that can be used as input to onboard acoustic prediction systems.*

