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THESIS

**IMPROVING METOC PRODUCTS AND SERVICES BY
UTILIZING NET CENTRIC CONCEPTS**

by

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September 2002

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**IMPROVING METOC PRODUCTS AND SERVICES BY UTILIZING NET
CENTRIC CONCEPTS**

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ABSTRACT

In order for the METOC community to remain operationally significant and engaged with the war fighters, decision makers and other customers, METOC products and services must be fully integrated into the systems that these various groups depend on for their daily information. This thesis investigates ways to make METOC product and services more interoperable by utilizing net centric concepts to improve the tactical significance of METOC products, accessibility to data, and interoperability between internal command systems.

Improvements were made to the Joint METOC Viewer and METCAST systems to improve the ability of the programs to provide tactically significant products and data accessibility. Additionally, developments were made to create an interoperable Electronic Ship Folder Database and Message Parsing Program that allows all Optimum Track Ship Routing (OTSR) data to be organized into one system that can be used to parse, track and disseminate OTSR related information.

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I. INTRODUCTION

In recent years, the Department of Defense (DoD) shifted from a threat-based model to a capabilities-based model for military operations (CJCS, 2000). This shift occurred because we no longer know with any certainty where or how our military resources will be required. The evolution of a capabilities-based military, as outlined in the Joint Vision 2020 (CJCS, 2000), requires that our military be more mobile, flexible, and interoperable (joint) than ever before. Today, Network Centric Operations (NCO) has become an important means to provide information to decision makers. Our military can now quickly exchange and process information so that navy goals such as munitions on target and expedient routing of ships around storms can occur.

This change of focus is as relevant to the Meteorology and Oceanography (METOC) community as it is to "Big Navy". Today we provide things like satellite images or weather briefings in stand-alone PowerPoint slides, but this must change. These new times mandate that we become more integrated and interoperable with the decision makers and warfighters. By increasing its interoperability, the METOC community will "remain strategically engaged and become significantly more operationally and tactically aligned by providing decision makers with knowledge that is specific to the warfighter platform, system, weapon, etc." (Oceanographer of the Navy, 2002).

This new business model will force the METOC community to modify the way it provides current products and

services, requiring new methods and tools to create new products and services. Today, our computer software programs and services in the METOC community have been largely developed by local commands. This resulted in very good programs like the Joint METOC Viewer (JMV), Naval Oceanographic Data Dissemination System (NODDS), Online Messaging System (OMS), or the current OTSR tracking databases, that met the local command requirements, but are not interoperable with the warfighter or other METOC commands. Current application that provide data to the fleet like JMV, GFMP, TAWS, AREPS, IMAT, NODS, Access, Word, Excel, Notepad provide static pictures or text products that require a man in the loop to process and present the product to the customer.

A. STATEMENT OF THESIS GOALS:

The goal of this thesis is to improve interoperability of METOC product and services by:

1. Enabling the forecaster tool of choice, the Joint METOC Viewer (JMV), to produce products (ESRI Shape formatted Horizontal Weather Depictions (HWD) and ship tracks) that can be displayed on a tactical display.

2. Improving the METOC product dissemination tool, METCAST, to allow easy transfer of Regional Center created products (HWD's and ship tracks) to customers, staffs, and other Regional Centers.

3. Upgrading existing Optimum Track Ship Routing (OTSR) database into an Electronic Ship Folder that would not only make all OTSR Centers more interoperable, but increase the efficiency of the database by including all elements of the OTSR system (e.g., message support,

database tracking, automated report/metrics generation and automated web page production).

Each of these individual projects improves the ability of the METOC community to better serve itself and the fleet with more timely, accurate and tailor-made products. This thesis also proposes a concept of operations for how future METOC (possibly more mesoscale) products can and should be provided.

B. INTEROPERABILITY WITH THE WARFIGHTER

Today, only a few METOC products, such as high winds and high seas warnings, tropical forecasts and NAVO REACT products are produced in a format that can be displayed on the warfighter display systems (e.g., Global Command & Control System (GCCS), ESRI ARCVIEW/ARCINFO). In an effort to increase the interoperability of METOC products with tactical displays, improvements have been made to JMV to allow viewing of HWD's and ship tracks in ARCVIEW and Polaxis Viewpoint. This process was tested during FBE-J as part of the Geospatial Enhanced METOC (GEM) program being coordinated by the center in San Diego. Although this project only tested a limited subset of METOC products, it has established the CONOPS and determined problem areas for developing additional capabilities.

C. IMPROVED COMMUNICATIONS FOR REGIONAL CENTER PRODUCTS

Traditionally, Navy METOC Regional Centers have produced products either in a text-based format for transmission over the Navy's messaging system or graphical-based formats that were pushed to a web site. These data formats were adequate for support within a particular centers Area of Responsibility (AOR); however, when support

for a command crossed traditional AOR boundaries, no simple method existed to produce a consolidated product. As a result, staffs and regional centers were forced to brief multiple slides or manually recreate products from other centers, wasting valuable resources. In this effort, improvements were made to the METCAST Channels system to allow multiple products from multiple product producers to be quickly and easily uploaded and downloaded. Now disparate or geographically separated products can be merged to create single consolidated basin, hemispheric or global products. The scope of this thesis is to conduct this process using HWD's and ship tracks. HWD's and Ship tracks traditionally are two important METOC products that require coordination between centers and are required by centers, and by Operational and Type Commanders.

D. ELECTRONIC SHIP FOLDER

The OTSR program, which will be discussed more in Chapter II, is operated by various centers around the globe and provides cost savings and storm avoidance services for vessels transiting large ocean basins. Running an OTSR program requires that Regional Centers have ways to retrieve and view current weather data, monitor operational message traffic, track the requested OTSR support, and supply the latest OTSR data to appropriate commanders. Although the end product of the OTSR process for Regional Centers is identical, current support methods differ from center to center causing inefficiencies and database mismatches. As a ship transits from one AOR to another, data entered into one database must be manually replicated to the database at the second regional center. To improve the interoperability in this program a comprehensive

Electronic Ship Folder system has been developed that will improve the maintenance of the OTSR program and improve interoperability between regional centers. The scope of this project will include a database for support tracking, message dissemination tools to automate some data entry, and upgrades to JMV and METCAST that allows easier product development and dissemination.

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II. PROGRAM AND SERVICE OVERVIEW

This chapter will discuss the programs used in this thesis, JMV and METCAST and provide a brief description of the basic structure of a NMOC Center OTSR program. The deficiencies discussed will be confined to only issues related to JMV, METCAST and the distribution of HWD and Ship route products

A. JMV

1. Background

JMV is a program developed by SPAWAR and Fleet Numerical Meteorology and Oceanography Center in Monterey, CA. JMV is compatible with the Microsoft Windows OS family, Sun Solaris and HP-UX. JMV is used to display gridded model data, satellite imagery, surface and upper air observations, along with many other types of meteorological and oceanographic data (FNMOC, 1999). The gridded data that is displayed can be viewed in standard contour maps or as horizontal and vertical cross-sections. To formulate a forecast, raw data can be overlaid with METOC symbology to produce meteorological products (e.g., HWD's, Analysis Charts, High Winds and Seas) as well as situational awareness and analysis tools (e.g., Ship Tracks and Storm Tracks). JMV is the backbone for current Naval meteorological forecasting; used in Ocean Basin and Operations Area (OPAREA) forecasting, Ship routing (OTSR), Flight forecasts using the Optimum Path Aircraft Routing Software (OPARS), airport observations and forecast display.

2. Deficiencies:

In the production of tactically relevant products or the automatic generation of Center "value added" products, JMV needs to have the capability to output shape formatted products and be able to add manually generated products to the slide show feature.

a. Tactically Relevant Products

The ability to know where your forces are in relation to your enemy is extremely valuable. Force locations combined with current intelligence (e.g., troop movements, missile launches, signal detection, etc.) and weather is vital to mission planning and execution. The Navy GCCS system provides the common operational picture (COP) used to display real-time and near real-time battle space information. Recently the Naval Special Warfare (NAVSPECWAR) Command began to use commercial products (e.g., ARCINFO, ARCVIEW, ARCGIS) from ESRI that allows geo-located and ortho-rectified information (satellite images, chart and map products, tactical Products) to be overlaid on the same display. In order to fuse METOC products into the tactical picture, the METOC community must produce products in compatible formats. In July 2002, DoD awarded a contract to ESRI for the Combined Joint Mapping Tool Kit (CJMTK) that may become the next Generation COP by year 2012. The METOC community only provides High Winds, High Seas and Tropical Warnings to the current GCCS COP. Additionally, some Naval Oceanographic Office products are being produced in shape format for use in ESRI's ARC Products. Minor upgrades to JMV will allow us to produce meteorological products into ESRI's shape format and thus

allow METOC products to be viewed directly by NAVSPECWAR and the future COP.

b. Auto Generation of NMOC Center "Value Added" Products

JMV's Slide Show production capability allows users to create presentations used for analysis or for creating weather products for customers. Presentations are produced by combining various types of METOC data like satellite images, gridded model data, observations, and combined on a common background map display. Data is automatically updated whenever the latest METCAST download occurs. Data is retrieved using METCAST, the publish/subscription service, from the Tactical Environmental Data Server (TEDS), located at FNMOC or any of the Regional Centers. Although these products are useful for the meteorologist to use for comparing the various model output with satellite data and local analysis products, they are not particularly useful to the novice who just wants to know basic weather, like visibility or temperature. These novice customers are actually provided with an interpretation of the model and satellite data that is prepared by the METOC Regional Center called "value added products". Unfortunately these "value added products" are not currently part of TEDS and METCAST. Today they are merely saved to a local server or hard drive thus JMV and METCAST do not know they are available and can not update the slide show presentation. The result of this deficiency is that personnel from the center must recreate the product from scratch. If JMV were aware of the "value added products" and automatically updated web pages it could save many hours of tedious and redundant work.

B. METCAST

1. Background

METCAST is a standards based, request-reply and subscription system used for distributing weather and oceanographic data. The METCAST System is made up of the METCAST Servers located at FNMOC or at any of the Regional Centers located around the globe and the METCAST Client that is used by the local user. Data is delivered by METCAST over the Internet, NIPRNET or SIPRNET using Hyper-Text Transfer Protocol (HTTP) and Multipurpose Internet Mail Extensions (MIME). METCAST users interact with the program by using the METCAST Client Graphical User Interface (GUI), which allows a user to select a region of interest, the products to be retrieved, as well as the frequency and type of retrieval. Once the region and product types have been created, the region is scheduled for download and the retriever process is started which establishes the communications path between the METCAST Client (user interface) and the METCAST Server.

METCAST currently has two methods of retrieving data via the METCAST Client. The request-reply is used for requesting established products from the METCAST Server, which are typically model output, satellite imagery, and observational data that FNMOC produces or collects and then distributes. The other method of data retrieval is to use the METCAST Channels where METCAST clients can publish and retrieve many different data types ranging from center generated forecasts, documents, PowerPoint presentations or simple text files. The advantage of this method is that METCAST Clients can publish information at will and as long

as the required attribute information is provided the product will be validated and posted to the channel. Once the product is posted, it is available to anyone who has a METCAST client or any other product that has access to the METCAST Server (i.e., Polexis Viewpoint). As stated in the introduction, one of the goals of this thesis was to improve the interoperability within the community and the METCAST Channels provide quick access to products between centers, staffs and the warfighter.

2. Deficiencies

The original version of the METCAST Channels server required that each channel contain only one type of data (e.g., text products, jpg graphics, gif graphics, PowerPoint presentations, etc.) and that only one version of each type of product exist at one time. Additionally, the METADATA or attributes available to sort the data was insufficient to provide easy access to the intended data. These restrictions meant that if this system were to be used to provide OTSR Ship Track data for a particular regional center, then a new channel would need to be created for every published ship track. Since each of the three Centers that provide OTSR services continuously track anywhere from 20 - 100 ships, the maintenance on this type of system would quickly become unmanageable. Consequently the METCAST Channels server must be modified to allow additional attributes to be associated with each product type and each Channel must be able to hold multiple products with unlimited attributes.

C. OTSR

1. Background

OTSR, which is operated by the Regional Centers in Norfolk, VA; San Diego, CA; and Yokosuka, Japan is a program used by the Navy for storm avoidance and cost savings during long ocean basin transits. OTSR is an advisory program, which minimizes damage to both personnel and material by constantly monitoring the atmospheric and oceanographic conditions throughout the world's oceans and providing continuous support to Naval, U.S. Coast Guard, DoD support and contract vessels, as well as authorized foreign vessels.

In order to maintain an OTSR program, a center must have a way to send and retrieve message traffic, retrieve and view current weather data, track the requested support, and supply the latest support metrics to the appropriate commanders. Every center can send and retrieve message traffic either by using Gateguard or the Defense Message Dissemination System (DMDS). Additionally, all centers display weather data using JMV and retrieve their data either using METCAST or by downloading thumbnails from the FNMOC website (NIPRNET or SIPRNET). Today, differences exist in the tracking mechanism and metrics generation between the three OTSR centers. Each center maintains its own independent program, using its own methods of tracking (database, spreadsheet, etc.) and watch-to-watch turnover procedures. However, all centers use OTSR folders to track routing information for each vessel. These folders are usually maintained by the OTSR officer or tech and contain some, if not all of the following information:

1. Ships OTSR request message or MOVREP
2. Picture of the ships track (usually plotted from JMV)
3. Observational messages
4. Forecast messages (WEAX or AVWEAX)
5. OTSR messages (Surveillance, Advisories, Divert messages)
6. Operational messages (OPREPS, Towing Reports, SITREPS)
7. Any other pertinent information about the vessel

Since OTSR support is provided on a daily bases, and information is passed from watch to watch, a database or spreadsheet is maintained to track the latest information on the ships and provide turnover between watch sections. Metrics are provided in many different formats such as spreadsheets and PowerPoint presentations. Some centers provide web pages with tracking information but unfortunately no consistent standard exists.

2. Deficiencies

Vessel tracking and metrics collection mechanisms differ from center to center. Database systems which, track the current support need to be more robust to provide latest ship information like observations, operational messages, WEAX/AVWEAX messages and all required message, graphics and current statistics. This information should be provided to appropriate commanders in an easy to read, standard format using an external or internal website.

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III. SOFTWARE DEVELOPMENT, OPERATING PROCEDURES AND PRODUCT DISTRIBUTION OVERVIEW

This chapter describes the upgraded features of JMV and METCAST and the Message Parsing Program and Electronic Ship Folder Database. Detailed information about the function of the entire system will be provided in Chapter IV.

A. JMV/METCAST UPGRADES

JMV is a forecaster tool used by nearly every Navy forecaster, around the globe. New requirements are continually satisfied as enhancements are added to the program. A goal of this thesis was to improve the interoperability of tactical and non-tactical products created using JMV and dissemination of those products using METCAST. The concept of operations (CONOPS) for this effort concentrated on two products, HWD's and Ship Tracks. The concept proven here can be applied to any METOC product.

1. JMV Upgrades

Over a six-month period, modifications to JMV 3.6 were made to make products more tactically relevant and to enable easier transfer of these products to customers. Additionally, changes were made to the slide show feature of JMV to allow ship tracks to be automatically generated and available for web publishing.

a. HWD and Ship Track Creation/Publishing

The primary change to JMV/METCAST was the ability to create and publish products to a METCAST channel. For this implementation, we used a METCAST server on SIPRNET

located at FNMOC. A user-friendly interface was developed that allows users to create and publish JMV overlays. Interfaces for publishing finished products were added to the existing HWD's and Ship Route portions of JMV. Since the interfaces remained essentially the same, very little training is needed to exploit this new functionality. Forecasters use the same drawing tools they already use daily to create HWD's, High Winds Warnings, and High Seas Warnings and now can publish the product using the new publish capability. Products are created using JMV graphical tools that allow a user to draw a feature and then save the product (See Figure 1).

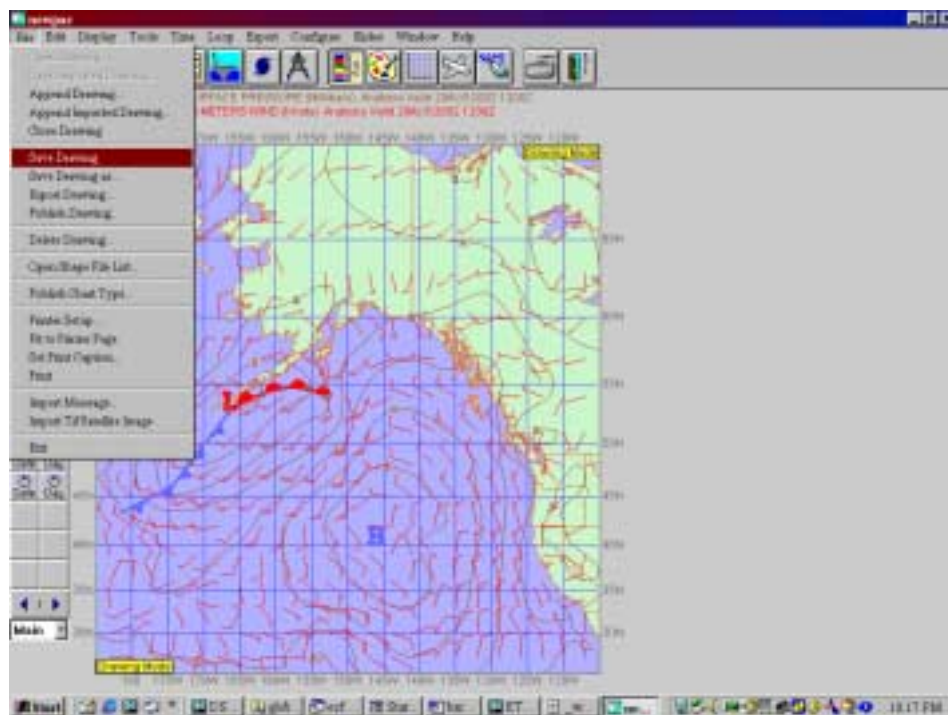


Figure 1: Saving a Drawing in JMV

If a user wants to publish a product to a METCAST Server, products are created in the same way but the user selects the Publish Drawing option (see Figure 2).

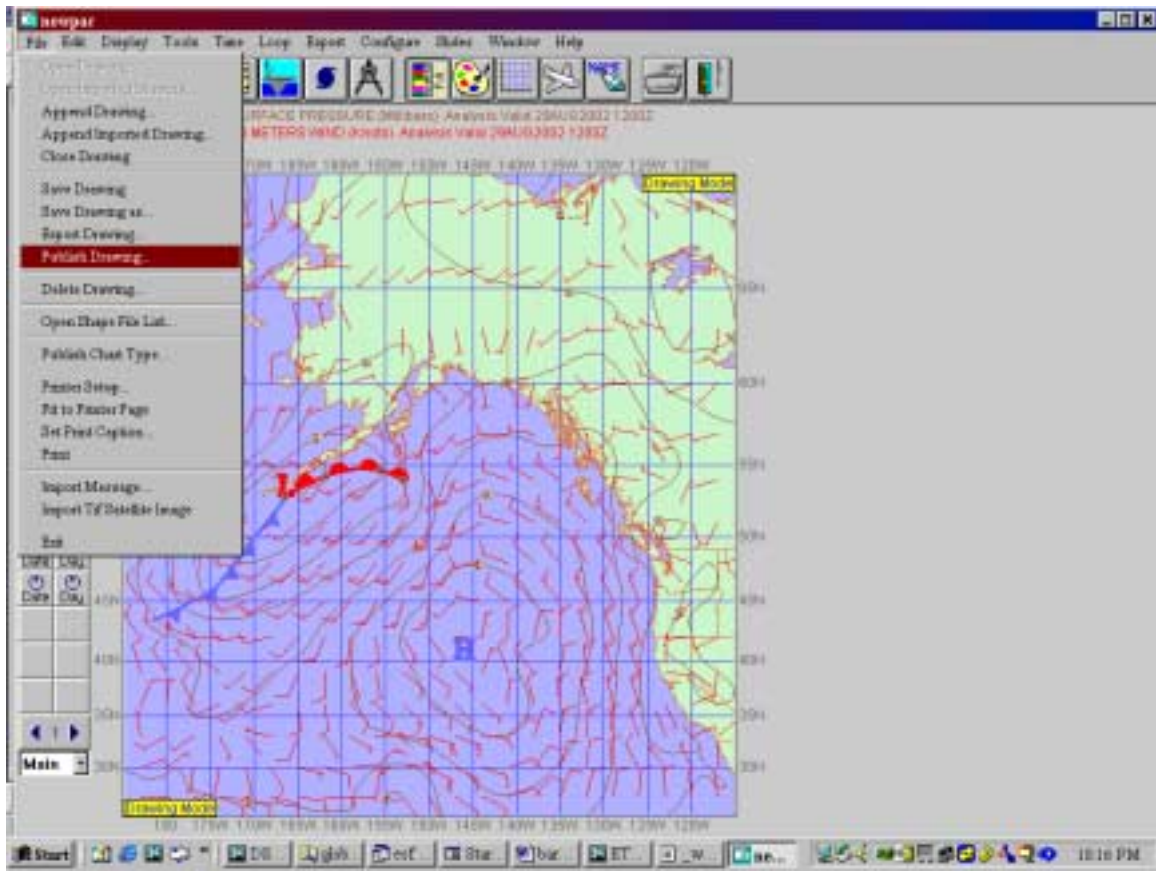
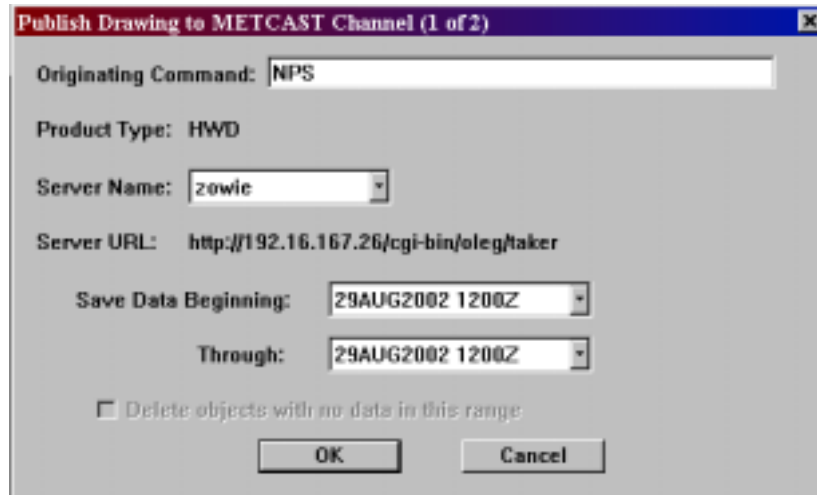


Figure 2: Publishing a Drawing in JMW

Product attributes must be specified when you publish to provide database cataloging and product selection for subscribers. The significance of attributes in METCAST channels will be discussed later. Figures 3 and 4 show dialogs used to collect the required attribute data. The attributes are then automatically sent to the channel using a utility program called wshove.exe.



Publish Drawing to METCAST Channel (1 of 2)

Originating Command: NPS

Product Type: HWD

Server Name: zowie

Server URL: http://192.16.167.26/cgi-bin/oleg/taker

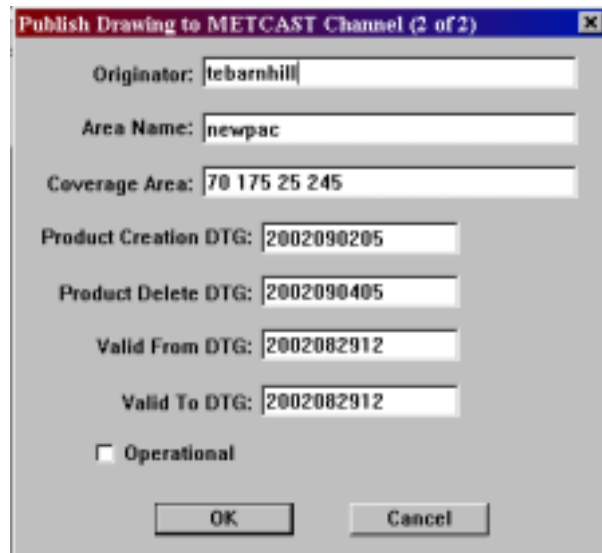
Save Data Beginning: 29AUG2002 1200Z

Through: 29AUG2002 1200Z

☐ Delete objects with no data in this range

OK Cancel

Figure 3: Publishing Dialog Box 1 of 2



Publish Drawing to METCAST Channel (2 of 2)

Originator: tebarnhill

Area Name: newpac

Coverage Area: 70 175 25 245

Product Creation DTG: 2002090205

Product Delete DTG: 2002090405

Valid From DTG: 2002082912

Valid To DTG: 2002082912

☐ Operational

OK Cancel

Figure 4: Publishing Dialog Box 2 of 2

Ship Track data is added to the server in a similar manner, however, rather than the publish feature being added under the File menu, it is added directly to the ship route editor. Users publish a ship track to the server by first selecting the track in the ship route editor and pushing the publish button. Dialog boxes are

similar to those for HWD's. Figures 5 through 7 show the steps required to submit a ship track to the server.

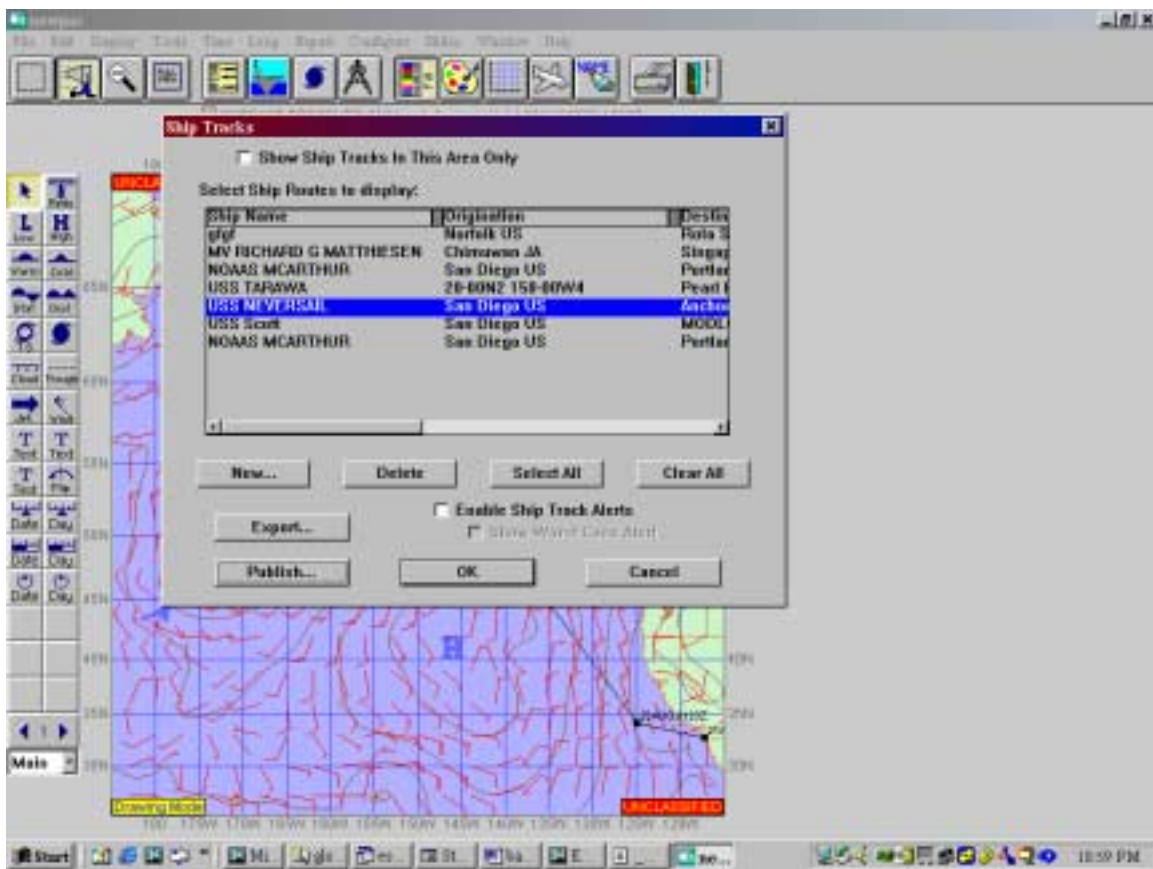


Figure 5: Ship Track Publisher



Figure 6: Ship Track Publish Dialog 1 of 2

Publish Ship Route to METCAST Channel (2 of 2)

Originator: jclernick

Ship Name: USS NEVADA

Origination Point: San Diego US

Departure DTG: 2802882100

Destination Point: Anchorage US

Arrival DTG: 280289214

Product Creation DTG: 2802892105

Product Delete DTG: 280289214

Track Type: Approved Track

Request Message Date: 121280AUG2802

☐ Operational

OK Cancel

Figure 7: Ship Track Publish Dialog 2 of 2

Once the file is placed on the server it is available to the METCAST client for download. Products are formatted in XML and comply with the Task Force Web Portal initiative. XML is well suited for making the product interoperable with other systems. More discussion about how the data is retrieved from the server will be provided in the METCAST server and client sections.

b. Automatic Product Generation

The upgrades to the existing slide show builder will reduce the amount of man-hours required to build customized value added products. Although JMV was able to produce slides using METCAST data along with the value added products, locally generated products do not cause the slide show product to automatically update. This issue was solved for ship tracks by modifying JMV's slide show capability. Now whenever a ship track is opened in the Ship Route Editor, the presentation will be updated. This feature will be added to the other value added products

like HWD's in the near future. For more information on creating slide show see FNMOC, JMV 3.5 Help.

2. METCAST Upgrades

a. METCAST Server

The METCAST server is a publish/subscription web service used to distribute data via the World Wide Web. Using METCAST, a user can publish products, define the catalog attributes, and delete products if authorized. Data consumers use the METCAST catalog to discover what data is available, and then, based on the discovered content subscribe to the required data. Data modified and published by the producer is then automatically sent to the consumer. In this case, the METCAST generic channel capability was used to send HWD's and ship routes. METCAST also contains fixed channels for known data types like forecast grids, imagery and observations. The original channel architecture only allowed one product type or MIME type per channel (i.e., product format; text, XML, grids, PowerPoint, etc.). The new architecture allows a channel to contain multiple MIME types and an unlimited number of descriptive attributes. Queries are made based on desired attributes or, if desired, a user can request contents of the entire channel. With this version of METCAST channels, nearly unlimited customization is possible for any arbitrary data. METCAST channels provide a very flexible and arbitrary data publish/subscription service. In any given implementation, a concept of operation is required if users are to exercise this capability. In our case approximately 20-30 different channels were established for

similar data formats. For additional information on the METCAST Channels Server see the documentation at <http://www.metnet.navy.mil/~spawar/JMV-TNG/Metcast-Channels.html>.

b. METCAST Client

The METCAST Client provides a user interface to the METCAST Server (Figure 8). Using the METCAST client users can retrieve available products from channels. METCAST provides several Graphical User Interfaces (GUI) specifically designed for grids, observations and images. For channels a more generic Graphical User Interface (GUI) was developed. To access the Channels dialog box, click on Options and then Channels menus with the METCAST Client (See Figures 8 and 9). Select the Channels option and an interface (Figure 10) opens that allows you to select the channel associated with a product. HWD's are stored in the annotated product display channel and the ship tracks are stored on the ship route channel (classified and unclassified servers). When a user accesses a channel, they have the option to retrieve the entire channel or only retrieve information based on a certain search criteria. The criteria that is used for the search is based on the attributes associated with each product. Again, the attributes are determined when the product is created and uploaded. METCAST attributes can be either mandatory or optional but for the HWD's and ship route products, all attributes are mandatory. Figures 10 through 13 shows how a user selects the available channel, the required attribute type and the specific attribute value. Once complete the user is ready to retrieve the product. Each

retrieval can be scheduled for an on demanded, periodic or scheduled download (see FNMOC, JMV 3.5 Online Help for specifics). When channel products are downloaded, they are routed to MIME handlers specified in the mailcap file. This process is part of the http protocol and specified by Borenstein, 1993.

Mail handlers are also referred to in the METCAST documentation at <http://zowie.metnet.navy.mil/~spawar/Briefs/Jmv-tng/HTTP-Ref.html>. Based on these mechanisms, HWD's are placed in the \jmvwin\noddsfls\globalhwd directory and the ship routes are placed in the \jmvwin\noddsfls\tracks directory. To display the product in JMV, follow the procedures for displaying a drawing or ship route, respectively in FNMOC, JMV 3.5 Online Help.

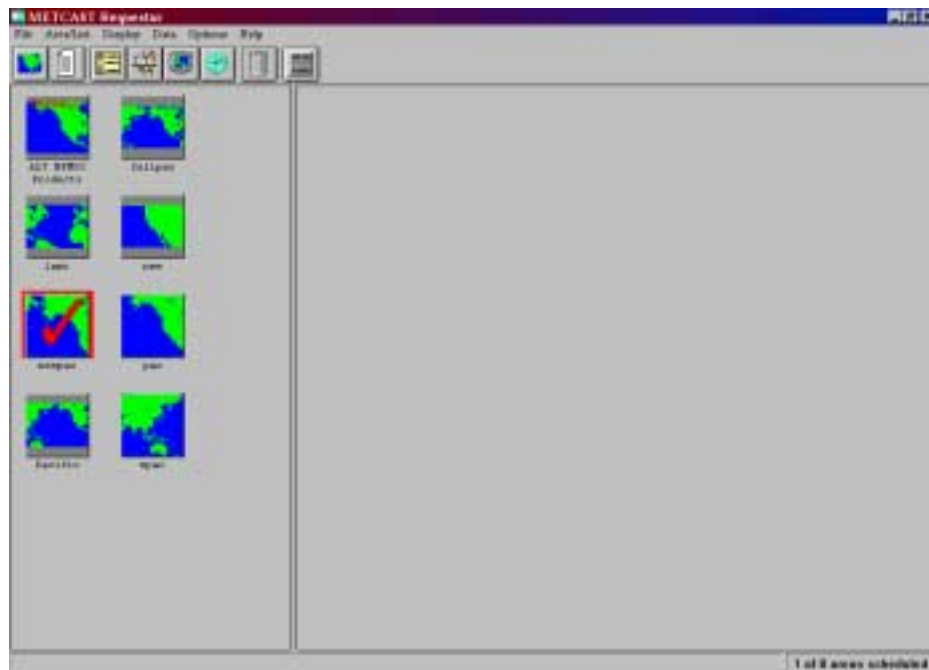


Figure 8: METCAST Client Interface

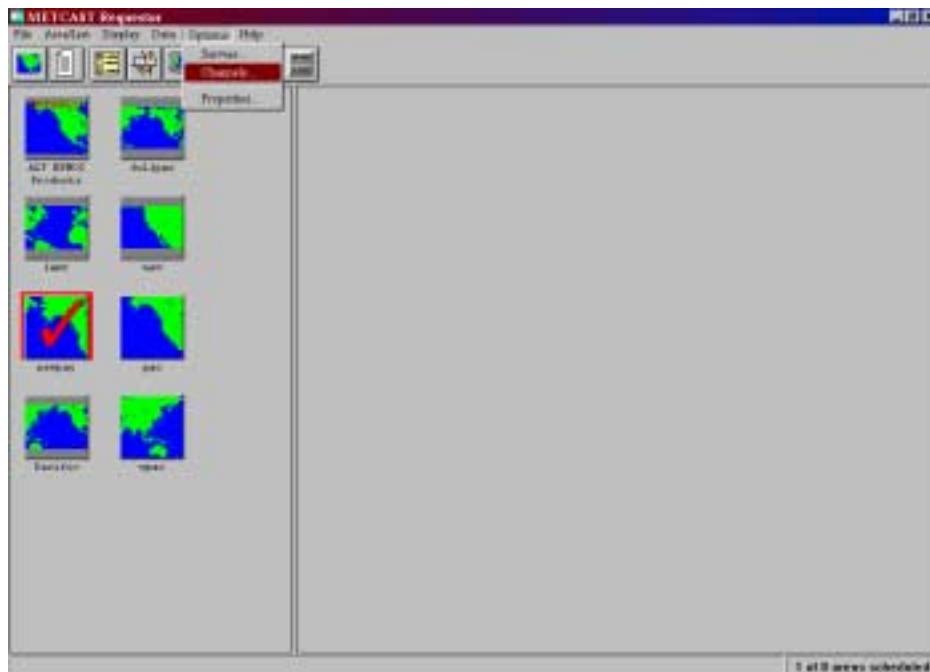


Figure 9: Accessing Channels Dialog Box

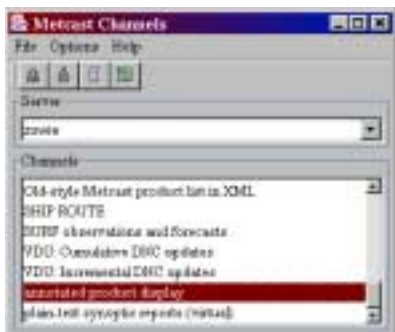


Figure 10: METCAST Channels Dialog Box

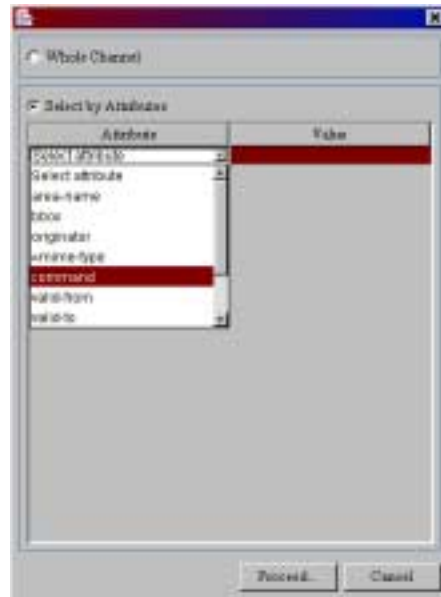


Figure 11: Select Product from Channels by Searching Attributes



Figure 12: Select Required Value from Attribute

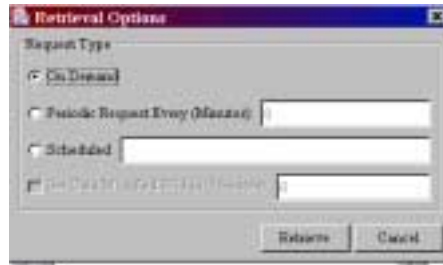


Figure 13: Retriever Setup

3. Tactical Products

Another significant addition made to JMV was an ability to export JMV products in ESRI's shape format. Shape allows different types of geo-referenced data to be added to a common map background. ESRI provides Geographical Information Systems (GIS) mapping Services for numerous governments and commercial agencies worldwide. In the summer of 2002, ESRI was awarded a contract for the Commercial Joint Mapping Toolkit(C/JMTK) that can be used to overlay military data over NIMA maps. Using this capability, the METOC community can now feed meteorological and oceanographic data directly onto decision makers displays.

In this demonstration, the user must export an XML file that is then converted to a Shape file using a stand alone program. This conversion process is either spawned automatically using a MIME helper application or manually from a command line. In the future, we should incorporate the export shape capability directly into the JMV interface. The program is activated manually as follows; open a Windows command window (Figure 14) and change the directory to drive:\jmvwin\noddsfls\globalhwd. Type the command `xml2shape "filename".xml`, where *filename* is the

actual name of the xml HWD file. The xml2shape.exe makes up three files, the first file (.shp) contains the latitude and longitude of the points, lines and polygons that will be generated, a second file (.shx) gives an index to the shp file and the third files (.dbf) is the database file that contains the attributes associated with each of the shp files. Since each graphic is created from both lines and polygons, the A files contain the line data and the B files contain the polygon information. JMV/METCAST moves the files into the \jmvwin\noddsfls directory. The user opens the JMV display map and then opens the shape file by selecting "File", "Open Shape File List" from the menu. A dialog allows users to select the appropriate shape file which is then displayed on the map background. The shape files are black and white because ESRI assigns arbitrary color files when initially loaded. A second file (ARCVIEW 3.2,.avl file) is required to associate colors to the shape file if colors in ARC View are desired. Until the format of this file is better understood, the current xml2shape file is unable to generate this file. These files can be created manually within any of the ARC products and associated to an HWD or ship route file.

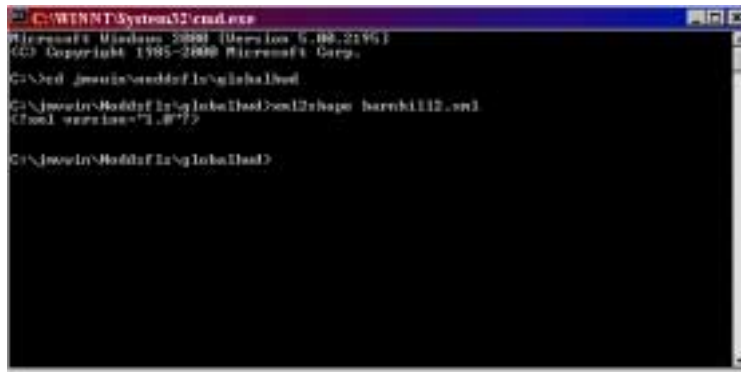


Figure 14: Activating XML2Shape.exe through Command Prompt

In addition to shape, XML (Extensible Markup Language - a standard format for the web enabled Navy) formatted HWD and ship route files are uploaded to the METCAST Channels. XML files can be displayed by the Polaxis XIS Viewpoint software and newer version of ESRI Arc View. These functions are currently undergoing testing as part of the Geospatial Enhanced METOC (GEM) program in San Diego. Polaxis provides encoders and decoders needed to fuse METOC data into the U.S. Navy's COP.

B. MESSAGE PARSING PROGRAM

The Message Parsing Program scans incoming text formatted messages and, based on a search word hierarchy and user preferences, parses messages into an Access database for the Electronic Ship Folders, JMV formatted Observations and MOVREPS, and moves messages to a specified directory if required.

1. Program Requirements

The program is written in Visual Basic and runs on Windows 2000 or higher. The program is called parser.exe

and requires two text files, `plist.dat` and `activeship.txt`, that are located in the program home directory. Two additional files, `parsedata.dat` and `admin.dat`, are created during setup and provide the necessary search criteria and configuration data.

2. Program File Descriptions

The `parser.exe` file is the executable program of the Message Parsing Program. This program parses the available message traffic into the specified formats. In order for the program to work, several secondary files are used to provide the search criteria, locations of the available directories, port list, and the name and route number of the OTSR supported vessels. The following is a list of required files and a description of their operation:

1. `activeship.txt`: The `activeship.txt` file is created in order to connect the messages sorted by the parser program with the ships being supported in the Electronic Ship Folder. This file is exported by the database with the route number and ship name separated by a comma (Ex. S2002100, USS Shipname). The format for the route number is Station Letter (S = San Diego, N = Norfolk and Y = Yokosuka) followed by the four-value year and finally the sequential route number (numbers start at 1 at the beginning of each calendar year).

2. `plist.dat`: The `plist.dat` file contains all the ports around the world, along with the associated latitude and longitude. This file is used when a MOVREP is parsed and the ETA or ETD line of the message does not contain the latitude and longitude information.

3. `parsedata.dat`: The `parsedata.dat` file, created by the `parser.exe` file, contains the search parameters and parsing criteria. This file is created when the program is installed and initialized with the first search parameter. The file is a random access file or indexed file that allows the information within the file to be quickly accessed and read into and out of the user interface. A text editor should never be used to manually edit this

file, as this will make the file unusable by the Message Parsing Program.

4. admin.dat: The admin.dat file contains the configuration data for the program. The configuration data holds the command name, command location, and all the directories for the parsed data files. These directories can all be pointed to the same location or to different locations depending on how the administrator of the program wishes the files to be stored.

5. p_log.dat: The p_log.dat file is a log that contains the actions of the program as it scans each file. The following data is stored in the log file:

- A. Time of scan
- B. Original file name
- C. Ship Name
- D. Date-Time-Group of Message
- E. Logcode. The logcode is a string of characters that show all the various steps that the program took to parse the file, as well as any problems that may have occurred. The possible messages are:

- 1. Parsed to Database. This means that the data within the file was parsed into the Electronic Ship Folder format and was placed in the mess.txt file.

- 2. Failed to Parse JMV File, the file is in strDir, where strDir is the directory where the file was placed. This error occurs when too many missing variables were detected when the observation or MOVREP files were parsed. The file is moved to a temp directory and can be modified by the user and reprocessed.

- 3. MOVREP Parsed to JMV. The MOVREP was properly parsed into the JMV format and the file was copied into the specified JMV directory and named SHIPNAME_DTG.shp, where SHIPNAME is the name of the originator of the message and DTG is the date-time-group of the message. It is recommended that all ship routes be sent to the tracks directory within your primary jmvwin\noddsfls directory.

- 4. MOVREP not parsed, ETD, ETA, VIA, POS or MODLOC not found. This error occurs when a MOVREP file is parsed and neither the ETD, ETA, VIA, POS or MODLOC key

words are found. Usually, when this occurs the MOVREP is an arrival or update message and would not need to be placed into JMV.

5. OB not parsed, Missing 99. This error occurs when the 99 specifying the location of the latitude group is missing from the observation. If the 99 is missing than the parser cannot locate the different sections of the code since it is using the 99 to determine where the information should be located within the code. In some case the 99 may be in the message, however extra spaces may be between the Latitude group and the previous code group.

6. OB parsed to JMV. The observation was properly parsed into the file jmvobs.dat located in the specified JMV Directory.

7. File moved to strDir, where strDir is the name of the directory where the file was placed.

8. Search Phrase provides the key word that was found in the message.

9. No search phrase found, file moved to General Folder. This message means that none of the search words in the parsedata.dat file were found in the message and now the program has defaulted to move the message in to the database as general and the text file has been moved to the general folder.

F. Code for whether search parameter was found (1 = yes, 0 = no)

6. Mess.txt: The mess.txt file is the message export file, which is read into the Electronic Ship Folder. This file is generated when the messages are parsed. When the file is read into the database, this file is deleted and recreated by parser.exe.

3. Installation

The Message Parsing Program (Fig. 15) operates in conjunction with the Electronic Ship Folder Database and both programs should be placed in the same directory for

is the primary screen of the Message Parsing program. In order to understand how data should be entered into this form one will need to understand the purpose of each of the sections.

a. Program Header

Figure 16 shows the program header where users must decide what term the program will look for and what will be done to the message once that particular term is found. The first object of the form is the "Select Profile Name" drop-down list. From the drop-down list the user can view all the Profile Names for each of the search phrases. Each profile can be viewed by selecting the appropriate item from the drop-down list.

The "Profile Name" is a unique identifier of the search phrase being looked for. Since the search phrase may not be unique if "Secondary Selection Criteria" is also being used, the profile name must be something that helps the user remembers what the particular profile does. If users enter two of the same profile names, an error will be produced and the user will need to change the name before the profile will be saved.

The "Search Phrase" is the exact term that will be scanned for in the message. Since the term must be an exact match to the string found in the messages, in order for the message to be parsed, users may need to use several forms of the same string idea to get all the associated messages (e.g., SURFACE OBSERVATION, SURFACE OB, SURF OB, SRF OB). In order to create these different phrases, several profiles will need to be created with unique profile names for each.

The last object in the header is the “Parsing option” box. This box controls what features are available for data entry. If the user selects one or all of the available check boxes then the dialogs below the header will become enabled. In the parsing options box, users have the option to move the file, parse the message to the database, parse the message to JMV or add a secondary selection criteria.

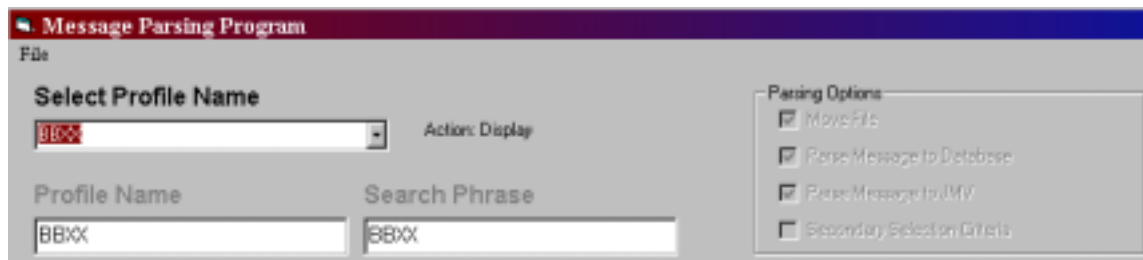


Figure 16: Message Parsing Program Header

b. Buttonology

As seen in Figure 15, there are several buttons along the right-hand side of the program that allow the user to Add Profile, Edit Profile, Copy Profile, Remove Profile, Save Profile, Exit, Edit Admin and Parse Messages. Depending on the current action that the user is trying to perform, some or all of the buttons may be available for the user to select. The meanings of each of the buttons are self-explanatory, however the method for adding or editing a profile is not necessarily so. When the program is initially opened the program window will look like Figure 15 with most of the screen disabled, the text boxes blank and the objects under the header locked. This ensures that the profiles will not be changed accidentally.

If a users wishes to view the list of profile names then they can select the drop-down list and click on the appropriate profile name. Once the profile is selected the information stored for that profile will be visible, however the boxes will remain disabled and locked. If the user wishes to change the profile, the Edit Profile button should be selected and then all objects that have checks in the header will be enabled and unlocked (Fig. 17). If the Profile Option in the header is not selected, then the associated box below the header will not be enabled.

The screenshot shows the 'Message Parsing Program' window with the 'Edit Profile' button selected. The 'Select Profile Name' dropdown is set to 'BBXX'. The 'Profile Name' field is 'BBXX' and the 'Search Phrase' is 'BBXX'. The 'Move File' section has 'Directory' set to 'c:\ship_folder\obs' and 'Filename' set to 'Performatted'. The 'Database' section has 'Database Type' set to 'Observation' and 'Database' set to 'BT'. The 'JMV' section has 'Format' set to 'Observation (BBXX)' and 'Directory for JMV File' set to 'c:\ship_folder\obs\'. The 'Files having a Route Number' section has 'Yes' selected. The 'First Search String' is 'BBXX' and the 'Last Search String' is 'BT'. The 'Edit Profile' button is highlighted.

Figure 17: Example of an Editable Profile

c. Entering Data into the Move File Frame

The Move File frame (Fig. 18) is where the user can specify where a parsed message should be moved to and how the file should be named. Depending on the message

type, different pieces of information may be available from the message itself or the activeship.txt file, which can be attached to the filename to help make the file more identifiable than just using a standard naming convention. The move file frame interface provides the text box to enter a directory name and then provides two methods to specify the filename. If the user selects Preformatted, the filename will be created by selecting from the list of available options. Using this method, the user can create either a dynamic filename that is unique for every message or a static filename that will overwrite every time a new message is received. If the user selects Manual, then the user can type in the filename that will overwrite any previous message. For either choice, if the message is also parsed to the database, a copy of the original message will be saved in the database.

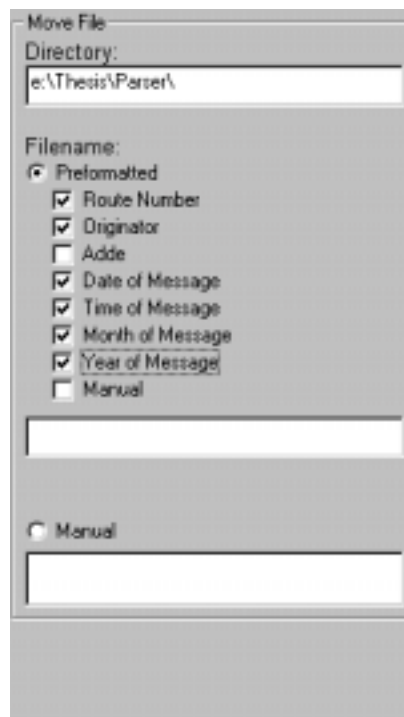


Figure 18: Move File Dialog box from Message Parsing Program

d. Required Header Info

The "Required Header Info" frame (Fig. 19) is used to determine whether the ship name should be the Originator or the Addressee (ADDE). In the case of an observation, the Originator of the message would be the ship name. However, if the message were a weather forecast message (WEAX) to an individual ship, then the ADDE would be the ship name. When a message is parsed the information created from this field is used to determine the vessel's name and compares that to the activeship file to see if that vessel is being supported. If the vessel is being supported and route number was selected to be part of the filename, then the route number is inserted into the filename.

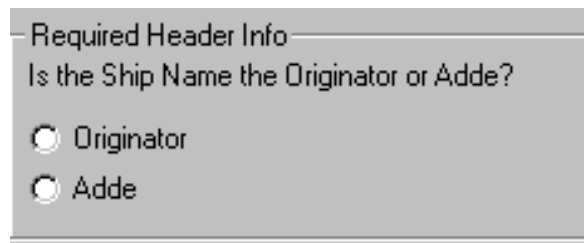


Figure 19: Required Header Frame

e. Database Frame

The Database frame (Fig. 20) is used to clarify what database message type the file should be added to, if the file should always be saved in the specified "Move" directory and finally provides the starting and ending string that forms the information which is added to the database. The six message types equate to the six database types in Figure 20. The yes check box provides the user the

ability to move messages from ships, not currently being supported, to a different director from those that are being supported. If this box is selected than messages from vessels not being supported will be moved to the External Message directory. This helps to separate the vessels that are in the AOR with vessels that are outside the AOR. Finally, the First Search String and Last Search String provide the key words that cause the parser to parse out the required text string from the message. In most cases, the first search string should be the search phrase you are looking for, but in some cases another string may do better. If the first search string is not the same as the search phrase, the first search string must follow the search phrase in the message. If the first search string precedes the search phrase then the text will never be found and the message will not parse.



The image shows a software dialog box titled "Database". It contains a section labeled "Database Type" with six radio button options arranged in two columns: "Observation", "Operations", "MoveRep" in the left column, and "OTSR", "General", "WEAX" in the right column. Below this is a text label: "Files missing a Route Number should be placed in the External Message Directory." followed by a checkbox labeled "Yes". At the bottom, there is a text label: "Enter First and Last words in search for the body portion of the message (e.g. BBXX, BT, RMKS, etc.)" followed by two empty text input fields labeled "First Search String" and "Last Search String".

Figure 20: Database Frame

f. JMV Frame

The JMV frame (Fig. 21) provides the JMV format that the message will be parsed into. Currently the parser only supports MOVREP's and BBXX formatted messages, however future versions of this program or others like it should be able to parse OTSR Requests and observations that do not contain the BBXX label. When parsing either a MOVREP or a BBXX message, select the appropriate JMV selection and then provide a directory string for where the files should be placed. All MOVREP files are placed in the appropriate directory with a shipname_dtg.shp format where shipname is the name of the vessel and dtg is the date-time-group of the message. Observations are placed into the appropriate directory and combined into one file called jmvobs.dat. Because JMV has separated Sea Synoptic files for every area that is created within JMV, the jmvobs.dat file will need to be manually appended to the SEA SYNOPTIC REPORT^OS^^^^^0^N^S^.JMV file, located in the directory of the area one is using whenever the latest observations are needed. If a user does not know what area they are using from JMV, the area name is located in the top left hand corner of the JMV display screen (Fig. 22) that they use to display JMV products.

JMV

Parse Message for the following formats:

Formats

☐ MDVREP

☐ Observation
(BEOX)

☐ OTSR Request

☐ Observation
(RMKS)

Directory for JMV File:

Secondary Selection Criteria

Message Originator:

Figure 21: JMV Parsing Frame

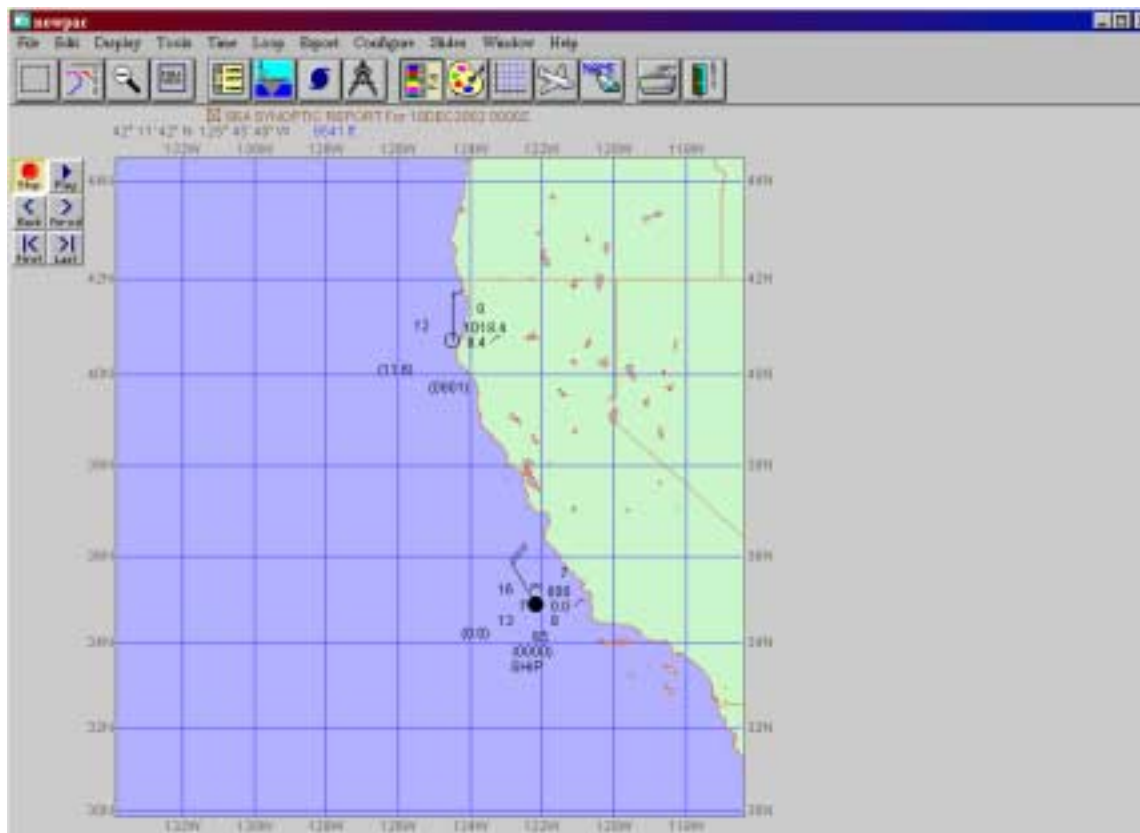


Figure 22: JMV Map Display Screen for Area NEWPAC

5. Adding Configuration and Parsing Criteria

Once the parser.exe, plist.dat and activeship.txt are all placed in the designated directory, the program is ready to be initialized by adding configuration data. To add configuration data, click on the button labeled "Edit Admin" (see Fig. 15) to open the administration form (Fig. 23). Once in the administration form is open, enter the command name and Location. Enter this information in the same format as the commands Plain Language Address (PLA). Next, enter the directory locations where the individual messages would be stored once they are processed. These directories can all be the same path or different paths as shown in Figure 23. While entering the directories into the administration form, ensure that all directory paths end with the "\". Error checking is installed to ensure that the path contains this slash, however, as a general rule all paths should end with a slash.

Administration

Command Name NPS	Command Location MONTEREY, CA
Observation Directory C:\SHIP_FOLDER\OBS\	OPS Directory C:\SHIP_FOLDER\OPS\
External Message Directory C:\SHIP_FOLDER\EXTMESS\	Drop Directory C:\SHIP_FOLDER\DROP\
OTSR Directory C:\SHIP_FOLDER\OTSR\	MOVREP Directory C:\SHIP_FOLDER\MOVREP\
WEAX Directory C:\SHIP_FOLDER\WEAX\	General Directory C:\SHIP_FOLDER\GENERAL\

Save Close

Figure 23: Form Used to Enter Configuration Data

Now that the configuration data is added, it is time to beginning adding the parsing criteria. Since a method of prioritizing the criteria is not available for this version of the program, care and planning should be given to the order that each criterion is added. As a general rule, priority should be given in the following order:

1. Individual search terms that will be received from vessels (e.g., BBXX, Surface Ob, OTSR Request, OTSR Report, etc.)
2. Individual search terms with secondary search criterion set for your command.
3. Individual search terms with secondary search criterion set for other commands. If you have a priority for other commands, place the commands with the highest priority higher in the list.

As an example of how this list should be prepared, the following short list would be for NPMOC San Diego.

1. BBXX
2. SURFACE OB
3. SURF OB
4. WEATHER OB
5. WX OB
6. MOVREP
7. MOVEREP
8. WEAX FOR, SECONDARY: NAVPACMETOCCEN SAN DIEGO CA
9. WEAX UPDATE FOR, SECONDARY: NAVPACMETOCCEN SAN DIEGO CA
10. WEAX FOR, SECONDARY: NAVPACMETOCCEN YOKOSUKA JA
11. WEAX UPDATE FOR, SECONDARY: NAVPACMETOCCEN YOKOSUKA JA
12. TROPICAL CYCLONE, SECONDARY: NAVPACMETOCCEN PEARL HARBOR HI

Remember, that if a search word is not found or the secondary selection criterion is not found than the message will be given a general message type and be parsed into the general folder. If you are not concerned with having another centers message parsed to a specific location or given a specific message type (OBS, OTSR, WEAX, OPS, etc.), do not add them to the list.

6. Program Operation

Once the configuration and parsing data have been entered into the system, the program can be run by placing the files in the designated drop directory and manually activating the "Parse Messages" button. Occasionally, errors occur with a particular file that causes the program to stop operating. In most cases the filename will appear in an error box. To continue the parsing process, remove the file and press the parse messages button again. Once the parsing program is complete a message box will open telling you that you have successfully parsed all the

available messages. Click the OK button and leave the program open for the next round of parsing. Once you have completed the parsing process it is a good idea to go ahead and import the messages into the database (See Program Operation under the Electronic Ship Folder section).

C. ELECTRONIC SHIP FOLDER DATABASE

The Electronic Ship Folder (ESF) Database (Fig. 24) is designed to be the one stop data location for the OTSR router. The database provides data entry and access capability to customer, support, and message data. Additionally, the program has the capability to provide links to valuable METOC data such as satellite images, overlaid model verification products, Meteograms and many other products which can be produced using JMV's slide show builder, WSI or Terascan. Once the support information has been entered, html web pages, metrics and reports can be automatically generated from the existing data.



Figure 24: Electronic Ship Folder Start Form

1. Program Requirements

The database used to create the ESF is run on Access 2000 and requires Microsoft Windows OS running Microsoft Office 2000 or Microsoft Office XP to operate. Since databases have a tendency to become very large, the machine that is used to store the database should have several hundred MB's of available storage.

2. Program File Descriptions

The database program is made up of four files that are responsible for maintaining the data, controlling the security access, providing the ingestible data, or containing the exported data.

1. ESF.mdb: The database file is the esf.mdb file that contains all the Forms, Tables, Queries, VBA Modules and Reports that are used by the program.

2. System.mdw: The system.mdw file controls the security access to the program. This level of security is not meant to keep people out of the database since the program will be on a secured network, but instead to log access to the database.

3. Mess.txt: This file is created by the Message Parsing Program and contains all the message traffic that has been received by the center. This file is used by the OTSR router to view incoming message traffic and ease data entry procedures.

4. Activeship.txt: Activeship.txt is exported from the database once some data has been entered into the system and ships are under active support from the OTSR Center.

3. Installation

To install the ESF program, copy the esf.mdb and system.mdw files into the same directory where the parser.exe file was copied. Now that the files are copied to the correct directory, the security parameters need to be updated. Find wrkgadm.exe usually located in the C:\programfiles\Microsoftoffice\office\1003\ directory. If the file is not located in this directory, run a search on wrkgadm.exe to find the file. Once you find the file, double-click on it and a Workgroup Administrator window (Fig. 25) will open. Click on join to open the Work Group Information file (Fig. 26) and browse to find the system.mdw file located in the directory with the ESF database file. Once the correct system.mdw file is selected, select OK. Figure 27 should now be seen; close this window and press exit on the Figure 25.

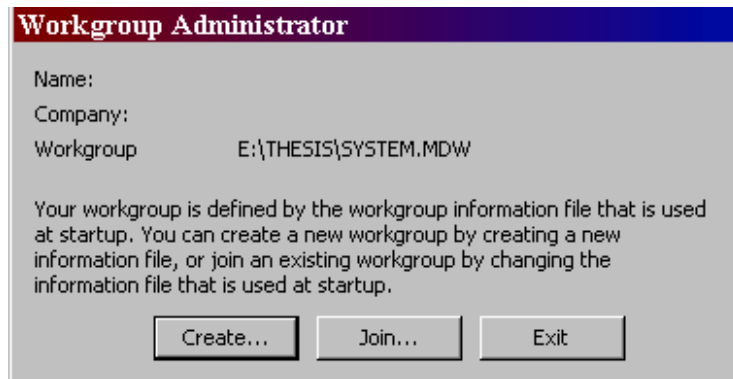


Figure 25: Microsoft Access Workgroup Administrator

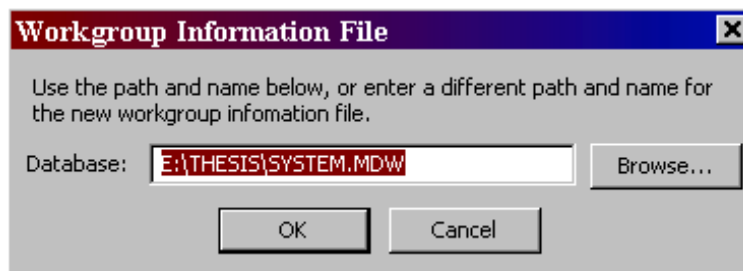


Figure 26: Workgroup Information File

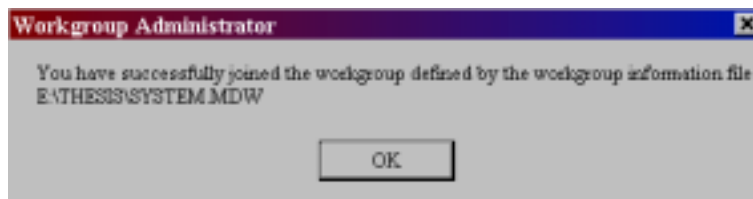


Figure 27: Workgroup Administrator

Now that the program is installed and the system settings are in place, double-click on esf.mdb and make sure that the log in screen opens (Fig. 28) when the database starts.

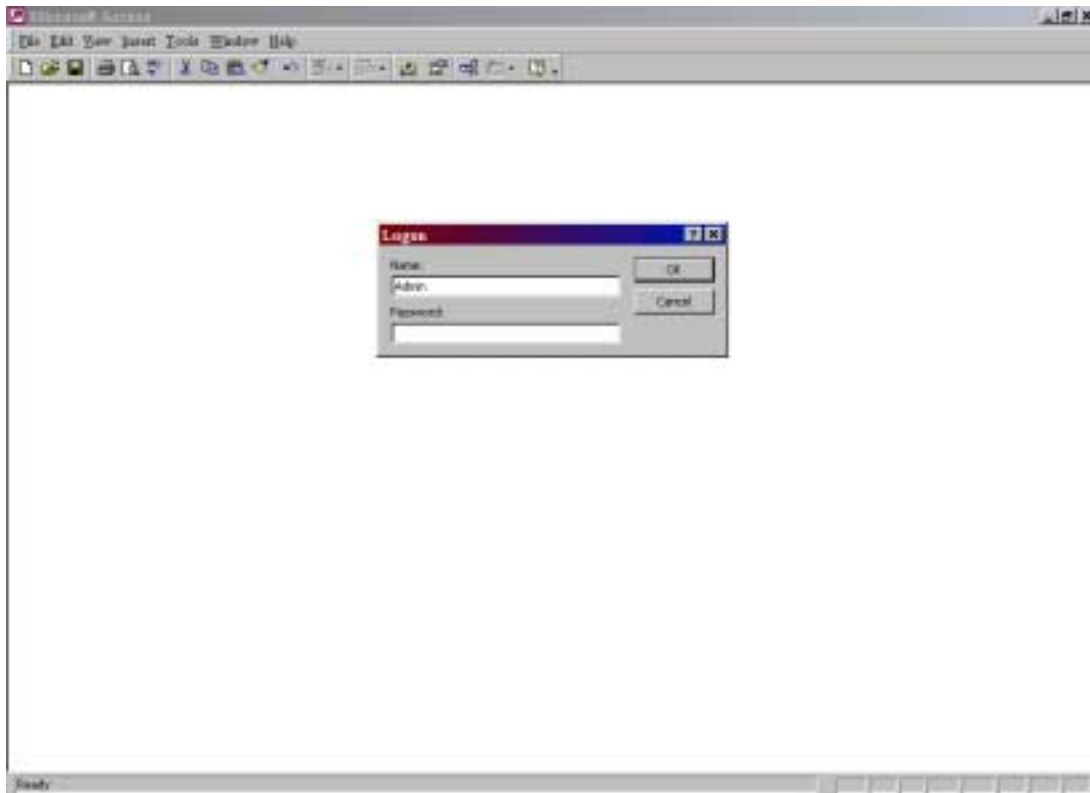


Figure 28: Database Login Screen

If a login screen does not appear when the program starts, repeat the installation process and ensure that you have not selected the system.mdw from a directory other than where the database is located. Upon initial install of the database the Admin password is admin1. Before you begin to use the database, the chosen administrator of the database should change the Admin login and add new logins for each member who will have access to the database. To complete these operations follow the instructions in the next section.

4. Adding or Changing Security Logins

a. Changing Login Passwords

To change the administrator (Admin) or any other logins password, users must login as Admin. Once you have

opened the database and logged in, click on Tools on the main toolbar, then Security and finally, User and Group Accounts (Fig. 29).



Figure 29: Accessing Security Form

Once users select the User and Group Accounts, a User and Group Accounts window (Fig. 30) will open showing the admin user. If this is the first time using the program than the Admin password should be changed so to ensure program integrity. To change the Admin password, click on the "Change Logon Password" and check to make sure that the User Name is Admin. If the user name is not Admin, than the user is not logged in as Admin and must

login again as Admin to complete the password change. If the username is Admin then enter admin1 or any previously entered password into the Old Password text box and then enter the new password in the New Password and Verify boxes. Click on the Apply button and then select OK. Your new password is now in effect. To test the login, close the database and login again as Admin. If someone other than Admin needs to have their password changed or reset two methods can be used. The first method is to login as the user and then follow the procedures above or, method two is to have Admin clear the password of the user by selecting the users name under User and Name: and then click Clear Password. This will clear the users password and when they login they will only enter the login name without any password. To reset the password, have the user open the User and Group Accounts window (Fig. 29 and 30) and go to Change Logon Password and enter a new password in the New Password and Verify text boxes.

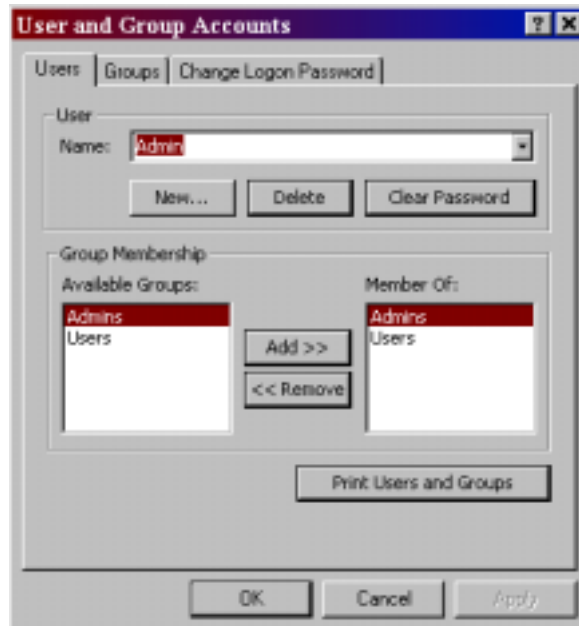


Figure 30: User and Group Accounts



Figure 31: Changing Admin Login

b. Add New Login

To add a new login to the database, login to the database as Admin and open the User and Group Accounts

window by following the instructions from the previous section. Click on the Users tab (Fig. 30) of the window and select New to open the New User/Group form (Fig. 32). Enter the users name (see warning below) in the name box and then enter a Personal ID value. This value does not need to be unique; however the combination of the Name and Personal ID value must be unique. Click on OK and the new user will be created without a password associated with it. To add the password, close the database and login as the new user, but do not add a password in the password block. When the new user is logged in, open the User and Group Accounts window and go to Change Logon Password. At the Change Logon Password window and verify that the User Name is the same as the new users and enter the new password into the New Password and Verify text boxes.

Warning: When creating a login and password only use letters (a - Z) and numbers (0 -9). Do not use spaces, slashes or any other unusual character as they may change when the database is compacted or repaired.

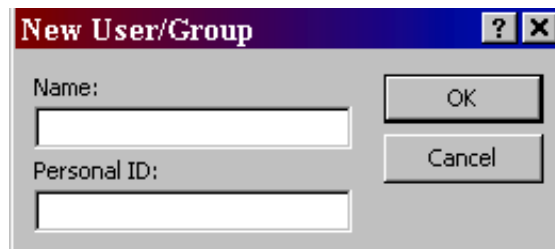


Figure 32: New User/Group Entry Form

5. Description of Database Setup and User Interface

The database is designed to reduce redundant data entry and allow quick access to necessary data. All queries, forms, reports and html pages are built on the information, which is stored in the many tables within the

database. Figure 33 shows the relationship between the two primary tables (Customer and Support) and the secondary tables that provide inputs to the primary tables.

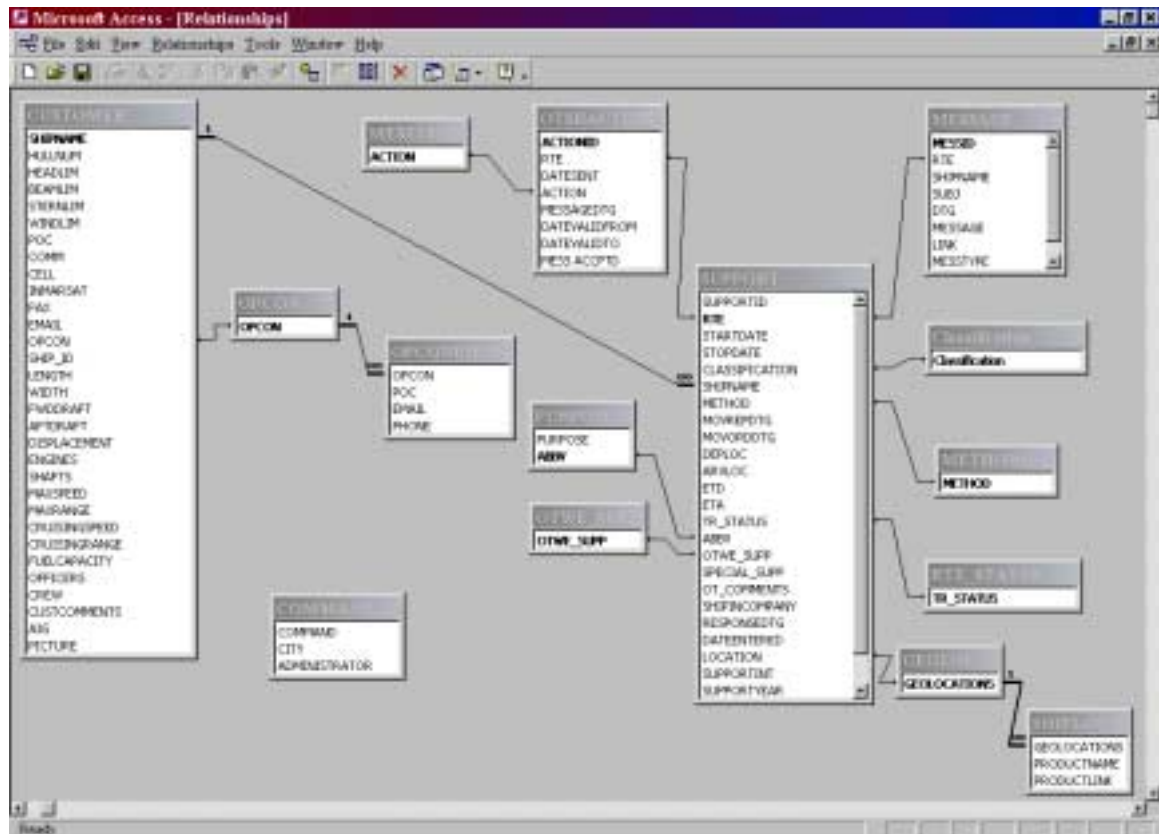


Figure 33: Database Table Relationships

To fully understand how the database operates one must understand what makes up the database. The following sections will describe the tables, forms and reports generated by the database.

a. Tables

Tables are the foundation to any database. They hold the information for the database, as well as provide the initial formatting for how the data will be stored. From Figure 33, this database contains 15 separate tables with some additional tables being created and deleted as files are imported and exported. The following paragraphs

will discuss the key tables and what they are used for. Additionally, any special relationships between the tables and the impact that that relationship has on data entry will be discussed.

The Customer table (Fig. 34) contains all the permanent and semi-permanent information about the vessel. This information includes the points of contact, telephone numbers, e-mail addresses, vessel limits, ship characteristics, vessel manning, operational commanders and possible mechanical problems associated with the vessel. This information should be maintained with the utmost vigilance since it is the table that will provide the most complete pass down between the vessel's missions. The Customer table has a one-to-many relationship with the Support table that requires that the customer entered into the Support table exist in the Customer Table. Additionally, the index on the ship name is set so that not duplicate entries can be entered into the table. This requires that every ship only be entered once in the database and that its information be constantly maintained.

The Support Table (Fig. 35) contains all the information about an individual support mission. Each record in the table will be given a mission route number (RTE) in order to provide a primary identifier between all the records in this table. Since support from 3 centers could potentially be in this table, every entry requires a route number for each support entry and this route number will remain the same even when vessels is passed to another center. The Support table has many relationships with other tables that provide an input (drop-down list in

forms) into the data that is available in the Support table.

	Field Name	Data Type	Description
12	SHIPNAME	Text	NAME OF SHIP, INCLUDING PREFIX (E.G. USS, USCG, MV, RV, ETC.)
	HULLNUM	Text	TYPE OF SHIP AND HULL NUMBER (CYN 72, T-AGOS 17)
	HEADLIM	Number	HEAD SEAS LIMITS
	BEAMLIM	Number	BEAM SEAS LIMITS
	STERNLIM	Number	STERN SEAS LIMITS
	WINDLIM	Number	WIND LIMITS
	POC	Text	SHIPS POINT OF CONTACT
	COMM	Text	COMMERCIAL PHONE NUMBER
	CELL	Text	CELLULAR PHONE NUMBER
	INMARSAT	Text	
	FAX	Text	COMMERCIAL OR INMARSAT FAX NUMBER
	EMAIL	Text	SHIPS EMAIL ADDRESS
	OPCON	Text	COMMAND WHO HAS OPERATIONAL CONTROL OF UNIT
	SHIP_ID	Text	
	LENGTH	Number	LENGTH TO NEAREST FOOT
	WIDTH	Number	WIDTH TO NEAREST FOOT
	FWDRAFT	Number	FOREWARD DRAFT TO NEAREST FOOT
	AFTDRAFT	Number	AFT DRAFT TO NEAREST FOOT
	DISPLACEMENT	Number	AMOUNT OF DISPLACEMENT FOR THE VESSEL IN U.S. GALLONS
	ENGINES	Text	NUMBER OF ENGINES
	SHAFTS	Text	NUMBER OF SHAFTS
	MAXSPEED	Number	MAX SPEED OF VESSEL IN KTS
	MAXRANGE	Number	RANGE OF VESSEL AT MAX SPEED IN NM
	CRUISINGSPD	Number	WHAT IS THE NORMAL CRUISING SPEED OF VESSEL IN KTS
	CRUISINGRNG	Number	MAX RANGE OF VESSEL AT CRUISING SPEED IN NM
	FUELCAPACITY	Number	
	OFFICERS	Number	NUMBER OF OFFICERS
	CREW	Number	NUMBER OF CREWMEMBERS
	CUSTCOMMENTS	Memo	COMMENTS ABOUT SHIP
	AIG	Text	WHAT AIG'S IS THE SHIP A MEMBER OF?
	PICTURE	OLE Object	PHOTO OF SHIP

Figure 34: Customer Table

	Field Name	Data Type	Description
	SUPPORTID	AutoNumber	
	RTE	Text	
	STARTDATE	Date/Time	DATE OF INITIAL SUPPORT
	STOPDATE	Date/Time	DATE SUPPORT FINISHED
	CLASSIFICATION	Text	CLASSIFICATION OF SUPPORT
	SHIPNAME	Text	NAME OF SHIP INCLUDING PREFIX (I.E. USS, MV, USCGC, ETC.)
	METHOD	Text	PRIMARY METHOD OF REQUEST
	MOVREPDTG	Text	DATE-TIME-GROUP OF MOVREP MESSAGE
	MOVORDDTG	Text	DATE-TIME-GROUP OF MOVORD MESSAGE
	DEPLOC	Text	POINT OF DEPARTURE FOR VESSEL
	ARRLOC	Text	POINT OF ARRIVAL FOR VESSEL
	ETD	Text	ESTIMATED TIME OF DEPARTURE FROM DEPARTURE POINT
	ETA	Text	ESTIMATED TIME OF ARRIVAL AT DESTINATION POINT
	TR_STATUS	Text	CURRENT STATUS OF SUPPORT
	ABBY	Text	ABBREVIATION FOR THE PURPOSE OF HAVING VESSEL 12-HOURLY
	OTWE_SUPP	Text	TYPE OF SUPPORT TO PROVIDE TO VESSEL
	SPECIAL_SUPP	Text	ANY SPECIAL REQUESTED PRODUCTS (I.E., GRAPHICAL WEAX, METSIT, SATELLITE PICTURE, MET SUPPORT)
	OT_COMMENTS	Memo	PASS DOWN ITEMS TO NEXT WATCH, SPECIAL INTEREST ITEMS
	SHIPCOMPANY	Memo	OTHER SHIPS TRAVELLING WITH REQUESTING VESSEL
	RESPONDDTG	Text	DATE-TIME-GROUP OF CENTER'S MESSAGE TO VESSEL CONFIRMING SUPPORT
	DATEENTERED	Date/Time	DATE SUPPORT ENTERED, AUTOMATICALLY ENTERED,
	LOCATION	Text	LOCATION OF VESSEL IN WORLD
	SUPPORTINT	Text	STARTING LETTER OF COMMAND'S CITY
	SUPPORTYEAR	Number	YEAR OF SUPPORT
	SUPPORTNUM	Text	SEQUENTIAL NUMBER OF SUPPORT
	ENTEREDBY	Text	INITIALS OF PERSON WHO ENTERED SUPPORT

Figure 35: Support Table

The OPCON table, which feeds the Customer table with the appropriate operational commander, is used in

conjunction with the OPCONINFO table (Fig. 36). These two tables have a one-to-many relation where the OPCON table provides the name of the operational commander and the OPCONINFO provides the point of contacts (POC) name, e-mail address and phone number. Since an OPCON can have several POC's the OPCON needed to be separated from the POC data. A POC of an OPCON cannot be added until the OPCON is available in the OPCON table.

	Field Name	Data Type	Description
	OPCON	Text	NAME OF OPERATIONAL COMMANDER
	POC	Text	POINT OF CONTACT AT OPCON STAFF
	EMAIL	Text	EMAIL ADDRESS OF OPCON POC
	PHONE	Text	PHONE NUMBER OF OPCON POC

Figure 36: Operational Command Info Table (OPCONINFO)

The final key table in the database is the SHIPLOC table that contains the related hyperlink products based on the geographic area of the customer's position. Again, a one-to-many relationship was created between GEOLOCATIONS and SHIPLOC to provide data to the Support table. The GEOLOCATIONS table holds the available geographic regions that a vessel can be in and the SHIPLOC table holds the locations with the products names and hyperlink to the product.

	Field Name	Data Type	Description
	GEOLOCATIONS	Text	GENERAL GEOGRAPHICAL LOCATION OF VESSEL IN THE WORLD (NEPAC, TROPICS, IO, ETC.)
	PRODUCTNAME	Text	NAME OF PRODUCT BEING LINKED TO
	PRODUCTLINK	Hyperlink	ADDRESS OF LINK

Figure 37: Ship Position Product Link Table (SHIPLOC)

b. Forms

Forms in a database are the primary means of entering data. By creating useful forms, the user can quickly and easily enter the necessary information and make the information available to the rest of the command. This database has many forms for entering the data into the tables. Some forms are individual forms that are connected to only one table, however many of the forms have forms and sub forms which use data from the first form to recall information from the sub form. In most case, where you find a one-to-many relationship between the tables, you will also find a sub form used to access the table with the many relationship. In Figure 38, the sub form is inside the box and is dependent on the SHIPNAME input box.

The first form that a user interacts with is the startup form (Fig. 39) that controls the basic navigation through the program. From the startup form a user can move to the secondary forms to add a new customer, add new support, modify existing support, review incoming messages, import or export required files, view or print the turnover sheet, modify the administration forms or close the database.

Microsoft Access - [ELECTRONIC FOLDER: Ferno]

File Edit View Insert Format Records Tools Window Help

Optimum Track Ship Routing Support Form

Report Action Ship Track

SHEETNAME: INTL YEAR: SUPPORTTYPE: CLASSIFICATION: STARTDASH: SECTNAME: (IT COMMENTS)

UNCLASSIFIED

LEADS	RELEASER	SPCON	LENGTH	WIDTH	DEPTH	DISPLACEMENT
121212120			0	0	0	0

MAX SPEED (KTS) MAX RANGE (NM) STD CRUISING SPEED (KTS) CRUISING RANGE (NM) FUEL CAPACITY (U.S. GALLONS)

0 0 0 0 0

COMMENTS

Open Full Database View

PRIMARY METHOD OF REQ: DEPEND: ETD: Operating Location: ERAC

HOWREQ: SAN DIEGO

HOWREQ: ARVLOO: ETR: Raw Product By Name

HOWREQ: PEARL HARBOR: 081212AUG0002 View Product

ADD AREA PRODUCTS

TR STATUS: PURPOSE: SPECIAL_SUPP:

PREREQ: SPECIAL_SUPP:

OTSR_SUPP: SPECIAL_SUPP:

OTSR/WEAR: SPECIAL_SUPP:

SHIPCOMPANY: NONE

Maintainers Initials

Add New Support Save/Close Form Save Support Delete Support Close Form

Quick Search

Search By Active ETD: Search By Active Ships

Filter By Status:

Ops Manual 12-Hourly PENDING IN PROG FINAL

Remove Filter

DBS WEAR OPS

OTSR HOWREQ GENERAL

Records: 1 of 1

Name of Ship including prefix (i.e. USS, NY, USCG, ETC.)

Figure 38: Area Inside the Box is the Sub Form of the Support Form



Figure 39: Startup Form, Used to Navigate through Program

The Add Customer form (Fig. 40) is used to enter, view or modify data about customers that either are or will be supported by OTSR. The primary purpose of this form is to provide history on vessels so that as personnel in the OTSR program turnover and are replaced by new routers, information on how a vessel were supported or what their standard limits are, can be obtained. This form contains much of the standard information that is available via web pages or "Janes", however if the information can be retrieved directly from the customer, the data is usually far more accurate. Almost all the controls on the form are text input where the data is typed directly into the text

boxes. The only exception to this is the Search by Ship Name drop-down box and the OPCON sub form. The Search by Ship Name control allows the user to select the customer that they wish to review. It also provides a way to quickly view all the customers to determine if a new customer needs to be added. The OPCON sub form is used to view all the POC's of the selected OPCON. To change the current POC use the navigation bar below the POC and PHONE header. For information on how to enter data into each of the text boxes, select the box and then look in the lower left-hand corner of the screen to see what is suppose to be in the box and what the format should be.

SHIPNAME	VESSEL ID	HEADLINE	DEANLINE	STERLINE	HONLINE	PICTURE
MY STRONG TEAM	12	12	12	12	30	
POC	COMM	CELL				
DEANLINE	FAZ	HONLINE				
SHIP ID	LENGTH	WIDTH				
FWD DRAFT	AFT DRAFT	ENGINES	SHAFTS			
18						
MAX SPEED (KTS)	MAX RANGE (NM)	FUEL CAPACITY (U.S. GALLONS)				
11	0	0				
STD CRUISING SPEED (KTS)	CRUISING RANGE (NM)	DISPLACEMENT				
0	0	3,444				
OFFICERS	CREW	AGE				
0	0					
OPCON	POC	PHONE	EMAIL			
COMMENTS						
Field: 1 of 1						
Field: 2 of 1						
Field: 3 of 1						
Field: 4 of 1						
Field: 5 of 1						
Field: 6 of 1						
Field: 7 of 1						
Field: 8 of 1						
Field: 9 of 1						
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Field: 100 of 1						

Figure 40: Customer Entry Form

The Support Form (Fig. 40) is the primary form that a router or OTSR tech will use while working with the data entry portion of this program. Because of the importance of entering data correctly, we will discuss each of the controls of this form in detail. This form is used for adding, editing and viewing all supported customers. Two versions of this form are available from the Startup form, Add New Support and Open OTSR Support. The Add New Support opens the form to a new record and the Open OTSR Support opens the form to the first record. Once you have opened the OTSR support form, new support can be added by clicking on the Add New Support button at the bottom left of the screen.

The SHIPNAME drop-down box allows the user to only select customers, which have previously been added to the Customer table. If a customer is not available, minimize or close the Support form and then open the Customer form and add the new customer by clicking on the "Add New Customer" button. Once the customer information is added, close the Customer table and then maximize or reopen the Support Form and select the customer from the drop-down list.

As mentioned in the Tables section, the RTE is required for all entries in the Support table. The RTE is made up of the INIT, the current year and the sequential support number. The INIT is the first letter in the commands location (S = San Diego, N = Norfolk, and Y = Yokosuka) and is set to default to the users value. The current year is set by using the systems clock, so depending on the time settings that one uses the clocks

could vary whether you are using local or GMT time. Finally, the Support Number is a sequential number that is set by the system by comparing the last value entered and adding 1. This value will reset to 1 upon the shift to the new year. These three values make up the RTE, which will remain the same for the remainder of the support for this track. Because these values are automatically entered when the new support is added, these three objects have been removed from the tab order and do not normally receive the focus. To change the value of the Support Number, select the text box under SUPPORTNUM and type in a new value. Remember: The next support value will add 1 to the modified entry so you may need to change that value if you are not adding numbers sequentially.

The classification of the support is selected from a drop-down menu and is usually provided in the MOVREP, MOVORD or OTSR request message. Enter this value by typing the first couple of letters to the classification and selecting enter or select the drop-down list and choose the appropriate value.

Both STARTDATE and STOPDATE are entered by selecting the current status of the support. If the TR_SUPPORT changes from "PENDING" to "OPSNORMAL" or "12 Hourly" then the STARTDATE will enter in a DD-MMM-YY format, where DD is day, MMM is month and YY is the last two digits of the Year. Additionally, the STOPDATE is entered when the TR_STATUS changes from an active type of support to "FINAL". Error checking has been created to check if the TR_STATUS has changed in a manor which would extend the support of remove a STOPDATE, such as mistakenly

selecting FINAL before one meant to. The tab order for these controls has also been removed to avoid data entry mistakes.

As shown in Figure 38, the values from Limits to Customer Comments are associated with the Customer form. To edit any of these values, select "Open Full Customer Form", edit the necessary fields and then click on "Save and Close Form". The values you have edited will be modified and the new values will appear when you return to the Support form.

The "PRIMARY METHOD OF REQ:" drop-down box is a selection to choose the method with which this particular support was requested. The standard choices for this object are usually, Movement Report (MOVREP), Movement Order (MOVORD), OTSR request, e-mail, or voice, however additional choices can be added by selecting the "Administration Form" and clicking on "Open Method of Request". Enter the new value on the next open line and close the form.

The "MOVREP/Pri Request DTG" object is the Date-Time_Group of the request message, unless the request comes from a MOVORD message. If the request method does come from a MOVORD, enter the value in the "MOVORD DTG" box. In the cases when a customer provides both a MOVREP and MOVORD to request support, enter the DTG of the messages in the appropriate boxes.

TR_STATUS is the current operational status of the vessel. The choices for TR_STATUS are:

1. 12 Hourly: This status is used when the vessel has met or exceeded their current operational limits and is

under close watch from OTSR or under OTSR advisory or diverts (WEAX every 12 hours).

2. OPS NORMAL: This status is used when the vessel is underway and under their operational limits.

3. IN PORT: This status is used for vessels that are still under OTSR support and in port for a short duration or OTSR can use this status as a reminder that the vessel is in port, but not currently under support. This would be helpful for sending sortie messages and ensuring that all vessels have been notified.

4. PENDING: This status is used for those vessels that have submitted an OTSR request, but are not currently underway.

5. FINAL: Status used when support for a vessel has completed.

Additional TR_STATUS values can be added by modifying the "TR_Status Types" button on the administration form. If a vessel is under 12 hourly status than amplifying remarks can be added by selecting the cause for the support in the "12 Hourly cause" drop-down box. The purpose of this box is to provide a reason for placing a vessel on the current support. This box could be used for all operational status, however the standard reasons only include those that meet the OTSR advisory or divert criteria.

The OTWE_SUPP box provides information about what support was requested and will be supplied to the vessel. The standard choices are:

1. AVWEAX: This type is used when the vessel only requests aviation weather forecast messages and does not require OTSR services.

2. AVWEAX/OPAREA: This type is used when the vessel is located within a local area OPAREA, however

due to operations requires special information from the aviation weather forecast message.

3. OPAREA: Type used when vessel is operating in local OPAREA and only requires a standard shipboard forecast.

4. OTSR: Type used for vessel transiting large ocean basins.

5. OTSR/AVWEAX: Type used for vessels who are transiting large ocean basins and require an aviation forecast.

6. OTSR/WEAX: Type used for vessels who are transiting large ocean basins and require a shipboard forecast.

7. OTSR/OPAREA: Type usually used for vessels that are conducting operations that may be weather sensitive and require a more watch eye from OTSR (e.g., towing operations, TAGOS ops, diving operations)

8. WEAX: Type used for vessels only requiring a shipboard forecast.

9. SPECIAL SUPPORT: Type defined by local center, may be used for vessels not under Navy support but that may need notification if a storm is in the general vicinity of the vessel.

10. SOI: Ship of Importance, could be a carrier or amphibious vessel with an embarked meteorology and oceanography division (OA division). Messages are not usually written to a vessel of this type; however OTSR coordination is required between OTSR and the vessels OA division.

Additional OTWE Support options can be added by modifying the OTWE Support Types on the Administration form.

The "Special Support" text box is a space to add any additional products that a vessel may have requested. If the vessel has an embarked met on board, and the met

needs satellite images sent daily or if the vessel would like a graphical WEAX, than this information could be added to the form.

The "Ships in Company" text box is used to list additional vessels that will be transiting with the lead vessel. This condition could be permanent or temporary depending on the operations.

The next section of the Support form is the most important portion of the entire form. This section is the departure and arrival information. If this information is not entered correctly, then vessels may be many miles from where the forecasting team expects the vessel to be. Both the departure location and the arrival location boxes are simply a text box used to type in the appropriate information received from the MOVREP or MOVORD. Additionally, each location has a departure or arrival time, respectively, that is inputted in a DDHHHMMYYYY format where D is day, H is hour and minutes, M is 3 letter month and Y is four number year.

The next object in our discussion is the Location drop-down box which provide information on where the vessel is located in relation to METOC products that are being produced. In order to make the Electronic Ship Folder a one stop shop location to review current support and valuable forecasting tool, the system must know where the vessel is located. Once the user select the region of the world that the vessel is in, he or she now has access to product links that have been established in the Ship Location table (SHIPLoc). As discussed in the tables section of this thesis, the linked products can then be

viewed to analyze the current situation or forecast the upcoming conditions. One can access the links by selecting the ship location, selecting the product name and then clicking on the View Product command button.

The final user input to this form is the OT_Comments block which is used for the on watch router to provide comments to the next on coming watches. This block usually contains information about conversations that occurred during the watch, or possible routing scenarios. This information should be kept as current and in-depth as possible.

Except for the command buttons that are labeled according to their task, the only other feature of the Support Form is the Quick Search section in the lower right hand portion of the form. In this portion of the form, the user can quickly access the needed RTE, Ship Name or view the current support by track status. Additionally, message traffic pertaining to the current RTE is available by using the Message buttons at the bottom of the page.

The screenshot shows a Microsoft Access database window titled "Microsoft Access - [ELECTRONIC_FOLDER : Form]". The main form is titled "Optimum Track Ship Routing Support Form". It features a top menu bar with "Support", "Action", and "Ship Track". The form is divided into several sections: "SHIPNAME" with fields for "UNCLASSIFIED", "INTL", "YEAR", "SUPPORTSHIP", "CLASSIFICATION", "STARTDATE", "STOPDATE", and "OT COMMENTS"; "CUSTOMERS" with fields for "LENGTH", "WELLBORN", "OPCODE", "LENGTH", "WIDTH", "DRAFT", and "DISPLACEMENT"; "MAX SPEED (KTS)", "MAX RANGE (NM)", "STD CRUISING SPEED (KTS)", "CRUISING RANGE (NM)", and "FUEL CAPACITY (U.S. GALLONS)"; "CUSTOMERS" with a text area; "PRIMARY METHOD OF REQ" with a dropdown menu; "DEPARTURE LOCATION" with a dropdown menu; "DEPARTURE TIME" with a date/time field; "ARRIVAL LOCATION" with a dropdown menu; "ARRIVAL TIME" with a date/time field; "OPERATING LOCATION" with a dropdown menu; "VIEW PRODUCT BY NAME" with a dropdown menu; "VIEW PRODUCT" with a button; "ADD AREA PRODUCTS" with a button; "TE STATES" with a dropdown menu; "DTIME_SUPP" with a dropdown menu; "OTSR/ASAX" with a dropdown menu; "SHIPCOMPANY" with a dropdown menu; "NONE" with a dropdown menu; "HARBOR DETAILS" with a text area; "Add New Support" with a button; "Save/Close Form" with a button; "Save Support" with a button; "Delete Support" with a button; and "Close Form" with a button. On the right side, there is a "Quick Search" panel with a search bar, a "Search by Active RTE" dropdown, a "Search by Active Ship" dropdown, a "Filter by Status" dropdown, and buttons for "View Product by Name", "View Product", and "Add Area Products". At the bottom, there is a status bar showing "Record: 14" and "Form View".

Figure 41: Support Entry Form

The last major form that is used in the program is the MESSForm (Fig. 42). This form is used to access the many messages that are being added to the system daily as message traffic enters the command. The MESSForm is used to view the data which has been added to the Message table and formatted for easier reading than reading from the tables. One feature that is available from the MESSForm is the ability to enter new support while having the message displayed on the active screen. This helps to avoid some human error when translating the information from one screen to another or from paper to screen. To add new support from the MESSForm, find the message that you wish to enter into the database and select the button that

reads, "Add New Support Using this Message". This action will open Figure 43 and allow the user to have easy access to the required messages while entering the data.

The screenshot shows a Microsoft Access window titled "MESSForm". The form has a header section with the title "MESSAGES" in red. Below the header, there are several fields: "DTG" (with a value of "030001"), "NAME" (with a value of "MY SAMS L CODE"), and "MSG" (with a value of "301102Z APR 02"). There is also a "SERIES" field with a value of "000". A button labeled "Add New Support Using this Message" is located on the right side of the form. The form also contains a "MESSAGE" field with a large text area containing a message body. At the bottom of the form, there are navigation buttons: "H", "V", "P", "N", "Save Record", "Close Form", and a "Start Up" button. There are also search fields for "Search for Specific DTG" and "NAME". The status bar at the bottom indicates "Record: 14 of 7" and "Form View".

Figure 42: Message Form used to Review Message Traffic and Provide an Easy Method to Add New Support

the OTSR support. Using Access's report generation tool additional reports can be generated.

d. HTML Display

The HTML web pages are created based on the 12-hourly and ops normal customers. The pages are only generated if the particular messages or supporting html page is available. If for instance, a support vessel does not have WEAX or operational messages the WEAX and OPS links will not be available. If the vessel does not have any messages associated with its route number, than that ship will not be available on the support page. Figures 44 through 46 show representative html documents.



Figure 44: OTSR Index.html File

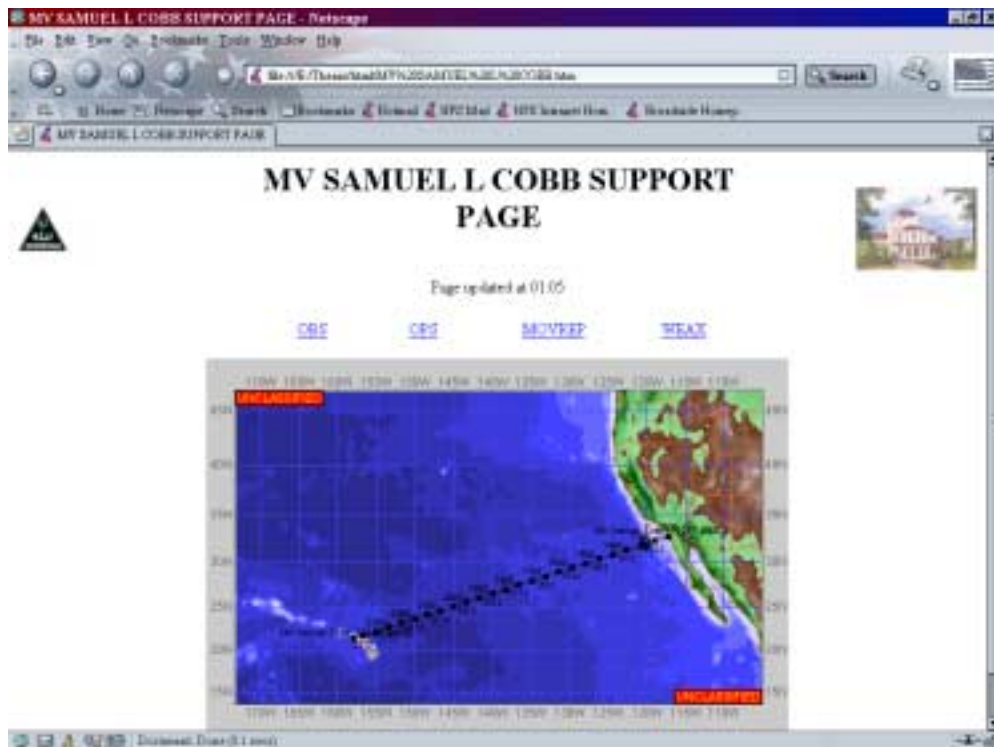


Figure 45: Individual Ship Support Page



Figure 46: Message Type Support Page

6. Program Operation

Operation of the ESF database is very easy with a little understanding of the basic operation of the program itself and Access 2000. The instructions in this chapter provide a very good overview on how the program should be used and how information should be entered into the program. As mentioned before, the ESF program can be operated from a network or stand alone PC. If the program is placed on a network drive, responsibilities for maintaining the data can be dispersed to several individuals, however one administrator can easily operate this program. These basic procedures should be followed in maintain the ESF database.

1. Ensure that all current and near future customer have been added to the Customer Form.
2. Ingest messages from the Message Parsing Program as often as the files are available. This keeps the number of ingest files to a smaller and more manageable number.
3. Review messages frequently and utilize the New Support QuickForm to enter the available information from the message.
4. For easier tracking of messages, be sure to change the message type from general to the appropriate value if the messages where not properly parsed.
5. Update the support information by using the Support Form on the main startup form. Be as detailed as possible when updating the OTSR comments.
6. Output html documents once all support data is updated by clicking in the "Create HTML Page" button from the startup form.

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IV. TESTING AND EVALUATION

In this chapter, the operational concept (OPCON), data flow and the test results will be discussed. The JMV and METCAST software modifications and concept of operations, along with the initial version of the Message Parsing Program were tested during Fleet Battle Experiment Juliet (FBE-J) in San Diego. A second test to evaluate the final version of the Message Parsing Program and the Electronic Ship Folders concepts was conducted in the classified lab at the Naval Post Graduate School (NPS). An Operational Concept (OPCON) was developed to describe how the various programs work in an operational environment.

A. FBE-J TEST

Tests were conducted during FBE-J between July and August 2002 to demonstrate ship track and HWD production and distribution. The distribution of XML data was tested between several JMV users as well as to the Pollexis Web COP called ViewPoint. Additionally, the production and distribution of shape files was tested to ensure that these files could be used by ESRI viewers. Additional goals and requirements were established during FBE-J for the Pollexis software; however, for this thesis only the product ingest and display of JMV products were tested.

1. Operational Concept

The OPCON for this test was to create HWD's and ship tracks using the MPP and JMV, publish these products and make them available for customer download. For this test the METCAST and Pollexis software were used to download the finished products, however any web enabled application that

understands XML formatted messages can be used. . This test simulated the production of products from a typical METOC center and demonstrated how centers can collaborate to combine products and thus create a larger support area of collaborated products. This type of product production would be used to create a regional or global HWD where centers, facilities or detachments could provide inputs to a central coordinator who fuses the products into one. Depending on the claimancy CONOPS, this coordinator could be single "Super Center" that is responsible for half the world or a coordinated effort between commands on the same echelon level. In our current center architecture where each center is run by an METOC Captain and command boundaries are closely aligned with Fleet responsibilities, coordination is required to prepare products that overlay properly at boundaries. Today, coordination is conducted over the phone or over Internet Relay Chat (IRC). By coordinating the boundaries prior to creating the product, producers can quickly negotiate and correct differences at the boundaries. Once producers agree on the collaborated product the operational attribute is turned on and the product is now available to operational customers.

2. Data Flow

Figure 47 describes the data flow from product generation to dissemination and then to product availability. Products are produced by a METOC center using JMV and published using METCAST (File|Publish Drawing for HWD's, the Publish button on the ship route editor for ship tracks). The publishing agent is called w-shove and is used to push the product with associated attributes to the METCAST server where the product is placed in a

channel. Once the product is in the channel, it is available for download by other METCAST clients and applications that used the METCAST discovery and subscription services.

Data Flow for FBE-J Test

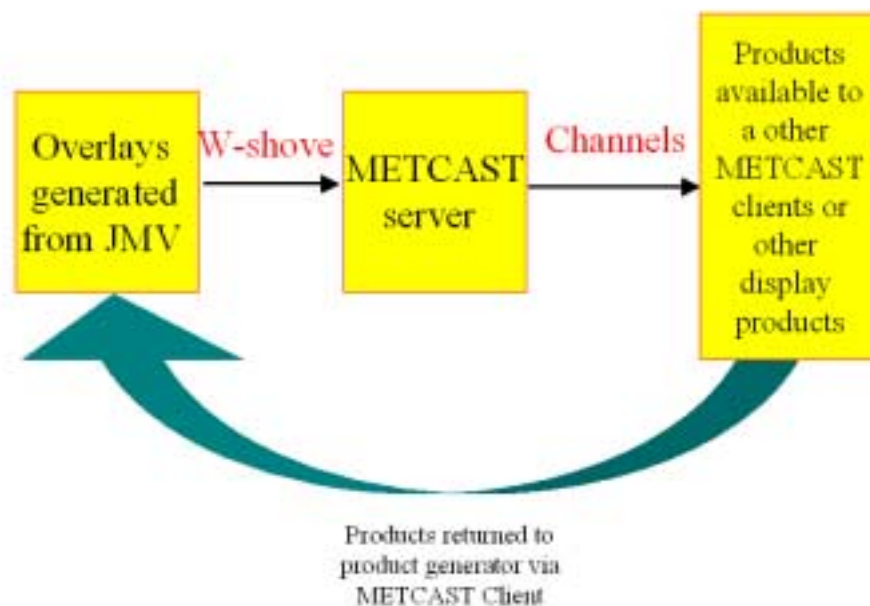


Figure 47: Data Flow for FBE-J Test

3. Results

Initially MPP generated ship tracks were placed directly into the JMV tracks directory. The initial version of the MPP correctly parsed about 50% of the MOVREPs that it was fed. For those files that were not parsed correctly, manual modifications to the files had to be made. In most cases, the modified files corrected most file errors. For those errors that even manual corrections

could not fix, the tracks were manually entered into JMV's ship route editor. In general, errors with the MPP were due to improper formatting and additional spaces in the messages. Once the tracks were displayable in JMV, the messages were converted to XML and successfully published to the METCAST server 100% of the time. All published products that were successfully displayed on both JMV and Polaxis displays. The ease of publishing, retrieving and updating was tested by creating separate Eastern and Western Pacific HWD's, publishing the products, and downloading them to a local system. Once the files were downloaded, both files were imported to the JMV display. In some cases, differences were created at the boundaries to verify that corrections could be made to the existing files and could be updated. In every case, the new product either wrote over the existing product or a new product was generated as desired. Figures 48 through 63 graphically depict the process of producing two separate forecasts and merging them into one.

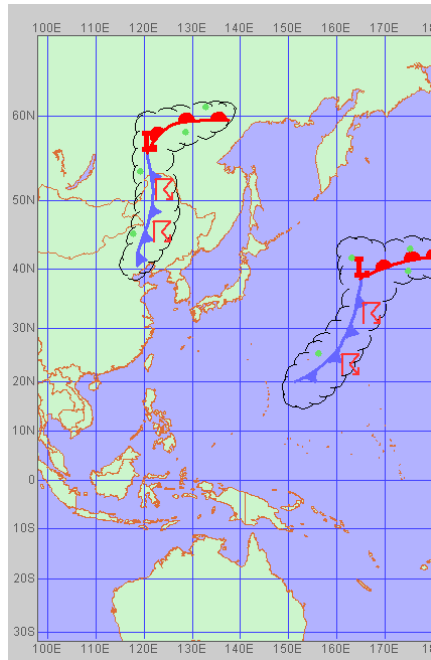


Figure 48: Creation of West Pacific HWD

The first step in creating any combined forecast is to create the individual forecast pieces. During the exercise users produced a Western Pacific HWD that included parameters such as locations of highs, lows, fronts, wind barbs and other weather phenomena associated with the area of concern. Boundaries at the 180° or any other METOC center boundary were coordinated over the phone or using IRC chat. Once the points are determined the individual centers create the final product.

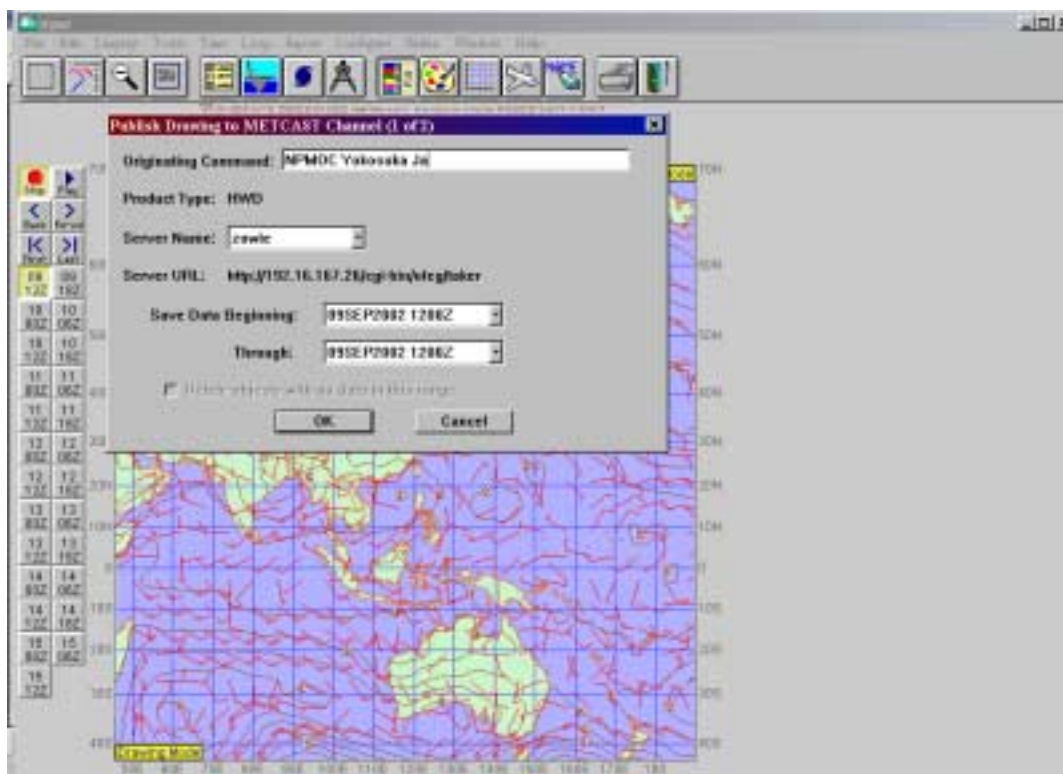


Figure 49: Publishing West Pacific HWD (Form 1)

Figures 49 and 50 represent the process to upload the files to the METCAST server. For this test, the METCAST server was located at FNMOC; however, when the TEDS installs are completed at all the local METOC centers local server could be used. Figures 51 through 53 show the process to publish the Eastern Pacific HWD. The process is the same as that performed for the Western Pacific area, except that the parameters in the two publishing forms contain slightly different attribute data. Once the HWD XML files are pushed to the server, the files are accessible from the METCAST channels dialogs (Fig. 54). First, open the METCAST client and select the Options then Channels menu item. Download the product by clicking on the down arrow in Figure 54 and selecting the whole channel or

a portion of the channel filtered by attribute (Fig. 55). Once the file has been downloaded, select the map of interest and click on File|Import Drawing (Fig. 56 and 57) to add the first HWD file. To add the second drawing, click on File|Append Imported Drawing (Fig. 58 and 59) to add any number of other overlays to the existing graphic. By importing the file rather than adding it through the standard product selector, a user is able to modify the files (Fig. 60 through 62) and publish the changes (Fig. 63).

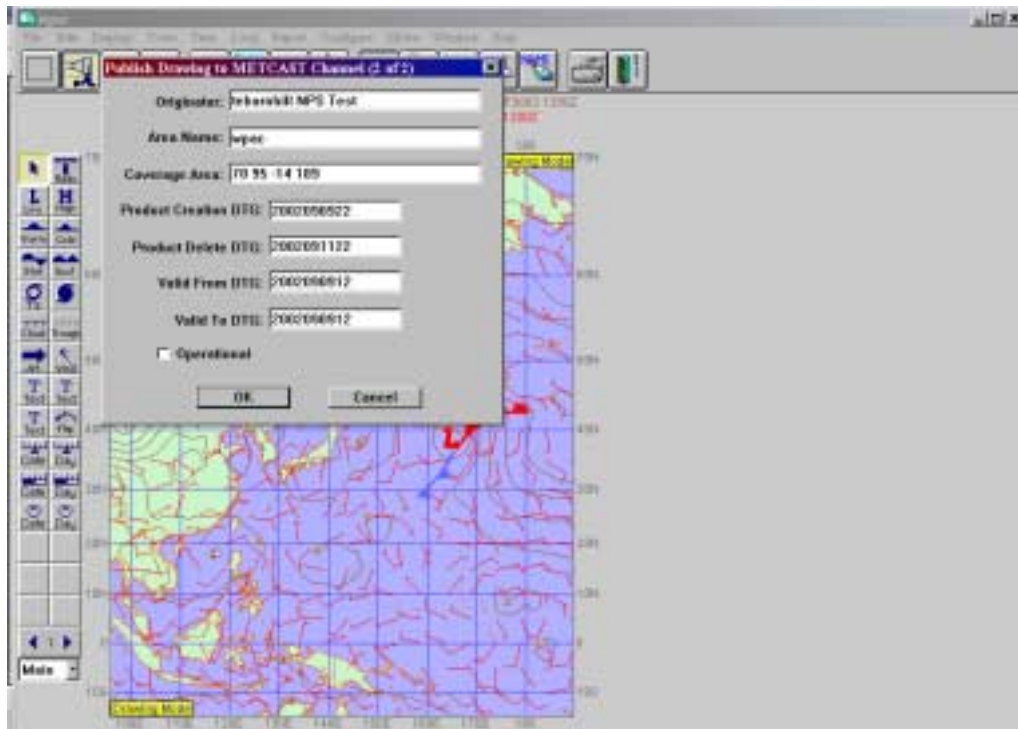


Figure 50: Publishing West Pacific HWD (Form 2)

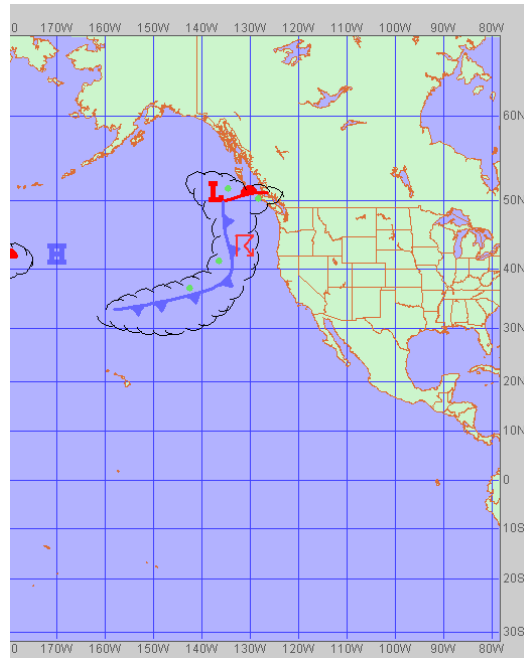


Figure 51: Creation of East Pacific HWD

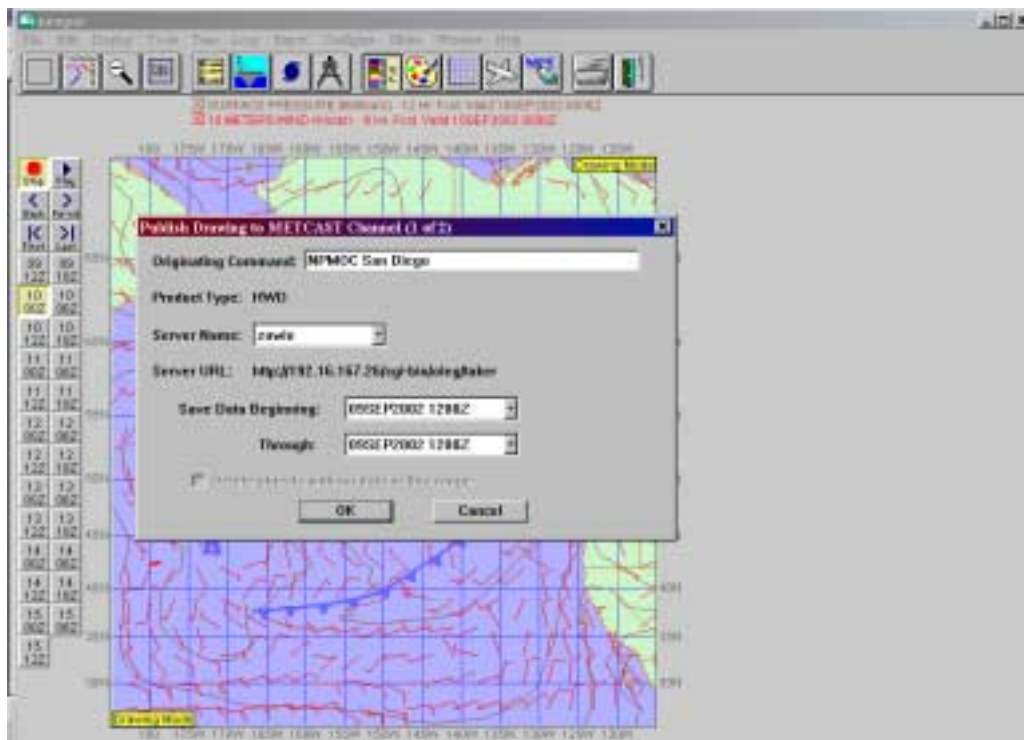


Figure 52: Publishing East Pacific HWD (Form 1)

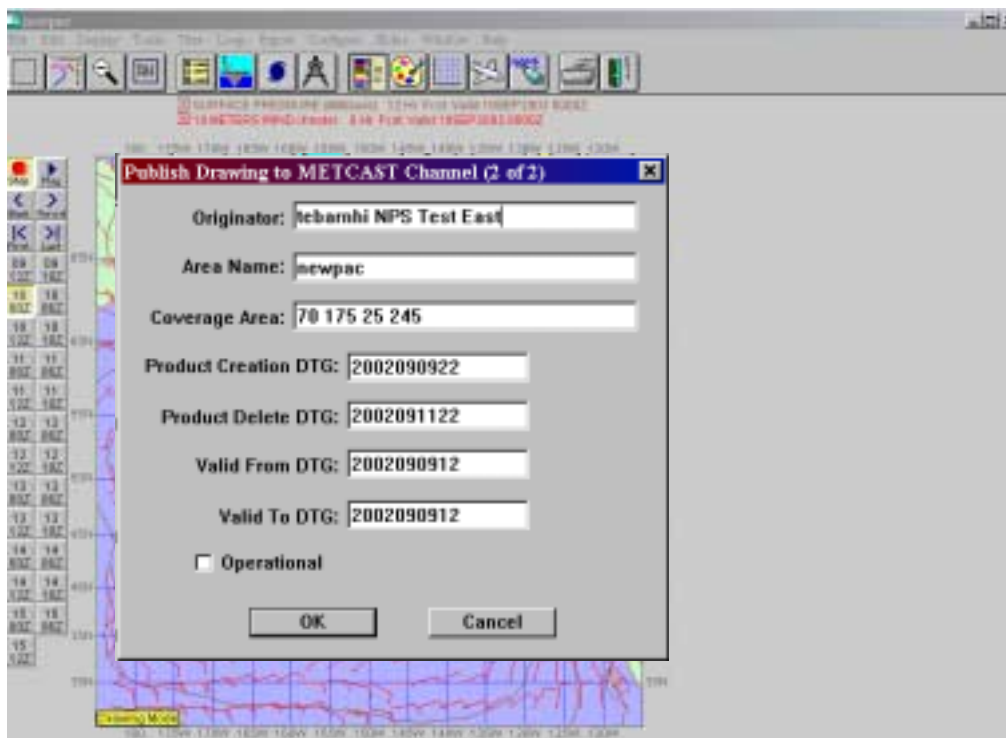


Figure 53: Publishing East Pacific HWD (Form 2)

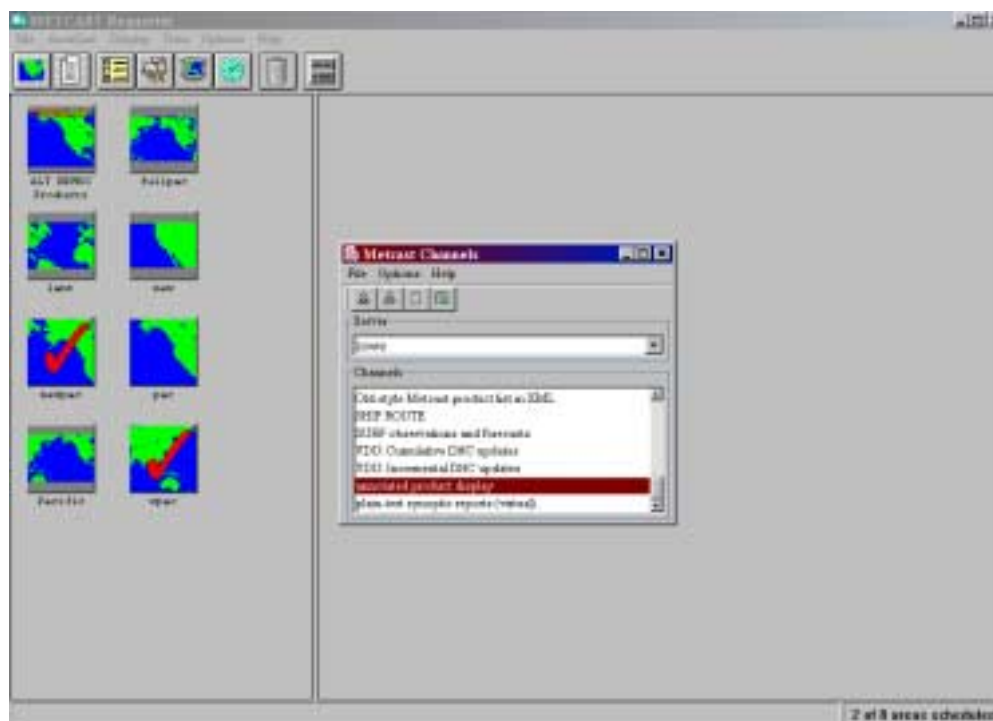
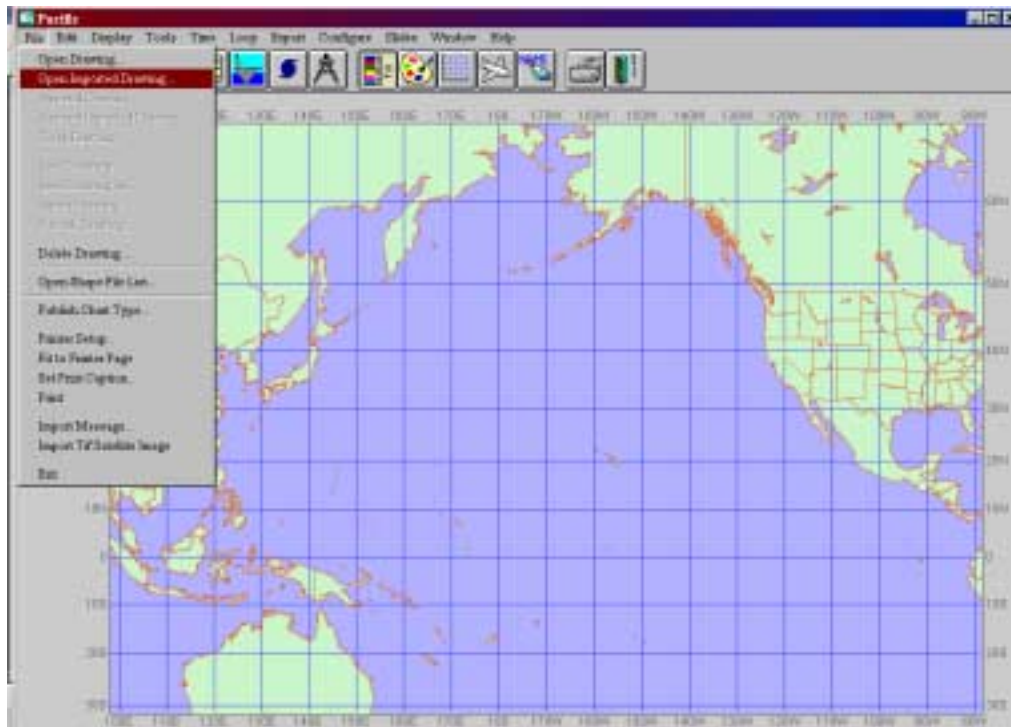
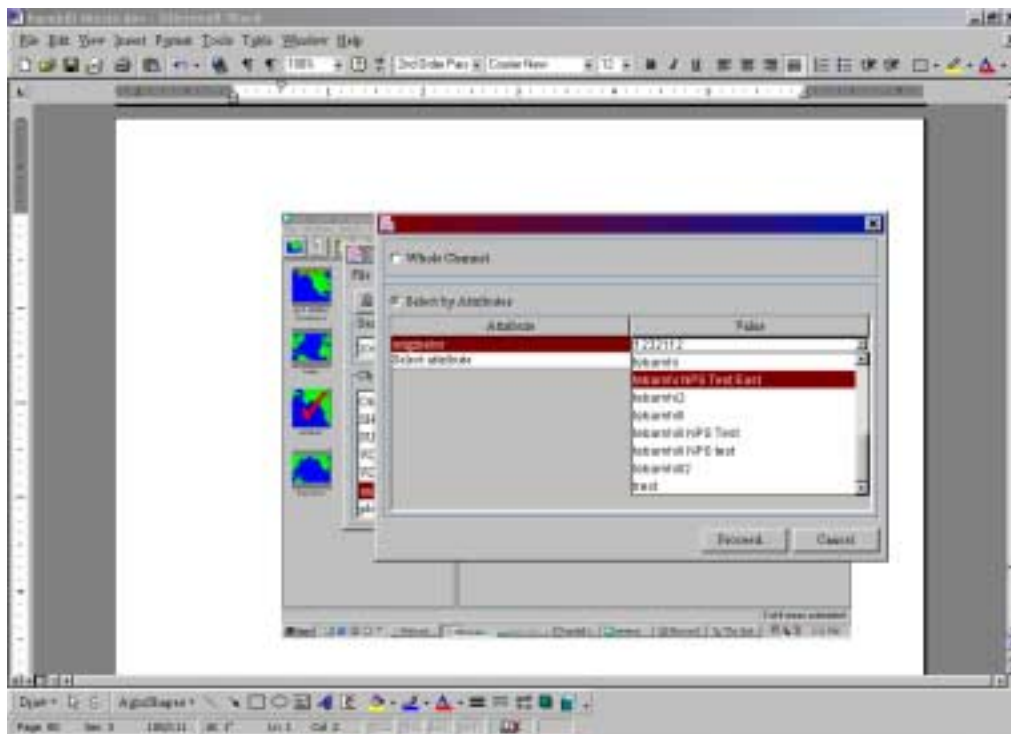


Figure 54: Accessing HWD channel



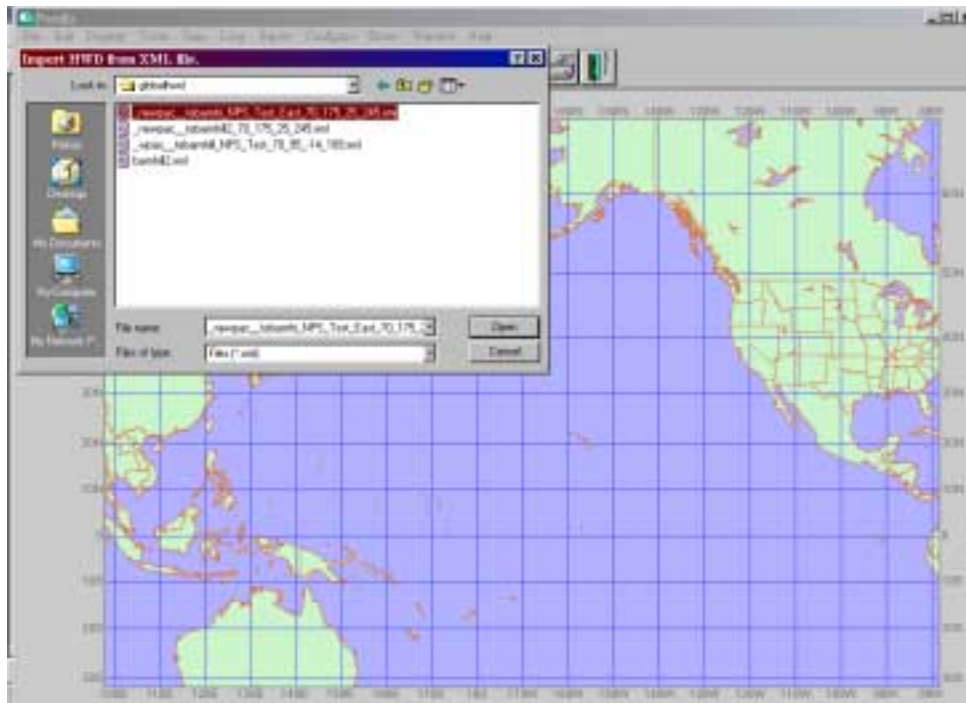


Figure 57: Importing East Pac HWD

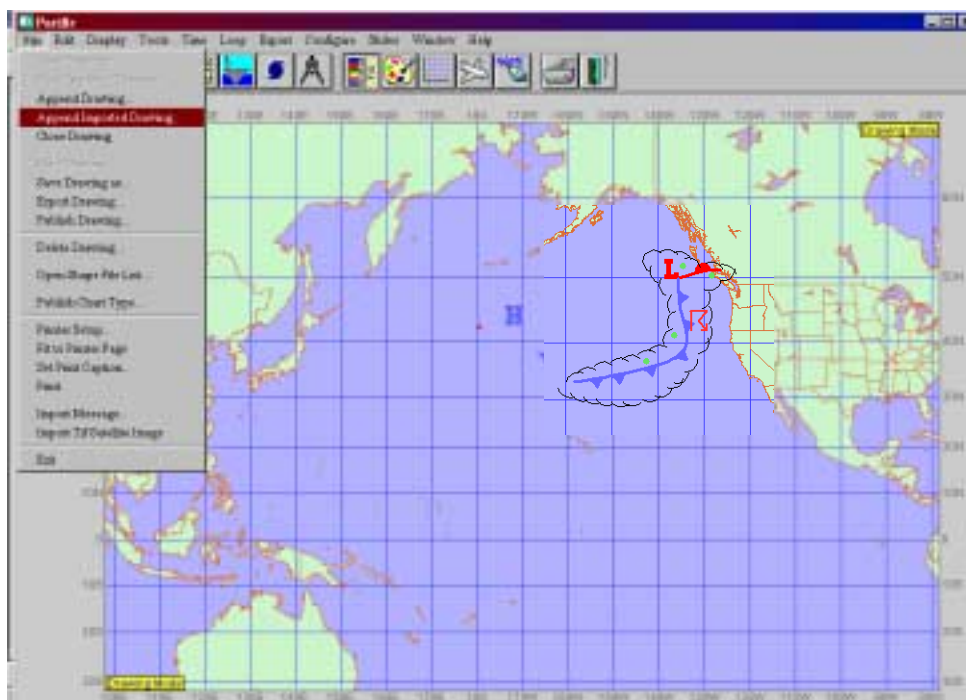


Figure 58: Appending WPAC HWD

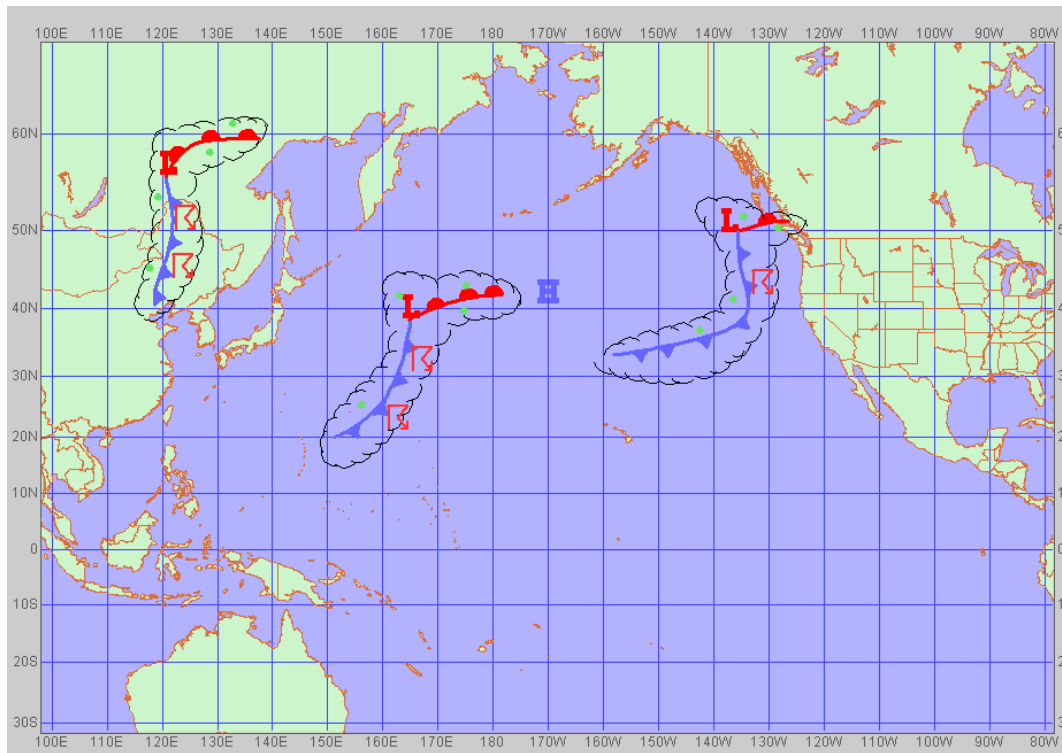


Figure 59: Complete Pacific HWD with Mismatched Crossing Point

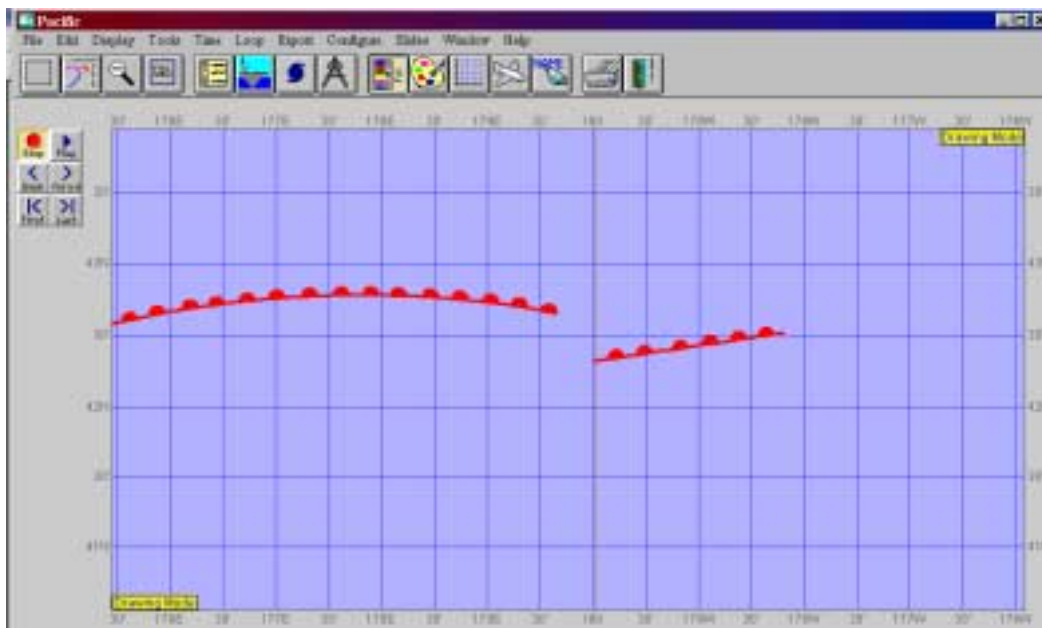


Figure 60: Mismatched Crossing Point (Blow-up)



Figure 61: Adjusting WPAC Product

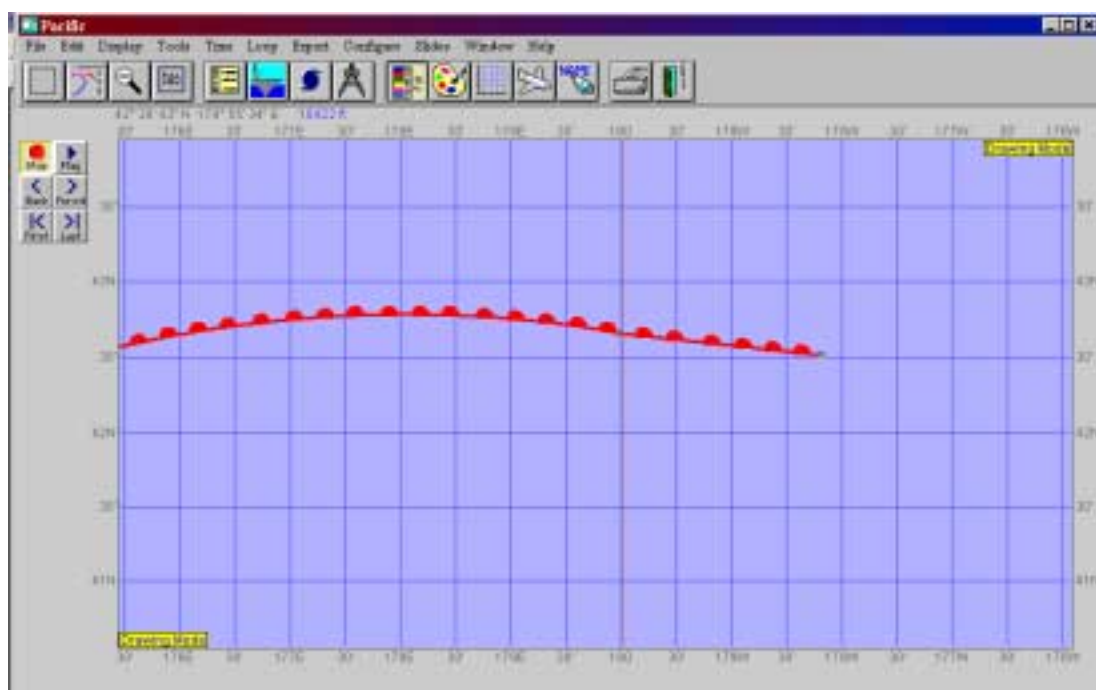


Figure 62: Adjusting EPAC Product

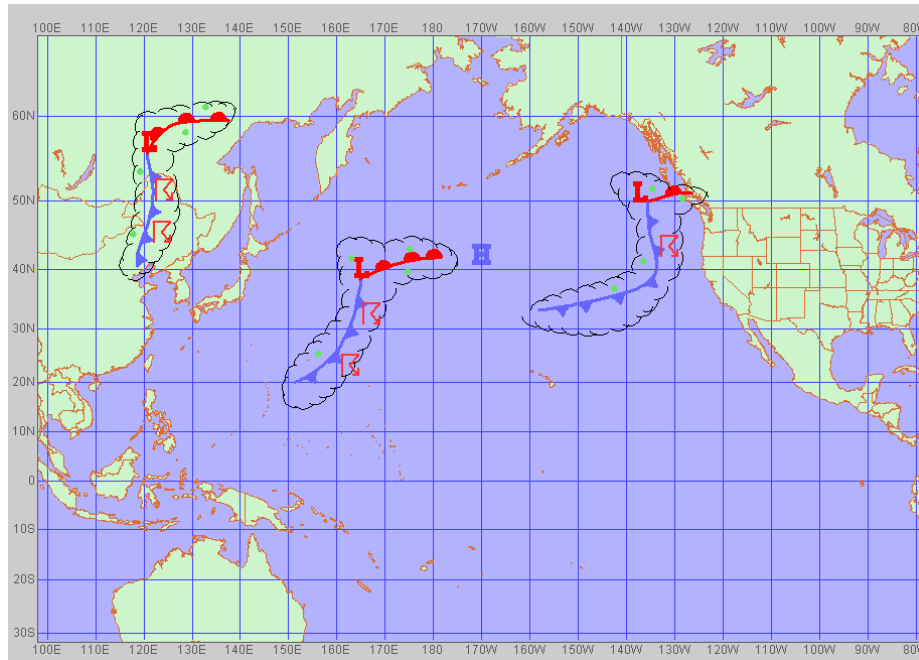


Figure 63: Newly Created Product

Finally we tested production, publication and subscription of ESRI shape files. Since ESRI's shape format arbitrarily assigns colors, an additional file is required to associate color with the published shape file. Depending on the version you are using, the format and file extension of this file differs. In ARCINFO version 3.2 this file is a .avl file and is generated by ESRI software. To make the shape file more useful, a .avl equivalent file needs be created by JMV to allow normal METOC symbology to be displayed properly.

The shape files are created from the downloaded XML files. As described in Chapter III, the XML files are converted to shape by using an executable program, which is currently separate from JMV. These files were successfully created and then opened in ARCVIEW 3.2 for display. To solve the color problems, all HWD's are named the same and

the .avl files were created and associated with each HWD file.

B. NPS TEST

This test was conducted from the 2nd to the 6th of September with the purpose of testing the operation of the Message Parsing Program, the Electronic Ship Folder and how the outputs from the MPP (ship tracks and observations) were ingested and displayed in the current JMV architecture.

1. Operational Concept

The OPCON for this test was to provide a set of programs, which ingested operational message traffic and provided the output to a support tracking system, the Electronic Ship Folder, and graphical display program, JMV. Additionally, output from the database must be provided to area Fleet Commanders through an easy to use web page. This web page should contain, at a minimum, the currently supported vessels, a graphic of the track and links to the available message traffic. The last requirement was that the data be available in a format which could be combined with other OTSR center data to create a system that was not only interoperable, but could be used by a center as a backup tool, in the event, that another center needed them to provide backup services for an extended duration of time. By having a system of programs that can parse, track, disseminate and backup the currently used bits of OTSR information, the OTSR program would have a more operationally useful tool to conduct the business of supporting ships. This system would reduce the amount of time it took to review and enter various types of message

data and would reduce the manpower required to maintain current OTSR web pages.

Manual data entry at each center should be limited to only those vessels that are currently being supported by that individual center. Messages being parsed and placed into the database as specific message types (i.e., WEAX, MOVREP, OBSERVATION, ETC.) should be reserved for messages that affect center supported vessels or those messages that are being sent by customers (i.e., observations or MOVREPs) that would be more difficult to separate. Since the parsing program can separate between active vessels (those being supported by the center using the database) and non-active vessels (those not being supported by the center using the database), these two groups of messages should be separated by directory and through database queries to reduce overlap between supporting and non-supporting centers.

2. Data Flow

Figure 64 provides a graphic of the data flow from NPMOC through the processing path. The data flow required messages that were provided by the watch from NPMOC San Diego, and were transmitted to NPS via an ftp transfer. Messages are in an ASCII text format and were ingested into the MPP to determine the message type. Once the message type was determined, parsing criteria determined whether the particular message was to be parsed to the database, to JMV or moved to a new location. If a message type was not determined, then the message was parsed to the database and the file was moved to a general directory, located on the hard drive. As shown in Figure 42, the

database output from the MPP provides the RTE (if available), SHIPNAME, DTG, Subject, message type, a link to the message file, and the parsed text of the message. This text could vary depending on the message type and the processing by the MPP.

Once the messages were processed, the database import file (mess.txt) is imported by the ESF database to feed the Messages table. Database users then review the message traffic from the Messages Form. While using the Message Form, support can be added or updated by manually editing the support data using the information contained in the messages. While the user is reviewing the traffic, the message type and route number are reviewed for accuracy. This information is later used for the html web page creation. While the messages are being reviewed, the user's login is added to the userid field to allow the user to know when all the messages have been review.

In addition to the files provided to the ESF database, files are also provided to JMV. The individually decoded MOVREP and decoded observation file are created and made available to the user to provide to JMV. The MOVREP files can be automatically added to the JMVWIN\NODDSFLS\TRACK directory if the user selects this directory within the MPP. However, the decoded observations are added to the file jmvobs.dat and must be pasted into the appropriate SEA SYNOPTIC REPORT^OS^A^A^A^A^0^N^S^JMV file within the users JMV area directory. Because JMV or METCAST have the potential to make many area boxes, the individual user will need to select the area they wish to add the files too. Additionally, only the most recent observations will be

kept in the JMV file since JMV is an operational system and is not routinely used for data archiving or reviewing historical events. Once the MOVREP is parsed and placed into JMV, the track is exported as a graphic and saved to the designated directory. For this test an images directory was added to the \JMVWIN\NODDSFLS\TRACKS directory. Once the file is created, the image is added to the tracks tab (Fig. 65) in the ESF database. These tracks are later used in the web page generation.

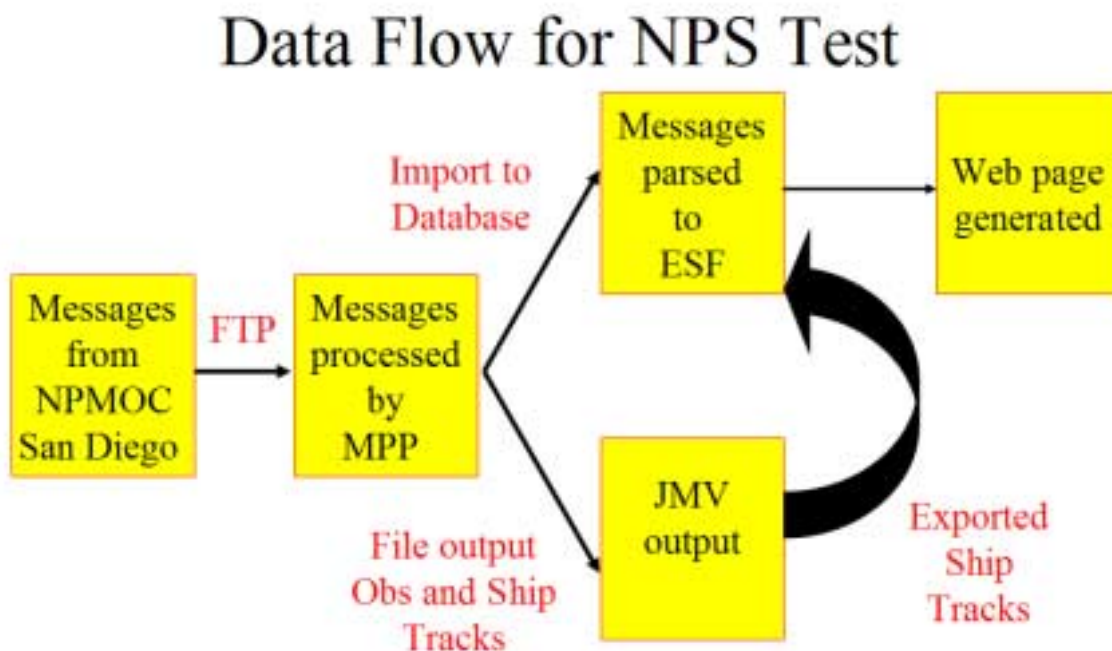


Figure 64: NPS Test Data Flow

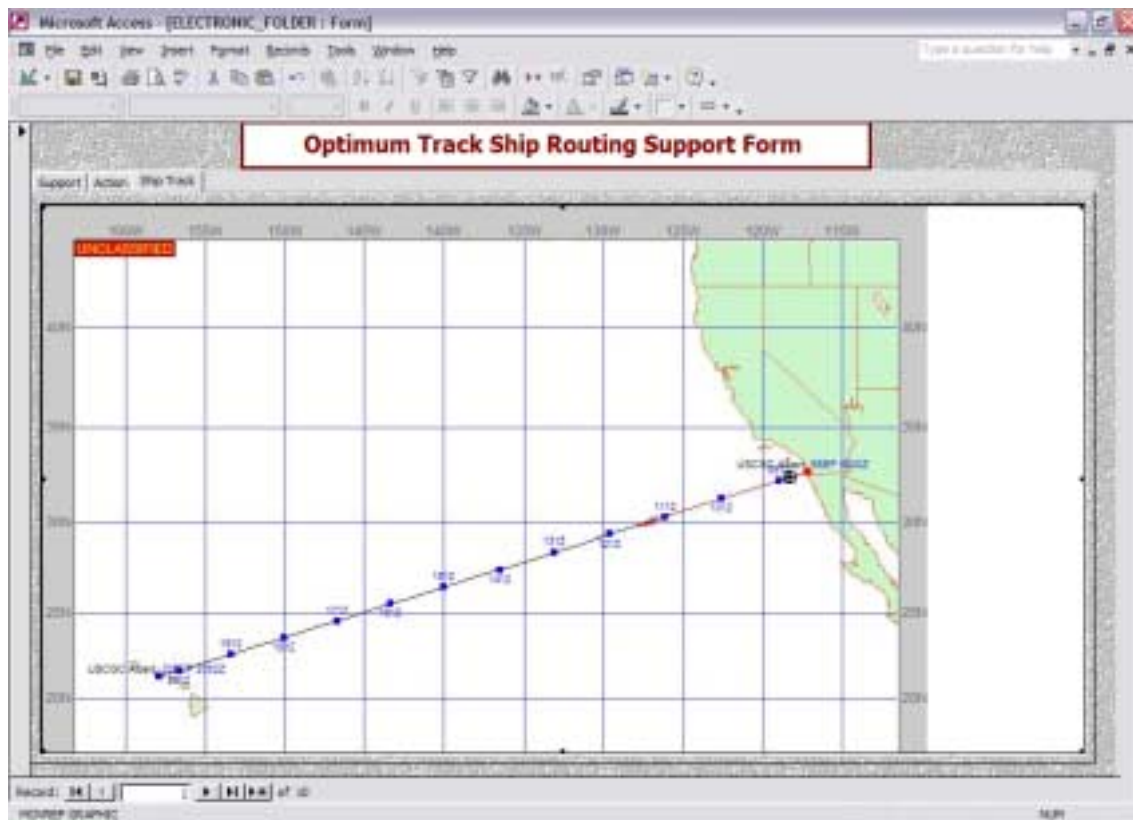


Figure 65: Ship Track display on Ship Track Tab of ESF database

Now that the messages have been parsed, support database is updated, JMV files have been created and imported to the database, the web page generator is ready to be utilized. The web page is created by clicking on the "Create HTML Page" on the Startup form. This generates an index.htm file that provides a listing of all 12 hourly and OPS NORMAL ships under support, a SHIPNAME.htm file that contains links to the available messages for that ship and available track image, and finally a SHIPNAME_MESS.htm file that contains the links to the individual message files.

3. RESULTS

The overall operation of the existing system was satisfactory; however, as the test progressed several deficiencies in the program operation and design were apparent. The results of the individual programs will be discussed in this section with additional requirements to address deficiencies being added and discussed in Chapter V.

a. Message Parsing Program

Overall, the program parses messages correctly with both MOVREPs and Observations being decoded and JMV files generated. In general, MOVREPs were correctly processed about 70% of the time with observations that contained the BBXX identifier being parsed approximately 90% of the time. For MOVREP files, errors were generated when incorrect latitude and longitude points were found for the ETA and ETD lines that only contained a port name and not a lat/long position or when other data was missing from the messages like ship's speed. As an example, a MOVREP was submitted with the track going from Okinawa to Sasebo, Japan. When the parser searched the port list file for the word Sasebo, it matched to the word Aseb. The program does compare latitude and longitude hemispheres; however, since Sasebo and Aseb are in the same hemispheres the file processed normally. Through this test, it is easy to see that much more detailed programming is required to parse the messages to a higher degree of completeness. All files that were run through the program were parsed into the database, except for when fatal errors occurred with the program. These errors usually occurred when twenty or more

messages where parsed at one time and incorrect data values or missing data were processed. Additional errors occurred when the program did not seem to initialize or reinitialize correctly with the right variables. These errors could easily be eliminated with a more complete understanding of Windows based programming in Visual Basic (program operations, file operations, etc.).

b. Electronic Ship Folder Database

The operation of the database was very reliable. Messages were entered into the database very quickly and the OTSR support data could be updated very rapidly. Once all data was updated, the web pages were generated without any missing data and products were available. One problem was found with the ability to import some long messages into the message field of the Message table.

In some cases, messages were truncated due to their length and only some portion of the message was available for review. Clicking on the link to the file and reviewing the text message could overcome this problem. One reason for this error was that Access table fields do not seem to except general ASCII string formatting and line feeds were not accepted to format the message properly. In order to fix this problem, extra spaces were added to fill all lines to 69 spaces and then the forms were adjusted to fit the font; Courier New, 10. This added unnecessary file size and exceeded the 65,536 character limit of a memo field. In most cases, METOC Messages were not affected by this error.

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V. SUMMARY AND RECOMMENDATIONS

A. THESIS SUMMARY

Today's military decision makers have the challenge of receiving and processing more data than has ever been available before. In addition, decision makers must also make decisions faster than in the past since our communications, as well as our enemies systems and reaction times have been greatly improved. In order for METOC products and services to be viable to the decision makers, products must be fully integrated into the decision makers system. This thesis has investigated several means to improve the interoperability of METOC products and services by improving the tactical significance of our products, accessibility to our data, and interoperability between our internal command systems.

In order to improve the interoperability of JMV and METCAST the following capabilities were added:

1. Re-engineered the METCAST Server to allow multiple product types, as well as multiple product variations.
2. Created communication path between JMV and METCAST to allow JMV overlays to be pushed to the METCAST server.
3. Developed user interface to publish products from JMV and retrieve products from the METCAST server.
4. Designed ESRI shape file export capability.

In order to improve the interoperability of the Navy METOC OTSR program the following capabilities were demonstrated:

1. Created a message parser that scanned operational message traffic and provided output to the database and JMV.
2. Upgraded existing database design to include all OTSR data, which is currently maintained in paper folders.
3. Designed database format to be easily transferable between systems to provide backup capabilities between centers.
4. Provided web output from database to provide quick access to all available OTSR data.

B. RECOMMENDATIONS FOR FURTHER IMPROVEMENTS

1. Improved Integration of Shape File Exporter

The Current method of converting XML HWD's or Ship Tracks requires users to utilize a separate executable program requiring them to leave the JMV environment. Since this method is outside the normal operations of the program the procedures are much more confusing and increases the training requirements for the program. This programs needs to be incorporated into the current JMV architecture with standard Windows based programming structure to determine where the XML file is located and where the program should place the converted file.

2. Better Integration of Message Parsing Program and Electronic Ship Folder Database

In order to make the programs more efficient and more user-friendly, the Message Parsing Program and Electronic Ship Folder Database should be combined into a single program that handles the message parsing and data tracking duties of the OTSR Program. Improved error and data quality checking must to be utilized to ensure that the support data is entered into the database correctly.

Additionally, wherever possible, parsed messages should provide inputs to the support database automatically to reduce the time that users must manually enter data. As an example, MOVREP received by ships in centers AOR should be automatically entered with a notification screen telling the router that a new request has arrived.

3. Improved Graphical Display Capabilities

Since the current graphical interface utilizes the JMV display tools and does not have its own inherent system, the currently program is limited to displaying only those products that JMV displays. Since JMV is an operational system, it does not allow historical observations or tracks to be displayed simultaneously. One graphic that should be available is a display that contains all the observations that were received by a certain vessel for each route number. This not only provides verification of position, but provides a quick mechanism to verify forecasts. Additionally, other graphical products such as a ship track with current satellite data, or a meteogram using the ships observational data would be very valuable to OTSR routers. Appendix A displays several other products which this author believes should be incorporated into the graphical display from this program.

4. Improved Statistical Analysis

The current ESF database only provides access to the text messages and requires the user to manually parse a majority of the needed information within the message. Improved data parsing is required to allow the system to have access to specific data types that would be useful to the user of the system. As an example, observations need

to be parsed in finer detail, in order to track the individual parameters of the observation for trend analysis or graphical displays (e.g., graphic of changing wind speed and direction with time or sea and swell wave height data).

C. OPERATIONAL IMPLEMENTATION

All JMV and METCAST upgrades are under review to be implemented as operational products in the next SPAWAR's release. The ability to transfer HWD's and ship tracks between METCAST users is needed by all METOC Regional centers, not only to support internal requirements, but also to supply JMV created products to their local customer base. Dialogs have been initiated between the centers to provide necessary training and guidance to implement the system in the near future.

APPENDIX A: OTSR GRAPHICAL DISPLAYS

This appendix shows several examples of products that should be available from an graphical display system that is incorporated in an OTSR routing support tool.

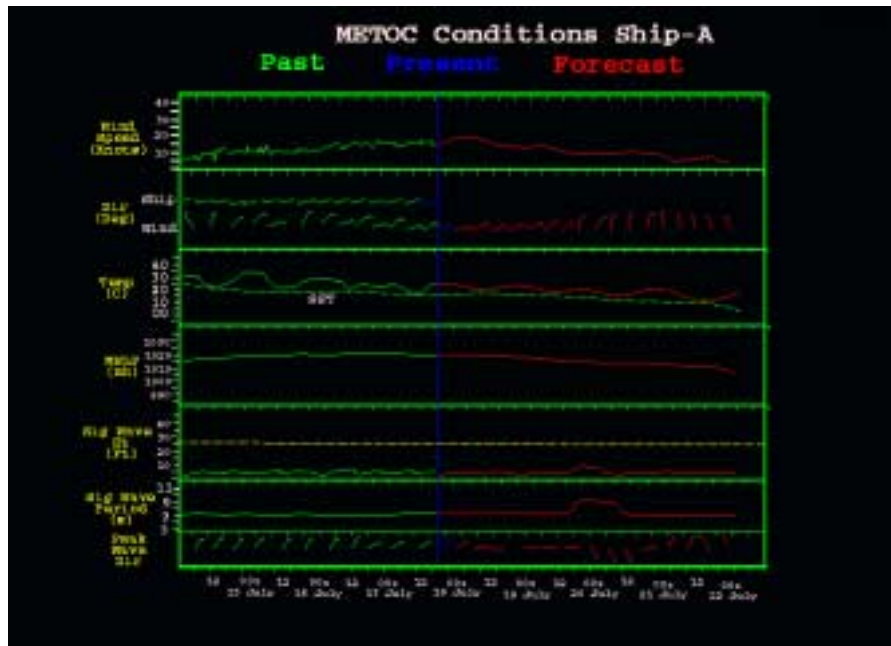


Figure 66: Modified Meteogram using Ship Observations and Model Forecasts

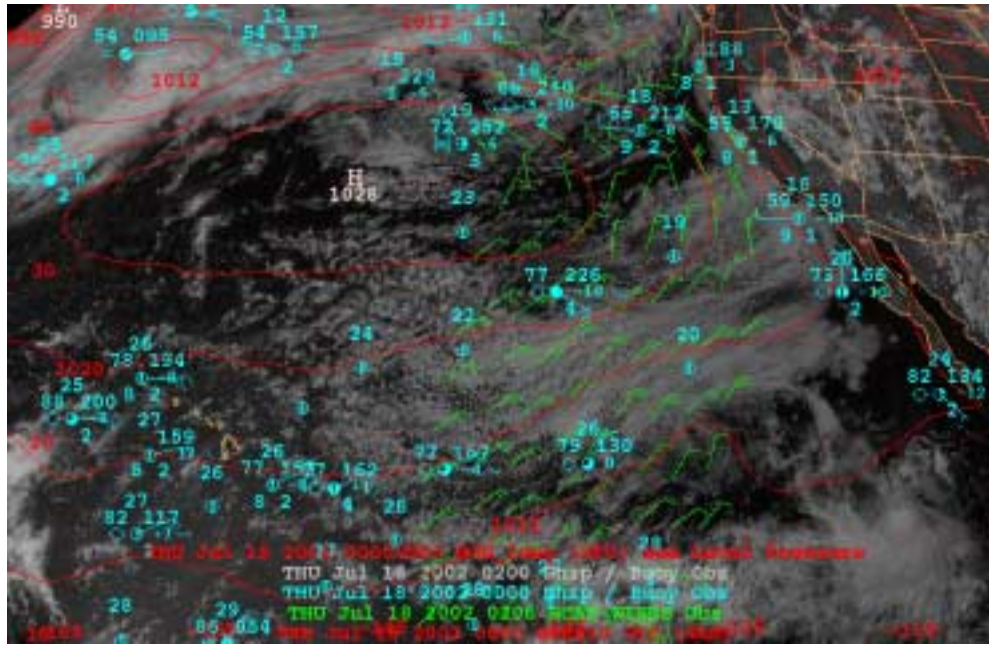


Figure 67: Ship Position with Model Pressures, Scatterometry Winds, Buoy Observations and Visual Satellite Images

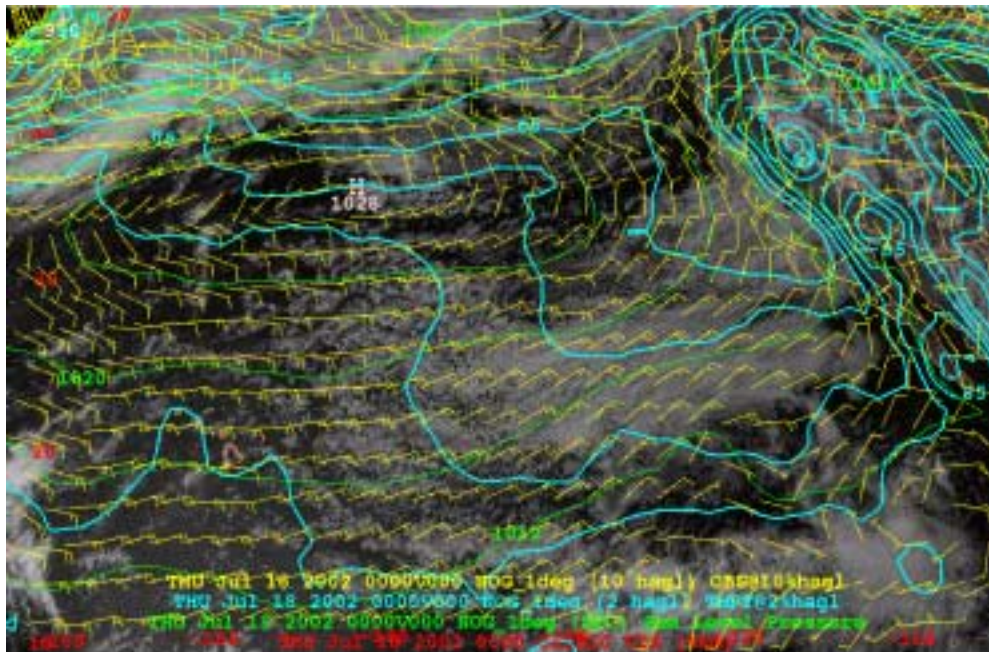


Figure 68: Satellite Overlaid with Model Surface Heights, Mean Sea Level Pressure and Surface Winds

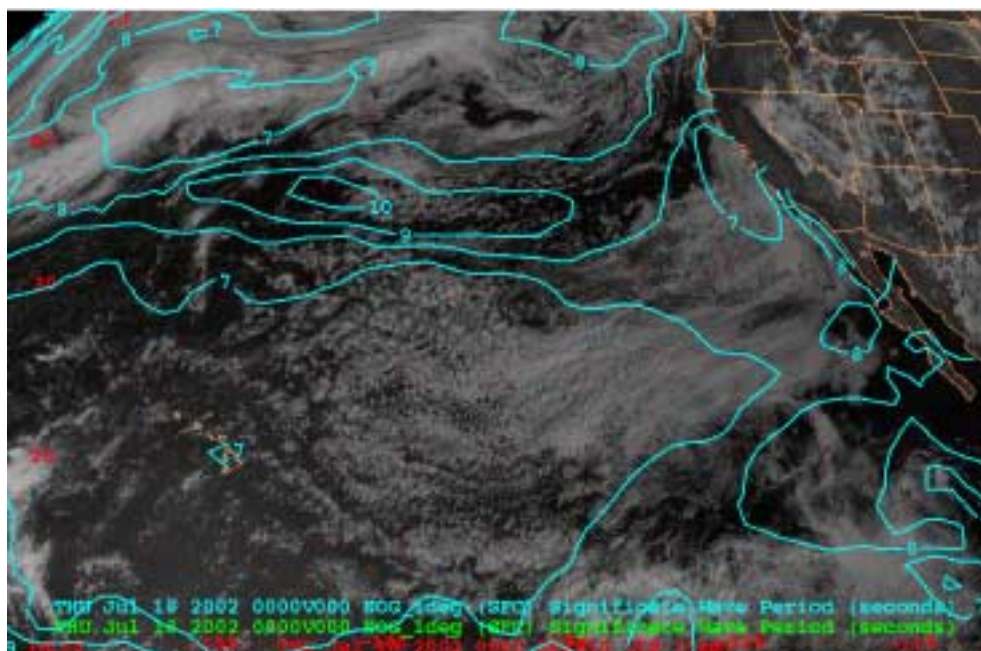


Figure 69: Satellite with Significant Wave Period

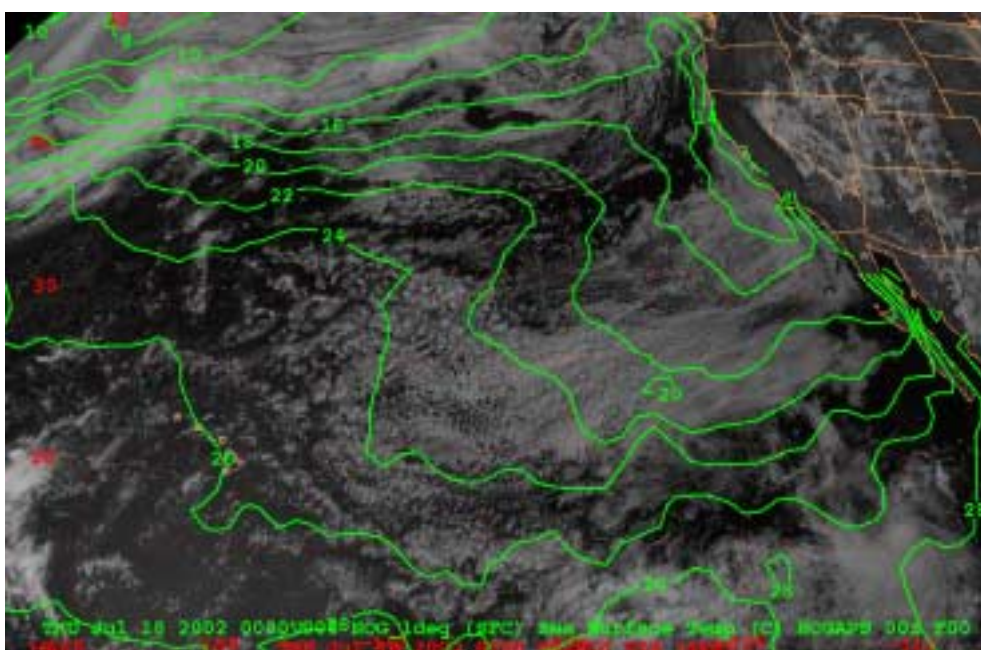


Figure 70: Satellite with Sea Surface Temperatures

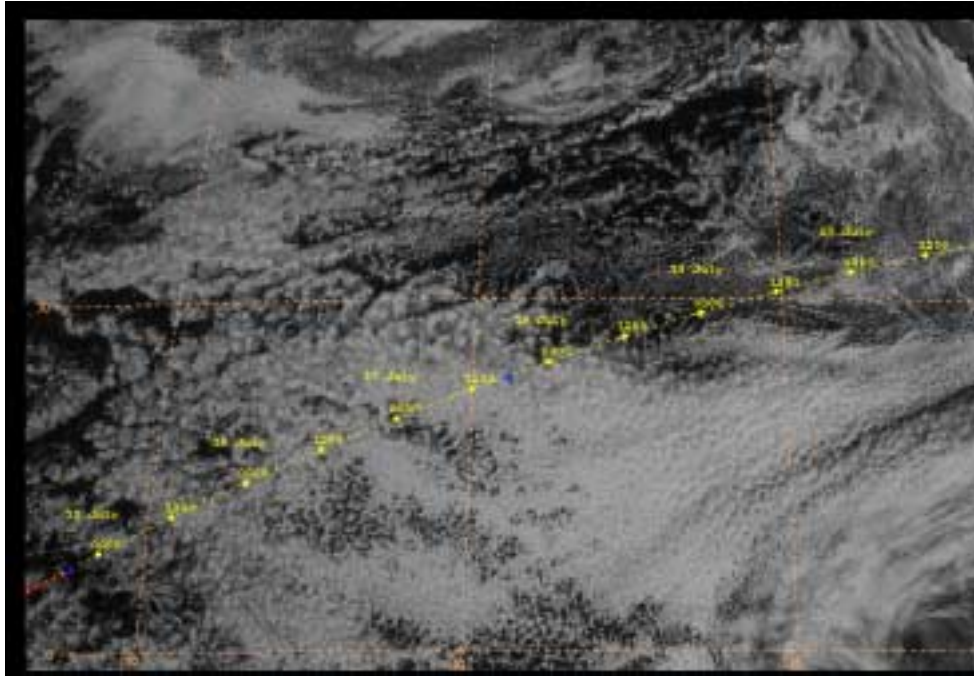


Figure 71: Satellite with Ship Track

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