



# Mariners Weather Log

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## Marine Meteorological and Oceanographic Guidance Products from the National Centers for Environmental Prediction

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### I. INTRODUCTION

NMC was reorganized as a part of the National Weather Service's (NWS) modernization and restructuring into what is now referred to as NCEP in 1995. NCEP is divided into nine centers: seven are forecast centers, one is a modeling center, and one is a computer operations center. Of the nine centers, three have marine meteorological and oceanographic responsibilities:

- The Marine Prediction Center (MPC)
- The Tropical Prediction Center (TPC) (formerly known as the National Hurricane Center)
- The Environmental Modeling Center (EMC) (specifically, the Ocean Modeling Branch [OMB])

The MPC and TPC provide forecasts to the marine community and guidance to coastal Warning and Forecast Offices (WFOs). The OMB creates and provides guidance to the MPC, the TPC, and WFOs. Many of these products are also available to the

public on the Family of Services or Internet, the appropriate interpretation of these products always comes from the field office charged with a given marine responsibility. In this article, the responsibilities of the OMB are discussed. Also a brief list of the guidance products produced by the OMB is given. In addition, dissemination of the products is discussed. In future articles other aspects of the marine guidance products or forecast products produced by NCEP will be discussed.

### II. RESPONSIBILITIES OF THE OMB

The primary responsibilities of the OMB are to:

- Prepare and disseminate operational marine guidance material to NOAA field forecast offices and the civil sector
- Develop improved numerical analysis techniques
- Develop state-of-the-art numerical forecast model output products
- Evaluate and improve the quality of the guidance products and develop new products to accommodate user needs
- Provide special support for the quality control of remotely sensed measurements of winds and waves

Because the primary function of OMB is to produce operational guidance products, the emphasis is on applied research and technology transfer whenever possible. For convenience the activities of the OMB are carried out in the following broad areas:

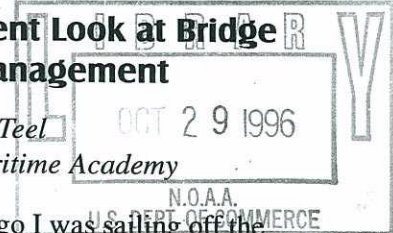
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## On the Bridge

### The Old Man's Chair

#### A Different Look at Bridge Team Management

J. Samuel Teel  
Maine Maritime Academy



Years ago I was sailing off the board from the New York union hall. After a week or so I landed a berth as third mate aboard a SeaLand ship. She paid well and had a good itinerary that took her to northern Europe and Spain before returning to the United States. The bonus came when I learned who the captain was. I had sailed with him off and on for a number of years and had always enjoyed the trips with him. His ship always ran well, everybody got along, and things went smoothly.

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## From the Editor

This issue of the Mariners Weather Log marks the second in what I hope will be a long and enjoyable relationship.

I have received many calls and letters from readers. Overall, the response to the changes we have been instituting has been very positive. One point that seems to come up in almost every piece of correspondence I've received so far is that the new format "seems to be missing the cover," and "where are all the great pictures?" The "news-letter style" format we are using commences with articles on the first page—as opposed to a magazine format which allows an introductory cover page. Also, if you send us pictures, we will use them. We can't afford to pay for them, and we would like to keep them if we get them (we are thinking of putting together a "scrapbook" of MWL pictures on CD-ROM, what do you think?).

I would like to start a "Letters to the Editor" department. That way, other readers would get a chance to see the kind of comments that are coming in, and maybe comment themselves. If I get enough letters, I'll start with the next issue. Remember, though, the deadline is October 15, so if you want to send me an uncomplimentary letter, send it after that (just kidding!). As I said before, please keep those comments (positive and negative) coming. They will help both us and

the "powers that be" tremendously in determining the future course of the Log.

As to this issue, I think you will find it as entertaining and informative as the last. Sam Teel's "On the Bridge" article teaches us both humility and humanity, not to mention respect. We also have an article from Dr. Gray of Colorado State University. Dr. Gray's column will now be a regular feature and we thank him for his generous contributions to the Log. The VOS Cooperative Ship Reports highlight some of those vessels that make the program work. And the articles on physical oceanography, biology, Great Lakes shipwrecks, and underwater archeology are as entertaining as they are informative.

On August 15, 1996, there will be a change of e-mail addresses for some government employees. We did not receive all of the new addresses in time for inclusion in this issue, but keep a lookout; they will be in the next issue for sure. Our e-mail address ([wvrs@erols.com](mailto:wvrs@erols.com)) will not be affected.

I'm sure you would like to get on to the *real* reading material, so I'll end for now. And as the skipper who taught me everything I know about boating said: "Keep the wet side down!" I wonder what I'm supposed to do when it rains...

John Oscanyan

## Products

*Continued from Page 1*

- Marine Meteorology
- Ocean Wave Dynamics and Modeling
- Coastal Ocean Forecasting
- Polar Seas and Great Lakes Ice Modeling
- The National Marine Verification Program (NMVP)

### III. PRODUCT LISTS

The products are listed by development group within the OMB. A brief description of the NCEP models used to produce the products listed is presented. The list gives the product and the generating model if applicable. For more complete details, see Burroughs (1995).

#### A. Marine Meteorology

The NCEP runs three operational analysis and numerical weather prediction models which are available to provide marine information over the oceans twice a day at 0000 UTC and 1200 UTC. These models include: a global spectral forecast model; a regional analysis and forecast model (RAFS); and a newly implemented regional "ETA" model. Most marine applications have been made by using the aviation run (AVN) of the Global Spectral Atmospheric Model. Products include:

- Ocean surface winds (AVN)
- Coastal and Great Lakes Statistical Wind Forecasts (RAFS)
- Santa Ana Regime and Wind Forecasts (RAFS)
- Superstructure Ice Accretion (AVN)
- Open Ocean Sea Fog and Visibility (AVN)
- Satellite Ocean Surface Wind and Wave Products

#### B. Ocean Wave Dynamics and Modeling

During the last five decades, wind wave forecasts have improved significantly from the empirical approaches of the 1940s and '50s to the spectral approaches of today. The NCEP has continuously made a systematic effort to test and develop models based on sound wave dynamics, prediction accuracy, and computational efficiency and to employ them to produce operational forecasts. Currently, a deep water global model and two variable depth regional models (for the Gulf of Mexico and the Gulf of Alaska) are operational.

##### 1. *Global Spectral Wave Model*

This is a third generation wave model called WAM (Chen, 1995) and incorporates the most updated dynamics in wave generation, dissipation, and non-linear energy transfer processes. Products from this model include:

- Significant wave heights
- Mean propagation of the wave spectrum
- Mean period of the wave spectrum
- Matrices of spectral energy densities as a function of frequency and direction at selected locations

##### 2. *Regional Wave Models*

Regional wave forecasting models are concerned with forecasting wave conditions over a limited area (less than global) which is characterized by unique environmental conditions (physiographic, meteorological, and oceanographic) such that a global scale wave model is unable to provide adequate wave information for that particular area. There are two regional models currently operational over the Gulf of Mexico and Gulf of Alaska.

##### a) Gulf of Mexico Regional Spectral Wave Model

This model is a second generation spectral wave model (Chao, 1991) applicable for both deep and shallow water areas of the Gulf of Mexico. It solves a spectral energy balance equation involving wave growth by winds, refraction by bottom bathymetry, energy loss due to whitecapping and bottom friction, as well as parameterized wave-wave energy transfer. The Gulf is assumed to be an enclosed basin.

Model outputs include:

- Significant wave heights
- Prevailing wave direction either of the wind-sea or the swell

##### b) Gulf of Alaska Regional Spectral Wave Model

The structure of the Gulf of Alaska model is essentially the same as Gulf of Mexico model; however, unlike the Gulf of Mexico which can be considered an enclosed basin, the Gulf of Alaska is open to the Pacific Ocean. Hence, the wave conditions inside the Gulf are determined by the wave trains propagating into the Gulf from the open ocean as well as the local winds over the Gulf. In this model, the waves propagating in from the Pacific across the mouth of the Gulf are obtained from the operational global wave model.

Products include:

- Significant wave height of combined sea and swell
- Period and direction associated with the peak energy of the directional spectrum
- Significant wave height, mean period and mean direction of the swell

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## Products

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- Significant wave height and mean period of the wind-sea

### C. Polar Seas and Great Lakes Sea Ice

Official ice analyses and forecasts are produced by the National Ice Center (NIC) by combined NOAA, U.S. Navy, and U.S. Coast Guard efforts. At this time the only product routinely produced and disseminated by NCEP is a set of drift sea ice vectors for the northern and southern hemisphere. The drift vectors are forecast out to seven days.

### D. National Marine Verification Program

The objectives of the NMVP are to help:

- WFO forecasters identify strengths and weaknesses in forecast skill
- NCEP distinguish good and bad points in their guidance
- Program managers discriminate assets and liabilities in marine services

Observed data, WFO forecasts, and NCEP guidance data are merged together for specific verification times into a Marine Verification Matrix (MVM). The data in the matrix are used to evaluate forecasts of four forecast elements: wind direction, wind speed, significant wave height, and SCAs/wind warnings.

### IV. EXPERIMENTAL AND DEVELOPMENTAL PRODUCTS

In addition to the operational products which run on a regular basis without interruption, except on extremely rare occasion, there are two additional classes of products: experimental and

developmental. Experimental products are ready for general comment and public dissemination on the Internet. Developmental products are not ready for general comment or public dissemination. They are given limited distribution on the Internet. Experimental and developmental products are produced by the following projects:

- East Coast Regional Wave Model
- Coastal Ocean Forecast System - East Coast Region
- Polar and Great Lakes Ice Prediction Systems

### V. PRODUCT DISSEMINATION

Operational products are sent out to field offices on various internal NWS communications circuits plus the Family of Services circuits to the public. Many are on the Internet as well.

Experimental and developmental products are available on the Internet only. Developmental products are available only to select evaluation groups on the Internet.

Most products are updated twice a day about 6-h after cycle time (0000 or 1200 UTC). Global products are available with projections out to 72-h, while regional products are available with projections out to 48-h. See Burroughs (1995) for full details.

Information about these products and many of the operational and experimental products are available for viewing on the Internet at the EMC or OMB home pages. The EMC home page is found at <http://nic.fb4.noaa.gov:8000>. The OMB home page is found at <http://polar.wwb.noaa.gov/>.

### VI. SUMMARY AND FUTURE PLANS

The products listed here are not expected to be static and unchanging; rather, they will undergo periodic re-examination, in view of the latest technical advances, to determine their value to users and their validity. Plans for improving the existing material and developing new products are continually evolving and parallel the progress in the art of numerical weather and ocean prediction, improved analysis techniques, increased availability of data from future satellites, and the advent of advanced dissemination systems.

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