P1.35

THE OBSERVING SYSTEM MONITORING CENTER: A TOOL FOR THE EVALUATION OF THE GLOBAL OCEAN OBSERVING SYSTEM

Kevin O'Brien[1*], Kevin McHugh[1], Gabriel Vecchi[1],
Ed Harrison[2], Steve Hankin[2], Ansley Manke[2]

[1]JISAO/Univeristy of Washington
[2]NOAA/PMEL

1. INTRODUCTION

In order to properly understand climate variability, the development, evaluation and maintenance of a sustained global observing system is required. As the Intergovernmental Panel on Climate Change (IPCC 2001) states, "Concern has been expressed about the present condition of the observational networks." Kevin Trenberth adds, "To advance the understanding of climate change and its forcings, it will be necessary to have a comprehensive global observing system reliably producing high-quality data and products." (Trenberth 2002). The Observing System Monitoring Center (OSMC) is being constructed in order to assess the effectiveness of the current global ocean observing system as well as to aid in the planning and evaluation of new observing system components. Currently, the observing system for climatic data consists of a variety of sensors measuring a multeity of physical variables from numerous platforms. Ensuring the effectiveness of the observing system requires software and data systems to keep track of the performance of the different sensors in near-real time. The near-real time data access is critical to promptly overcome any shortcomings of the observing system. The goal of the OSMC is to fill the clear need for near-real time overseeing of the global ocean climate observing system. The OSMC will be an information gathering, decision support and display system and will also display current historical status of globally distributed data collection systems. In addition, the OSMC will provide the data visualization tools necessary to identify the coverage of any given collection of platforms and parameters.

2. FEATURES OF THE OSMC

The OSMC shows the types, location and timing of observations throughout the global oceans. This metadata is based on the in situ observations available from the National Centers for Environmental Prediction (NCEP) and the U.S. Global Ocean Data Assimilation Experiment (GODAE) server, which receive their data from the Global Telecommunications System (GTS). The OSMC currently uses data from the U.S. GODAE server for sub-surface observations and NCEP data for surface observations. The metadata values are quality controlled by the OSMC in that they are compared to normal geophysical constraints and, if valid, are binned into one-degree latitude and longitude bins. All data falling into a particular bin are counted to create a final tally of daily observations in that bin. The data are available beginning in September 1991 and are currently being updated on a monthly basis.

Designed to be used by both high level planners and scientists, the OSMC has two separate user interfaces: the OSMC executive user interface and the OSMC Live Access Server (LAS) user interface. The OSMC LAS will be discussed further in the Future Development section. The OSMC executive interface has four different components: Observational density, in situ sea surface temperatures (SST) observations, in situ SST and salinity profile observations, and observational density animations.

2.1 OBSERVATIONAL DENSITY

The observational density page allows the user to view the spatial density of observations for several different variables: SST, sea level pressure (SLP), air temperature, dew point, wind speed/direction and cloud cover. The values are obtained by using the aggregate of several observational sources, including ships, drifting buoys and fixed or moored buoys. The user may choose to see the spatial density of these observations as a function of the combined sources, or from each individual source. Since the goal of the OSMC is to monitor the sufficiency of observations, a threshold of minimum number of observations in a 5x5 degree box is also applied. The preset values of the selectable threshold range are 1, 5, 10, 15 or 25 observations. The user is able to select either a running time series or a map of a given year. Figure 1a and 1b illustrate a sample of each.

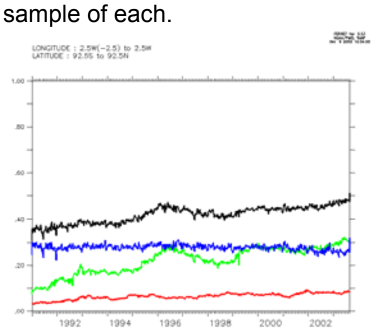

Figure 1a. Time series plot from the OSMC Observational Density data page

*Corresponding author address: Kevin O'Brien, NOAA/PMEL, 7600 Sand Point Way NE, Seattle, WA 98115-6349; Kevin.M.O'Brien@noaa.gov

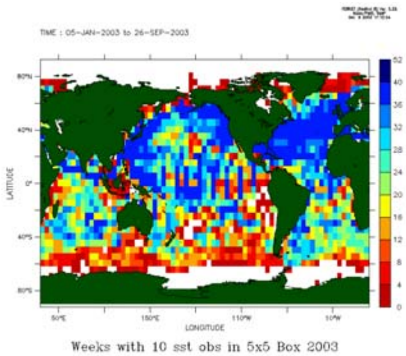

Figure 1b. Global View plot from the OSMC Observational Density Page.

2.2 IN SITU SST OBSERVATIONS

For sea surface temperature (SST), the OSMC allows the user to view monthly observations of a given year from the specified platform. Available platforms include ship, drifting buoy and moored or fixed buoys. The user can view observations associated with each individual platform, all platforms combined, or all buoy platforms. The resulting plot shows the location of SST observations taken during the given month, and also the value of that SST observation. Figure 2 illustrates a sample plot.

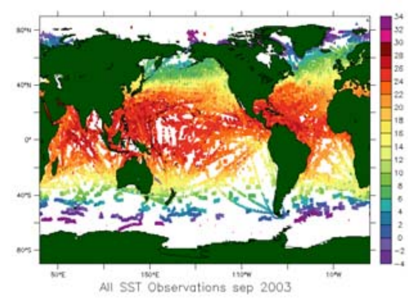

Figure 2. SST observation plot of Sept. 2003 from the OSMC

2.3 IN SITU PROFILE OBSERVATIONS

Also available on the OSMC are sub surface observations retrieved from the US GODAE served data. Temperature and salinity data are available as monthly products beginning in September 1991. When a user requests a given month and variable, the depth of the sub surface observation for the chosen variable is displayed. Figure 3 illustrates a sample plot.

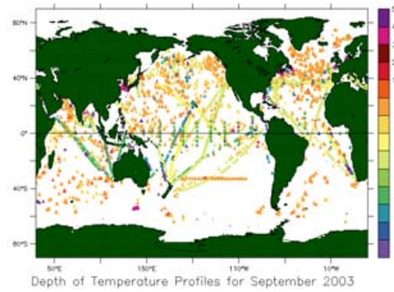

Figure 3. Sub surface observation plot for Sept. 2003 from the OSMC.

2.4 OBSERVATIONAL DENSITY ANIMATIONS

Finally, the executive interface page of the OSMC contains a selection of observational density animations for SST, SLP and wind observations. These animations were created using three different minimum number of observation thresholds. The thresholds used are 5, 10 and 25 monthly observations in a 5x5 degree box.

3. FUTURE DEVELOPMENT

An important, and key future aspect of the OSMC is the development of the OSMC Live Access Server (LAS). The OSMC LAS will supply customized visualizations of global observational data. A prototype of the LAS is available and provides a view of the spatial density of observations at a 5x5 degree resolution. The operational LAS will provide more detailed control over visualizing and evaluating the global observing system. Both the LAS and the executive user interface will continue to be developed as components of the Observing System Monitoring Center. In addition, more detailed databases will be developed to contain complete metadata for all of the in situ observations, rather than simply the gridded summaries. This addition will make it possible to track the performance of individual instruments. This near-real time access to the data will facilitate quickly rectifying any shortcomings or identifying any problems with the observing system elements.

4. CONCLUSION

According to Kevin Trenberth, "there is a need to set observations in the appropriate framework in order to obtain value from the data [collected]. A climate observing system must go beyond the climate observations themselves to include the processing and support system that leads to reliable and useful products." (Trenberth, 2002). The function of the OSMC will be as an oversight facility which will be able to, with near-real time data, identify problems and shortcomings in the global observing system. This will be an important role in what the IPCC indicates is required to better understand climate change, namely "global data that clearly document the state of the system and how that state is changing as well as observations to illuminate important processes more clearly" (IPCC 2001).

5. ACKNOWLEDGEMENTS

This publication is funded by the Joint Institute for the Study of the Atmosphere and Ocean (JISAO) under NOAA Cooperative Agreement No. NA17RJ1232, Contribution #1028.

6. REFERENCES

IIPC (Intergovernmental Panel on Climate Change), 2001:Climate Change 2001: The Scientific Basis. J.T. Houghton et al., Eds., Cambridge University Press, 881 pp.

Trenberth, K. E., T. R. Karl and T. W. Spence, 2002: The Need For a Systems Approach to Climate Observations. Bull Amer. Meteor. Soc., 83, 1558-1559 (abstract) 1593-1602