Ocean Surface Topography Data Products and Tools

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Abstract— **The Physical Oceanography Distributed Active Archiving Center (PO.DAAC), NASA's primary data center for archiving and distributing oceanographic data, is supporting the Jason and TOPEX/Poseidon satellite tandem missions by providing a variety of data products, tools, and distribution methods to the wider scientific and general community. PO.DAAC has developed several new data products for sea level residual measurements, providing a long-term climate data record from 1992 to the present. These products provide compatible measurements of sea level residuals for the entire time series including the tandem TOPEX/Poseidon and Jason mission. Several data distribution tools are available from NASA PO.DAAC. The Near-Real-Time Image Distribution Server (NEREIDS) provides quick-look browse images and binary data files. The PO.DAAC Ocean ESIP Tool (POET) provides interactive, on-line data subsetting and visualization for several altimetry data products.**

Keywords-altimetry; near-real-time; sea surface height; TOPEX/Poseidon; Jason-1; operational oceanography

I. INTRODUCTION

The Jason altimetric satellite, launched December 2001, continues the work of the highly successful, on-going, TOPEX/Poseidon (T/P) satellite in mapping the global sea surface topography. In combination, these altimetric satellites provide high-resolution measurements, sampling the global ocean on 10-day exact repeat cycles.

The T/P and Jason missions are jointly conducted by the French Space Agency, Centre National d'Etudes Spatiales (CNES) and the United States National Aeronautics and Space Administration (NASA); both the CNES Archivage, Validation et Interprétation des données des Satellites Océanographiques (AVISO), the French multi-satellite databank dedicated to space oceanography, and the NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) distribute these data to the international science community.

For more information about data products and services available from PO.DAAC, see http://podaac.jpl.nasa.gov/

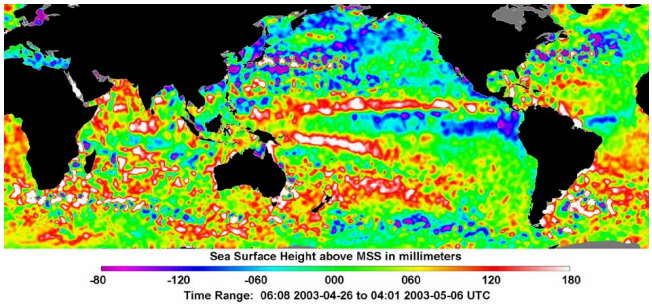

Figure 1. Sea surface height anomaly from Jason and T/P tandem mission

II. ALTIMETRY DATA PRODUCTS

NASA PO.DAAC distributes various ocean surface topography data, including near-real-time and higher quality, validated science products. Science data products are intended for research use, e.g., ocean circulation (global and mesoscale), ocean variability (seasonal, annual, and decadal), El Niño & La Niña forecasting, and climate studies. Near-real-time (NRT) data are primarily used for operational oceanographic applications, e.g., seasonal ocean forecasting.

A. Altimetry Data Products

- Jason-1 Geophysical data Records (GDR) are full accuracy altimeter data with the high precision orbit (3.3 cm sea level accuracy), provided approximately 35 days after data collection and contain all relevant corrections needed to calculate the sea surface height. This science data product is generated by the Jason Project.
- Jason and TOPEX/Poseidon Sea Surface Height Anomaly (SSHA) data correspond to the 1/second along-track Geophysical Data Record. Sea surface height measurements are corrected for atmospheric effects (ionosphere, wet and dry troposphere), effects due to surface conditions (electromagnetic bias), and other contributions (ocean tides, pole tide, and inverse barometer) using Jason models, providing compatible measurements of the sea level residuals for the entire time series including the tandem TOPEX/Poseidon and Jason mission.
- Jason and TOPEX/Poseidon Along-Track Gridded Sea Surface Height Anomaly data are interpolated to a

reference track of standard latitude and longitude locations that are common to every cycle, allowing for a direct cycle by cycle comparison.

B. Near-Real-Time Altimetry Data

As orbit determination techniques and geophysical correction models have improved, the latency to produce altimetry products also has been reduced, resulting in higher quality, near-real-time altimetry data. The following near-real-time altimetry products are available from NASA PO.DAAC:

- Jason Near-Real-Time Sea Surface Height Anomaly (NRTSSHA) data are generated with a latency of 3-5 hours from the time of the last measurement received from the satellite. Data are derived from a combination of altimeter and radiometer data from the Jason-1 Operational Sensor Data Record (OSDR), a NRT GPS-based orbit (5 cm sea level accuracy), and atmospheric pressure fields from the National Center for Environmental Prediction (NCEP).
- TOPEX/Poseidon NRTSSHA data for a particular UTC day are generated with a latency of approximately 18 hours from the time of the last measurement in that UTC day. Data are derived from a combination of altimeter and radiometer data from the T/P Quick-Look Interim Geophysical Data Record, a next-day GPS-based orbit, and NCEP atmospheric pressure fields.
- Jason-1 Interim Geophysical Data Records (IGDR) are full accuracy altimeter data with the exception of an interim orbit (3.9 cm sea level accuracy), provided within 1-3 days of data collection. IGDR data contain all relevant corrections needed to calculate the sea surface height. This science data product is generated by the Jason Project.
- Jason-1 Operational Sensor Data Records (OSDR) are provided every 2 hours and within 3 hours of data collection. They contain wave height, wind speed and water vapor measurements. This science data product is generated by the Jason Project.

III. Distribution Services and Tools

Several data distribution methods and tools are available from NASA PO.DAAC. In addition, PO.DAAC continues to explore new technology for rapid data distribution.

A. Near-Real-Time Image Distribution Server (NEREIDS)

The Near-Real-Time Image Distribution Server (NEREIDS) provides quick-look browse images and binary data files of ocean surface topography measurements within 3 hours of observation. Images include significant wave height, wind speed and water vapor content and sea surface height anomalies. In addition, sea surface temperature, ocean vector winds, land and sea ice satellite browse images also are available from NEREIDS within a few hours of capture.

For more information, see http://podaac.jpl.nasa.gov/nereids/

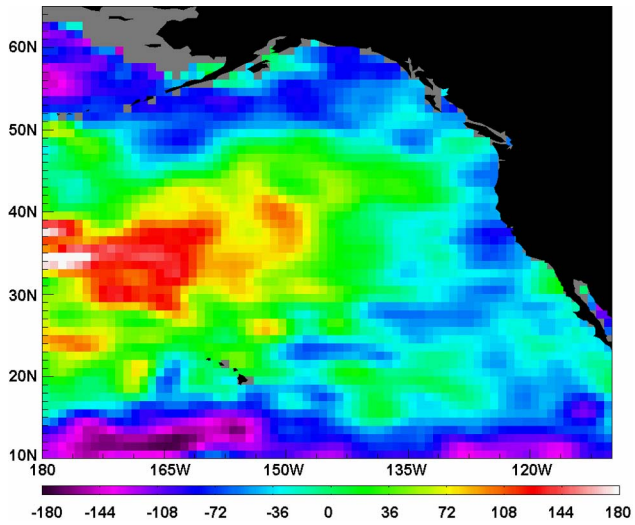

Figure 2. Regional subset of T/P Sea Surface Height Anomaly data for the period November 19-23, 2000, generated by POET

B. PO.DAAC Ocean ESIP Tool (POET)

The PO.DAAC Ocean ESIP Tool (POET) provides interactive, on-line data subsetting and visualization for many of PO.DAAC's data, including several altimetry data products. Output is returned as a latitude-longitude map, animation, time-series graph, or space-time profile. Data output options include GIS formats (GeoTIFF, ArcGrid), image formats (GIF, PNG, JPEG), science data formats (HDF, netCDF), binary data, and ASCII text. This interface was developed by the Ocean ESIP, a member of the Earth Science Information Partner (ESIP) Federation.

For more information, see http://podaac.jpl.nasa.gov/poet/

IV. Summary

In addition to ocean surface topography data, PO.DAAC is a multi-mission data center, distributing ocean vector wind, sea surface temperature, atmospheric moisture, land/sea ice and gravity data. The PO.DAAC, an element of the Earth Observing System Data Information System (EOSDIS), and a member of the DAAC Alliance, distributes products from NASA's Earth Science Enterprise (ESE) Earth Observing System (EOS) project, as well as through partnerships and cooperative agreements with other organizations and institutes within and outside the United States.

All PO.DAAC holdings are free of charge to scientists, educators and the community at large. However, any products freely obtained from the PO.DAAC may not be redistributed for profit.

Acknowledgment

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