Products, tools and services from the Physical Oceanography DAAC

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Jet Propulsion Laboratory
California Institute of Technology
PO.DAAC Data Holdings

- Sea Surface Temperature
- Sea Surface Height / Altimetry
- Ocean Winds
- Multi Parameter Products
- Educational/Informational Products
JPL Physical Oceanography DAAC

- EL NINO PREDICTION
- SEA LEVEL RISE
- WEATHER FORECAST
- GLOBAL CLIMATE CHANGE RESEARCH

NEAR SURFACE WIND VECTOR

SEA SURFACE TEMPERATURE

Global Mean Changes in Sea Level and Sea Surf Temperature

- Seasonal variations removed
- 60-Day smoothing applied

NEREM(2001)
Physical Oceanography Distributed Active Archive Center (PO.DAAC)  
Manage and deliver physical oceanographic data

- Main clearinghouse for satellite data sets that describe the physical state of the ocean, including sea surface temperature, height, and vector winds.
- Archive in support of JPL flight projects.
- Manage near-real-time data streams, including quality control & status checks.
- Tools for near-real-time visualization of all products.
- User Support Services provide technical and scientific expertise for all PO.DAAC data.
- Subsetting of global satellite products.
- Output data in different formats for maximum user flexibility.
- Visualization and animations of data sets.

Serving NASA Missions and the Nation with Global Physical Oceanic Data and Information

- Sea Surface Height: JASON, TOPEX
- Sea Surface Temperature: AVHRR, MODIS, etc.
- Vector Winds: QUIKSCAT, NSCAT
- NRT Data Management
- Data Archive & Stewardship
- Data Discovery
- Data Presentation (e.g. POET, Subset)
- NASA Science Community
- U.S. Agencies: NOAA, Navy, Government
- International Agencies: CNES, AVISO, JAXA, IFREMER, British Met. Office
- National/International Science, Governmental & Educational Community

DATA SUPPLIERS
JPL PO.DAAC
DATA CUSTOMERS
QuikSCAT winds

25 km

12.5 km
Wind Stress (and curl)
Altimetry

- Jason Geophysical Data Record (GDR)
  - Full accuracy altimeter data with the high precision orbit
  - Provided in approximately 30 days of data measurement
  - Validated data product
  - 3.3 cm sea level accuracy
  - Near realtime SSH anomaly available within hours at about 4.5 cm accuracy
Sea Surface Temperature

- Global Terra & Aqua MODIS 4 km
- Global 4 km Pathfinder SST (1985-2005)
- Longest time series of AVHRR from 1981 (MCSST)
- GHRSSST

Aqua SST, 1-8 Apr 2006
PO.DAAC Ocean ESIP Tool (POET)
http://poet.jpl.nasa.gov

• POET is an interactive, on-line system
  – Subsetting capabilities
  – Data visualization

• Output options include:
  – Latitude-longitude map
  – Animation
  – Time-series graph
  – Space-time profile

• Data format options include:
  – GIS formats (GeoTIFF, ArcGrid)
  – Image formats (GIF, PNG, JPEG)
  – Science data formats (HDF, netCDF)
  – Raw data (binary, ASCII)
PO.DAAC Ocean ESIP Tool (POET)

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

Ten-year time series of regional subset (left), starting January 1, 1994, generated by POET
Near-Real-Time Image Distribution Server (NEREIDS)

http://nereids.jpl.nasa.gov

• near-real-time browse images include:
  – sea surface height
  – sea surface temperature
  – ocean vector winds
  – land and sea ice
Data distribution and discovery

• FTP (w/ bandwidth optimization)
• POET (World Map Server)
• NEREIDS (Near realtime imagery)
• OPenDAP
• GHRSSST metadata catalog
• New technology:
  – “data casting” (i.e, RSS for data products)
  – L2 subsetting
User scenarios
Operational (Near-Real-Time) User

- Subscription service to data products by user-defined spatial domain
- Receive automated notification as data become available or receive a direct push
- Example: user wants daily wind vectors for North East Pacific Ocean
User wants multiple measurements co-registered to the same time/space grid

Example: AVHRR SST and Topex/Poseidon sea level data at 1x1 degree grid
Interdisciplinary Research User

- User wants to overlay different measurements in selected region (contours or vectors over color image)
- Example: combination of Topex/Poseidon/Jason sea surface height from and SeaWiFS ocean color imagery shows small eddy of Drake Passage
- Note: data products may reside remotely
Research User

• User obtains a monthly salinity map from PO.DAAC and wants the corresponding input data
• Level-2 Aquarius data files used for input are located at GSFC
• User receives list of (linked) granules

ftp://obpg.gsfc.nasa.gov/aquarius/c001_p125.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p126.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p127.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p128.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p129.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p130.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p131.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p132.dat
Event Tagging

• User wants to search all data granules for specific events (e.g., hurricane, tsunami, El Niño, algal blooms, etc.)
• Metadata and granule search
Decision Support Application User

• User wants high-resolution SST coastal data, blended from multiple instruments
• Example: combine SST measurements from active/passive sensors, and in-situ data
• Note: some input data may reside remotely
Climatologies

• Current
  – 4 km NODC AVHRR Pathfinder SST
  – Reynolds SST climatology

• Potential candidates:
  – Winds from QuikSCAT
  – Waves/Winds from Topex/Poseidon
  – SST from MODIS Terra
High resolution SST anomalies in 2005
SST applications
White Shark: Indian Ocean

FishTracker solution

Bonfil et. al published route
Distribution dependence of striped marlins on temperature

Data from Pfleger Institute of Environmental Research (PIER) and Offield Center for Billfish Studies
GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSSST-PP)  
http://www.ghrsst-pp.org

- Provide the framework for developing the next generation of operational SST products.
- Produce SST products for assimilation into real-time ocean and climate models.
- An international collaboration between the major centers that produce SST products.
- Develop and implement standards (e.g., data & metadata formats, interoperability).
- Develop data integration methods to generate improved multi-sensor SST products.
- Provide a forum for the SST community to resolve outstanding issues: cloud clearing algorithms, diurnal warming, data merging & access.
Present and future GHRSSST products of interest

• Global MODIS L2P 1km
  – Collaboration between JPL, OBPG, and RSMAS
  – Include SST and SST4
  – Daytime includes chlorophyll and K490
  – gridded L3 4 km product

• Global AATSR L2P

• Global AMSRE L2P

• Regional GOES L2P

• Regional AVHRR L2P

• Global and regional merged L4 products