Reaching Operational Users
A JPL/CCAR collaboration
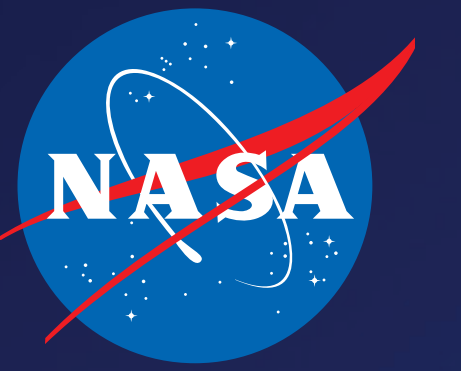
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Abstract

Since 1996 NASA's Jet Propulsion Laboratory and the University of Colorado's Colorado Center for Astro-dynamics Research (CCAR) have collaborated on an effort to support both science and operational users via an automated web-based user data interface located at CCAR.

This web-based data system, partially funded by NASA/JPL, provides data processing, near real-time (NRT) data, and FTP archived data to operational and research users. The data users include a community that may not have the technical expertise or resources to process this valuable data stream and would be otherwise unserved in this capacity. The CCAR data team also provides NRT blended OSTM/Jason-2 and Jason-1 sea surface height (SSH) anomaly maps to the NASA/JPL PO.DAAC for hosting on the PO.DAAC State of the Ocean (SOTO) web page.

The collaboration provides an outlet for altimetry data products and exposure of the mission applications through the CCAR web pages. It also provides the project team with an opportunity to highlight the applications and users in web features and current events reporting.

Outreach Goals

Public Engagement: Engage the public in NASA's mission by providing pathways for participation, promote ocean science literacy, produce outreach products that explain science concepts and science findings.
Education: Support of science, technology, engineering and math (STEM) education and educators, building strategic partnerships that promote STEM literacy through formal and informal means.

Applications Goals

Promotion of science data uses and applications from NASA ocean altimeter missions, enhance utility of the altimetry data sets for applied and operational purposes in the public and private sectors such as weather services, state government organizations, policy makers, businesses, and nongovernmental organizations.

Collaborations

- **Real-time web pages;** processing, archiving and distribution of ocean altimetry data (TOPEX/Poseidon, Jason-1, OSTM/Jason-2, ERS-1 & 2, GFO, Envisat) NRT and historical data.
- **Jason-1 Non-Repeat altimetry;** new satellite ground tracks were incorporated into NRT and historical products.
- **AGU Oceans Operational Applications sessions;** Session at biannual meeting featuring studies and methods that highlight the practical uses of ocean remote sensing datasets.
- **Applications features;** Societal benefits and operational uses of satellite altimetry data.

Features

### Drifter Studies in the Gulf of Mexico

The Gulf of Mexico Research Initiative (GoMRI) is funding many oceanographic studies on the Gulf. GoMRI is British Petroleum's commitment to provide $500 million over the course of 10 years for independent scientific research related to the Deepwater Horizon incident. CCAR SSH maps are used by shore support teams along with other products (e.g. MODIS SST and chlorophyll maps, other drifter observations, model runs) to provide likely positioning of mesoscale flow elements such as eddies. Research targets include fate and transport of oil from the BP Deepwater Horizon oil spill and the effects on the ocean surface from hurricanes.
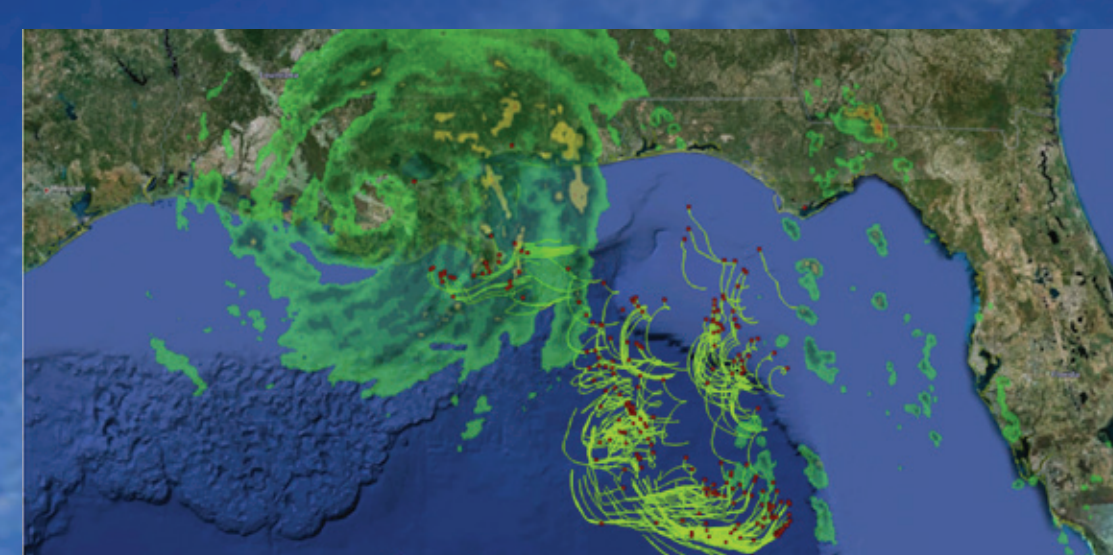
Drifter trajectories in path of Hurricane Isaac provide new insights on ocean currents and increase our understanding of ocean flows and atmospheric conditions on the surface of the ocean during a hurricane.

PO.DAAC State Of The Ocean (SOTO)

CCAR provides sea surface height anomaly data to NASA's Physical Oceanography Distributed Active Archive. SOTO is a core visualization tool for the ocean data sets supported by PO.DAAC including SSH, sea surface temperature (SST), winds, and ocean chlorophyll. Users can globally visualize near real-time SSH anomaly fields from the previous 10 days using a Google Earth interface. No specialized software other than a web browser and the Google Earth plug-in is required to run the system.
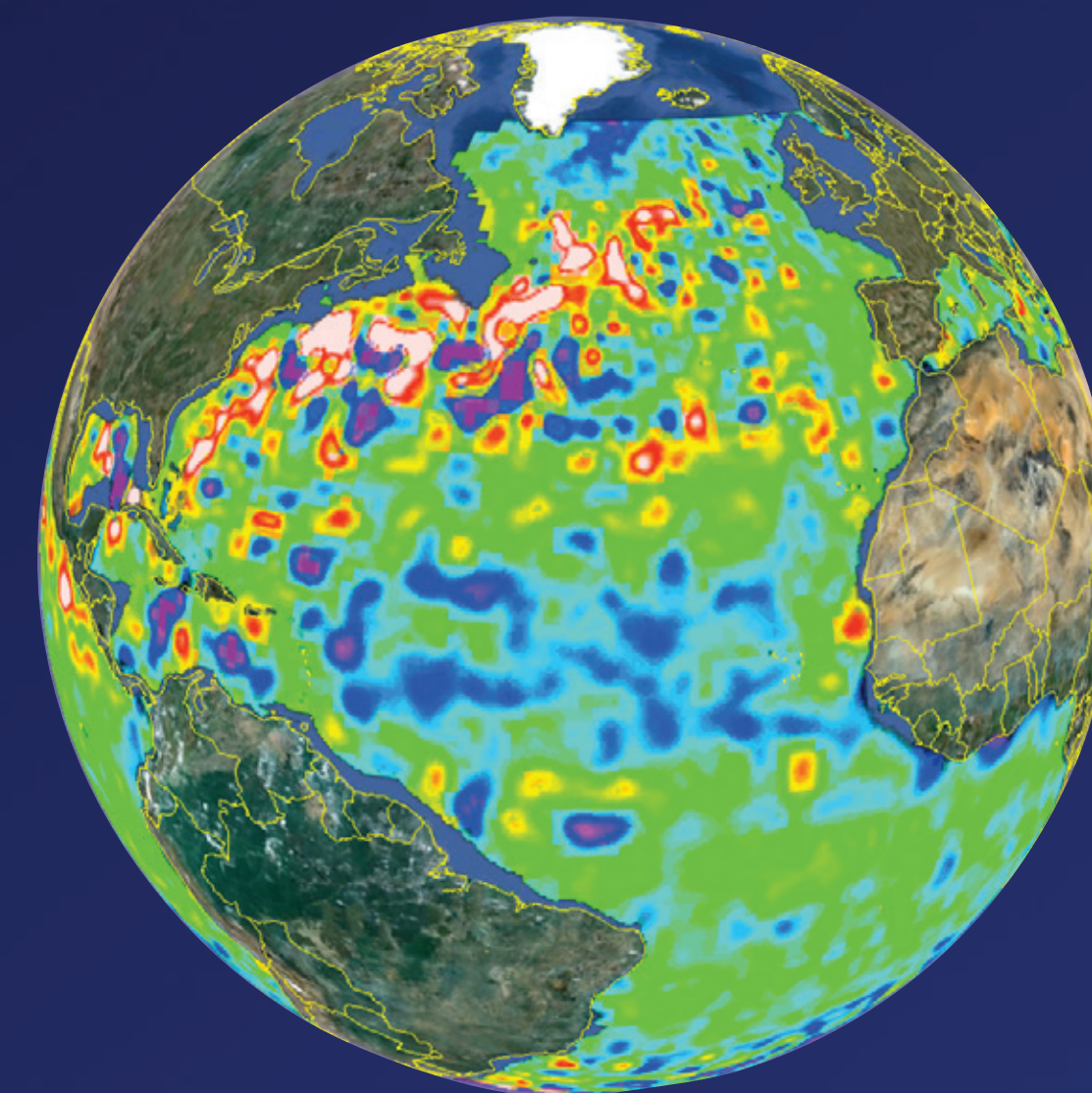
Incorporating Satellite Data into West Coast Fisheries Stock Assessments

North Pacific Hake, the most abundant fish along the Pacific Northwest shoreline of America, is an essential source of economic stability for this coastal region. Hake commercial fisheries average 220,000 metric tons per year with an estimated annual revenue of $35 million. Coastal upwelling affects the spatial distribution of Hake fish. Correlations between coastal upwelling and fish population density are identified using SST, SSH from Jason-1, wind speed, and chlorophyll–a concentrations from satellite data. The results of this project will allow fisheries to better understand seasonal variations in Hake distribution, promote fishery management, and prevent exhaustion of the species.

2010 Chilean Earthquake Tsunami

In 2010 an 8.8 magnitude earthquake offshore northeast Chile produced a large tsunami. Researchers at CCAR, in collaboration with NOAA, used the event to evaluate a model simulation of the tsunami and develop processing that could be used to implement an altimetric tsunami detection system. Given the short latency of the JPL Jason-1 and OSTM/Jason-2 data, this could allow near real-time monitoring of an ongoing event like this.

Hurricane Intensity Forecasting

Hurricane Katrina - 2005

In 2005, Hurricane Katrina's maximum wind speeds increased dramatically as the storm passed over the Loop Current and forming Loop Current eddy named "Eddy Vortex." The storm evolved quickly from a Category 3 to a Category 5 event in a matter of nine hours as it drew heat from the warm Loop Current waters. It subsequently dropped in intensity to a Category 3 storm at landfall.

Hurricane Isaac - 2012

One of the reasons why Hurricane Isaac only reached Category 1 and did not become a "Katrina" is the path it took across the Gulf. The storm skirted around the Loop Current, then caught the outer edge of a warm eddy before passing directly over a cold eddy. The storm's track away from the Gulf's warmest waters helped to keep Isaac from rapidly intensifying as Hurricane Katrina did in 2005.
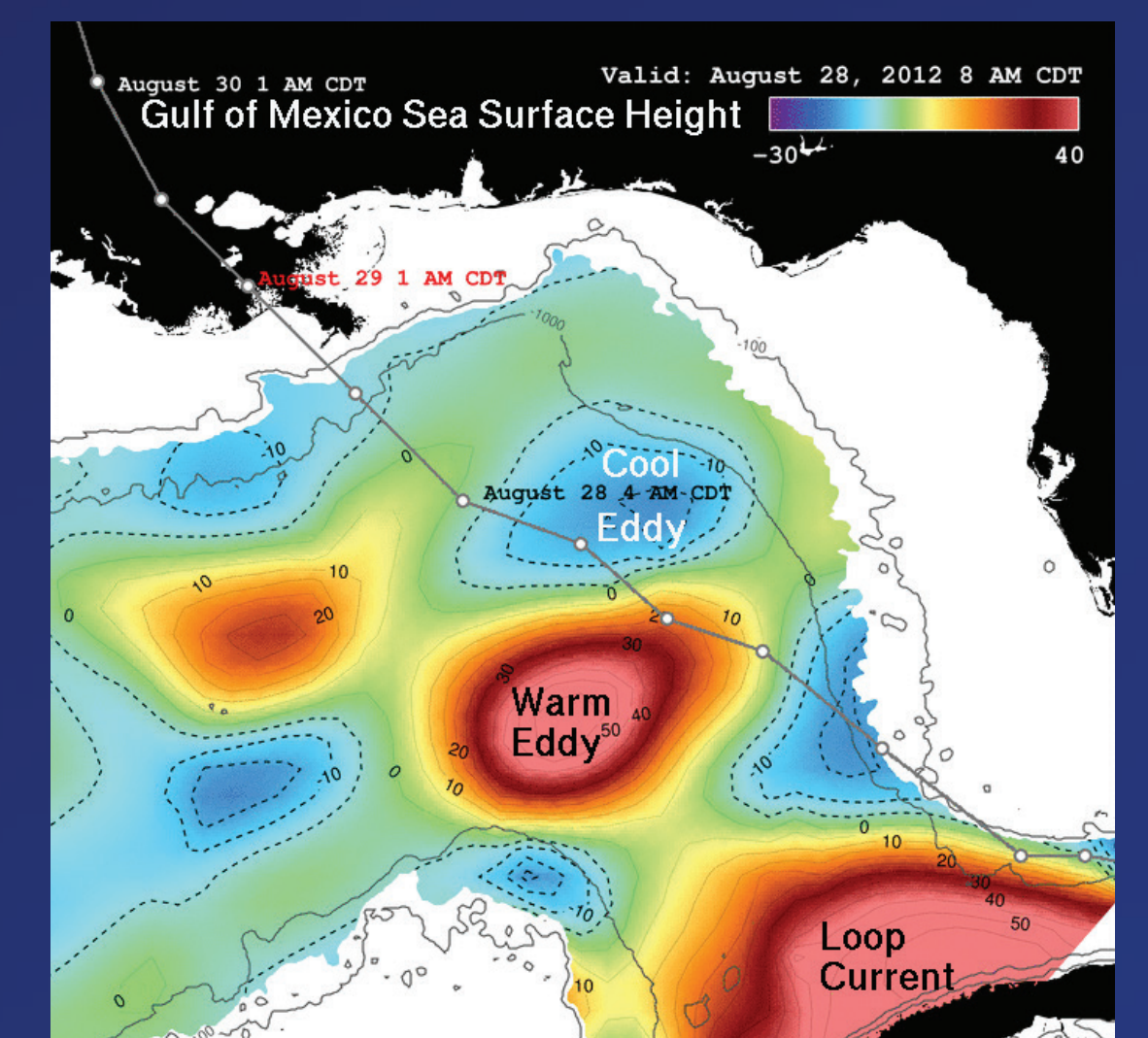
Holland America Line Cruise Ship ms Noordam

CCAR NRT current anomaly products are provided to the crew on the Holland America ms Noordam cruise ship to investigate the efficacy of using ocean current information to reduce fuel costs in the Gulf of Mexico, Caribbean, and the western tropical North Atlantic. This ship consumes approximately 216 tons/day (57,000 U.S. gallons) of heavy fuel oil and 90 tons/day (23,000 U.S. gallons) of marine gas oil at peak power production. The goal is to use the altimeter product to try to maintain a constant ship velocity and/or engine RPMs to minimize fuel usage.

For more information:
sealevel.jpl.nasa.gov
http://eddy.colorado.edu/ccar/data_viewer/index

Ocean Surface Topography Science Team meeting
Venice, September 2012