



NASA'S OST WEB SITE: PROMOTING OSTST RESEARCH

***Margaret Srinivasan
Altimeter Applications Lead
Jet Propulsion Laboratory
California Institute of Technology***

***Ocean Surface Topography Science Team Meeting
11 November 2008
Nice, France***



Ocean Surface Topography
From Space

The banner features a satellite in orbit over a colorful, topographic map of the ocean surface. The map uses a color scale from blue (low elevation) to red (high elevation). The satellite is shown in profile, with its solar panels extended.

Kristy Kawasaki - Raytheon Webmaster

Rosemary Sullivant - JPL Science Writer

Annie Richardson – JPL Ocean Outreach Lead

Jason-1 & OSTM/Jason-2 Project Management

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A major milestone for OSTM/Jason-2

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The latest image from NASA's Jason satellite is updated every two weeks. Check out the [latest ocean conditions here!](#)



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Monthly updates – news, press & image releases, awards, outreach activities, new societal benefits...





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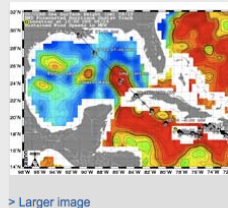
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br- Click [here](#) for directions.

This month's lecture: **Keeping an Eye on Earth's Changing Climate: The Ocean Surface Topography Mission**
Summary: Following in the footsteps of the remarkable Topex/Poseidon and Jason-1 spacecrafts, the Ocean Surface Topography Mission has the responsibility of continuing one of the most important on-going chronicles of Earth's changing climate - the detailed measurements of

Gulf's Warm Ocean Circulation Features May Fuel Gustav

Tropical Storm Gustav will have to walk a fine line to dodge the deep, warm ocean circulation features in the Gulf of Mexico that often cause hurricanes in the Gulf to rapidly intensify: the Loop Current and its associated eddies. The actual track of a hurricane is primarily dependent upon steering winds, which are forecasted through the use of atmospheric models. However, the interaction of the hurricane with the upper ocean is the primary source of energy for the storm. Hurricane intensity is therefore greatly affected by the upper ocean temperature structure and can exhibit explosive growth over warm ocean currents and eddies. Because the Loop Current and its eddies are warmer, and thus higher in surface elevation, than the surrounding waters, they are easily spotted by satellite altimeters. Hurricane forecasters use satellite altimetry to estimate the heat content of the upper ocean to assess the potential for intensification.



This Aug. 29 image, generated by the University of Colorado's Center for Astrodynamics Research, plots the predicted path of Gustav, as indicated by the most recent National Weather Service National Hurricane Center forecast track, against a near-real-time map of sea surface height and associated ocean circulation features in the Gulf of Mexico and northwestern

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"Follow the water" has been a strategy behind the latest Mars explorations. Scientists from NASA and CNES, the French space agency, want to take that concept in a different direction and apply it to Earth--tracking water around the globe both in the ocean and on land.

Unlike Mars, Earth has 'water, water everywhere.' But no one knows exactly how much there is, or if, in the future, there will be enough for us to drink. Oceans, lakes, rivers, reservoirs are constantly changing, interacting in ways that are not entirely clear. Add a warming planet, melting ice and more frequent floods, and the uncertainties about Earth's water resources and climate change mount.



JPL web site

NASA Hurricane web site



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with the Surface Water Ocean Topography mission

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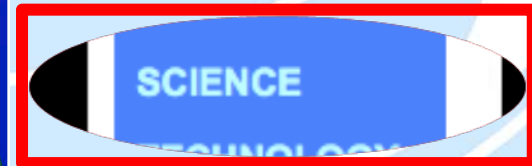
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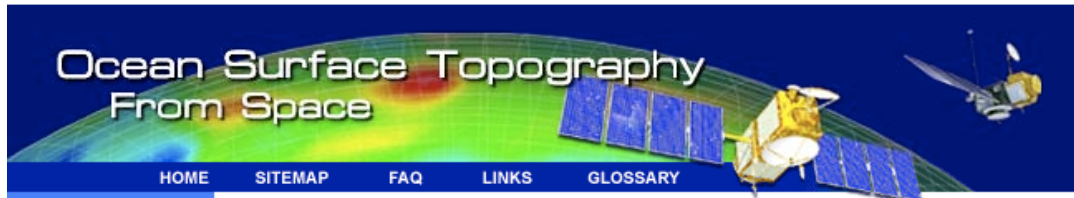


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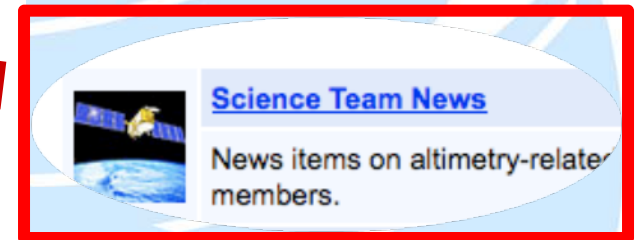
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[Rising Oceans and Global Warming](#) Listen to a podcast with JPL's Josh Willis on OSTM/Jason-2 mission science.



[Riding the Waves!](#) OSTM's Parag Vaze and Lee Fu share their views on the newest NASA mission.



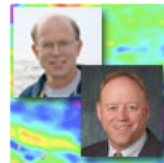
[Anny Cazenave Honored](#) Another outstanding OSTST member has been recognized for excellence.



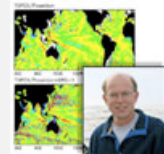
[Dr. Lee-Lueng Fu Honored](#) Jason Project Scientist is selected to the National Academy of Engineering



[Chelton & Nerem Honored](#) Jason Science Team Members elected AGU Fellows.



[Altimeters Bring Eddies into Focus](#) Jason Investigators find eddies in the details.



[Girl scouts voyage 'Under the Sea'](#) JPL's Dr. Patzert takes ocean science to local troop.



[Ray and Roemmich win AMS awards](#) Two OST science



Recent stories & highlights of OSTST members

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NEWSROOM - Features

Riding the Waves with Jason-1 - A Q&A with Two Mission Leaders December 2006

Successful space missions require much more than just great technology, they need dedicated people to create them, operate them and make the most of the information they provide. Leading the engineers, technicians and scientists behind Jason-1 are Project Manager Mark Fujishin and Project Scientist Dr. Lee-Lueng Fu. Here's a brief look at the mission from their unique perspectives.




Project Manager Mark Fujishin
Image credit: NASA/JPL

Project Scientist Dr. Lee-Lueng Fu
Image credit: NASA/JPL

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NEWSROOM - Features

Willis honored for climate change publicity October 2008

For his efforts in sharing information on international climate change research, Joshua Willis of Section 324 has garnered JPL's Charles K. Witham Environmental Stewardship Award.

Willis' studies of ocean warming and sea-level rise have been widely used by colleagues all over the world. His calculations of long-term and short-term sea-level rise were used in the recent Fourth United Nations Intergovernmental Panel



JPL Director Charles Elachi, Josh Willis, and Bill Patzert

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Simultaneous Measurements from Two Altimeters Bring Eddies into Focus December 2007

More than half the variation in sea surface height across Earth's ocean is due to eddies, according to a recent study by Ocean Surface Topography Science Team members. These eddies, they concluded, are responsible for much of the westward energy propagation in the ocean. This new view of ocean dynamics comes from combining satellite data from multiple missions to reveal changes in the ocean surface in greater detail than is possible with a single instrument.



This image shows the data from TOPEX/Jason-1 (top), and the combined data from TOPEX/Jason-1 and ERS-1 (bottom).

Image credit: NASA/JPL-Caltech/Chelton, et al., 2007

Dudley Chelton and three of his colleagues at Oregon State University analyzed ten years of sea surface measurements from two different sources: the TOPEX/Poseidon altimeter and the successive European Space Agency's ERS altimeters. The higher resolution of this merged data set showed the presence of many individual, slow-moving eddy-like features, between 5 to 40 centimeters in amplitude and 100 to 200 kilometers in diameter.

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Anny Cazenave Honored May 2008

Anny Cazenave, a Principal Investigator of the Ocean Surface Topography Science Team, has been elected a Foreign Associate of the US National Academy of Sciences as announced in a press release from the Academy:

Apr. 29, 2008: The National Academy of Sciences today announced the election of 72 new members and 18 foreign associates in recognition of their distinguished and continuing achievements in original research. Those elected today bring the total number of active members to 2,041.

Members and foreign associates of the Academy are elected in recognition of their distinguished and continuing achievements in original research; election to the Academy is considered one of the highest honors that can be accorded a scientist or engineer.



Anny Cazenave

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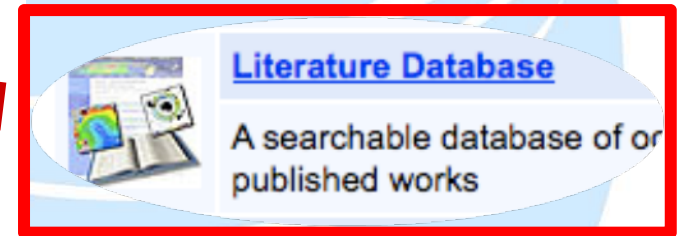
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Fill out the form below to search the Literature Database. A field that is left blank will be ignored. If you leave all fields blank, all **2753** records in the database will be returned. If you think a reference is missing and would like to add it to the database, please email the complete citation to Annie.Richardson@jpl.nasa.gov.

Search Example:
If you want all articles written by **Lee Fu and Y. Chao** in **1999** with **Altimeter** or **Altimetry** in the title:

1. Type **Fu AND Chao** in the Author field.
2. Type **altimet*** in the Title field (where ***** is a wildcard and **altimet** and **altimetry**).
3. Select **1999** from the Year list.

The results from your search will be displayed on the next page. To get the complete citation, click on the results to get the complete citation. To enter another search, click on the "Search" button.

NOTE: In the Author, Abstract, Keyword, and Title fields, AND, OR, NOT, * (wildcard for partial match), and " (literal) are allowed. A comma is the same as OR, a blank space is the same as AND, and a quoted string is a literal (a quoted string).

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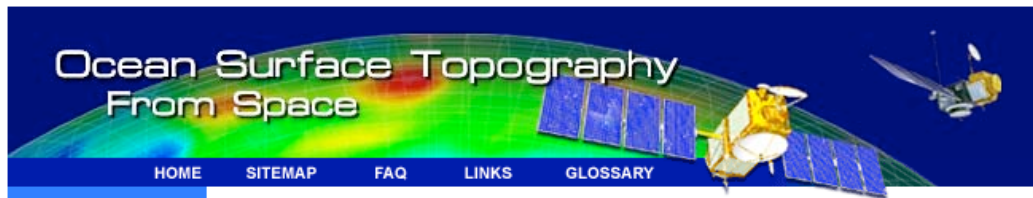
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LITERATURE DATABASE SEARCH RESULTS

Click on the Title to get the details for that entry. Or return to the [Search page](#) and run another search.

Displaying **1 to 10** of **2753**

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1. [A 44-year \(1958-2001\) sea level residual hindcast over the Mediterranean Basin](#)

Authors: Ratsimandresy, A. W.; Sotillo, M. G.; Alvarez Fanjul, E.; Carretero Albiach, J. C.; Perez Gomez, B.; Hajji, H. Year: 2008

2. [A method for spatial calibration of wave hindcast data bases](#)

Authors: Tomas, A.; Mendez, F. J.; Losada, I. J. Year: 2008

3. [A parametric model for ocean wave period from K-u band altimeter data](#)

Authors: Mackay, E. B. L.; Retzler, C. H.; Challenor, P. G.; Gommenginger, C. P. Year: 2008

4. [A survey of ICESat coastal altimetry applications: Continental coast, open ocean island, and inland river](#)

Authors: Urban, T. J.; Schutz, B. E.; Neuenschwander, A. L. Year: 2008

5. [Accurate linking of Lake Erie water level with shoreline datum using GPS buoy and satellite altimetry](#)

Authors: Cheng, K. C.; Kuo, C. Y.; Shum, C. K.; Niu, X. T.; Li, R. X.; Bedford, K. W. Year: 2008

6. [Anomalous variation of sea surface height in Southwestern Indian Ocean](#)

**--Updated quarterly
--2,801 entries**

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Authors: Mackay, E. B. L.; Retzler, C. H.; Challenor, P. G.; Gommenginger, C. P.

Year: 2008

Journal: Journal Of Geophysical Research-Oceans

Publisher:

Volume: 113

Number: C3

Pages: C03029

Edition:

Type of Work:

Category: 2a. Science Applications - Winds & Surface Waves (WW)

ISBN/ISSN:

Accession Number: ISI:000254533600003

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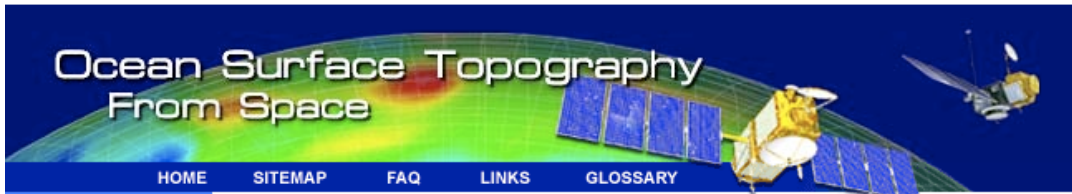
0148-0227 C03029

Author Address:

Abstract:

Using a large collocated data set of altimeter and buoy measurements, we examine the relationship between the altimeter Ku-band measurements of significant wave height, H_s , backscatter coefficient, $\sigma(0)$, and the buoy wave period. This is used to derive an empirical altimeter wave period model for TOPEX, Poseidon, Jason-1, ERS-2, Envisat, and GEOSAT follow-on. We show that there is a step change in the response of $\sigma(0)$ at around 13 dB and above this value $\sigma(0)$ is not related to wave period. The results are compared to algorithms proposed by two previous authors (Gommenginger et al., 2003; Quilfen et al., 2004) and examined in terms of absolute accuracy (RMS error), ability to replicate the joint distribution of wave height and period, and residual trends with various parameters. The new algorithm is shown to perform better than the previous algorithms in all metrics considered. Finally, we demonstrate that there is a limiting accuracy achievable for a function of the form $f(H_s)$.

Entry detail;
authors, citation
information,
abstract, etc.



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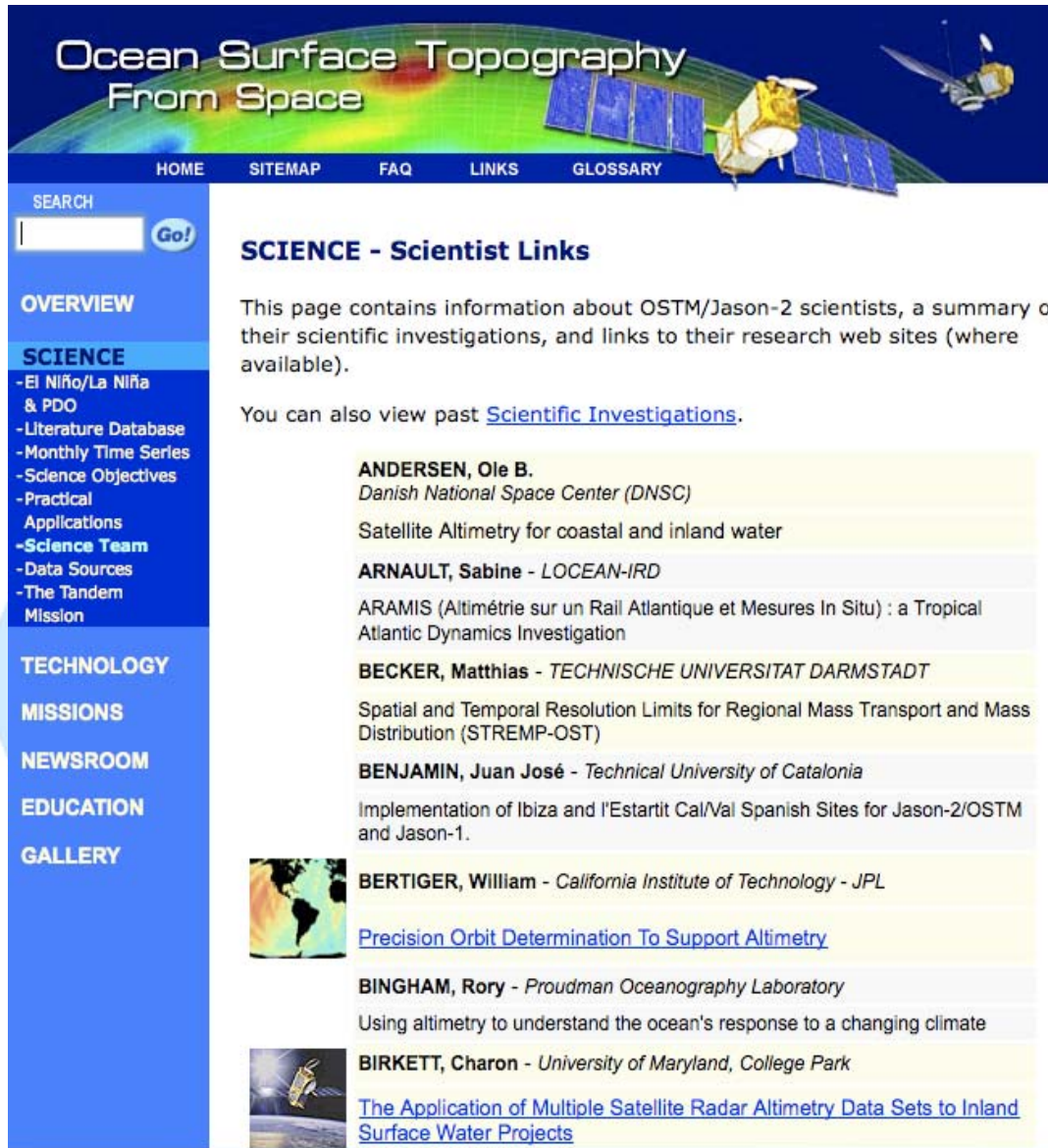


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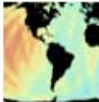
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ANDERSEN, Ole B.
Danish National Space Center (DNSC)
Satellite Altimetry for coastal and inland water


ARNAULT, Sabine - LOCEAN-IRD
ARAMIS (Altimétrie sur un Rail Atlantique et Mesures In Situ) : a Tropical Atlantic Dynamics Investigation

BECKER, Matthias - TECHNISCHE UNIVERSITÄT DARMSTADT
Spatial and Temporal Resolution Limits for Regional Mass Transport and Mass Distribution (STREMP-OST)

BENJAMIN, Juan José - Technical University of Catalonia
Implementation of Ibiza and l'Estartit Cal/Val Spanish Sites for Jason-2/OSTM and Jason-1.

 **BERTIGER, William - California Institute of Technology - JPL**
[Precision Orbit Determination To Support Altimetry](#)

BINGHAM, Rory - Proudman Oceanography Laboratory
Using altimetry to understand the ocean's response to a changing climate

 **BIRKETT, Charon - University of Maryland, College Park**
[The Application of Multiple Satellite Radar Altimetry Data Sets to Inland Surface Water Projects](#)

- All science plans listed
- All NASA- and some CNES-funded research linked
- Review & provide text/images/captions

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Abstract: A New Method for Mapping Mesoscale Circulation over the Shelf: Retracking Currents

Authors: Sharon Gillett (University of Maryland)

Co-Investigator(s):

1. To examine water larg
2. To refine accuracy
3. To examine
4. To understand

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Abstract: Error Characterization and Intercalibration of the Wet Path Delay Measurement Microwave

Authors: Sharon Gillett (California Institute of Technology)

Co-Investigator(s):

William Bertiger (California Institute of Technology)

Co-Investigator(s):

Sharon Gillett (California Institute of Technology)

Co-Investigator(s):

Sharon Gillett (California Institute of Technology)

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SCIENCE

Abstract: Improvement, validation and merging of altimeter products for coastal and regional applications

Authors: Ananda Pascual (Institut Medterran d'Estudis Avançats, IMEIA/CSIC-UIB)

Co-Investigator(s):

Alberto Alvarez (IMEIA)

Joan Riera (IMEIA)

Gilles Larnicol (CLS)

Abstract: We are investigating several aspects of the use of altimeter measurements. The first objective deals with the accuracy of altimeter data in coastal areas, an important challenge in the present era of operational coastal oceanography. To achieve this objective, updated algorithms and corrections are applied to improve altimeter observations in the shelf and slope regions. The validation of the improved products is then performed by using available public independent data and by taking advantage of

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SCIENCE

Abstract: Precision Orbit Determination To Support Altimetry

Authors: William Bertiger (California Institute of Technology)

Co-Investigator(s):

Sharon Gillett (California Institute of Technology)

Co-Investigator(s):

Sharon Gillett (California Institute of Technology)

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Abstract: Altimeter Data And ECCO2 Ocean State Estimates Used To Study The Variability Of Antarctic Circumpolar Current Fronts And The Formation Of Antarctic Intermediate Water

Authors: Victor Zlotnicki (California Institute of Technology - JPL)

Co-Investigator(s):

Dimitris Menemenlis (California Institute of Technology - JPL)

Abstract: The Southern Ocean is a significant component of the global overturning circulation and of the oceanic carbon cycle yet it is also a region where there are few in-situ observations, large uncertainties, and the potential for important climate feedback mechanisms. This study uses the 15+ years of available radar altimeter data, high-resolution ocean state estimates from the Estimating and Climate of the Ocean, Phase II (ECCO2) project, and in-situ data (hydrography and Argo floats), in order to study time changes in the formation of Antarctic Intermediate Water (AAIW). This is a step towards an improved description and understanding of Southern Ocean

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The Ocean Surface Topography Science Team is composed of a group of international and interdisciplinary scientists dedicated to the study of Earth's oceans, utilizing ocean altimeter data from space. You will find updates on the latest research being completed by the team, links to scientific publications, information on some of the science team members, and OSTST meetings.

[Science Team News](#)
News items on altimetry-related science research and science team members.

[Literature Database](#)
A searchable database of ocean surface topography related published works

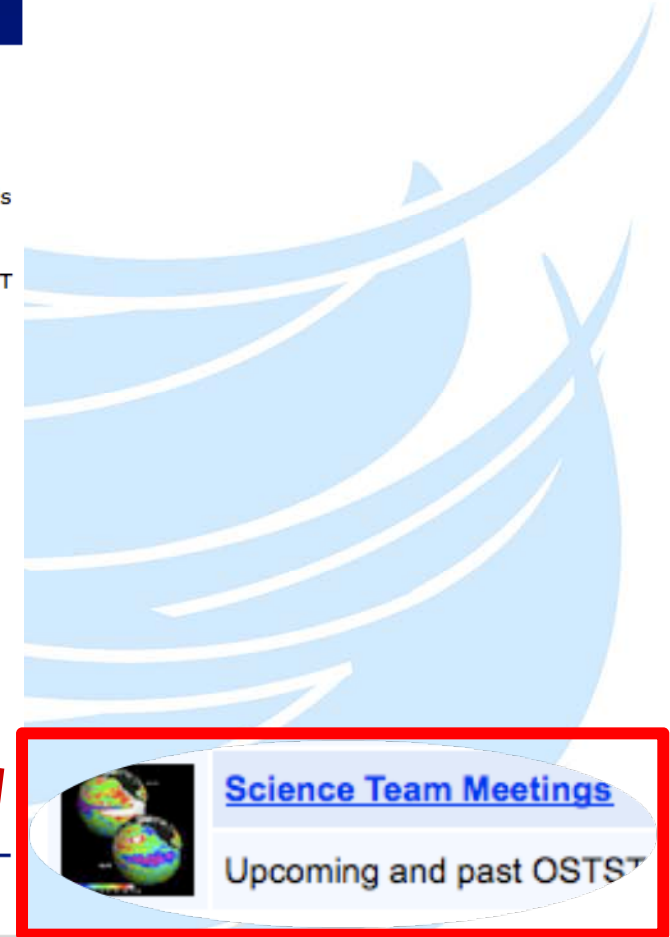
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Links to web sites of some OSTST members and affiliates.

[Science Team Meetings](#)
Upcoming and past OSTST meeting links and information.

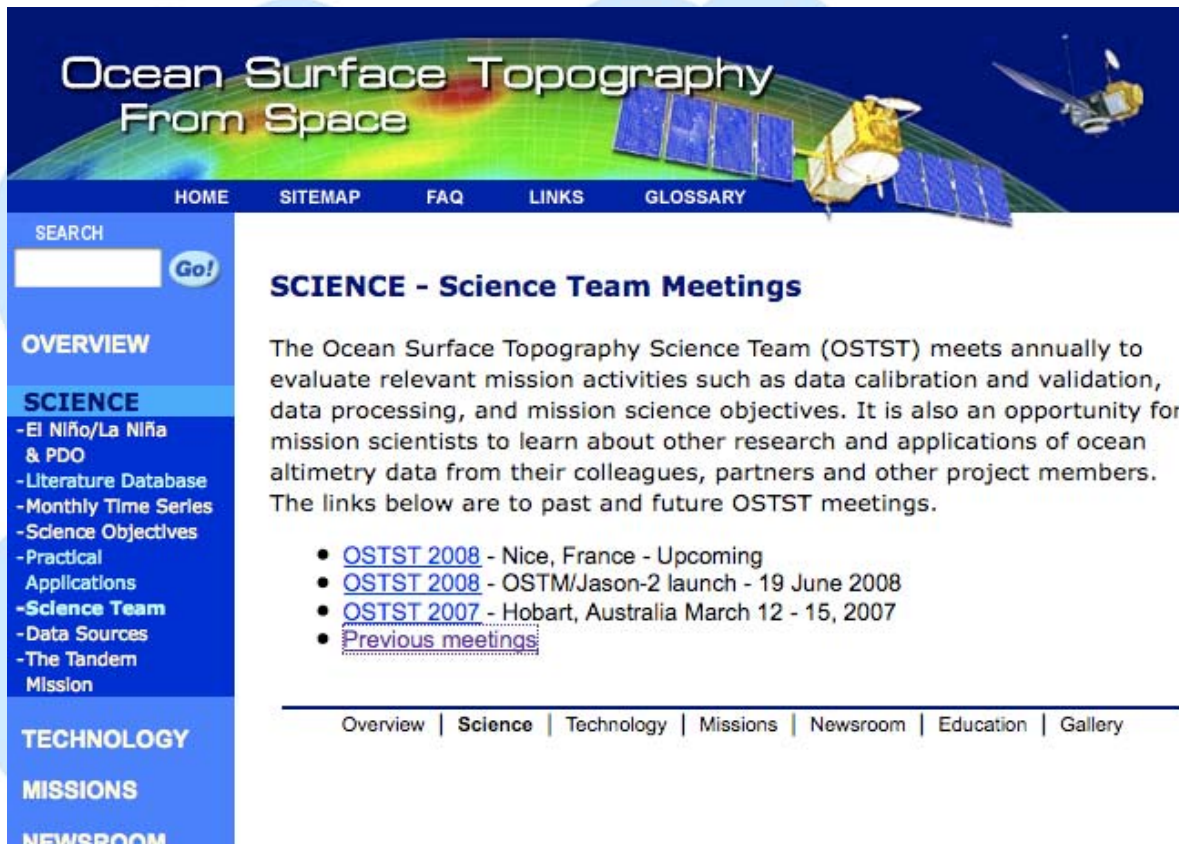
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SCIENCE - Science Team Meetings

The Ocean Surface Topography Science Team (OSTST) meets annually to evaluate relevant mission activities such as data calibration and validation, data processing, and mission science objectives. It is also an opportunity for mission scientists to learn about other research and applications of ocean altimetry data from their colleagues, partners and other project members. The links below are to past and future OSTST meetings.

- [OSTST 2008](#) - Nice, France - Upcoming
- [OSTST 2008](#) - OSTM/Jason-2 launch - 19 June 2008
- [OSTST 2007](#) - Hobart, Australia March 12 - 15, 2007
- [Previous meetings](#)

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- Past meeting web sites -
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Congratulations!

OSTM/Jason-2
successfully launched
on 20 June 2008

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Sea Level Monitoring Enters a New Era

A major milestone for OSTM/Jason-2

Features



Latest El Niño/La Niña Jason Data

The latest image from NASA's Jason satellite is updated every two weeks. Check out the [latest ocean conditions here!](#)



We remember our friend & colleague, Yves Ménard

[Read more...](#)



OSTST Meeting 10-12 November 2008

The 2008 ocean altimetry meeting and GODAE conference is in Nice, France. [Read more...](#)

Society Benefits

Sea Level Viewer

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Monthly Time Series

El Niño/La Niña Watch







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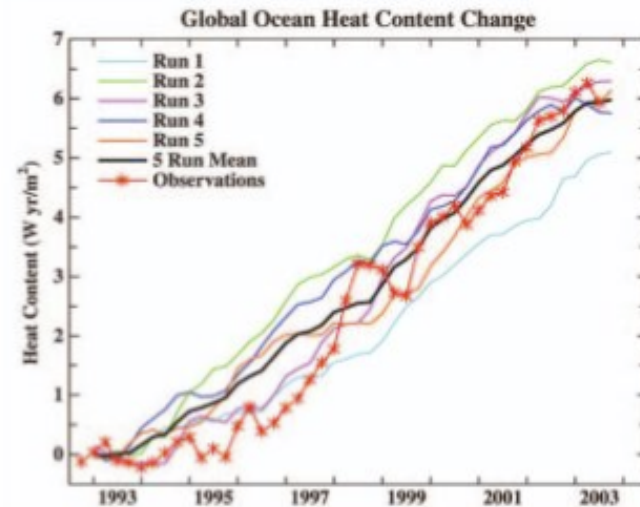




Ocean warming estimates from Jason



JPL Postdoc Josh Willis was a co-author on the study and provided the ocean warming estimates used for comparison with the model.



Ocean heat content vs. time, from observations and several global climate model runs.

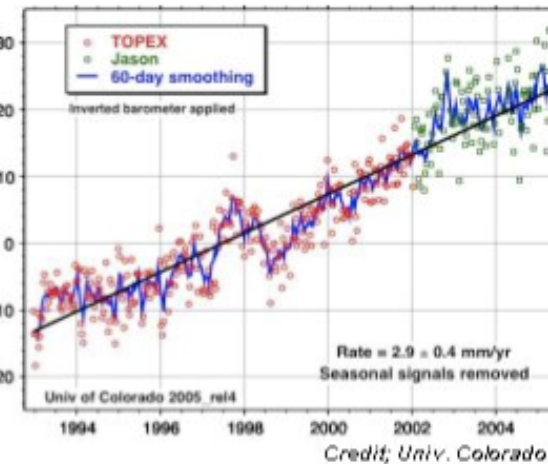
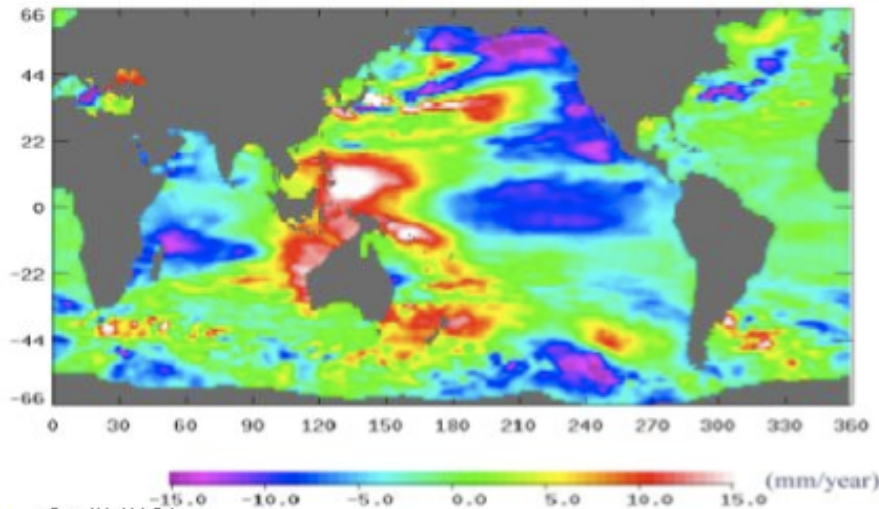
(J. Hansen, et al*)

A new NASA study concludes that more energy is being absorbed from the Sun than is emitted back to space, warming the globe. The study compares ocean warming estimates based on data from satellite altimeters on TOPEX/Poseidon, Jason-1 and other spacecraft, along with oceanographic profiling instruments such as Argo floats with results from a global climate model. JPL's Dr. Josh Willis used the satellite data to provide a global picture of rising sea level and ocean warming. The climate model predicted that growing amounts of human-produced greenhouse gases would trap solar radiation and lead to a warming planet. Aided by ocean altimetry data, they found this excess heat in the oceans. The measurements show that, over the past ten years, the heat content of the ocean has grown dramatically and can account for the excess energy that the climate model calculated should exist. Dr. Willis' analysis of the data showed a fairly steady, measurable warming over the past decade.

*Hansen et al., *Earth's Energy Imbalance: Confirmation and Implications*, Science, 2005, vol.(308), pp. 1431-1435



Global mean sea level rise



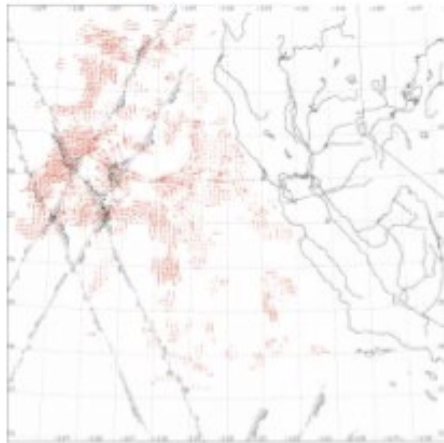
This global map of the trend of sea surface height (SSH) is estimated from the combined data from TOPEX/POSEIDON and Jason-1 from 1993 through 2004. Complex patterns of spatial variability are clearly shown. In the North Pacific the pattern of variability is similar to that of the Pacific Decadal Oscillation, in part caused by wind-driven long-period Rossby waves. The SSH trends in the North Atlantic are caused by a slowdown of the circulation of the subpolar gyre of the North Atlantic Ocean, leading to a decrease of the northward heat transport of the ocean.

In the South Atlantic and South Pacific, the marked striations are roughly consistent with the characteristics of Rossby wave fronts, reflecting a possible role of Rossby waves in the decadal change of ocean circulation. In the Southern Ocean the spatial pattern shows the characteristics of a wavenumber-2 Antarctic Circumpolar Wave, with two minima centered at longitudes of 30°-60° and 210°-240°. These waves travel eastward around Antarctica in 8 to 9 years.

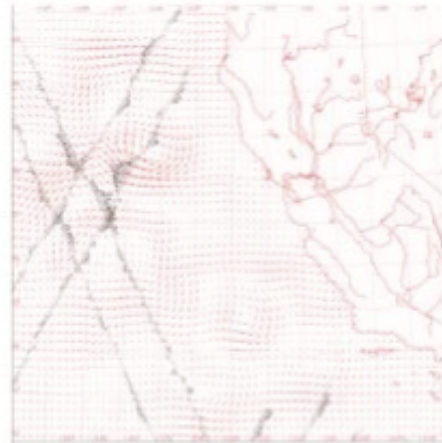
The decadal trend of SSH in the Indian Ocean suggests that there is a decrease in the northward geostrophic flow of the upper ocean and hence a reduction of the ventilation of the tropical Indian Ocean by the cold water from the South Indian Ocean, responsible for a long-term warming of the upper Indian Ocean.



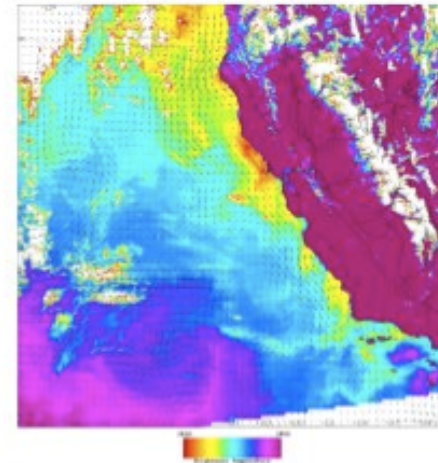
Coastal Surface Current Mapping with Radiometry and Altimetry



Composited MOC currents (red) computed from AVHRR images with altimeter currents (black) overlain for Sep. 13-16, 2003.



CI currents from MOC method (red) with altimeter currents (black) overlain for Sep. 13-16, 2003.



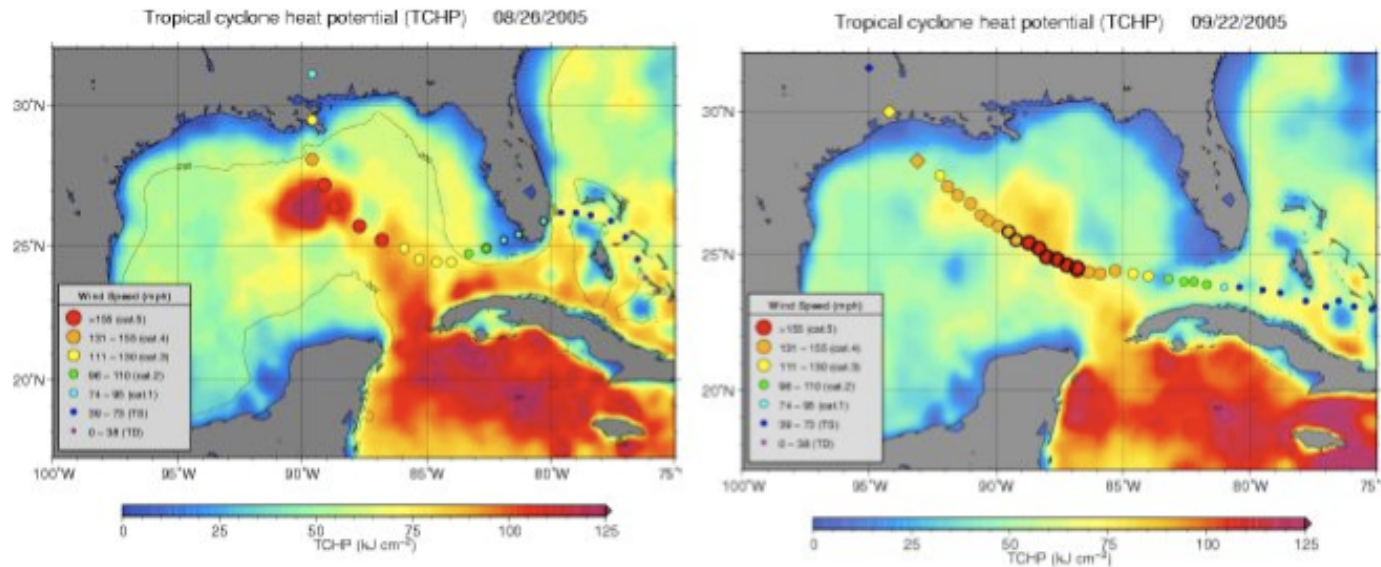
10-day CI currents from MOC method and altimetry centered on Apr. 8, 2003.

(W. Emery, D. Matthews, R. Crocker, D. Baldwin)

The California Current is representative of the complex temporal and spatial variability that can be seen in an eastern boundary basin. Conventional oceanographic measurements are unable to resolve these relatively small scale variations, but by employing both satellite imagery and satellite altimetry we are able to resolve this complex structure and its variations in space and time. In addition, using historical satellite imagery it is possible to extend this study back into the past. This system focuses on resolving these variations and later studies will relate these variations to various forcing functions. These images demonstrate that ocean surface currents derived from sequential thermal images can be merged with altimeter derived geostrophic surface currents to form a high-spatial resolution surface observational product. <http://ccar.colorado.edu/research/calif/>



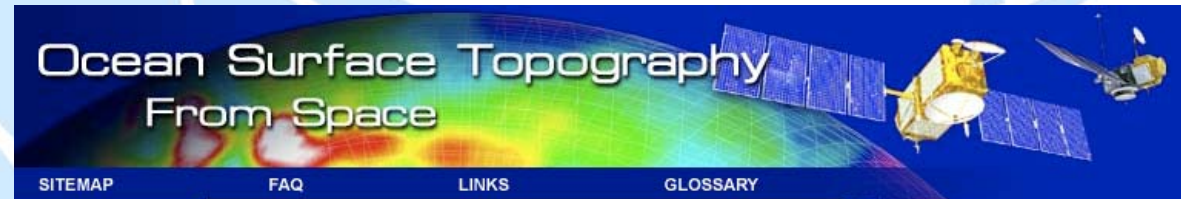
Packing Heat in the Gulf



(G. Goni and J. Trinanes, NOAA/AOML)

Tropical Cyclone Heat Potential (TCHP) fields are derived from altimetry data for hurricanes Katrina (left) and Rita (right) in 2005. The path of each hurricane is indicated with circles, their size and color representing intensity (see legend), as the storms made their way across the Gulf of Mexico. Both hurricanes rapidly intensified to category 5 as they passed over the Loop Current and a warm ring, then diminished to category 4 and category 3, respectively, by the time they traveled over cooler waters outside the warm ring. NOAA's Atlantic Oceanographic and Meteorological Laboratory uses blended satellite altimetry data, including those from NASA's TOPEX/Poseidon and Jason-1 missions, to estimate TCHP (a measure of the oceanic heat content from the sea surface to the depth of the 26°C isotherm) in the Gulf of Mexico in near-real time. High values of TCHP may be linked to hurricane intensification. These fields are critical to scientists and forecasters in better understanding the link between the ocean and the intensification of hurricanes. See <http://www.aoml.noaa.gov/phod/cyclone/data/> for more information.

- NASA/JPL Ocean Surface Topography from Space
<http://sealevel.jpl.nasa.gov/>



- AVISO page - <http://www.aviso.oceanobs.com/>



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- Get your story out into the public domain;
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 - Press Release
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 - Awards, Honors, Milestones

Merci.