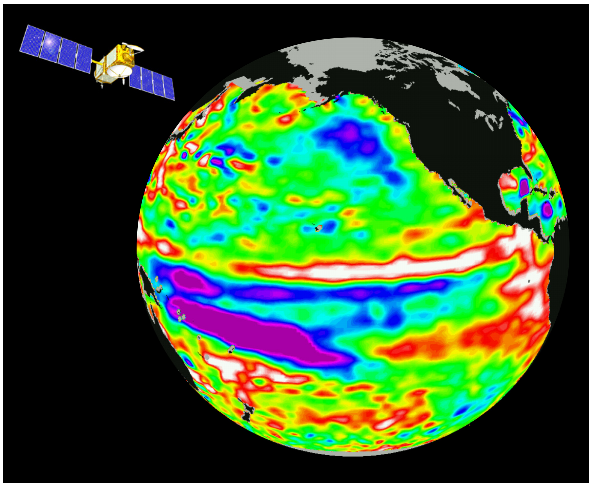
National Aeronautics and Space Administration

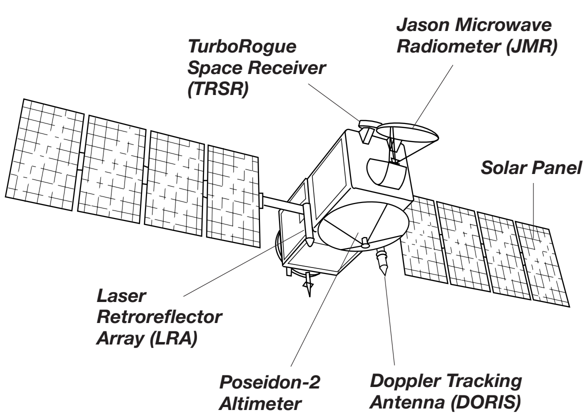
Jason–1

An Ocean Odyssey — Ocean Data from Space

http://sealevel.jpl.nasa.gov



Jason-1, *a follow-on to the highly successful Topex/Poseidon mission, measures ocean-surface topography to an accuracy of 3.3 centimeters (1.3 inches). Topex/Poseidon enabled scientists to forecast the impact of the 1997–1998 El Niño and has vastly improved the understanding of ocean circulation and its effect on global climate. Jason-1 altimeter data are part of a suite of ocean data provided by other JPL-managed ocean missions — the Gravity Recovery and Climate Experiment (GRACE) mission, which uses two satellites to accurately measure Earth's mass distribution, and the QuikScat scatterometer mission, which measures ocean-surface winds. Jason-1 is a joint program of NASA and the Centre National d'Études Spatiales (CNES) in France. The next-generation NASA ocean altimetry mission, which will be the follow-on to Jason-1, is the Ocean Surface Topography Mission (OSTM) on Jason-2. This joint mission, with partners CNES, Eumetsat, and NOAA, will extend the ocean-surface topography time series even further, and is scheduled to launch in 2008.*



Ongoing science investigations for Jason-1

- *Studying the emerging ocean variability on decadal scales and their relations to climate.*
- *Understanding the global sea-level rise through the change of the ocean's heat content and mass changes.*
- *Producing much improved tide models for the coastal oceans where the scales of tides are too small to be resolved by a single altimeter.*
- *Studying ocean eddies and their effects on large-scale ocean circulation and heat transport.*
- *Assimilating altimetry data with wind, temperature, and salinity data for improved prediction of El Niño–related climate events.*

The Jason-1 Mission	
Sea-level measurement accuracy	***3.3 cm (1.3 in.)***
Satellite to data user delay	***3-hour data product within 1 hour of satellite download***
Satellite mass	***500 kg***
Launch vehicle	***Delta II***
Satellite altitude	***1336 km***
Latitude of coverage	***66 deg N to 66 deg S***
Orbit type	***Circular***

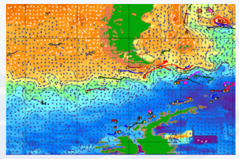
Jason-1 was launched from Vandenberg Air Force Base in California on December 7, 2001. Mission operations are carried out by NASA/JPL. Data products are available through NASA/JPL and from CNES. Research using the data from Jason-1 and Topex/Poseidon is undertaken by scientists worldwide.

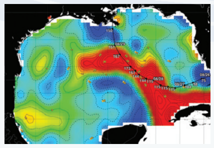
Objectives

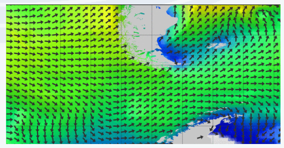
- *Extend the ocean-surface topography time measurements into the 21st century*
- *Increase understanding of ocean circulation*
- *Improve forecasting of climate events*
- *Measure global sea-level change*
- *Improve coastal tide models*

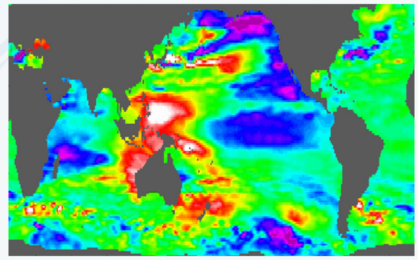
Sensors and primary functions

- *Poseidon-2 Altimeter — Measures sea level (CNES)*
- *Jason Microwave Radiometer (JMR) — Measures signal delay due to water vapor (NASA)*
- *Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) — Precision orbit determination and tracking (CNES)*
- *TurboRogue Space Receiver (TRSR) — Global Positioning System receiver for satellite tracking (NASA)*
- *Laser Retroreflector Array (LRA) — Satellite tracking (NASA)*









Why study the oceans?

The oceans control Earth's weather as they heat and cool, humidify and dry the air, and affect wind speed and direction. The weather determines not just what you'll wear to work in the week ahead — but also whether the wheat crop in Nebraska will get enough rain to mature, whether the snow pack in the Sierras will be thick enough to water southern California, whether the hurricane season in the Atlantic will be mellow or brutal, and whether El Niño will kill the eastern Pacific anchovy fishery. Long-term weather patterns influence water supply, food supply, trade shipments, and property values. Weather is even credited with fostering the growth of civilizations, or killing them off. You can't escape the weather, or even change it — but being able to predict its caprice makes its impact manageable. Only by understanding the dynamics of the oceans can we begin to do this.

NASA's ocean altimetry missions

The combined data record from the Topex/Poseidon and Jason-1 missions has created an unqualified revolution in oceanography. The seasonal and interannual variability of the global ocean has been determined, leading to the first reliable test of the performance of ocean and climate models as well as the development of improved ocean data assimilation capabilities. The formation of El Niño and La Niña was observed and analyzed on global and decadal scales for the first time, saving both lives and money. Global sea-level rise has been confirmed and more accurately determined than ever before. New discoveries have been made in the change of ocean circulation and its effects on climate. Long-standing questions about the nature of ocean tides have been answered, and the resulting tide models have led to a revolution in thinking in the way mixing is treated in ocean models. Additionally, the Tandem Mission, the nearly four-year period when Topex/Poseidon and Jason-1 flew together, provided new opportunities to study the details of ocean circulation and its interaction with turbulent ocean eddies.

Societal benefits

The continued success of the NASA and European spaceborne ocean altimeters over the past fifteen years has provided sustained opportunities for researchers and operational users to incorporate this important data set into a variety of applications that benefit society. The data are used in areas of climate research, ocean circulation studies, marine mammal research, and land operations, as well as in public education and operational oceanography. Examples of the societal benefits of ocean altimetry data can be seen on the NASA/JPL Ocean Surface Topography from Space website (http://sealevel.jpl.nasa.gov), and the CNES Aviso website (http://www.jason.oceanobs.com).

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