

NASA PMSEP Conference

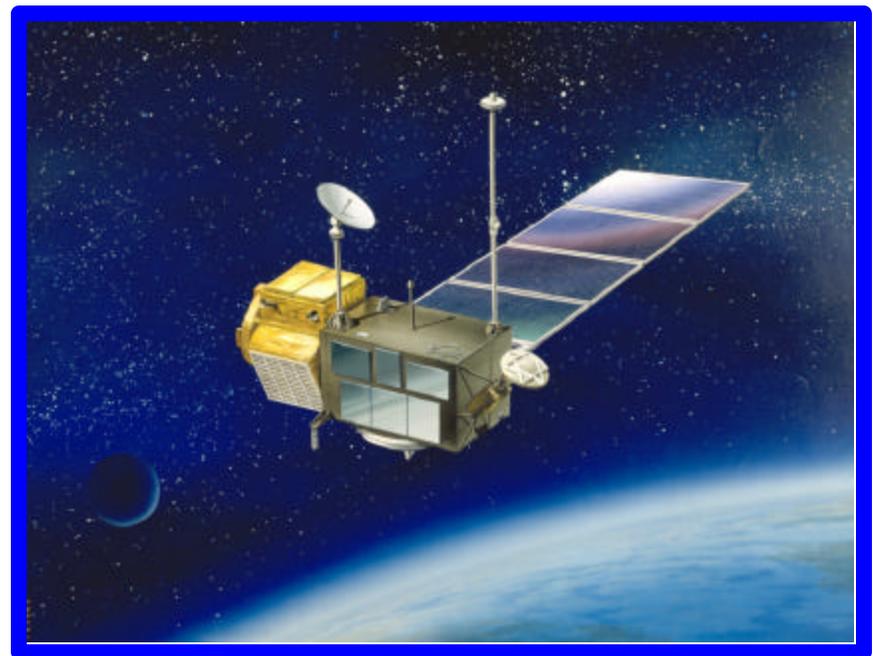
TOPEX/Poseidon Project

Shel Rosell

TOPEX/Poseidon Project Overview

Project Summary

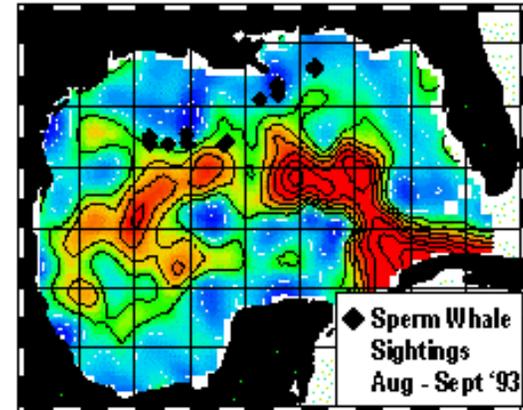
- Earth orbiter, 66 degree inclination
- 1335 km altitude
- joint NASA/CNES mission
- satellite built by Fairchild Space Company (currently Orbital Sciences Corporation)
- three-year design life
- launched August 10, 1992
- ~2400 kg. at launch
- six payload instruments, four NASA and two CNES
- primary instrument: NASA Radar Altimeter



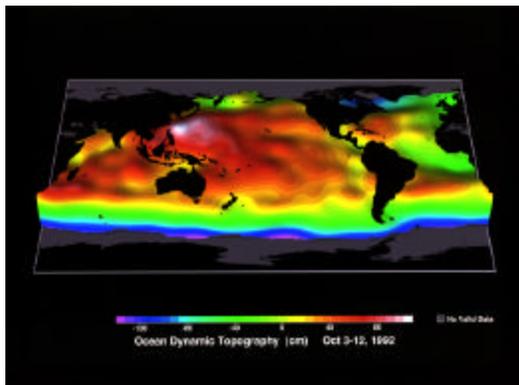
TOPEX/Poseidon Project Overview (cont.)

Science Goals

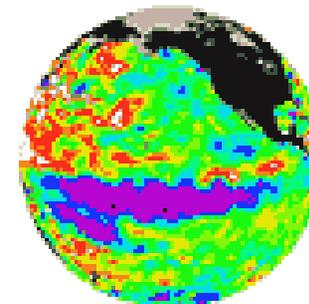
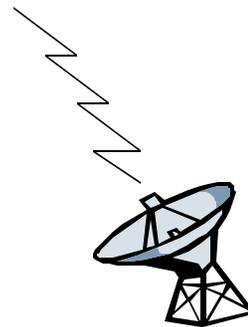
- Measure global sea-level variations with sufficient accuracy for applied ocean dynamic studies
- Lay the foundation for a continuing program of long-term observations of the oceanic circulation and its variability



marine life studies



global topography

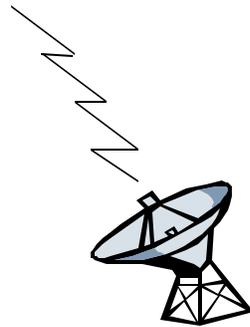


*El niño and
La niña*

TOPEX/Poseidon Project Overview (cont.)

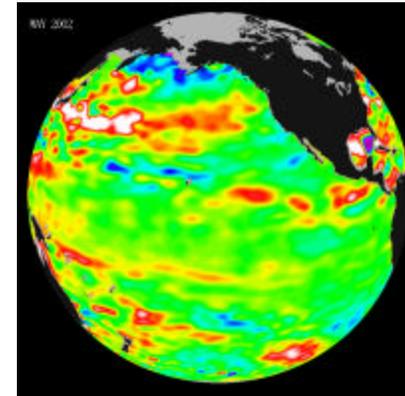
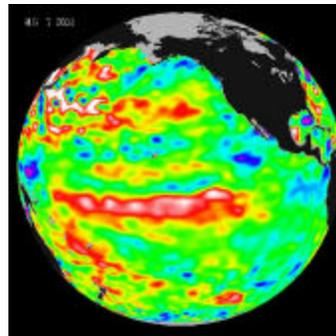
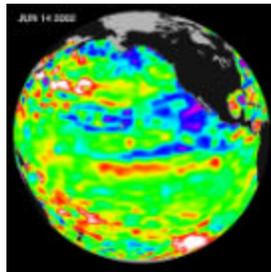
Launch

- August 10, 1992
- CNES-supplied Ariane 42P launch vehicle
- Launch site in Kourou, French Guiana



TOPEX/Poseidon Project Current Operational Status

- Satellite bus and instruments continue to perform well
- Current engineering estimates show 12-14 year total lifetime achievable
 - tape recorder degradation (2 of 3 still operational, but data quality declining)
 - failures of electrical components due to radiation
 - reaction wheel motor degradation
- Flight team now operating both TOPEX/Poseidon and Jason-1 in JPL multi-mission operations center



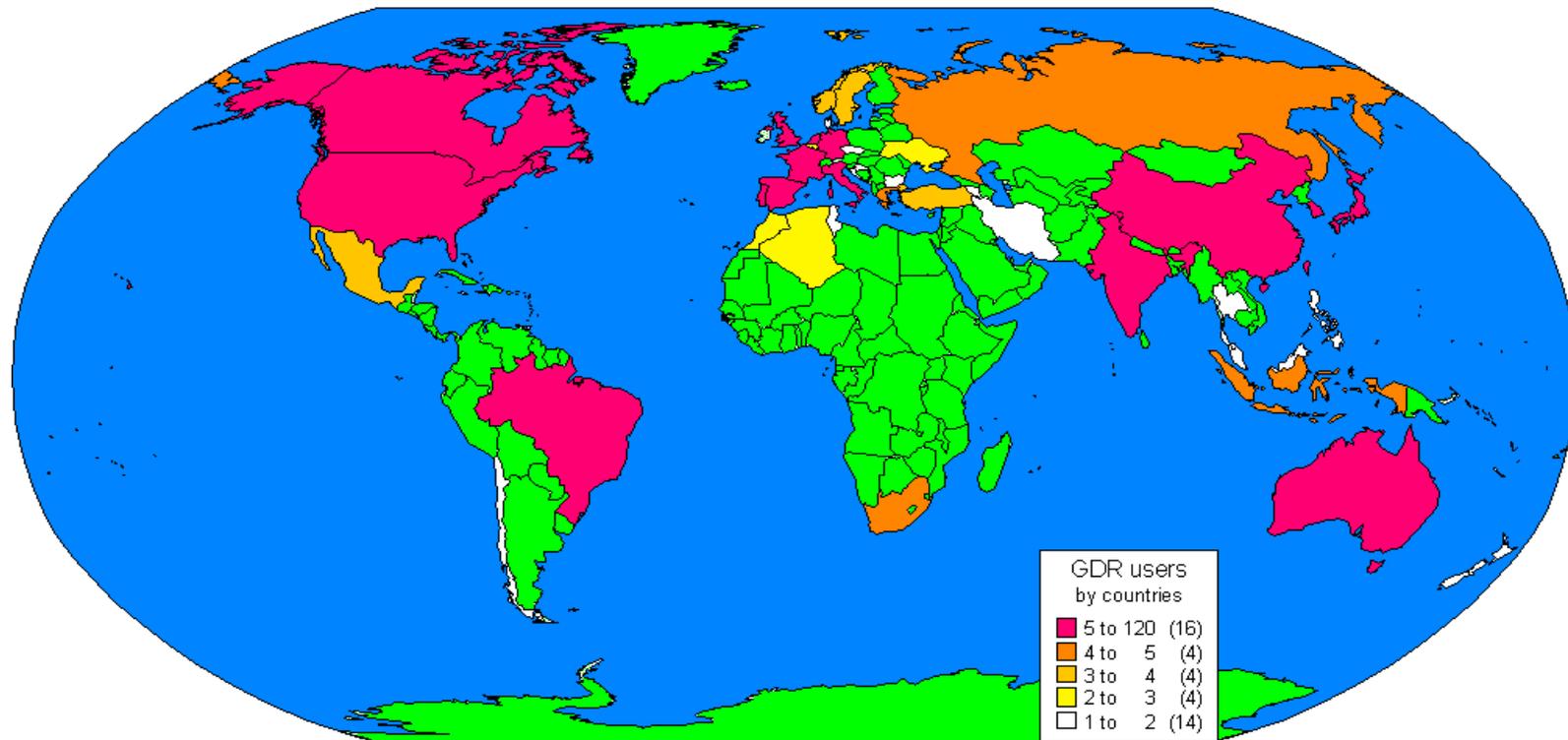
TOPEX/Poseidon Project Current Operational Status (cont.)

- Operations conducted from on-site JPL multi-mission support facility



TOPEX/Poseidon Project Public Outreach

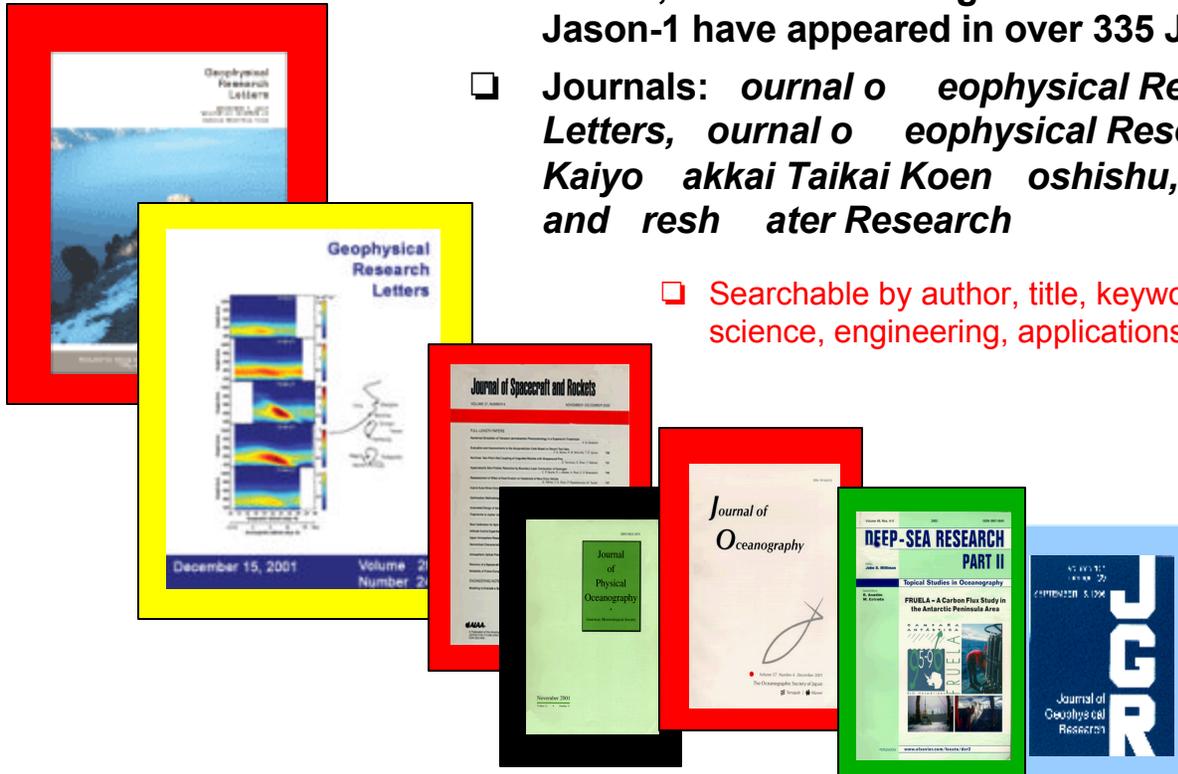
- Project is collecting and tracking enhanced web statistics, e.g. traffic, demographics, domain/access site information to direct outreach efforts and provide product feedback



TOPEX/Poseidon Project Public Outreach (cont.)

- o TOPEX/Poseidon science open literature database now available on-line
(see URL <http://sealevel-lit.jpl.nasa.gov/science/search-form.cfm>)

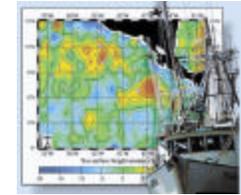
- Over 1,450 articles using information from TOPEX/Poseidon and Jason-1 have appeared in over 335 Journals or Publications.
- Journals: *Journal of Geophysical Research*, *Journal of Geophysical Research Letters*, *Journal of Geophysical Research-Oceans*, *Japan's Nippon Kaiyo Gakkai Taikai Koen Shishu*, *New Zealand Journal of Marine and Freshwater Research*
- Searchable by author, title, keyword, abstract, & category for TP/J-related science, engineering, applications, education research from 1990-present



TOPEX/Poseidon Project Science Data Applications

□ Climate Research:

By modeling changes in the distribution of heat in the ocean with TOPEX/POSEIDON & Jason-1 data, scientists can study patterns of evaporation and resultant precipitation in the ocean system.



□ Ship Routing:

Maps of currents and eddies from TOPEX/POSEIDON and Jason-1 are used in commercial shipping and recreational yachting to optimize routes.

□ Offshore Industries:

Cable-laying vessels and offshore oil operations require accurate knowledge of ocean circulation patterns to minimize impacts from strong currents.



□ Hurricane Forecasting:

Altimeter data are incorporated into atmospheric models for hurricane season forecasting and individual storm severity.

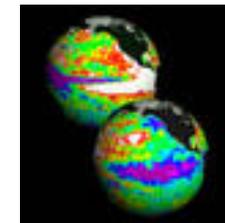
□ Fisheries Management:

Altimeter data identifies ocean eddies which bring an increase in organisms that comprise the marine food web, attracting fish and fishermen.



□ Marine Mammal Research:

Sperm whales, fur seals, and other marine mammals can be tracked, and therefore studied, around ocean eddies where nutrients and plankton are abundant.



□ El Niño & La Niña Forecasting:

Understanding the pattern and effects of climate cycles such as the El Niño Southern Oscillation (ENSO) is a primary goal of the TOPEX/POSEIDON and Jason-1 missions.

□ Coral Reef Research:

Altimeter data is used to monitor and assess coral reef ecosystems, which are sensitive to changes in ocean temperature.



TOPEX/Poseidon Project Lessons Learned

- ❑ Clear definition of roles and responsibilities as early as possible
 - ❑ Memorandum of Understanding between NASA and CNES
 - ❑ Project Plan
- ❑ Satellite contractor selection process
 - ❑ Define subsystem level requirements
 - ❑ Heritage hardware and software
 - ❑ Few items truly off-the-shelf
 - ❑ Clear definition of quality of parts
- ❑ Control of requirements definition
 - ❑ Establish cutoff dates
 - ❑ Can be never ending
 - ❑ Include user buy-in



TOPEX/Poseidon Project Lessons Learned (cont.)

- ❑ Foundation of success is built on a dedicated team
- ❑ Collocation of staff
- ❑ Define and test interfaces early
- ❑ Involve operations staff in satellite system testing
- ❑ Satellite test bed invaluable for flight operations
 - ❑ Satellite anomaly investigation
 - ❑ Training of staff
 - ❑ Testing of post-launch satellite sequences
- ❑ Test and training of mission operations staff



TOPEX/Poseidon Project Onward and Upward

- TOPEX/Poseidon operations currently approved through at least FY 03
 - working with NASA for continued mission in FY 04 and beyond
- Scientists and Project must continue joint efforts to demonstrate applications of ocean science to the public
 - societal benefits will define NASA/CNES strategy for long-term ocean observing systems

