Paris, 3 july
PR042-2013
Press release

Jason-1 altimetry satellite stops after more than 11 years of continuous ocean monitoring

The ocean observation satellite altimetry mission, Jason-1, has been officially terminated by NASA and CNES on July 2nd, 2013. Jason-1 was launched from Vandenberg Air Force Base, Calif., on December 7th, 2001. That made it one of the longest-lived oceanographic satellites with more than 11 years in orbit. Measurements made by Jason-1 payload instruments have allowed us to monitor sea surface topography with an extreme precision. Jason-1 observations gave us access to ocean currents, as well as climate monitoring and marine meteorology.

"Jason-1 has been a resounding scientific, technical, and international success," said John Grunsfeld, associate administrator of NASA's Science Mission Directorate in Washington. "The mission met all of its requirements, performed an extended mission and demonstrated how a long-term climate data record should be established from successively launched satellites. Since launch, it has charted nearly 4 centimeters of rise in global sea levels, a critical measure of climate change and a direct result of global warming. The Jason satellite series provides the most accurate measure of this impact, which is felt all over the globe."

For Jean-Yves Le Gall, CNES President: "Jason-1 was an exemplary and multi-faceted altimeter mission. Not only did Jason-1 extend the precise climate record established by Topex/Poseidon, it then made invaluable observations for mesoscale ocean studies on his second, interleaved orbit. Even when moved to a "graveyard" orbit, Jason-1 continued to make unprecedented new observations of the Earth's gravity field, with precise measurements right till the end. Jason-1 contributed so much to so many scientific disciplines."

From TOPEX to the Jason series:
During the 1990s, CNES and NASA started the Jason-1 project to ensure the continuity of the highly successful TOPEX/Poseidon mission. Jason-1 contributed to the double success achieved by these two agencies: firstly by establishing the more than 35 year U.S.-French cooperation -from TOPEX to SWOT- in the domain of satellite altimetry, secondly by confirming that radar altimetry has become the keystone of ocean monitoring by satellite. In the evolution of TOPEX/Poseidon to Jason-1, the main science objectives have remained essentially the same, however technology and responsibility sharing has deeply evolved. Much smaller and lighter than TOPEX, Jason-1 was the first satellite to use the CNES-TAS PROTEUS platform. The main instrument, the TAS-developed radar altimeter instrument Poseidon-2 presented a new entirely digital design, and the precise orbit determination system included one of the first NASA Jet Propulsion Laboratory (JPL)-developed GPS high precision receivers. Other instruments included the JPL-developed microwave radiometer and laser retroreflector array, and the CNES-developed DORIS orbitography instrument. Those technological choices have proven to be right, and paved the way for a series of precise, reference altimetry missions that have continued with Jason-2 in 2008, and Jason-3 planned in 2015.

Long-term monitoring of sea level rise:
From 2001 to 2013, Jason-1 provided a major contribution to the monitoring of sea level rise, an essential climate variable. This was due to its excellent measurement accuracy, the long-term stability of its instruments, and the continuous effort of calibration-validation performed on the ground. During its lifetime, Jason-1 was carefully calibrated with respect to in situ measurements, compared to other spaceborne sensors, and the processing algorithms have been maintained to state-of-the-art standards. This precise calibration was assisted by two key periods of formation flying intercalibration, with its predecessor TOPEX in 2001, then with its successor Jason-2 in 2008, allowing us to maintain measurement uncertainty below the 0.5 mm/year mark.

Beginnings of operational oceanography:
TOPEX/Poseidon had demonstrated the capability of radar altimetry to observing ocean dynamics and variability. By the late 1990s, in synergy with Jason-1 development, an ambitious international effort was established which allowed the parallel development of a dense network of in-situ sensors (more than 3000 ARGO floats have been deployed worldwide), and a concerted development of new models and numerical methods to describe and predict the oceans (GODAE: Global Ocean Data Assimilation Experiment). Today several institutions worldwide are continuously generating analyses and forecasts of the ocean state, contributing to a large variety of applications. All of these systems rely on a triptych of information: model – in situ – satellite observations. The Jason series is a key element, being the reference mission on which all other altimeter missions are calibrated.

Long life and abundant science results:
Almost 12 years in orbit – 4 times the nominal life time-, this represents more than 53 thousand revolutions around the Earth, more than 1 million products distributed to users, and more than 3500 science publications: there is much to be proud of for this mission. Until the end-of-life decision taken this week, the whole system (space segment, ground segment, and user distribution system) was exemplary thanks to the long-term commitment of all actors, from operational teams to science users. The worldwide scientific community is federated within the Ocean Surface Topography Science Team, whose annual meetings allow space agency engineers to meet with oceanographers and scientists, and share a common understanding of the ultimate objectives of the mission. As a consequence, the performance of the Jason-1 mission largely exceeded both the written specifications and the original science expectations.

An exemplary end of life:
Since 2010 and the enforcement in France of the "Loi sur les Opérations Spatiales" (Space Operations Law), NASA and CNES have worked jointly towards a common strategy to avoid leaving an inert object in orbit, with the potential to pollute the altimetry reference orbit (1336 km, 66°), which will be populated by Jason-2, Jason-3 and Jason-CS1 and 2 for the decades to come.
Taking into account the ageing satellite and the loss of certain redundant components, Jason-1 had its excess fuel depleted as a preventive measure, and was moved to a graveyard orbit in April 2012. Even here, the good will and the commitment of all actors allowed NASA and CNES to choose a graveyard orbit that is compatible with the legal constraints but also highly interesting scientifically, namely a "geodetic orbit" useful for marine geoid (or gravity) and bathymetry characterization with a sub-cycle that maintained good ocean observations. A full 406-day cycle has been completed, and first renewed gravity and bathymetric maps are currently being generated. It is on this very orbit that on June 21st, 2013, the Jason-1 transmitter ceased to function, cutting off all communication from the satellite to the ground and thereby terminating the science mission capacity. This failure still allowed CNES and JPL engineers to send commands to the satellite, while laser tracking confirmed the response of the spacecraft. Passivation operations have been performed on July 1st and 2nd to conform to the previously established procedures.

For more information, please visit:
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