ERS-2: an essential mission for oceanography

Abstract

After 16 years of successful activity, the ERS-2 satellite has been decommissioned and removed from its operational orbit in July 2011. This is the end of the largest altimetry mission ever flown, ERS-1, ERS-2 and Envisat satellites are widely used for a range of specific applications, from real time mesoscale modeling to fine climatology analysis. Thanks to validation, homogenization and cross-satellite merging methods, ERS-1/2 allowed the noise of operational oceanography and contributed to study the climate change, with a level of accuracy which could not have been achieved with one single satellite. All this has been made possible through the current validation activities (ESA and Ifremer) and the ESA/CLS/TELEOS project (Cnes). During their entire life time and with the continuous effort of the oceanographic community and Space Agencies, new standards have been regularly updated to provide oceanographers with a multi-mission long time series as precise as possible. New, new ESA projects such as Reaper and Sea Level Climate Change Initiative (SL-CCI) will dramatically improve the data quality and emphasize the legacy of these missions.

16 years of ERS-2 data

ERS-2 provided data from 1995 to 2011. It has been very useful for oceanographic applications mainly until June 2003 where the on-board register failed. Fortunately, there was enough data to intercalibrate with Envisat before the failure. The figure below gives an outline of the different phases and main events.

ERS-1

ENVISAT

Impact of using ERS-2 with TP for mesoscale activity: The comparison between 2-satellites and mono-mission constellations highlights the bias in energy in the areas of high mesoscale activity signal when using a mono-mission constellation

Oceanographic applications

To combine ERS data with other missions an orbit error reduction method was used, taking TP data as a reference to constrain cubic spline adjustment (Gaspard P. - V. L. F. Oger, 1998, “ERS-1/2 orbit improvement using Topex/Poseidon: The 2 m challenge” , J. Geophy. Res., 103, C4, 8045-8057).

Validation outputs

To conclude

The ERS missions were key for the oceanographic community: thanks to validation activities and combining methods with other satellites, they allowed the raise of operational applications and studies on mesoscale activities.

Since 2003, the ERS-2 mission has been less valuable but can still be used for comparisons to Envisat.

As errors on altimetric standards will continue to be reduced in the future, the interest of ERS datasets will therefore increase for climate and oceanic applications and studies. For instance, Esa projects such as Reaper and CCI are on-going and will allow improving dramatically those datasets.

“Within the Reaper project, all ERS data will be reprocessed and validated in 2012.

Within the SL-CCI, new ERS-2 products (FCDR) will be available in 2012 dedicated to climate studies (see http://www.esa-cci.org/)

And now

The ERS-2 data will be used in the future within the ERS-2 coverage (ERS-2 coverage is provided by Ifremer, CEOS, CLS, JPL, ESA) and on the new mission ERS-3 (ESA/CLS/IFREMER).