Improved Envisat Preliminary (MOE) and Precise (POE) Orbit Data Products

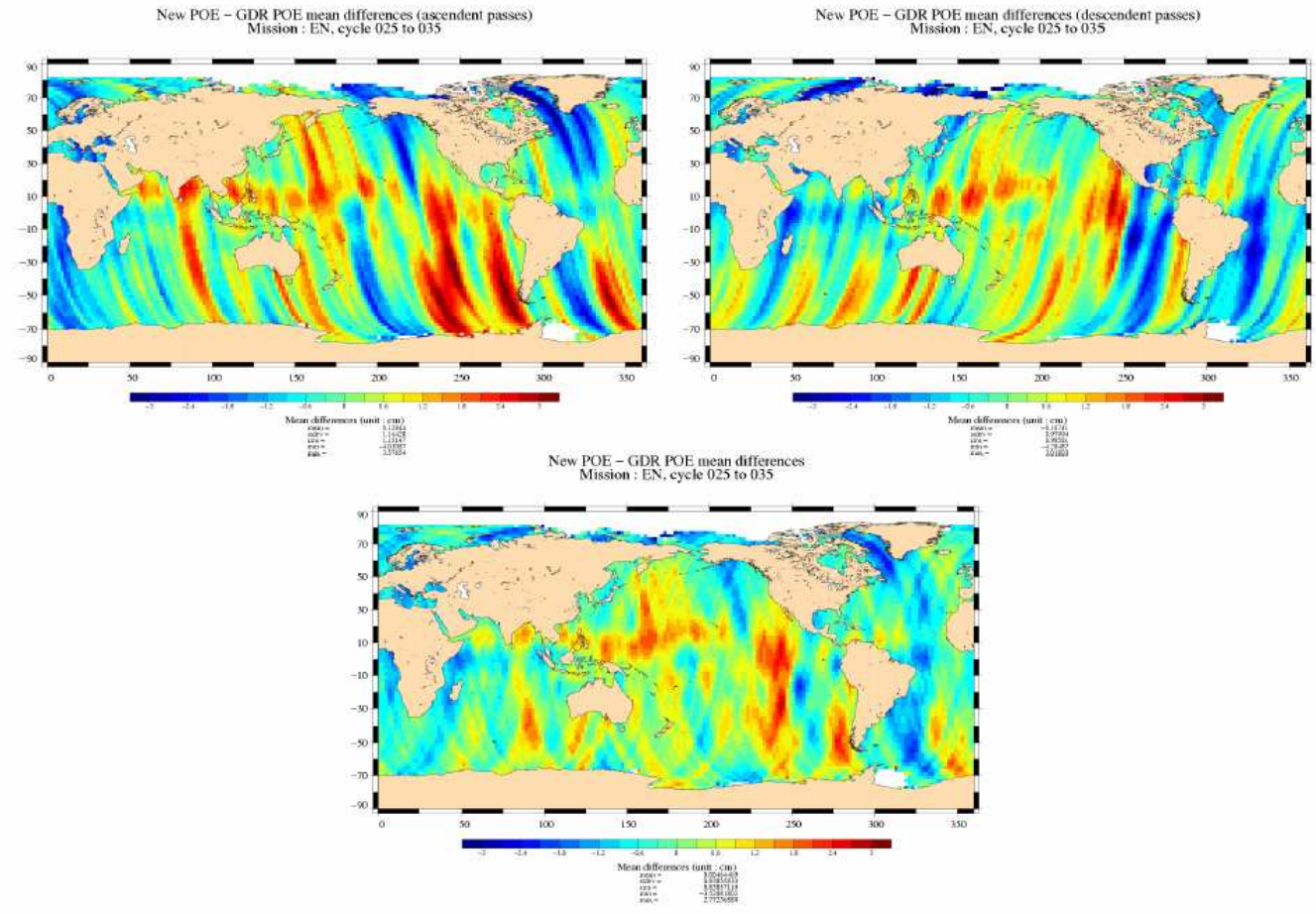
Please note that improved Envisat MOE and POE orbit files will be made available from the F-PAC :

- from October 24 onwards for the MOE orbit (Preliminary orbit file)
- from the beginning of cycle 41, and with the usual delay of 5 weeks, for the POE orbit information (Precise Orbit file)

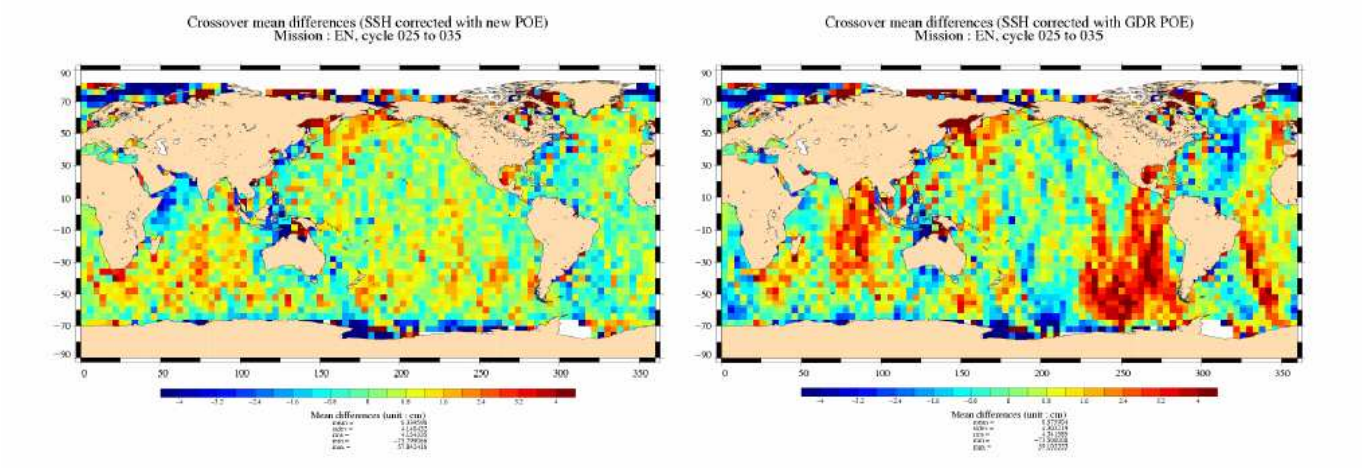
OFF-LINE ORBIT PRODUCT IMPROVEMENT

With GRACE mission in flight since March 2002, geoids have been greatly improved. The use of the latest geoid standards for orbit determination reduces geographically correlated errors. This is particularly visible in the ascending/descending passes differences. Such errors have been identified in the past thanks to systematic comparisons of ENVISAT data sets with other altimetric missions like Jason-1 and T/P.

Since late June 2005, CNES has worked on a new POE solution: a few cycles were processed in order to analyze and validate this new configuration. The figure below shows the mean differences over ENVISAT cycles 25-35 using the new POE solution with regard to the one currently used in ENVISAT GDR products. On the top two panels, the ascending and descending passes have been plotted separately while on the bottom panel all the passes have been taken into account. There are strong local biases that can reach +2 and -2 cm in some areas. In South-East Pacific for example, between longitude 225 and 250, the reprocessed orbit is noticeably different from the GDR orbit. These local differences are mostly due to the use of the GRACE gravity model instead of GRIM5.



The new POE also improves slightly the performance at crossovers (1 to 3 cm2), and the mean SSH values at crossovers are much closer to 0.



NEW ENVISAT CNES PRECISE ORBIT DETERMINATION (POD) CONFIGURATION AND STANDARDS

New pre-processing software

The main features are:
- polynomial and along-track error adjustment
- Iterative editing on residuals (per pass)
- Min pass size
- Max RMS per pass

The main impact of this new pre-processing is that less measurements are edited, thus allowing more measurements to contribute to the orbit determination. This may slightly increase the post-fit DORIS residuals.

Reference systems:

- polar motion and UT1: IERS bulletin D with IERS 1996 daily and sub-daily corrections
- stations coordinates: DPOD2000 reference for Doris Stations, ITRF 2000 with minor corrections for a few SLR
- satellite reference: Post-Launch value of Mass + variations generated by Control Centre, attitude model: Nominal Yaw Steering Law

Force models:

- EIGEN-CG03C gravity field model
- IERS 2003 Solid Earth tides
- FES 2004 (all principal constituents, with admittance) ocean tides
- Haurwitz & Cowley atmospheric tides
- Sun, Moon, Venus, Mars and Jupiter third bodies
- thermo-optical coefficient from pre-launch box and wing model for solar radiation, with smoothed Earth shadow model
- MSIS86 model, solar activity from Boulder, physical box and wing model for atmospheric drag, with 1 Cd adjustment per 2Rev with a priori constraint
- Knocke-Ries albedo and IR model for Earth radiation
- 1/rev along-track and cross-track constant per 24 hours for empirical force modelling

Tracking data:

- **DORIS**:
  - Troposphere correction: CNET1 model, vertical bias adjusted
  - Frequency: Bias per pass adjusted
  - Weight: 1.5 mm/s
  - 6.5 microseconds datation bias in order to cope with a 4.5 cm along-track bias with Laser orbits
- **Laser**
  - Troposphere correction: Marini-Murray following IERS 2000
  - Relativistic delay applied
  - Retro-reflector correction: Constant correction of 5.0 cm for all stations
  - Bias/Pass: Solved-for for a few stations
  - Weight: Globally 10 cm