

2010 Ocean Surface Topography Science Team (OST-ST) Meeting

DORIS/JASON-2 : LESS THAN 5 CM ON-BOARD ORBITS IN REAL-TIME

C. Jayles¹, J.P. Chauveau², C. Tourain¹, A. Auriol¹...

¹ *Centre National d' Etudes Spatiales* (CNES), 18 Ave E. Belin, 31401, Toulouse cedex 9, FRANCE, email : christian.jayles@cnes.fr, Tel : +33-(0)5-61-27-44-61, Fax : 0(33)5-61-28-25-95 (corresponding author)

² Akka I&S, 6 rue Roger Camboulives, 31000 Toulouse, FRANCE, email : jp.chauveau@akka.eu, Tel : +33-(0)5-34-61-93-91.

Abstract

DIODE (DORIS Immediate Orbit on-board Determination) is a real-time on-board orbit determination software series, embedded in the DORIS receiver. Different versions have been flown on-board different satellites, beginning with SPOT4 (1998), SPOT5, Jason-1, Jason-2, EnviSat, and the recently launched CryoSat-2. After a description of the DORIS system and its recent evolutions, and a few recent CryoSat-2 results, the presentation will concentrate on the Jason-2 mission.

On February 2010, a new version of the Navigation Software has been uploaded on EEPROM, without interrupting the RT orbit determination process. After 1.5 year of correct results, the original version has been deactivated and the new version has been started, following a recommendation of the Seattle OSTST.

This new version improves several technical points observed on the initial version (especially in quaternion processing) and implements enhanced algorithms. Since February, the accuracy of the on-board DORIS/DIODE orbits has been oscillating between 1 and 5 cm radial RMS as compared to the final Precise Orbit Ephemerides (POE) orbit, allowing valuable NRT use of Jason-2 OGDR products. The paper details these results through several months of on-board data.

Future improvements are also discussed for Jason-2 as well as for the next missions. Ground analysis and validation tests show that the DORIS measurement is very precisely and properly modelled in the DIODE navigation software. Consequently, improvement of DIODE accuracy is still possible and should be driven by enhancement of the physical models : forces and perturbations of the satellite movement, Radio/Frequency phenomena perturbing measurements. Of course, parallel improvement of the DORIS station network is a necessity (densification reduction of interferences, suppression of multipath, stability of the antennas, ...). In the end, if both models and network keep on being improved, a one-centimeter accuracy is possible with future versions of DIODE.