

GSFC OSTM, Jason-1 and TOPEX POD Update

F. G. Lemoine
N. P. Zelensky
S. Melachroinos
D. S. Chinn
B. D. Beckley
S. B. Luthcke
D D. Rowlands
J. W. Beale

The OSTM (Jason-2) has been in orbit for three years (since June 2008), and the full suite of altimeter data from TOPEX/Poseidon, Jason-1 and Jason-2 now span nearly twenty years since the launch of TOPEX in 1992. Issues that affect the stability of the orbits through time and the orbit accuracy include the reference frame, the radiation pressure models for the altimeter satellites and the fidelity of the dynamic force model, including time-variable gravity, as well as the performance of the individual tracking systems. We have conducted detailed analyses of the new ITRF2008 reference frame and find only a small effect on global mean sea level compared to ITRF2005, although we note an improvement in POD quality over the most recent time periods for Jason-2. In the past year we have developed a new time series of orbits for TOPEX/Poseidon, Jason-1, and Jason-2 based on the ITRF2008 reference frame using SLR and DORIS data and for Jason-2 using GPS data. In addition, we have continued to experiment with improvements to the radiation pressure model for the altimeter satellites in particular the Jason satellites since these nonconservative force model errors now rank as the most outstanding source of error on altimeter satellite POD. In the previous (ITRF2005-based) and current (ITRF2008-based) orbits we have relied on a simplified time-variable gravity (TVG) model, derived from GRACE solutions. We have recently experimented with improvements using higher fidelity TVG models (both temporally and spatially) and report on the results. We have computed a time series of GPS-only reduced-dynamic orbits at GSFC, and used these in conjunction with the SLR-DORIS dynamic and reduced-dynamic orbits to assess reference frame stability with respect to the different tracking systems for both ITRF2005 and ITRF2008. We show through internal (GSFC-only) and external comparisons (with other analysis centers) that the radial orbit accuracy for Jason-2 remains at 1 cm.