



The application of the ITRF2014 Product Center solutions with respect to Altimeter Satellite Precise Orbit Determination

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The IERS product centers, IGN, DGFI, and JPL, have prepared new solution realizations of the International Terrestrial Reference Frame (ITRF), based on the analysis and the combination SINEX solutions submitted by the individual geodetic techniques: Satellite Laser Ranging (SLR), Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS), Very Long Baseline Interferometry (VLBI), and Global Navigation Satellite Systems (GNSS). We evaluate these solutions with respect to their orbit determination performance, including RMS of fit, and other orbit metrics, including altimeter crossovers, focusing on the altimeter satellites, in particular TOPEX/Poseidon, Jason-1, and Jason-2, but also Cryosat-2 and Envisat. We also evaluate the POD performance using the Jason-2 JPL/reduced-dynamic orbits as a reference. We have conducted a preliminary evaluation of the new solutions so far released, ITRF2014P (IGN), and DTRF2014 (DGFI) with respect to the Jason-2 satellite, and find a significant improvement in the DORIS satellite RMS of fit for DORIS-only orbit computations. Over 260 orbit cycles (July 2008 to August 2015) the RMS of fit improves from 0.3667 mm/s for DPOD2008 to 0.3646 and 0.3645 mm/s for the two new ITRF2014 realizations. The following stations show improvements in RMS of fit of more than 0.02 mm/s, which is significant for DORIS data: KRUB/KRWB (Kourou), CIDB (Cibinong), JIUB (Jiufeng), YEMB (Yellowknife), MATB (Marion Island), FUTB (Futuna), and ARFB (Arequipa). In this paper we also focus on the SLR performance, and we evaluate how the new ITRF2014 reference frame realization can be integrated into the next generation of precision orbit improvements for the Jason series of satellites.