Geophysical Research Abstracts
Vol. 17, EGU2015-2612, 2015
EGU General Assembly 2015

An updated model of short-period Earth rotation variations deduced from altimetry-based elevations and barotropic currents

Matthias Madzak (1), Michael Schindelegger (1), Johannes Böhm (1), Wolfgang Bosch (2), Jan Hagedoorn (3), Harald Schuh (3,1)

(1) Vienna University of Technology, Department für Geodäsie und Geoinformation (matthias.madzak@tuwien.ac.at), (2) Deutsches Geodätisches Forschungsinstitut (DGFI), (3) Helmholtz-Centre Potsdam - GFZ German Research Centre for Geosciences

Improving the current conventional model of short period ocean tidal effects in polar motion and changes in length-of-day is a key challenge of present Earth rotation research. Accurate estimates of ocean tidal angular momentum (OTAM) that are required to this end can be inferred from a purely altimetry-based method, in which measured elevations determine the OTAM mass signal and also the horizontal velocity field through an inversion of the classical shallow water equations. Some of the subtleties of this global adjustment, which we investigate here in the context of Earth rotation, include the weighting schemes for different observation equations, the treatment of closed boundaries, as well as the choice of bathymetry and the amount of bottom friction. We perform a range of test inversions, where the optimal parameter set for diurnals and semi-diurnals is found by working with a data-assimilative global tide model for which both heights and barotropic currents are known. Having completed the fit of tidal velocities to elevations from an up-to-date altimetric model of major constituents, OTAM values are computed and supplemented by the contributions from minor tides using admittance assumptions. We assess the quality of the derived high-frequency Earth rotation model by deploying it as an a priori in the analysis of VLBI (Very Long Baseline Interferometry) observations and comparing its performance to that of the conventional model and those of empirical solutions.