Tests of daily time variable Earth gravity field solutions for precise orbit determination of altimetry satellites

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This study makes use of current GFZ monthly and daily gravity field products from 2002 to 2014 based on radial basis functions (RBF) instead of time variable gravity field modeling for precise orbit determination of altimetry satellites. Since some monthly solutions are missing in the GFZ GRACE RL05a solution and in order to reach a better quality for the precise orbit determination, daily generated RBF solutions obtained from Kalman filtered GRACE data processing and interpolated in case of gaps have been used. Moreover, since the geopotential co-efficients of low degrees are better determined using SLR observations to geodetic satellites like Lageos, Stella, Starlette and Ajisai than from GRACE observations, these terms are co-estimated in the RBF solutions by using apriori SLR-derived values up to degree and order 4. Precise orbits for altimetry satellites Envisat (2002-2012), Jason-1 (2002-2013) and Jason-2 (2008-2014) are then computed over the given time intervals using this approach and compared with the orbits obtained when using other models such as EIGEN-6S4. An analysis of the root-mean-square values of the observation fits of SLR and DORIS observations and the orbit arcs overlaps will allow us to draw a conclusion on the quality of the RBF solution and to use these new trajectories for sea level trend estimates and geophysical application.