



Influence of parameterization on the accuracy of altimetry satellite orbits

S. Rudenko and T. Schoene

GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg A17, D-14473 Potsdam, Germany
(rudenko@gfz-potsdam.de / Phone: +49-8153-281578)

Motion of altimetry satellites is essentially affected by the influence of non-gravitational perturbations. Now, when the knowledge of the gravitational forces acting on a satellite improved significantly due to the use of GRACE derived Earth's gravitational models, new planetary ephemerides, solid Earth and ocean tide and other models, modeling of non-gravitational perturbations, especially, atmospheric drag plays an important role. Significant improvement of the orbit quality can be reached by choosing an optimal parameterization, in particular, of atmospheric drag coefficients and empirical accelerations to reduce unmodeled accelerations. Numerous tests have been performed to find the best parameterizations to derive precise orbits of altimetry satellites GEOSAT, ERS-1, ERS-2 and TOPEX/Poseidon in the same (ITRF2000) reference frame for all satellites using common, most precise models and standards. The orbit quality achieved is illustrated using the results of single crossover analysis over the whole mission for each satellite. Thus, we managed to reduce RMS crossover differences from 14.1 to 9.0 cm for GEOSAT, up to 8.6 cm for ERS-1, 7.5 cm for ERS-2 and 5.9 cm for TOPEX/Poseidon orbits.