Validating GRACE-derived static and dynamic gravity field models using long-term geodetic results from Laser ranging and DORIS data.

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The GRACE mission led to a new generation of gravity field models, called EIGEN, and GGM, modelling the static part of the Earth gravity field and also estimating seasonal effects related to mass redistribution in the whole Earth-Ocean-Atmosphere system. The goal of this paper is to assess the improvement gained in accuracy, when using these new gravity field models to fit orbital arcs of geodetic satellites, processing Laser ranging or DORIS tracking data. In particular, we look at long-term Laser orbits solutions to derive any long-term improvement and at shorter term DORIS orbits, looking for a potential removal of systematic seasonal effects.

In this paper, we investigate the impact of the choice for a gravity field model used to propagate the equations of motion, on the quality of the geodetic products. We therefore use several gravity field models: EGM96, GRIM5-S1, two EIGEN models as well as two GGM models. We discuss the accuracy and the stability of the fit-derived products, built since the beginning of the periods when tracking data are available : fit-residuals, station coordinates, gravity field parameters, in particular...

We also use monthly gravity field solutions elaborated at Jet Propulsion Laboratory (JEM) to evaluate if the DORIS or the SLR results can provide a more stable pseudo-geocenter determination and verify how annual systematic effects could be removed or not from weekly station coordinate determinations.