

Precise Orbit Determination for the GOCE Satellite Using GPS

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Apart from the gradiometer as the core instrument, the first ESA Earth Explorer Core mission GOCE (Gravity field and steady-state Ocean Circulation Explorer) carries a 12-channel GPS receiver dedicated for precise orbit determination (POD) of the satellite. The EGG-C (European GOCE Gravity-Consortium), led by the Technical University in Munich, is building the GOCE HPF (High-level Processing Facility) dedicated to the Level 1b to Level 2 data processing. One of the tasks of this facility is the computation of the Precise Science Orbit (PSO) for GOCE. The PSO includes a reduced-dynamic and a kinematic orbit solution.

The baseline for the PSO is a zero difference procedure using GPS satellite orbits, clocks, and Earth Rotation Parameters (ERPs) from CODE (Center for Orbit Determination in Europe), one of the IGS (International GNSS Service) Analysis Centers. The scheme for reduced-dynamic and kinematic orbit determination is based on experiences gained from CHAMP and GRACE POD and is realized in one processing flow. Particular emphasis is put on maximum consistency in the analysis of day-boundary overlapping orbital arcs, as well as on the higher data sampling rate and on differences originating from different GPS antenna configuration.

We focus on the description of the procedure used for the two different orbit determinations and on the validation of the procedure using real data from the two GRACE satellites as well as simulated GOCE data.