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Geodetic Earth System Parameters from GPS/CHAMP/GRACE Integrated Processing

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Applying dynamic satellite orbit adjustment in the integrated mode, where the constellation of all GPS satellites and Low Earth Orbiters (LEOs; here CHAMP and GRACE) are processed in a single step considering all correlations, time series of geodetic Earth system parameters were homogeneously derived for the entire year 2004 using GPS, SLR and K-band measurements together.

The set of parameters estimated comprises station coordinates, low-degree spherical harmonics coefficients of the Earth's gravity field, and Earth Orientation Parameters. Trying different analysis approaches and processing options (e.g., datum definition, observation weighting, etc.) different time series suitable for geophysical interpretation were obtained.

Comparisons of the results for satellite orbits and other parameters with external solutions are presented for validation purposes. The differences between the integrated one-step processing and the results obtained from applying the commonly followed two-step procedure, where the GPS satellite orbits and the LEO parameters are determined in two subsequent steps, are discussed as well.