



Geocenter Coordinates Estimated from a Combined Multi-GNSS Data Analysis

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The geocenter is the Earth's center of mass. The geocenter coordinates define the offset of the Earth's center of mass w.r.t. the origin of the polyhedron of reference stations located on the Earth's crust. The geocenter varies w.r.t. the Earth's crust because of mass redistributions in the Earth's crust and in the Earth's interior. The geocenter (center of mass) is the origin of the natural reference frame the equations of motion of all Earth orbiting satellites refer to. The geocenter coordinates may in principle be estimated together with other orbit parameters in satellite geodesy.

GPS-only, GLONASS-only, and GPS/GLONASS combined geocenter time series were computed based on three years (2008-2010) of GNSS observations from a global network of 92 stations. Special care was taken to keep the GPS and GLONASS solutions fully consistent and comparable, in particular where the station selection is concerned. The time series of geocenter coordinates and the associated amplitude spectra as they emerge from the different solutions are studied and compared.

The Z-component of the GLONASS-only geocenter coordinates shows large variations of about 30 cm peak-to-peak. In addition, the variations show a striking correlation with the elevation of the sun w.r.t. the three orbital planes of the GLONASS satellites. This relation suggests a correlation between the orbit parameters related to radiation pressure and the geocenter parameters. We present the current status of understanding of these issues.