Improved antenna phase center models for GLONASS

Abstract:

Thanks to the increasing number of active GLONASS satellites and the increasing number of multi-GNSS tracking stations in the network of the International GNSS Service (IGS), the quality of the GLONASS orbits has become significantly better over the last few years. By the end of 2008, the orbit RMS error had reached a level of 3–4 cm. Nevertheless, the strategy to process GLONASS observations still has deficiencies: one simplification, as applied within the IGS today, is the use of phase center models for receiver antennas for the GLONASS observations, which were derived from GPS measurements only, by ignoring the different frequency range. Geo++ GmbH calibrates GNSS receiver antennas using a robot in the field. This procedure yields now separate corrections for the receiver antenna phase centers for each navigation satellite system, provided its constellation is sufficiently populated. With a limited set of GLONASS calibrations, it is possible to assess the impact of GNSS-specific receiver antenna corrections that are ignored within the IGS so far. The antenna phase center model for the GLONASS satellites was derived in early 2006, when the multi-GNSS tracking network of the IGS was much sparser than it is today. Furthermore, many satellites of the constellation at that time have in the meantime been replaced by the latest generation of GLONASS-M.
satellites. For that reason, this paper also provides an update and extension of the presently used correction tables for the GLONASS satellite antenna phase centers for the current constellation of GLONASS satellites. The updated GLONASS antenna phase center model helps to improve the orbit quality.

Stichworte:
GLONASS; Multi-GNSS processing; Receiver antenna; Satellite antenna; Phase center modeling; Reference frame; GNSS orbits

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