



Impact of GNSS Orbit Modeling on Reference Frame Parameters

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The Center for Orbit Determination in Europe (CODE) contributes with a re-processing solution covering the years 1994 to 2013 (IGS repro2 effort) to the next ITRF release. The measurements to the GLONASS satellites are included since January 2002 in a rigorously combined solution. Around the year 2008 the network of combined GPS/GLONASS tracking stations became truly global. Since December 2011, 24 GLONASS satellites are active in their nominal positions. Since then the re-processing series shows - as the CODE operational solution - spurious signals in geophysical parameters, in particular in the Earth Rotation Parameters (ERPs) and in the estimated geocenter coordinates. These signals grew creepingly with the increasing influence of GLONASS. The problems could be attributed to deficiencies of the Empirical CODE Orbit Model (ECOM) for the GLONASS satellites.

Based on the GPS-only, GLONASS-only, and combined GPS/GLONASS observations of recent years we study the impact of different orbit parameterizations on geodynamically relevant parameters, namely on ERPs, geocenter coordinates, and station coordinates. We also assess the quality of the GNSS orbits by measuring the orbit misclosures at the day boundaries and by validating the orbits using satellite laser ranging observations. We present an updated ECOM, which substantially reduces spurious signals in the estimated parameters in 1-day and in 3-day solutions.