



## **Rigorously combined multi–system GNSS analysis**

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Since May 2003 the Center for Orbit Determination in Europe (CODE), acting as an Analysis Centers of the International GNSS Service (IGS), generates consistent GPS and GLONASS satellite orbits from a combined analysis. Data of about 30 GPS/GLONASS–tracking stations are analyzed for that purpose together with numerous GPS–only stations of the IGS receiver network.

Various inter–system biases have to be taken into account when processing different GNSS in a common analysis. The user of products from such a rigorously combined multi–system analysis has not longer to care about such biases and can take maximum profit from the observations of an additional GNSS. The increased number of satellites in view may help, e.g., to improve the redundancy for kinematic positioning.

The fact that GLONASS satellites emit their signals on individual frequencies may lead to frequency–dependent biases in the receivers. Such biases have been investigated, e.g., in (Foks et al., Latest calibration of GLONASS P–Code time receivers, 36<sup>th</sup> PTTI, 2004). As a matter of course, they have also to be considered in a combined analysis of GPS and GLONASS code data. In analogy to differential code bias (DCB), corresponding parameters can be introduced for all GNSS receivers. For the phase observations similar biases can be absorbed by the ambiguity parameters which implies an additional difficulty for fixing the phase ambiguities to their integer values.

The rigorously combined analysis of GPS and GLONASS measurements is considered as a good preparation for inclusion of the upcoming European GALILEO system into the processing, with a maximum benefit for all resulting products.