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GALILEO Precise Orbit and Clock Determinaiton using GPS and GALILEO Combined Processing Strategy

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The GALILEO system—still in its development phase—will be Europe's GNSS, and the in-orbit validation (IOV) phase has begun with launch of two IOV satellites, IOV-1 (E11) and IOV-2 (E12). High precise data processing is the precondition for upgrading navigation precision, monitoring and assessment of GNSS Open services, and expanding the application region for satellite navigation system.

BACC is doing the work about operation and maintenance the iGMAS (international GNSS Monitoring and Assessment Service) Analysis Center (BAC), and producing the precision products to the users with equivalent accuracy to well-known institutes, such as IGS and CODE including precise satellite orbit and clock, tracking station coordinate and receiver clock, Zenith Total Delay (ZTD), Earth Orientation Parameter (EOP) parameters, global and statistical integrity and Ionospheric map, and this study just focuses on the combined orbit and clock.

For GALILEO in the initial deployment phase, in order to take advantage of GPS observation and mature models to do joint orbit determination in a unified time and space frame to improve the orbit of other systems, and use the GPS orbit and clock from joint solution as the external check, we adopt combined orbit determination of GPS and GALILEO fixing firstly the coordinate of station, receiver clock and tropospheric parameters using GPS precise ephemeris and clock, and seting inter-system bias (ISB) between GPS and GALILEO as a parameter to be estimated.

The observation data from a network of multi-GNSS capable receivers from the MGEX tracking network and a regional multi-GNSS network operated by China from day 321 to 334 in 2013, and the satellite force models and GFZ standard observation modeling except Yaw-control model are used in three day solution. For impact analysis, we compare the GPS orbit and clock to IGS final orbit and clock products to evaluate the accuracy, and the accuracy of GALILEO orbit and clock and can be validated by checking the orbit differences of overlapping time span between two adjacent three-day and SLR comparison. In addition, the characteristic on inter system biases parameters involved the GPS/GALILEO systems is investigated.