Monitoring Time Offset to GPS at European GNSS stations

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Systematic monitoring of 14 multiGNSS European sites

- Web page: map of multiGNSS permanent sites in Europe, with different receiver types; updated weekly
- For each site, link to downladable plots and data sheets (.csv) with the following information
 - Time offset to GPS
 - Coordinate residuals from multiGNSS processing
 - Post Fit residuals, with different symbols for different GNSS's
 - TZD estimates
- Software: own Matlab development

MultiGNSS european network.

Select a site clicking on the relative marker.

Legenda = Javad Leica Septentrio Trimble Daily estimates of clock offsets and drift relative to GPS. <u>View file</u>

About this Web Page

Background

To investigate the interoperability of the various GNSS constellations we compute epochwise the positions of European permanent GNSS receivers by analyzing data simultaneously from different GNSS constellations.

Method

Use RINEX 3.02 data freely available within the MGEX data base. Process pseudoranges in ionofree combination, and broadcast ephemeris. Use as apriori coordinates official ITRF2008/IGb08 values.

Solve for 3 coordinates, 1 clock offset for each GNSS constellation, 1 Tropospheric Zenith Delay (ZTD) at each computation epoch.

The computation is made daily for a sample of European GNSS sites, and different receiver types. This Web site is updated on a weekly basis, beginning Jan.1, 2014.

Goal

Our goal is to provide data, in tabular and plot format (see Keyword File Type), enabling one to assess (see Keyword Parameter):

-Parameter = Position: epochwise departures in North East Up from a priori position



Glonass clock steering as of October 2014 (TWG and IGC meetings)



day of year 2014

Starting August 19, 2014 (doy 231) the Glonass time offset relative to GPS is being reduced progressively

Glonass to GPS time offset 2014->today: small, but receiver dependent biases still exist)

GLGP (ns)



GLGP relative to Leica receiver



Time offset of the weekly IGLOS reports of the IGS

GPS/GLONASS time offsets added to the broadcast clocks

Before GPS Week 1637, the time offsets were derived from the bkg summary files; Starting Week 1637 the offsets are derived from the gfz summary files



Galileo to GPS time offset

We decided to ignore the complicated flagging system containing the quality issues in the Galileo Navigation Message, as it appears not to be active/operational

The Galileo message was not available in the doys 28-32, 34-39, 41-64 of 2015 In the last weeks it appears there has been an alignment to GPS



GGTO taking the Leica receiver as reference 2014.0 - present

GPGA(Receiver) - GPGA(Leica) (ns)



BeiDou to GPS clock bias

BDGP (ns)



QZSS1 to GPS Clock bias (KIR0 only)

QZGP (ns)



Conclusions

- Statistics available for several european receivers of different type since 2014.0, routinely updated in Web site
- Glonass time has aligned to GPS time
- Galileo: improving
- BeiDou: periodic offsets to GPS time
- QZSS1: random offsets, improving
- Receiver dependent biases clearly visible