



Combining GNSS Signals

Bias and Calibration Issues

IGS2010 workshop, Tuesday 29 June, 2010, 9:00-10:30
21-7-2010

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9:00 Welcome

9:10 **Biases in GNSS analysis**

Stefan Schaer, Rolf Dach (SwissTopo, AIUB; Berne)

9:30 **Widelane biases, code-carrier phase biases, application to PPP ambiguity resolution**

Flavien Mercier et. al. (CNES, CLS; France)

9:50 **CONGO – characterization of user equipment in a heterogeneous GIOVE tracking network**

Oliver Montenbruck et al. (DLR, BKG, TUM; Germany)

10:10 **Antenna chamber calibrations and antenna phase center variations for new and existing GNSS signals**

Mathias Becker, Philip Zeimet, E. Schönemann (TU Darmstadt, Uni Bonn)

10.30

Suggestions for discussion items:

Code biases:

- Presently P1-P2, P1-C1, but also P2-C2, but modernization and upcoming GNSS result in an increasing number of types of biases.
- Intersystem biases; lessons from combining GPS and GLONASS
- Code-carrier phase biases?

- Should IGS change from referencing to P1&P2 observations (considering the new GPS policy on civil use, upcoming L5 signals, and L2 not being available on Galileo)?
- Should the IGS change to an absolute delay scale rather than use a zero mean datum, maybe using carrier phase as reference?

- What about other receiver-based effects related to implementation of tracking loops?

Carrier phase biases:

- Is there a need to track phase biases?
 - we know there are biases between L1, L2 and L5 carrier phase
 - L2-L1 carrier phase bias was always ignored, but affects wide-lane and ionosphere. Average lumped into DCB?
- L1-P and L1-CA carrier phase are both used within the IGS network without problems. Can we conclude that there are no carrier phase biases between L1-P and L1-CA? Or are these absorbed by other parameters? What about L2-P and L2-C?
- Inter-system biases in the receiver?
- IGS clock is now a iono-free I.c. based on L1/L2 data. Do we have to maintain a "second" clock with L5, or differences with the main clock? Do we have to give this every epoch, or can we model with a bias, of low order polynomial?
- Should we change the definition of the IGS clock to a "phase" clock (at the SD level)? Important for AR with PPP.

Antenna calibrations:

- Antenna PCO/PCV calibrations of future signals. Implementation in IGS.
- Should we consider separate PCO/PCVs for code and phase?
- Effect of satellite PCV (L2-L1) on ionosphere determination is another issue, as well as the effect of PCV's on other linear combinations with the new frequencies.
- Satellite antenna calibrations on the ground prior to launch?
- Z-offsets calibration in orbit (LEO?)

Standards/formats issues:

- Resolution of problem with different quarter-cycle phase offsets by receivers? RINEX 2.12/3.01, links to other standards
- Two or more clocks. Phase clocks. SP3 and clock formats.
- Other standardization issues.