

## ***Proposal/Draft***

### **Antenna Working Group**

#### **Background**

The IGS started to use absolute antenna phase center variation (PCV) patterns with GPS week 1400. Considering such corrections in the data analysis promises a further increase in accuracy and consistency of the IGS products as well as of derived results. Absolute receiver antenna patterns have to be used together with satellite antenna PCVs and offsets in order to exploit full consistency. This complicates the procedures to be applied, e.g., if a new satellite is placed into orbit. In future, new satellite systems will emerge, existing systems will evolve to more frequencies. New antennas will be available and installed. Replacement of existing antennas may disrupt long time series.

Coordinates of IGS reference stations are consistently based on the official IGS absolute PCVs. As a consequence, a user should use the identical pattern for these sites as used by the IGS in order to get a consistent tie to the reference frame. When using IGS clock products special attention is required on a proper and consistent use of PCV information. Corresponding user questions on how to handle the absolute antenna information e.g. for precise point positioning can already be found in discussion fora.

#### **Tasks**

The IGS Antenna WG maintains the relevant IGS files concerning receiver and satellite antenna information, it constitutes recommendations for the content of the official IGS antenna files, for the appropriate procedure to include antenna information for newly launched satellites, and related questions. The Antenna WG establishes a contact point to users of IGS products, providing guidance for antenna calibration issues and for a consistent use of IGS products.

Antenna phase center issues are related to topics such as reference frame, clock products, calibration, monumentation. The Antenna WG therefore closely cooperates with the respective working groups (Reference Frame WG, Clock Product WG, Bias and Calibration WG, Reanalysis WG), with antenna calibration groups, with the Analysis Center Coordinator and the Analysis Centers for analysis related issues, and with the Network Coordinator concerning maintenance of relevant files.

#### **Responsibilities**

Tasks of the Antenna WG are:

- The maintenance of the receiver and satellite antenna model for IGS routine processing which includes updating and adding receiver and satellite antenna information and the assurance of the internal consistency of satellite models as well as consistency to the terrestrial reference frame.
- The assistance of the Network Coordinator in maintaining the relevant files available to the users such as `rcvr_ant.tab` and `antenna.gra`.
- Setting up rules for the IGS antenna model files, i.e., to define recommendations
  - for the question whether the files should contain information only for those antennas that are in use within the IGS or for all geodetic-type antennas,

- for the assurance of consistency between different reference frame institutions such as EUREF and NAREF,
- for the continuation of maintaining the old relative antenna model.
- Setting up rules and recommendations
  - for the handling of new satellites in official antenna models,
  - for the handling and consistent use of satellite antenna offsets,
  - for the inclusion of azimuth-dependent satellite antenna PCVs,
  - for the inclusion of frequency specific PCVs.
- Setting up rules and recommendations concerning
  - the issues related to the use of radomes and radome calibrations.
  - the definition of the antenna northing direction.
- The investigation of the incorporation of LEO antenna calibration results into the absolute antenna model to allow for larger satellite antenna nadir angles.
- The promotion of pre-launch calibration of transmitter antennas.
- The development of the ANTEX file format definition to allow the inclusion of additional information such as, GLONASS- and Galileo-PCVs, calibrations of side band frequencies, linear combinations, carrier-to-noise patterns.
- The establishment of recommendations for antenna mounts for mitigating near-field multipath effects, investigation of in situ calibrations of antenna installations.
- The support for the user community concerning the use of IGS antenna information and promotion of IGS antenna standards.
- Establishment of a contact point for user questions.
- To act as a contact to antenna manufacturers.
- To interface with the Reference Frame WG, the Bias & Calibration WG, the GNSS WG, the Reprocessing WG. Support the ACC, the ACs and the NC on antenna issues.

### **WG Membership:**

The working group consists of

- The chair
- Representatives from Analysis Centers, in particular from those involved in estimating antenna antenna PCVs and offsets, currently CODE, GFZ, JPL.
- Representatives from antenna calibration agencies, institutions, companies (NGS, Geo++, Unavco).
- Representatives from related WGs.
- Any others who contribute to the success of the WG, e.g., representatives from industry.

Ex officio:

- Analysis Center Coordinator
- Network Coordinator