IGS Antenna Working Group
Splinter meeting 2020

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IGS 2022 Virtual Workshop

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Content

- IGS20: Creation of the IGS20 antenna models (30min)
  - Update of the status
  - Extension of the IGS20 related ANTEX file with BeiDou and QZSS satellite antenna pattern
- Update / adding new antenna and receivers to the IGS database (rcvr_ant.tab, antenna.gra, igsXX.atx) (15min)
  - Restricting new antennas / receivers to the needs of the IGS and its affiliated partners (e.g. EUREF)
- Status / discussion of the ANTEX 2.0 format (15min)
- Guideline on how to become an IGS calibration facility (15min)

IGS20: Transition from IGSR3 to IGS20 ANTEX file ☺

- IGSR3 ANTEX file:
  - Galileo based satellite z-PCOs
  - Multi-GNSS robot and chamber receiver antenna calibrations
  - Include:
    - Satellite antenna pattern: GPS, GLONASS and Galileo
    - Receiver antenna pattern: multi-GNSS (including BeiDou and QZSS)

- IGS20:
  - Adapting IGSR3 satellite PCOs (in progress with IGS RF):
    - estimation of satellite-wise GPS and GLONASS PCOs
    - Estimation of one common offset for GPS BLOCK IIIA satellite (using updated disclosed pattern from Lockheed Martin)

IGS20: Transition from IGSR3 to IGS20 ANTEX file

- IGS20:
  - Adapting IGSR3 satellite PCOs (in progress with IGS RF):
    - estimation of stellate-wise GPS and GLONASS PCOs
    - Estimation of one common offset for GPS BLOCK IIIA satellite (using updated disclosed pattern from Lockheed Martin)
    - Estimation of on common offset for all Galileo satellite
  - Update of receiver antenna pattern
    - Repro3 ANTEX file using patterns from 2019
    - Update of existing antenna pattern:
      - Using PPP to estimate difference between old and updated pattern
      - Taking the difference for the IGS20 realization into consideration (by IGS RF)
      - Same apporach as for IGS14 Restricting new antennas / receivers

IGS20: Transition from IGSR3 to IGS20 ANTEX file

- IGS20:
  - Nadir angle extension for LEO
    - Will be extended according to IGS14
    - Should be updated (in particular BLOCK IIIA)
    - PV will be revised
    - The extension are not part of the “official” IGS20 and can be updated
  - BeiDou / QZSS / IRNSS
    - Manufacturer values
    - As not part of the official IGS20 the values can be changed
    - Might be needed to account for scale inconsistencies -> further investigations needed

IGS20: Transition from IGSR3 to IGS20 ANTEX file

- Renaming of the igs_www.atx:
  - Igs20_wwww.atx (no change)
  - igs20_wwwwd.atx
  - igs20_yyyydoy.atx
  - igs20_yyyymmdd.atx

IGS20: Transition from IGSR3 to IGS20 ANTEX file

- IGS ANTEX File igs14.atx:
  - Will be replaced by igs20.atx once the IGS20 is releases and the IGS products are using this framework
  - The pattern will no longer be updated
  - Switch to the new igs20.atx will be needed

Recommendations

- The IGS20 ANEX file shall be extend with BeiDou, IRNSS, and QZSS using disclosed satellite antenna pattern (if available)
- If no phase variation pattern are available, zero PV shall be used (with extended nadir angle for LEO POD)
- The IGS20 ANTEX file naming scheme shall be changed from igs20_www.atx to igs20_yyyymmdd.atx

Update / adding new antenna and receivers to the IGS database 😐

- Restricting new antennas / receivers
  - Motivation: more and more request are coming in to add new receiver and antenna to the IGS database
  - Not all receivers are used by the IGS nor fulfil the reference station criteria
  - New rules:
    - **Geodetic antenna**
    - **Antenna pattern must be available (or statement by an calibration facility)**
    - **Exceptions:**
      - Antenna and receiver names which are used by IGS affiliations:
        - e.g. antenna calibrations facilities
      - Regional networks (e.g. EUREF, …)

Recommendations

- The listing of receiver and antenna names shall be restricted to geodetic antenna used by the IGS (if pattern are avalable) or requested by associated IGS partner (e.g. antenna calibration facilities, regional network such as EUREF, …)

Project ANTEX 2.0 ☹

- Urgently needed
- Duplication of entries (making the ANTEX file larger than needed)
- Does not support group delays
- Does not support RMS entries
- Satellite entries are PRN base (-> SVN/COSPAR)
- Some information given in the ANTEX file are already covered by the satellite information SINEX file provided by MGEX
- Definition of LEO PCO/PV
- Uncontrolled growth of individual extensions

Project ANTEX 2.0

- Timeline
  - First discussions (in a small round) will be held in August
  - Once a first draft is made, it shall be distributed for comments / further discussions
  - Hopefully we will agree to a common updated standard!

Project Ring-Ant ☹ → ☺

- The project was initiated by the end of 2022
- Since then the project was on hold
- The lead of the project shall be changed from the IGS AWG chair to a new (co-) leader.
- Discussions are currently ongoing

Recommendations

- The IGS AWG entourages the change of lead of the project “Ring-Ant” and supports this project as a crucial part of the antenna calibration comparison / validation activities

How to become an IGS calibration facility

- Intent to formalize the procedure how to become an official IGS calibration facility
- Give expected quality measures to the applicants
- Guide the what kind of tests are needed (from their side and from the IGS)
- First draft was discussed last year within the AWG, however, the open tasks are still open
- Open questions:

How to become an IGS calibration facility

- Open tasks:
  - PPP tests with using different IGS-approved calibrations: what are the current differences?
  - Comparison of antenna calibrations
  - How to handle the different frequencies?

- Those who are willing to make some test please let me know it!
  - Comparison of PPP tests between calibrations (e.g. chamber and robot). What is the impact on CRD? ZPD? What would be an acceptable limit?
  - What should we expect?

How to become an IGS calibration facility

- How to continue?
  - Extend the project to a “co-lead” project
  - Willing to make tests, discuss and came with an updated version for an IGS AWG discussion
  - Should be done within reasonable time frame