Multi-GNSS Working Group

Oliver Montenbruck

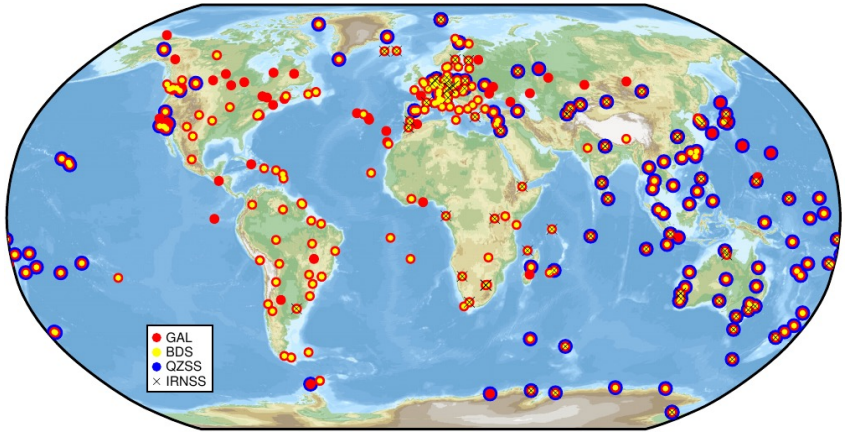
Multi-GNSS News

- QZS-1R set healthy/operational, QZS-1 decommissioned
- Galileo E223 & E224 set healthy
- Two GLO-K1B satellites launched
- Release of GPS III antenna patterns by Lockheed Martin
- ICD and initial transmission of Galileo High Accuracy Service

- GLONASS excluded from ILRS tracking

Multi-GNSS Status and Accomplishments (I)

- ~370 multi-GNSS stations
  - Improved support for modernized BeiDou-3 signals (B1C, B2a)
  - Essentially no IRNSS S-band support
- Introduction of new RINEX4 format
  - Standard released Dec. 2021
  - Routine generation of cumulative broadcast ephemerides including all nav messages
  - Native RINEX 4 obs and nav files from selected receivers in IGS network



RINEX

The Receiver Independent Exchange Format

Version 4.00

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1 December 2021

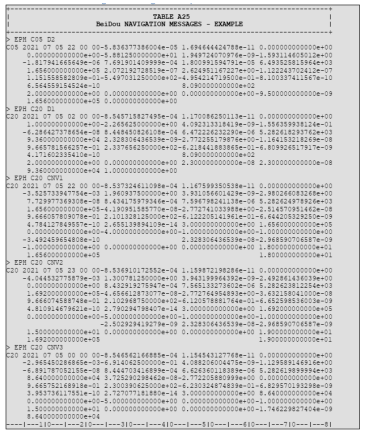
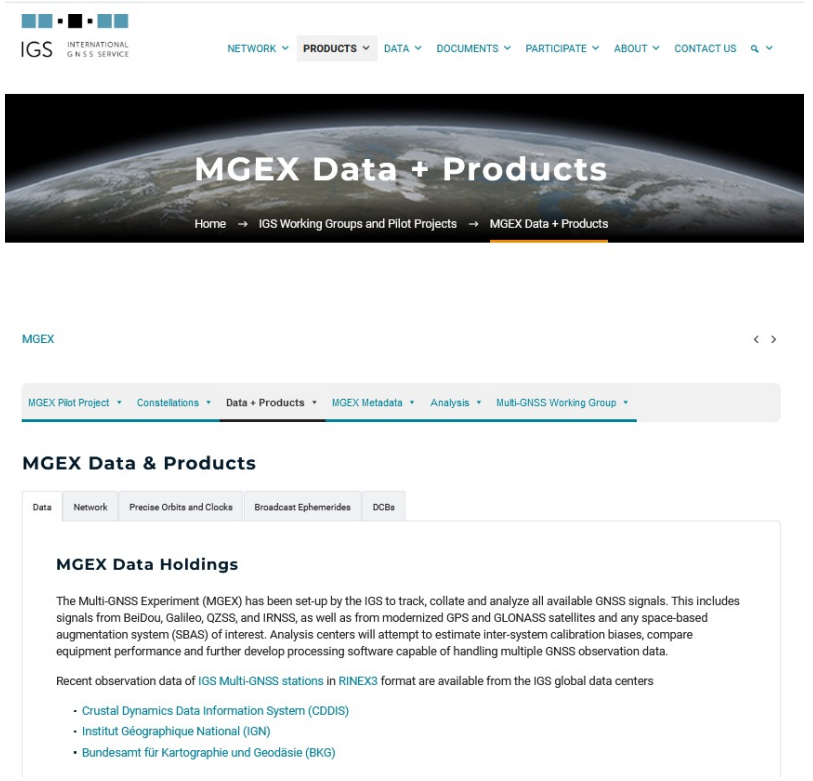


TABLE A25
BeiDou NAVIGATION MESSAGES - EXAMPLE

MGEX Status and Accomplishments (II)

- New IGS multi-GNSS antenna model (igs20.atx)
  - Additional multi-band receiver antenna calibrations
  - Satellite-specific GPS III and BDS-3 calibrations
- Continued provision of orbit/clock products by 7 ACs
  - Mostly 5 GNSSs (GPS, GLO, GAL, BDS-2/3, QZSS)
  - Additional ACs providing ERPs
  - Hourly near real-time products (Wuhan Univ.)
  - IGS20 transition in progress
- Various bias products (DCBs, OSBs)
- Orbit/clock performance monitoring (MGEX website)
- Continued maintenance of GNSS satellite metadata file



MGEX Status and Accomplishments (III)

- Performance assessment of BDS-3 orbit/clock products
- Assessment of BDS-2/3 group delays (broadcast vs IGS)
- Assessment of manufacturer calibrations for BDS-3 PCOs
- PCO vs. TRF scale relation for different GNSSs

- Preparation of ILRS tracking for all BDS-3 MEO satellites (ongoing)

Status of Recommendations from IGS Workshop 2022

- Relocate all MGEX products to standard IGS products directory
  Planned for Jan 2023 including data from Jan 2022 onwards
- Request GB approval for Satellite Metadata SINEX File Format and Product
  Governing board meeting of 11 Dec. 2022
- Establish a Task Force to define and implement a tool chain for multi-GNSS orbit/clock/(bias) combination and to establish an operational product.
  Task force established Sep. 2022, work in progress
- Study options for supporting the GPS L1/L5 user community through dedicated IGS clock or bias products
  No activity so far

Combination Task Force

- Scope: coordinate and advance existing efforts for product combination across the IGS
- Call or Participation in July 2022, kick-off in Sep. 2022
- 15 members from 7 institutions, chaired by O. Montenbruck
- Results
  - Focus on combination for multi-GNSS PPP users
  - Orbit, clock+bias combination; initially no SINEX combination
  - Assessment of orbit interpolation
  - Specification of orbit combination requirements
- Next steps
  - Build up of Python s/w repository for orbit combination

IGS

INTERNATIONAL
GNSS SERVICE

Thank You!

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