RINEX
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RINEX – a resounding IGS Data format success!!

- RINEX format thanks to Werner Gurtner (AIUB), Gerald Mader (NGS), Lou Estey (UNAVCO), Ken MacLeod (NRCan)
- Helping to exchange GNSS data since 1990.
- Adopted by receivers and by commercial and scientific software as an international standard.
- RINEX format maintained jointly in the RTCM/IGS RINEX WG to engage industry and scientific community to encourage early and wide adoption.
- The RTCM/IGS RINEX WG aims to maintain accuracy and precision in GNSS observations as signals evolve, and alignment with streaming data formats.
RINEX – Content & Evolution

- The workhorse format for GNSS data;
  - Stores measurements to all GNSS satellites; code, phase, SNR, doppler
  - Used for Precise Orbit Determination, Precise Point Positioning, Geodesy, Ionosphere, Time transfer, etc
  - 3 different RINEX file types; Observation, Navigation, Meteorological
- RINEX format has evolved over time to accommodate the observations of all GNSS systems RINEX 2.XX (1990) → 3.XX (2007)
- RINEX format navigation data format is evolving to keep pace with modernized GNSS navigation messages RINEX 3.XX (2020) → 4.XX (2021)
New QZSS Observations added, some header lines declared optional, new FAIR data header lines added, clarified and simplified document.

Navigation Message Taskforce finalized RINEX 4.00 with;

- Old & new navigation messages in traditional matrix form – fully identified; LNAV, CNAV, CNAV2, INAV, FNAV, FDMA, D1, D2, CNV1, etc.

- Navigation “data record” concept; **EPH, ION, EOP, STO**
  - **EPH** - traditional satellite ephemerides data
  - **ION** - Ionosphere model coefficients into full messages, from single header lines
  - **STO** - Time Offset full messages, previously contained as optional header lines
  - **EOP** - Earth Orientation Parameters system messages
RINEX 4.00 – In summary

- **Observation files** are **backward compatible** to RINEX 3.0X
- **Navigation files** are **not** backward compatible, but the legacy navigation message blocks remain as in RINEX 3.0X so very easy to continue reading those with small adjustment, also;
  - Navigation messages from any station are not unique, many other stations will have the same messages, so no loss of data.
  - IGS merged navigation files will remain available for the foreseeable future (brdcDDD0.YYn in RINEX 2.11, BRDC00IGS in RINEX 3.0X, etc)
- **Meteo files** are **backward compatible** to RINEX 3.0X
RINEX – Participation and Feedback

- RINEX WG is open to all IGS Associate members and to RTCM SC104 members.
- Early RINEX format adoption and testing is necessary and encouraged.
- Feedback from the GNSS community helps keep the format ‘fit for purpose’, please use the new website form;

https://igs.org/wg/rinex/#feedback
Thank You

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