



# Troposphere Working Group

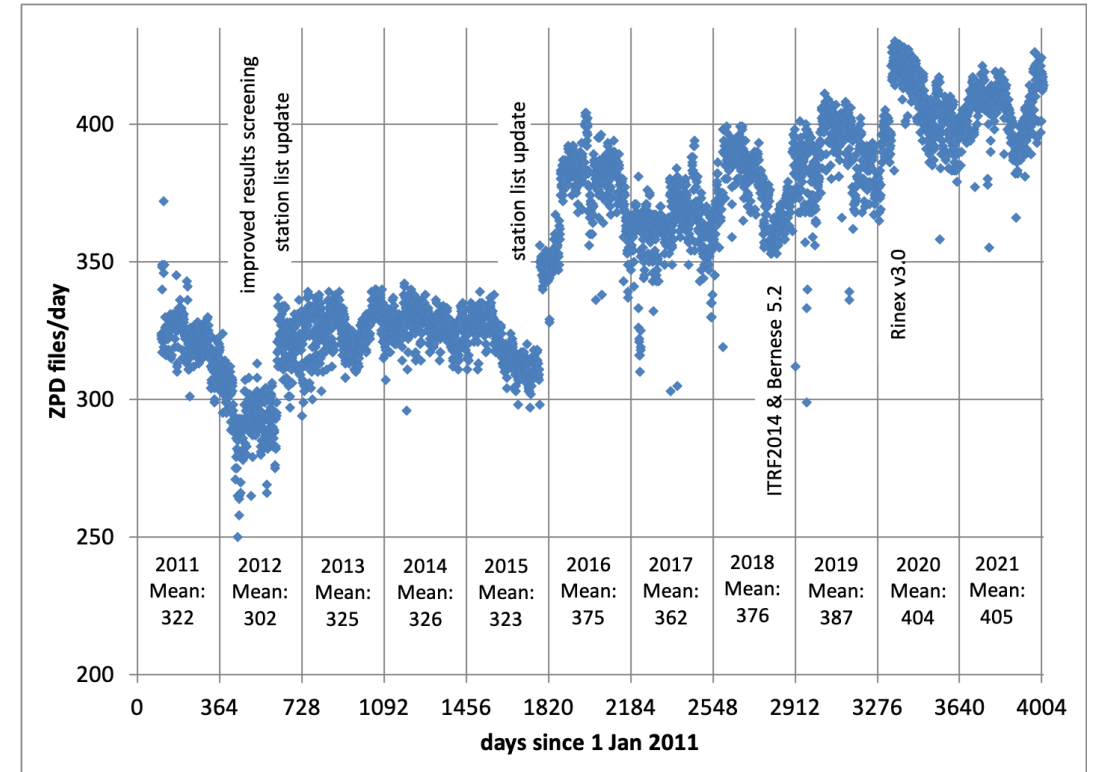
Sharyl Byram

# Overview of the Working Group

- Chair – Dr. Sharyl Byram, US Naval Observatory
- The primary goals of the IGS TWG are to:
  - Assess/improve the accuracy/precision of IGS GNSS-based troposphere estimates
  - Improve the usability of IGS troposphere estimates
  - Confer with outside agencies interested in the use of IGS products
  - Assess which new estimates should be added as “official” IGS products, and which, if any, official troposphere product sets should be discontinued
  - Provide and maintain expertise in troposphere-estimate techniques, issues and applications

# Status of IGS Final Troposphere Estimates

- ZTD and gradients every 5 min for most IGS receivers (data availability and quality dependent)
- 405 stations/d in 2021
- Computed using *Bernese GNSS SW 5.2*, GMF, PPP using IGS Final Combination
- Missed stations
  - Attempt to fill in any missed stations in past years



Number of quality-checked IGS Final Troposphere Estimate files submitted to IGS per measurement day.

- **Download location:** <https://cddis.nasa.gov/archive/gps/products/troposphere/zpd/>

## Progress since IGS 2022 Virtual Workshop (June 2022)

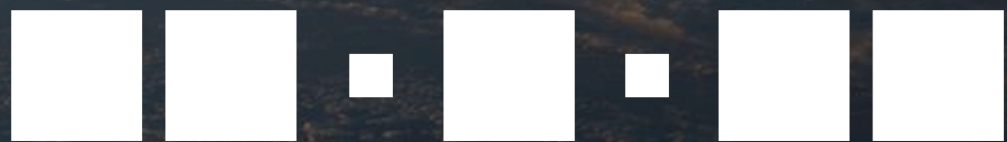
- Update to IGS20 reference frame and Repro3 models
  - Estimated December 18 (need IGS finals for GPS week 2238, 3 wk latency)
- Switch to Long Format Filenames – to match IGS products
  - **New:** AAAPPPPTTT\_YYYYDOYHHMM\_LEN\_SMP\_SITENAME\_CNT.TRO
  - **Old:** siteDOY0.YYzpd
  - Example - Dec 11, 2022 for site USN9/USN900USA
    - **New:** IGS00PSFIN\_20223450000\_01D\_05M\_USN900USA\_TRO.TRO
    - **Old:** usn73450.22zpd
  - **Filename details at:** [https://files.igs.org/pub/data/format/sinex\\_tro\\_v2.00.pdf](https://files.igs.org/pub/data/format/sinex_tro_v2.00.pdf)

## Work in Progress

- Upgrade to Bernese GNSS SW 5.4
  - Estimated completion ~3-6 months
- README files in troposphere directories
  - Many directories with little info as to contents, can be confusing to new users
  - Working with CDDIS
- Restore archive on USNO webserver
  - Location: <https://maia.usno.navy.mil/gps/products/troposphere>
  - CDDIS still official location for IGS Final Troposphere estimates

# Recommendations and Future Work

- Repro3 computation:
  - Moving forward with using Repro3 orbits/clocks/EOPs
  - Estimates to be available soon – GPS only
- Test newer troposphere models in final troposphere estimates
  - GMF currently in use
  - Test VMF model
    - Concern with discontinuities between 6 hr releases
  - Investigate other models as well
- Multi-GNSS investigation
  - Begin testing production and analysis quality of a Multi-GNSS final troposphere product
  - Quality analysis of combined observations as well as evaluate individual constellation inclusion



IGS

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GNSS SERVICE

**Thank You!**

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