

Radio Occultation Web Page Development

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Background

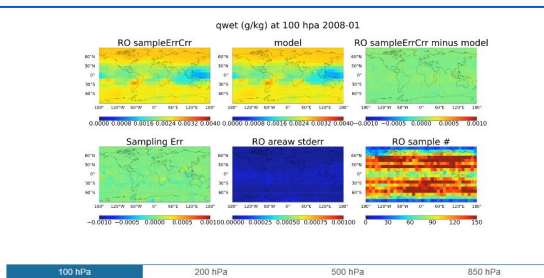
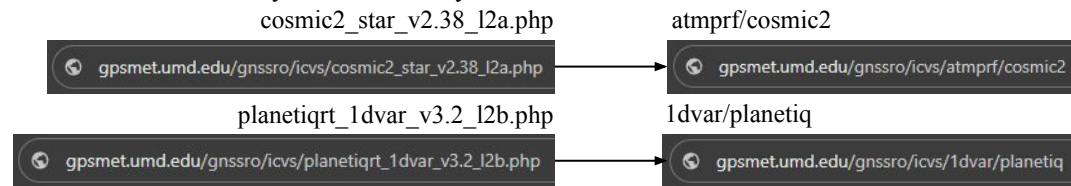
1. NOAA STAR GNSS RO datasets are widely recognized internationally in the past year. Users includes NOAA NCEP weather forecast center, JCSDA joint center (NOAA, NASA, US Navy & Airforce) and ECMWF etc.
2. Rapid expansion of served data, demand for real-time availability and growing user base has stressed systems
3. We need to:
 - a. Better understand our current user base,
 - b. Extend existing systems to cover new products,
 - c. Develop new functionality to increase data accessibility.

Results

1. New page routing system to simplify user experience,
2. Added multi-graph functionality to ICVS (*Integrated Calibration/Validation System*) for level 2 and introduction page for new level 3 (*monthly mean anomaly*) products,
3. Custom Python tool to analyze downloading log files,
4. Developed Ground Tracker application.

Improved Page Routing

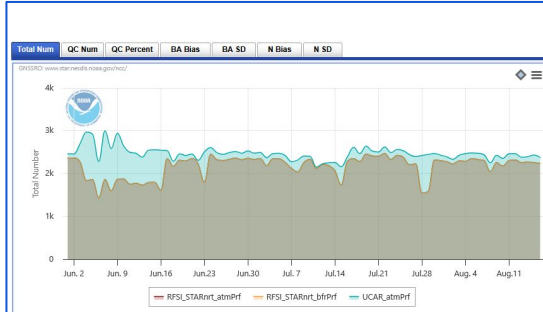
1. Consistent URL for users
2. Significantly reduced file and code duplication
3. Greater maintainability and extensibility



Monthly Mean Humidity Anomaly

The STAR gridded monthly mean humidity anomaly (MMHA) of specific humidity is generated from STAR 10Var wet profiles derived from multiple GNSS RO missions, processed by the GNSS RO Science Data Center (SDC) at NOAA STAR. These missions include MetOp-A, COSMIC-1, CHAMP, CNORF, GRACE, SAC-C, and TerraSAR-X. The dataset is constructed on a $10^\circ \times 10^\circ$ latitude-longitude grid, spanning pressure levels from 850 hPa to 100 hPa, and covering the period from 2002 to 2014. Grid cells without any RO observations are assigned a missing value of -999. For a detailed description of the MMC dataset, please refer to the metadata included in the NetCDF file.

New intro level 3 page.



Example ICVS time series plot of near real time data (PlanetIQ).

STAR GNSS RO Homepage Development

Download Data Analysis

Download Data Analysis

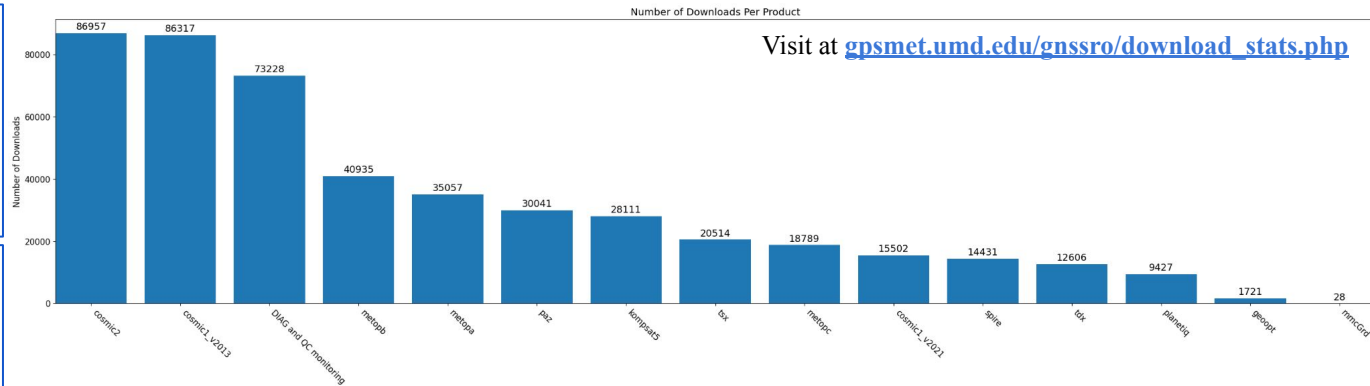
- User location
- User nationality
- Product popularity
- Trends over time
- Download count and size

Monitored Period: Jun 01 2025 - Aug 18 2025 (78 days)

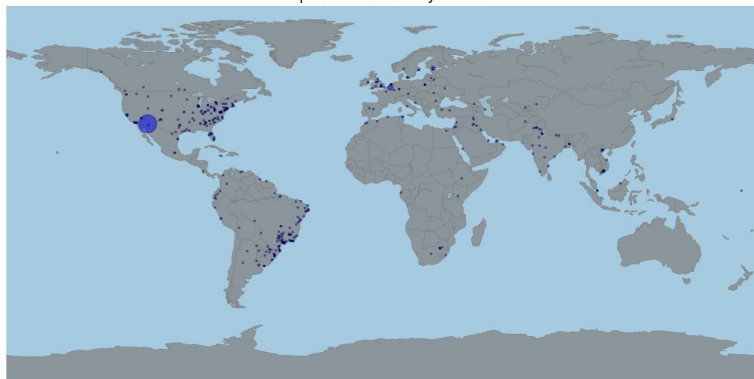
Download Count: 479,881 (HTTP / FTP)
(479,477 / 404)

Download Size: 74.96 TB (74.95 TB / 14.42 GB)

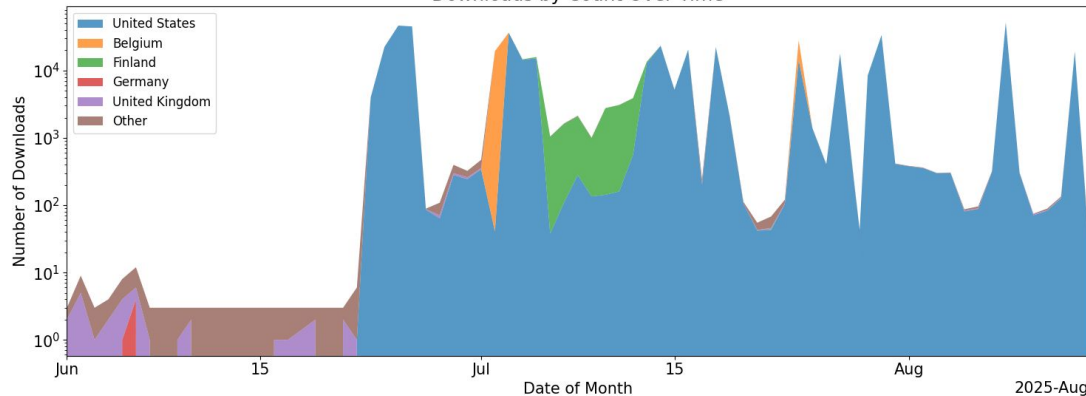
Identified Individual User: 1,829 (1,770 / 59)



Map of Downloads by Count



Downloads by Count Over Time

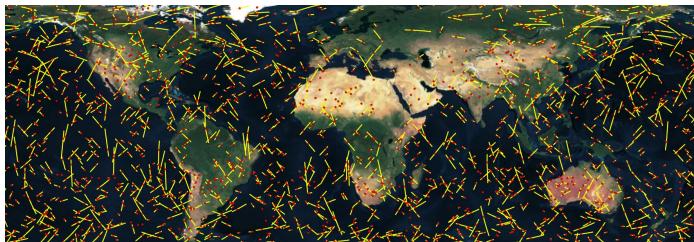


Ground Tracker Application

Definition and Prototyping

Objective

1. GNSS Radio Occultation (RO) profiles are vital for:
 - a. Weather forecasting,
 - b. Climate monitoring,
 - c. Ionospheric research.
2. The current NOAA GNSS RO monitor only shows static, daily images.
3. Our requirements:
 - b. Interactive 2D & 3D environments,
 - c. Arbitrary display up to a week of profiles,
 - d. Web-based,
 - e. Ability to select and monitor individual profiles.



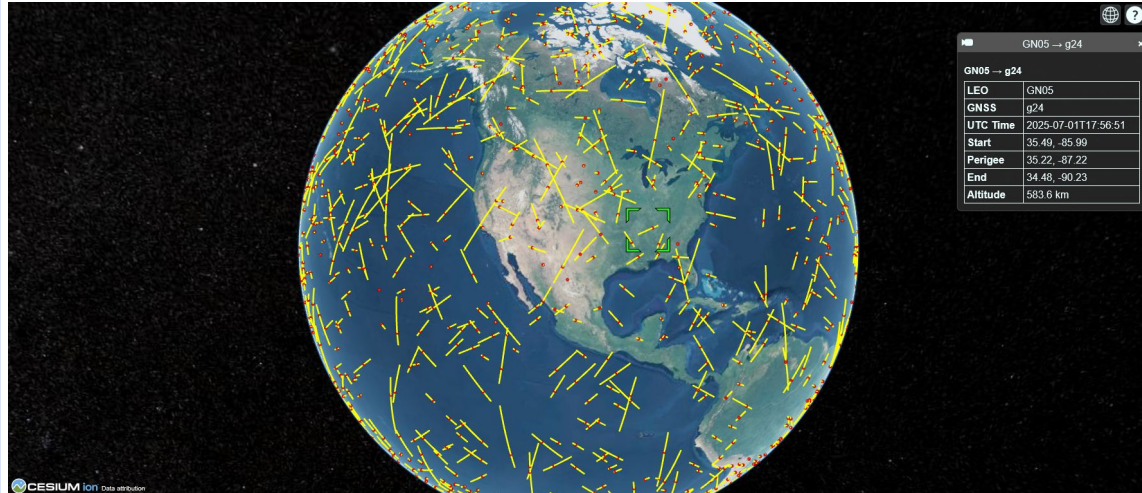
A 2D projection with ~2300 profiles loaded.

System Overview

Ground Tracker



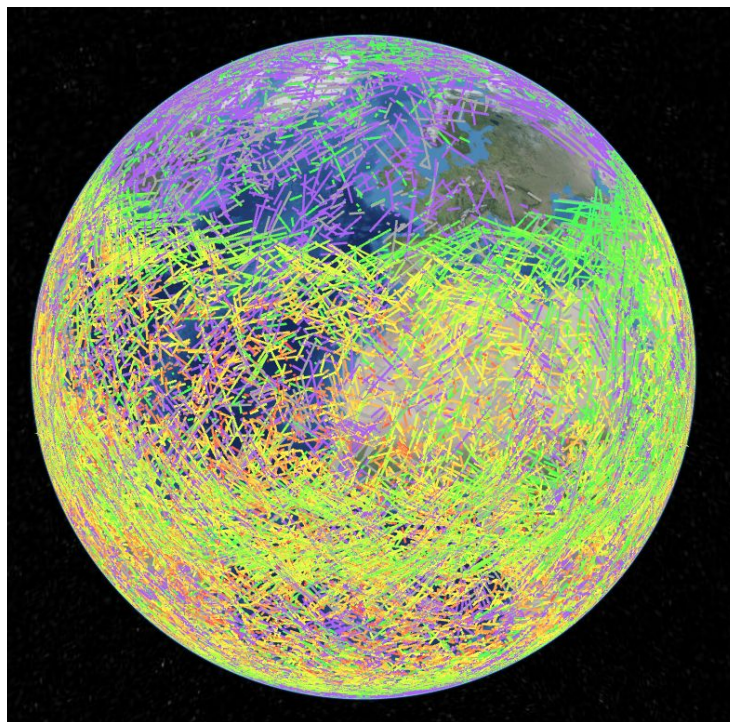
User



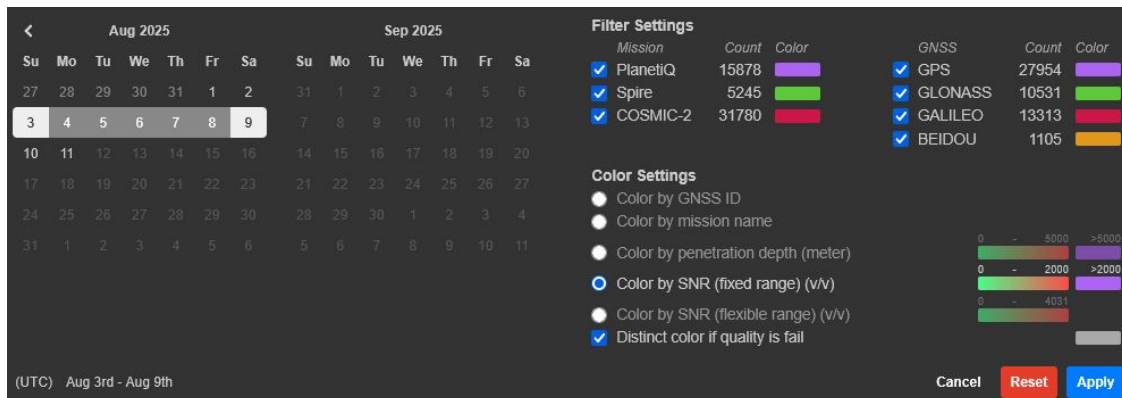
Initial prototyping of plotting profiles (yellow). Perigee points are highlighted in red.

Ground Tracker Application

Data Ingestion and Manipulation



51,000 Profiles (PlanetiQ, Spire, and COSMIC-2) from Aug 3 - 9, colored by SNR value.



Filter settings used for the figure on the left.

**1. Read NOAA STAR
GNSS RO Data**

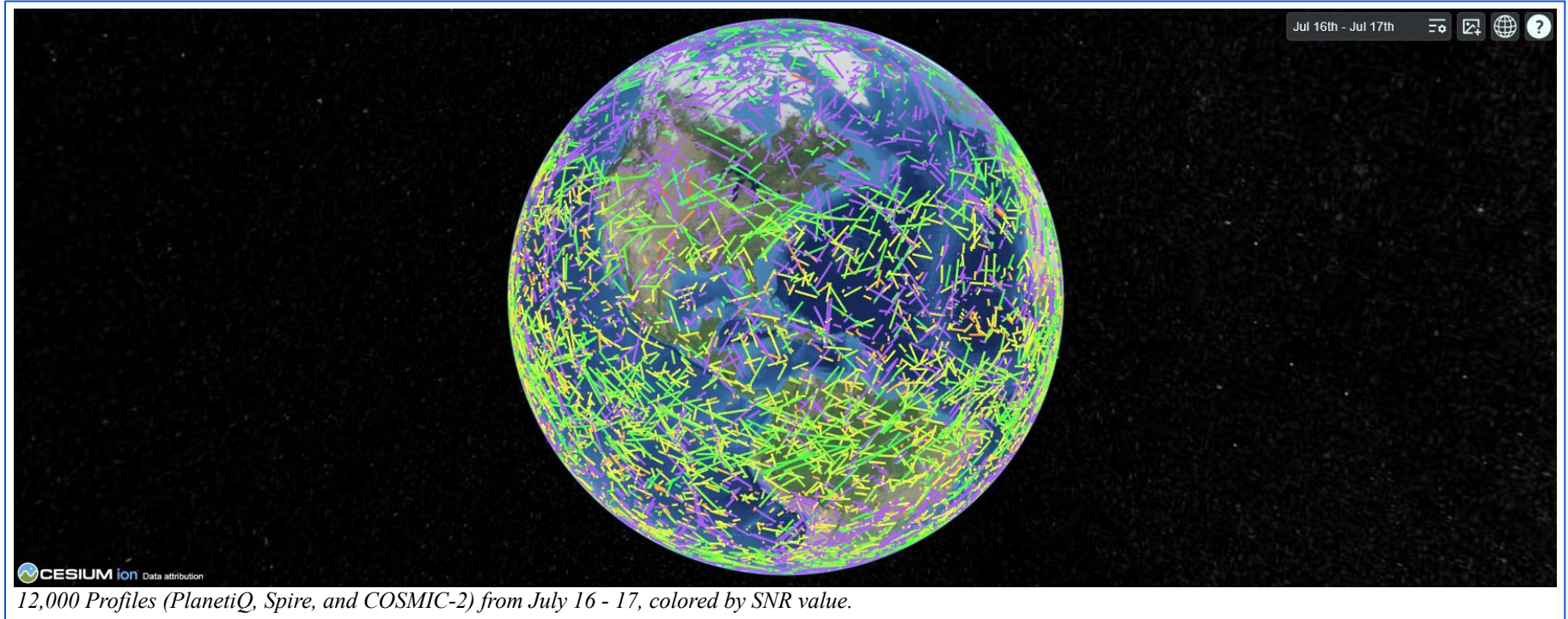
2. Convert to Entities

3. Set Material/Visibility

4. Render

Ground Tracker Application

Demo



Visit at gpsmet.umd.edu/gnssro/ground_tracker.php