



# The Crustal Dynamics Data Information System (CDDIS) – 2024 Status Update

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## ABSTRACT

NASA's Crustal Dynamics Data Information System (CDDIS) continues to maintain and expand archive services for the International DORIS Service (IDS) and the Space Geodesy community. The CDDIS is continually evolving to fulfill new storage, latency requirements, and to meet new standards such as the shift toward FAIR and open science. In 2024 several improvements have been implemented and more are currently in development.

## WHAT IS THE CDDIS?

The CDDIS was established in 1982 and currently supports GGOS as an essential archive for geodetic data and products:

- Global Navigation Satellite Systems (GNSS)
- Laser ranging (satellite, SLR, and lunar, LLR)
- Doppler Orbitography and Radio-positioning Integrated by Satellite (DORIS)
- Very Long Baseline Interferometry (VLBI)

CDDIS - Total number of files downloaded by Country 2023

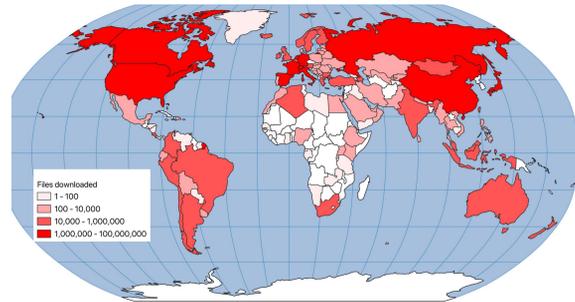


Figure 1: CDDIS Download Statistics for 2023

## GNSS REAL-TIME (NTRIP) SYSTEM STATUS AND LATENCIES

**Description:** The CDDIS has real-time streaming software (NTRIP, Networked Transport of RTCM via Internet Protocol) for receipt and transmission of real-time GNSS data and product streams in support of the International GNSS Service (IGS) Real Time Service. The available product streams consist of GNSS orbit and clock corrections

**Use:**

- Precise point positioning
- Time synchronization
- Disaster monitoring

CDDIS-Caster NTRIP Broadcaster



Real-time Map



**CDDIS Support:** The CDDIS has been supporting GNSS real-time data streaming since 2018 via the CDDIS-Caster NTRIP broadcaster. This year, to provide additional usability and clarity to users, the CDDIS created a real-time map showing which streams are active and their latencies.

### CDDIS Real-time Streams

More information about the real-time streams available through the CDDIS caster can be viewed in the following tables:

- CDDIS caster [active data streams](#)
- CDDIS caster [inactive data streams](#)

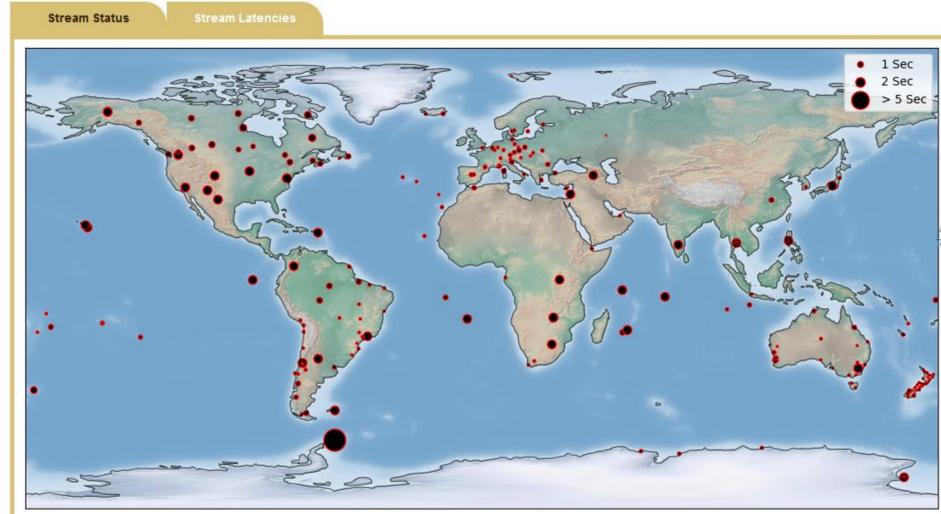


Figure 2: The CDDIS Real-Time Stream Latencies Map

## Ingest Processing Software Upgrade - Version 4 and Middleware

**Description:** Developed at the CDDIS, Version 4 of Ingest Processing is an improved software package that aims to meet the needs of data providers and users by ensuring conformity to standards and reducing delays in processing.

Middleware processes the uploads immediately as they are uploaded, significantly reducing the delay from upload to archive placement.

Datasets are identified as distinct collections and incoming files are identified and processed accordingly. All incoming files are checked against generic software before moving to specific processing

At this point each incoming file is checked against ingest software that is written specifically for this dataset. Any errors are handled, and files that pass the quality checks are moved to the archive.

**Advantages:**

- File in – file out processing
- Significantly improved ingest speeds
- Dedicated hardware for each technique
- Scalable architecture

**Current Status:**

- Middleware and V4 both operational with GUARDIAN products
- V4 operational with SLR Data

**Planned Order of Implementation:**

- DORIS Data
- DORIS Products
- SLR Products
- VLBI Data
- VLBI Products
- GNSS Data
- GNSS Products

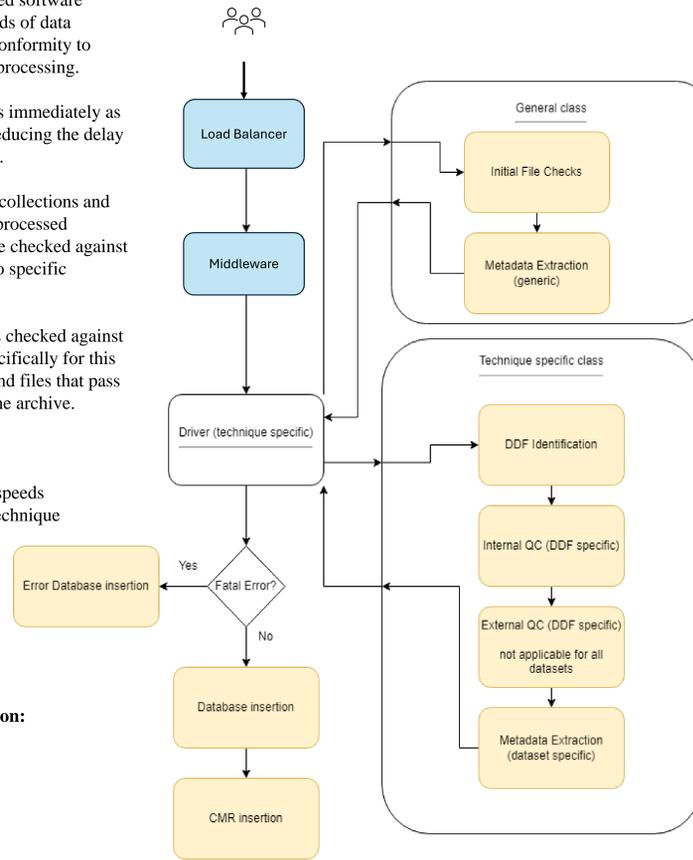


Figure 3: The CDDIS Processing V4 Software Flow Diagram

## NASA EARTH SCIENCE CLOUD MIGRATION

**Description:** The CDDIS has paused its transition to the Earthdata Cloud until further notice.

Please note that, even when the CDDIS transitions to the cloud, users will still be able to download data to their servers and the original archive structure will still be maintained. The NASA EOSDIS is also investing in helping scientists transition to the cloud through training initiatives.

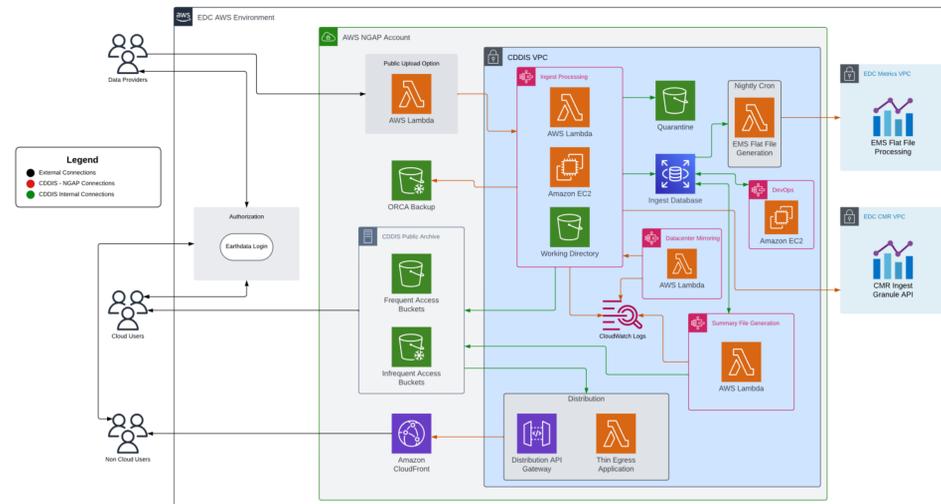


Figure 4: The CDDIS Flow Diagram for onboarding to the Cloud

## FAIR Stewardship

**Description:** The CDDIS upholds the FAIR (Free, Accessible, Interoperable, Reusable) principles. These principles aid the CDDIS in promoting data discoverability and usability, acting as an aid to our data customers and the science they provide.

**Findability:** Data should be easy to find with clear metadata and identifiers.

Earthdata Search allows data customers to search across all DAACs, of which the CDDIS is one. Data are organized into collections and metadata are available for each collection to aid customers to find the data they're looking for.

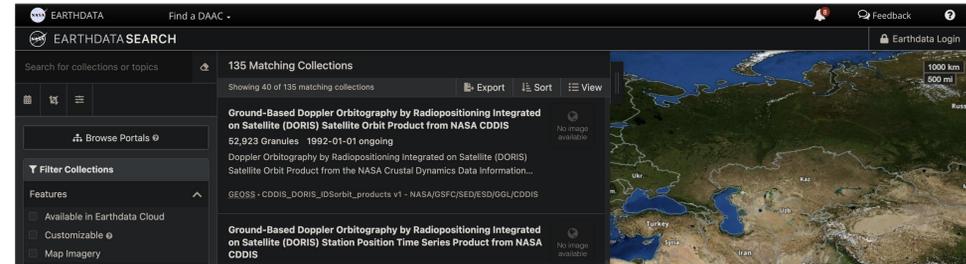


Figure 5: Earthdata Search Collections

The CDDIS archive is organized within a directory structure based on geodetic technique. The subdirectory structures are agreed upon by the scientific community for each technique and enforced by the CDDIS.



Figure 6: CDDIS DORIS Archive Structure

**Accessibility:** Data should be openly available and retrievable by humans and machines.

The CDDIS archive is available via FTP-SSL and HTTPS. Downloads via HTTPS require authentication with Earthdata Login and downloads via FTP-SSL are allowed to be anonymous.



Figure 7: CDDIS HTTPS Access via Graphical User Interface

Figure 8: CDDIS programmatic access examples, both HTTPS and FTP-SSL

**Interoperability:** Data should allow for integration with other datasets.

The CDDIS follows the standards set by the geodetic communities (International VLBI Service, International GNSS Service, International DORIS Service, and International Laser Ranging Service). In addition, the CDDIS follows the GCMD (Global Change Master Directory) structure for keywords to describe datasets.

**Reusability:** Data should be well described and licensed for reuse.

The CDDIS utilizes DOIs (Digital Object Identifiers) to aid data customers in citing the data that they use in papers and publications to ensure traceability. These DOIs may be found on the landing pages hosted at the CDDIS website.

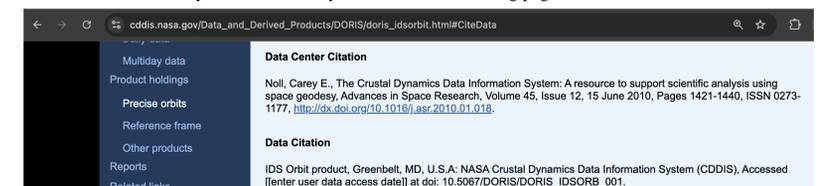


Figure 9: DOI for DORIS Precise Orbit Determinations