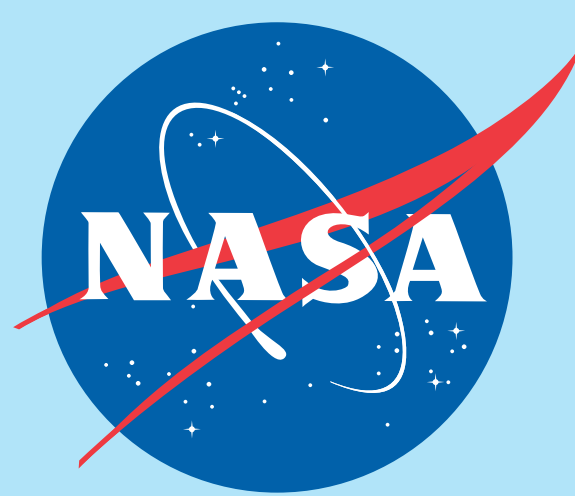


Recent Developments at the CDDIS



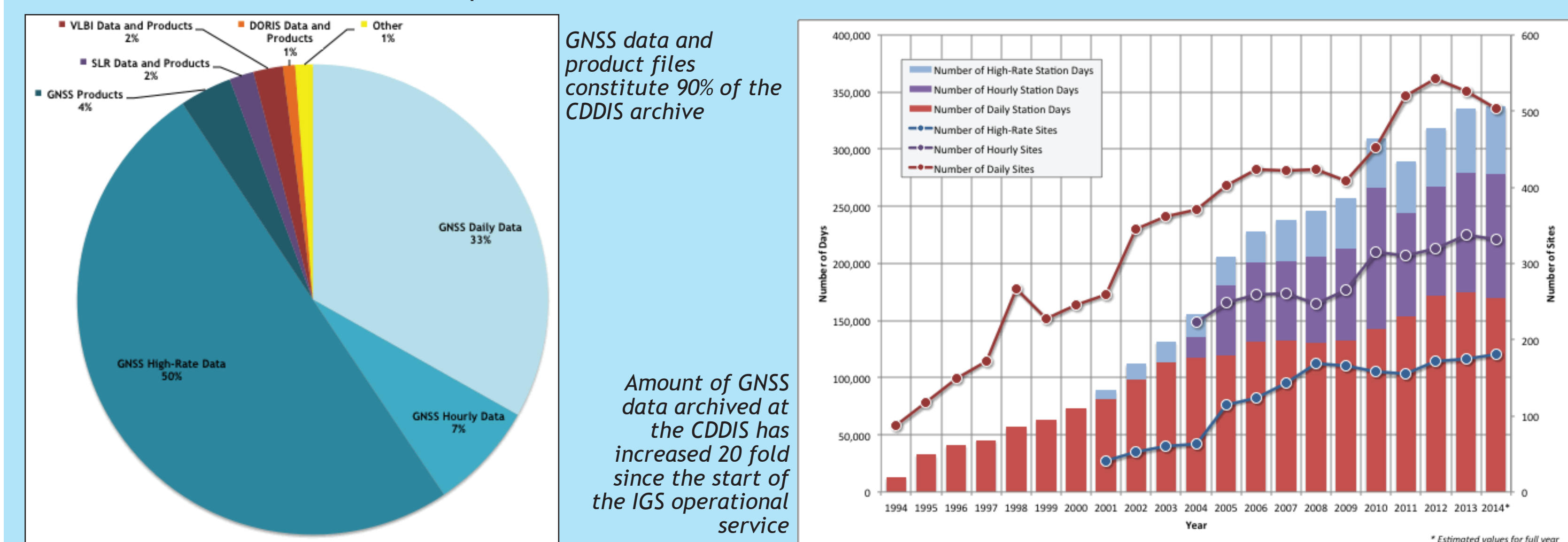
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IGS 20th Anniversary Workshop
Session PS04 - Data Centers

Abstract: The Crustal Dynamics Data Information System (CDDIS) supports data archiving and distribution activities for the space geodesy and geodynamics community. The main objectives of the system are to store space geodesy and geodynamics related data products in a central data bank, to maintain information about the archival of these data, and to disseminate these data and information in a timely manner to a global scientific research community. The archive consists of GNSS, laser ranging, VLBI, and DORIS data sets and products derived from these data. The CDDIS is one of NASA's Earth Observing System Data and Information System (EOSDIS) distributed data centers; EOSDIS data centers serve a diverse user community and are tasked to provide facilities to search and access science data and products. The CDDIS data system and its archive is a key component in several of the operational services within the International Association of Geodesy (IAG) and its project the Global Geodetic Observing System (GGOS), including the IGS, the International DORIS Service (IDS), the International Laser Ranging Service (ILRS), the International VLBI Service for Geodesy and Astrometry (IVS), and the International Earth Rotation Service (IERS). This poster will include background information about the system and its user communities, archive contents and updates, enhancements for data discovery, new system architecture, and future plans.

Introduction

- The Crustal Dynamics Data Information System (CDDIS) has supported the International GNSS Service (IGS) since the pilot project in 1991.
- Since that time, we have seen the types and amount of GNSS data and products increase significantly.
- Archive is currently nearly 10 Tbytes in size; over 9 Tbytes of this archive, or 90%, is devoted to the storage of GNSS data and derived products.
- In 2013, the CDDIS became a regular member of the International Council for Science (ICSU) World Data System (WDS), an international organization that strives to enable open and long-term access to multidisciplinary scientific data, data services, products and information.



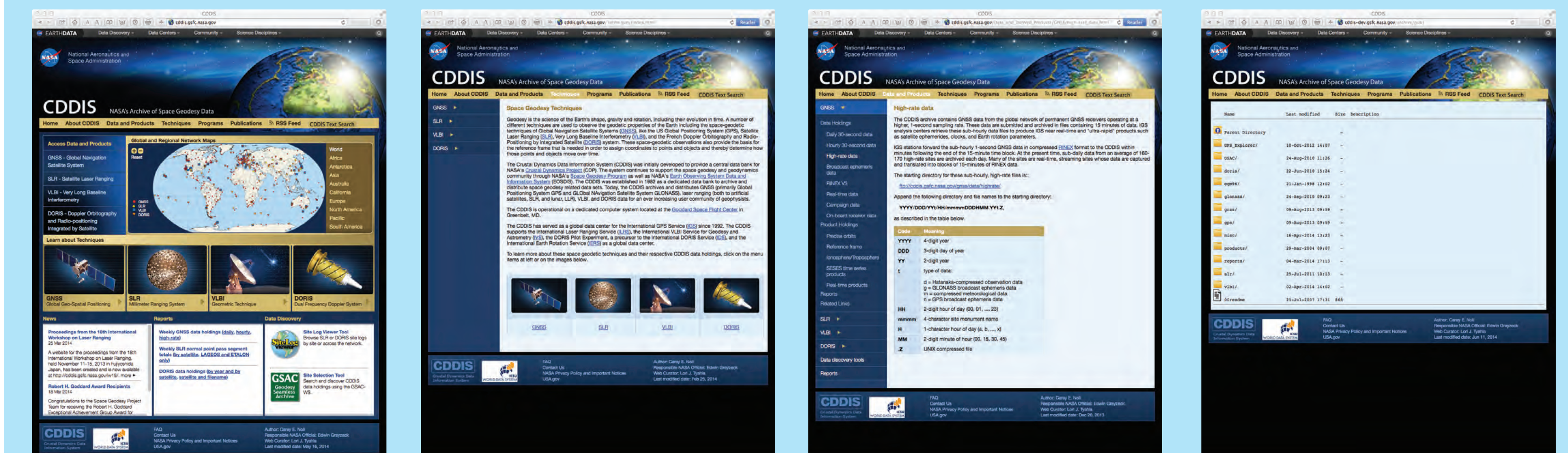
Website Improvements

New CDDIS Website:

- The CDDIS website has been redesigned and incorporates improved navigation.
- The design, development, and implementation process included a content review and update.
- The new website features access to the SiteLogViewer application, a map selection tool and the CDDIS data discovery application.
- A data discovery tool, based upon the GSAC-WS, the Geodesy Seamless Archive Center - Web Services, allows users to search CDDIS metadata to discover CDDIS data, products, and information.
- The new website provides links to the EOSDIS EarthData web applications.
- The new CDDIS website was made operational in March 2014.

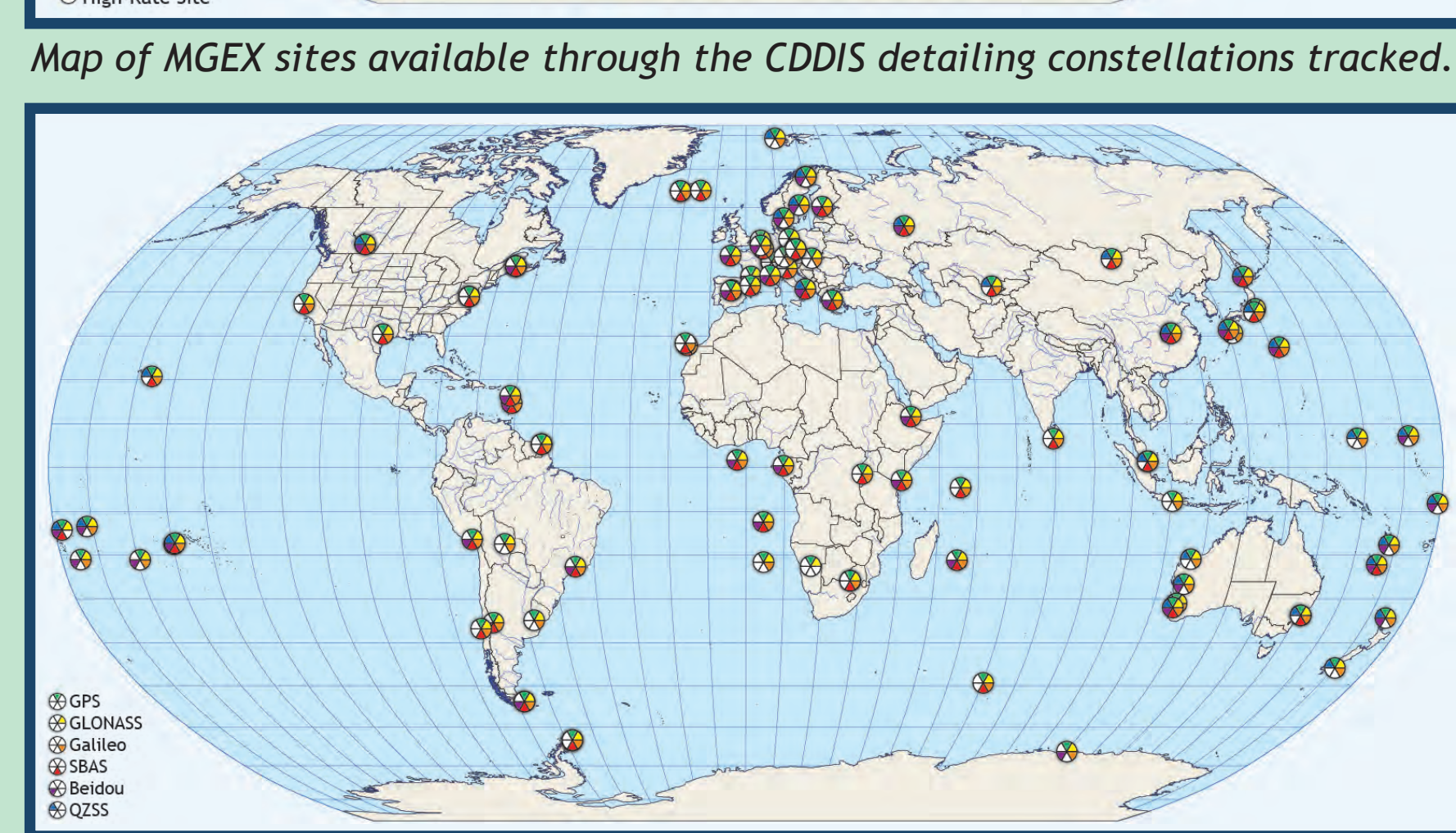
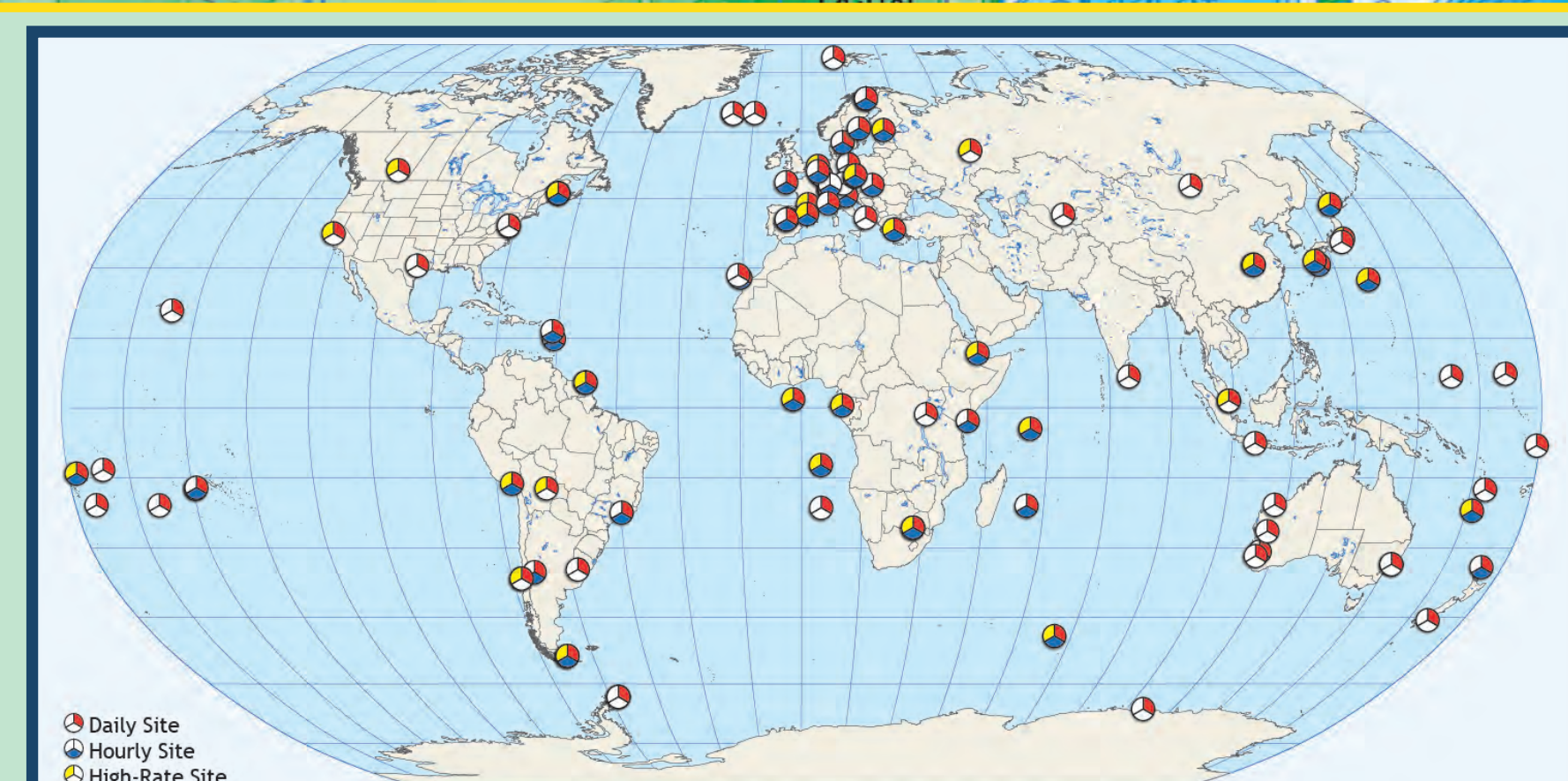
Archive Access:

- The CDDIS archive is now accessible through http as well as ftp.
- The new access method provides flexibility for the user community.



MGEX and RINEX V3 Support

- In 2012, the CDDIS began its support of the IGS Multi-GNSS Experiment (MGEX).
- The CDDIS expanded the archive to include data from participating multi-GNSS receivers, products derived from the analysis of these data, and any required metadata for the experiment.
- The archive now contains daily and hourly 30-second and sub-hourly 1-second data from an additional 100+ stations in RINEX V3 format.
- Staff coordinated data flow within the IGS to support MGEX at not only the CDDIS but other global data centers as well.
- Staff made required updates to the online archive structure and developed software to extract the required metadata and move files to the appropriate archive structure.
- This activity proved to be more complicated due to the fact that MGEX GNSS data are provided in RINEX V3 format in order to support new GNSS signals.
- Since UNAVCO's TEQC software does not support RINEX V3, the CDDIS staff needed to develop its own s/w to provide minimal QC and metadata extraction functionality.
- Metadata are required for archive management, report generation, and data distribution reporting.
- The CDDIS has also began archiving MGEX data in RINEX V3 format utilizing the new documented file naming convention.
- The data in these files are also available in the "standard" format (SSSSDDD#.YYT.Z); having files in the new naming format allows analysts to become familiar with the convention.
- These files are archived within the MGEX directory structure in the "crx" subdirectory (e.g., ftp://cddis.gsfc.nasa.gov/gnss/data/campaign/mgex/daily/rinex3/2014/160/crx/).



MGEX Tracking Network Status for 09-Jun-14 140009 14160 GPS Week 1794 Day 2

Site ID	Receiver Type	Antenna Type	Ant. Height	Marker Name	Marker Number	Type	RINEX Version	Obs. Type	Del. Type
alpha	10	TRIMBLE NETRS	TM857971.00	NONE 0.0000 ANNA	971038001	M	3.02	4879	X X X X
alpha	10	TRIMBLE NETRS	TM859800.00	SCIE 0.0000 ATRA	217428001	M	3.00	2347	X X X X
alpha	23	TRIMBLE NETRS	TM859800.00	NONE 0.4251 ANNO	423208000	M	3.02	1437	X X X X
alpha	23	TRIMBLE NETRS	TM857971.00	NONE 0.0000 ANNO	141218001	M	3.02	1437	X X X X
alpha	23	TRIMBLE NETRS	TM857971.00	NONE 0.0000 ANNO	100048004	M	3.02	1438	X X X X
beta	71	JAVAD TRP_0378 DELTA	LEIAR25.83	LEIY -0.450 WPE2	142018014	M	3.02	4500	X X X X
beta	22	JAVAD TRP_0378 DELTA	JAV RINEX02_037	NONE -1.204 MRE2	216028001	M	3.02	1437	X X X X
beta	1	TRIMBLE NETRS	TM859800.00	NONE 0.0000 SING	140018008	M	3.02	66	X X
beta	1	TRIMBLE NETRS	TM859800.00	NONE 0.0000 SING	140018008	M	3.02	66	X X X X
beta	1	JAVAD TRP_0378 DELTA	JAVRINEX02_037	NONE 0.0770 SING	140018004	M	3.01	66	X X X X

Program: QC 2009m23 by UNAVCO run with elevation angle cutoff of 10 degrees

FIELD Explanation

Site ID: 4 char site name
Receiver Type: 2 char delivery delay in hours
Antenna Type: 20 char type of GPS receiver from RINEX header
Ant. Height: 8 char height of antenna from RINEX header
Marker Name: 20 char marker name from RINEX header
Marker Number: 10 char marker number from RINEX header
Type: 1 char type
RINEX Version: 7 char RINEX version number
Del. Type: 2 char delivery delay in minutes

Daily MGEX status file listing RINEX header information summary for day 14160 (ftp://cddis.gsfc.nasa.gov/gnss/data/campaign/mgex/daily/rinex3/2014/160/14160.status)

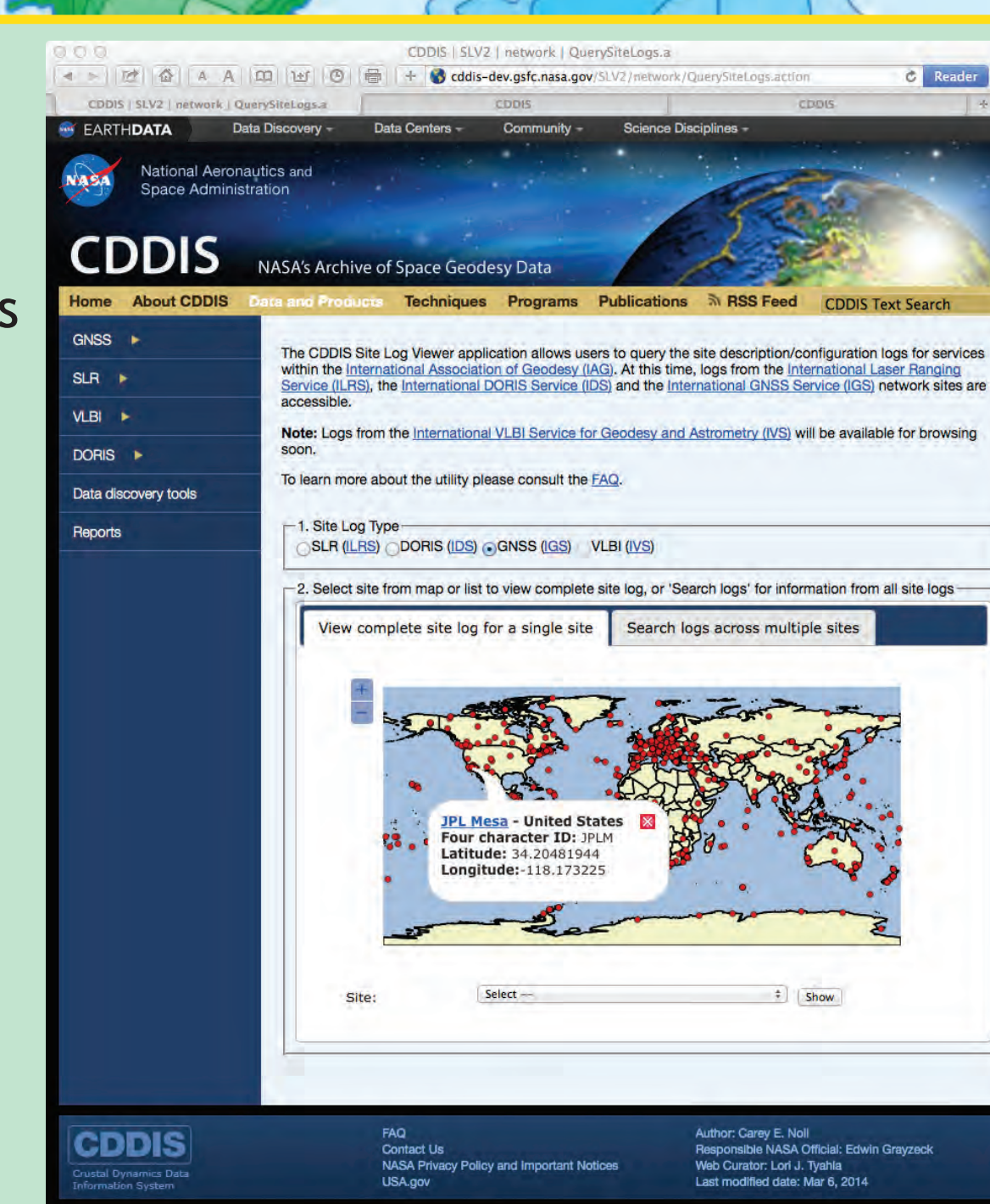
Site Log Viewer Application

Background:

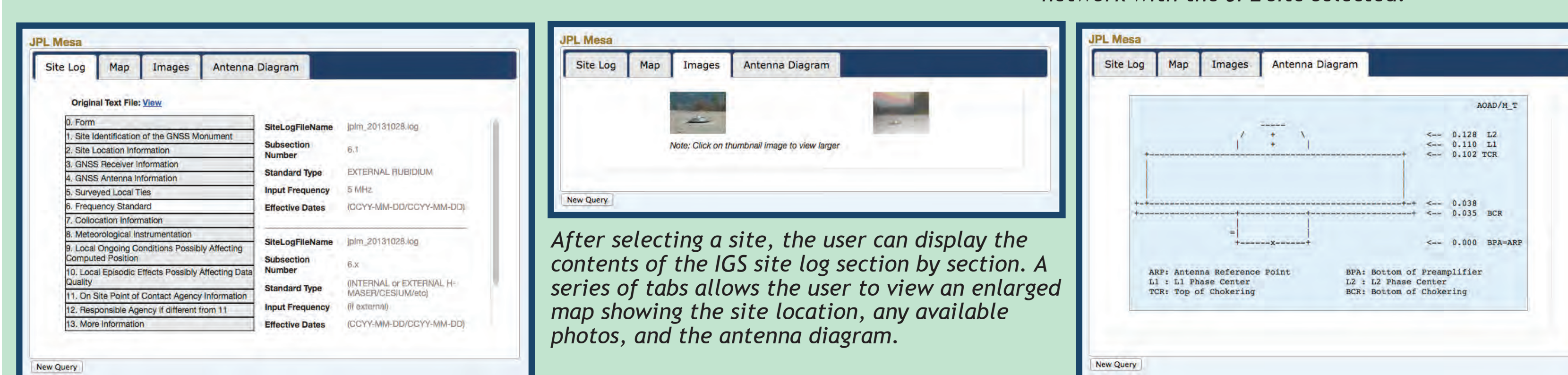
- Each of the IAG's geometric services (IGS, ILRS, IVS, and IDS) coordinates measurements from a global network of stations.
- Each service utilizes site logs to record information about the station's configuration.
- The CDDIS has developed an application, the SiteLogViewer, for the enhanced display and comparison of the contents of these site logs.*

Use Cases:

- Users can query the logs for a particular system to understand station configuration or determine which sites have equipment with a particular configuration.
- Through the SiteLogViewer application, users can:
 - Display a complete site log, section by section
 - Display contents of all site logs for a specified topic (site log section)
 - Search the contents of all site logs for a specified parameter value, e.g., a particular equipment configuration



The main screen for the SiteLogViewer application. The user has selected the IGS radio button to view site information from the International GNSS Service. A zoomable map shows all sites in the IGS network with the JPL site selected.



After selecting a site, the user can display the contents of the IGS site log section by section. A series of tabs allows the user to view an enlarged map showing the site location, any available photos, and the antenna diagram.

The user now wants to determine which sites in the IGS network have a particular type of equipment installed. To view multiple logs, the user has selected the "Search logs across multiple sites" tab. This tab allows the user to select a single section of the site log to:

- View a specified section for all site logs or
- Select a field within a section and specify a value for that field from a drop down menu

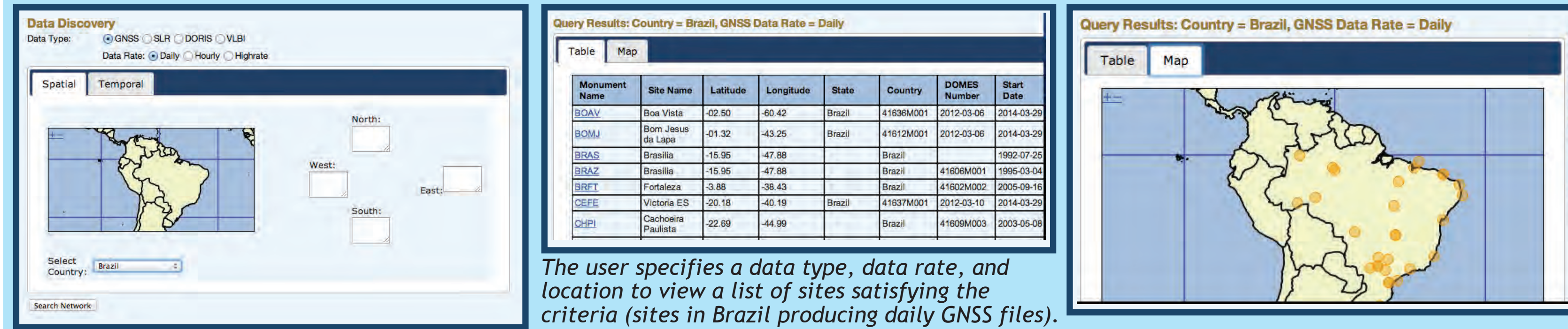
In this example, the "GNSS Receiver Information" section of the IGS site logs is selected from the drop down list. The user selects "ReceiverType" from the list of fields in this section and then selects "JPS LEGACY" from the list of possible values for this field.

The results show a table of information extracted from the site log, listing those laser ranging sites having a JPS LEGACY receiver installed. The "Get CSV" button will create a file of these results in comma-separated values format for use in other applications (e.g., Excel).

*Note: The official responsibility for receipt and maintenance of each service's logs remains with the service. The CDDIS regularly ingests the logs into a database developed for the SiteLogViewer application. The application also provides a link to the official site log and service to ensure the user has access to the latest information.

Data Discovery Developments

- Developing web application for display of data holdings to aid in discovering data available from the CDDIS
- Queries will allow users to enter spatial and temporal parameters to determine sites of interest

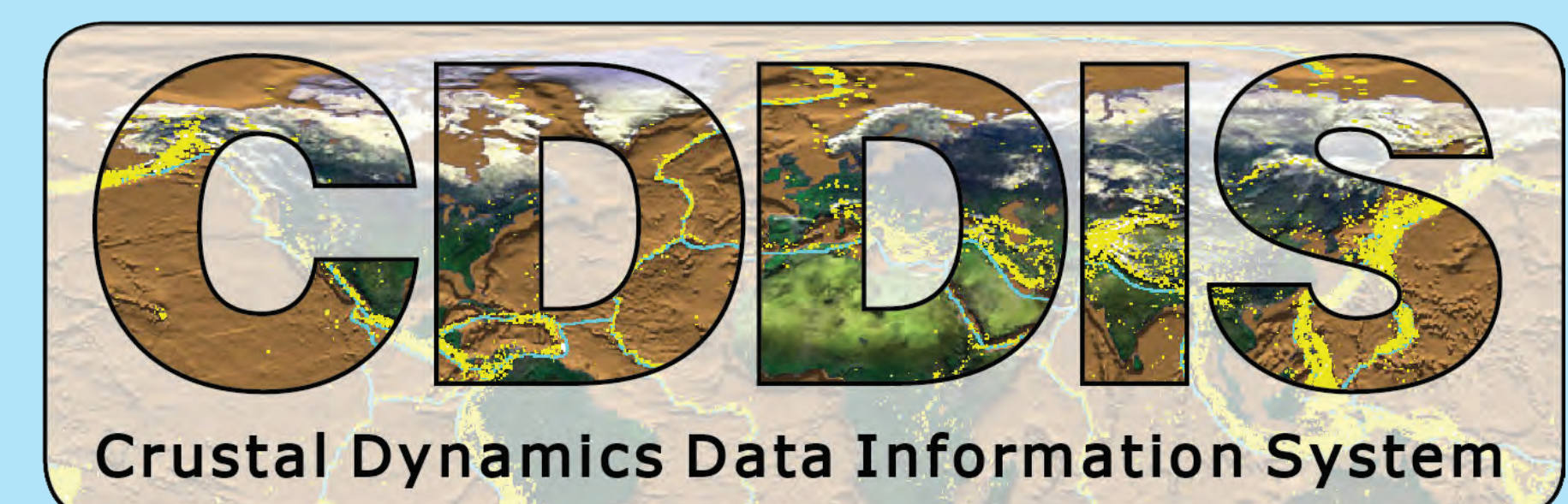


The user specifies a data type, data rate, and location to view a list of sites satisfying the criteria (sites in Brazil producing daily GNSS files).

Real-Time Activities

- In support of the IGS Real-Time Service (RTS), the CDDIS has installed a real-time caster using the NTRIP software on an available, dedicated server for receiving and serving real-time GNSS data and product streams.
- CDDIS real-time activities will require user authentication which will be handled through a NASA GSFC User Registration System (URS)
 - User registration provides secure authentication required for RTS
 - Allows gathering of metrics for usage reporting
- CDDIS has begun the process to capture incoming streams for generation and comparison of high-rate data files.
- Testing continues on the CDDIS caster installation and the NTRIP user registration module
- For more information see poster: "CDDIS Real-Time Developments," Patrick Michael, Carey Noll, James Roark.

The authors would like to acknowledge the contributions of the CDDIS staff members Maurice Dube, Rebecca Limbacher, Nathan Pollack, James Roark, and Lori Tyahla.



Future Developments

System Upgrades:

- CDDIS is in the process of procuring a hardware refresh
- System will be located within EOSDIS infrastructure, which will provide for expanded bandwidth and increased redundancy
- Some changes in authentication of incoming data will be required; we will keep the user community informed
- Operations on new system expected in late fall, 2014

More Information/Feedback:

- Data and products are acquired as part of NASA's Earth Science Data Systems and archived and distributed by the Crustal Dynamics Data Information System (CDDIS): C. Noll, The Crustal Dynamics Data Information System: A resource to support scientific analysis using space geodesy, Advances in Space Research, Volume 45, Issue 12, 15 June 2010, Pages 1421-1440, ISSN 0273-1177, DOI: 10.1016/j.asr.2010.01.018.
- The staff welcomes feedback on the CDDIS and in particular the ideas expressed in this poster; contact Carey Noll (Carey.Noll@nasa.gov).