UNAVCO Support to the GPS Global Network (GGN) and the International GPS Service (IGS)

Ruud, O.[1], Stowers, D.[2], Fisher, S.[1], Meertens, C.[1], Andreatta, V.[1]

1. UNAVCO, Inc., Boulder Facility, 6350 Nautilus Drive, Boulder, CO 80301
2. Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109

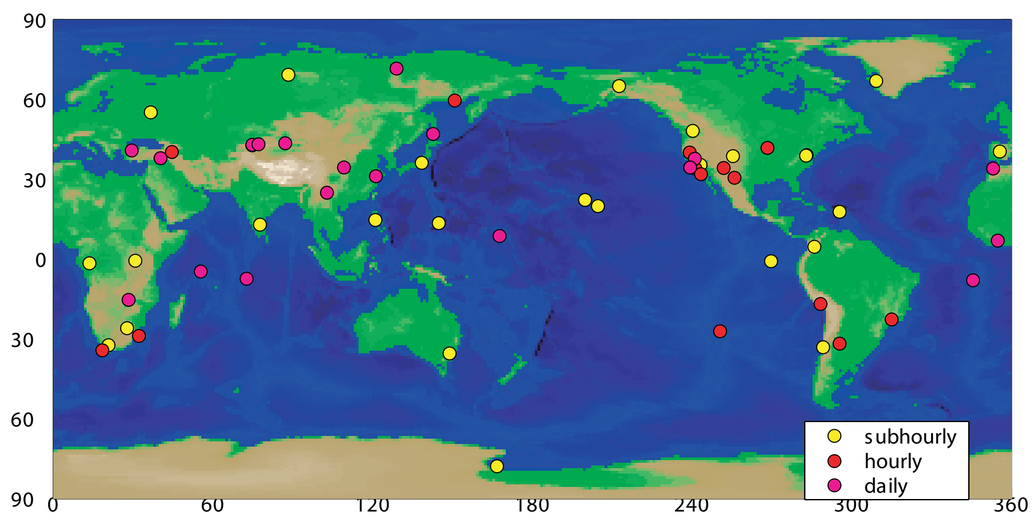
Abstract

The UNAVCO, Inc. Boulder Facility provides GPS project support to investigators funded by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA), including the NASA Solid Earth and Natural Hazards (SENH) Research and Applications Program. As part of this agreement, support is provided to the NASA Jet Propulsion Laboratory (JPL) in their management of the NASA GPS Global Network (GGN), and to the International GPS Service (IGS) Central Bureau (CB), also located at JPL.

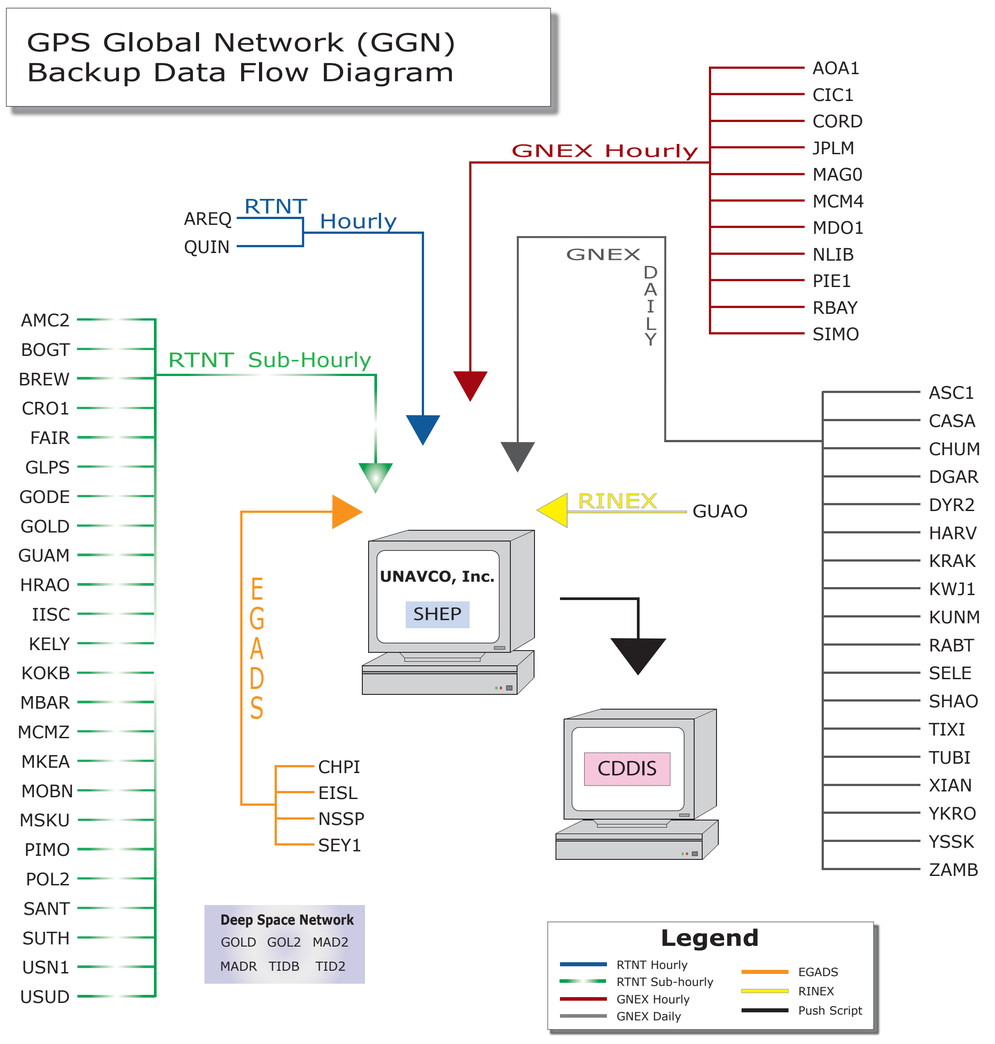
UNAVCO provides daily monitoring support for 67 NASA permanent GPS stations, 30 of which are part of the IGS Low Earth Orbit (LEO) pilot project, three are part of the Deep Space Network (DSN), four are stations supporting Ionospheric Scintillation projects, and 26 sites are real-time 1 Hz (high rate) global stations. NASA provides support for the GPS infrastructure through a network of permanent GPS stations called the GPS Global Network (GGN) which represents approximately 20% of the 362 stations (as of January 16th, 2004) that make up the IGS permanent station global network. On a global scale, these stations contribute to IGS data and precise products, help realize an International Terrestrial Reference Frame (ITRF), determine station velocities for global tectonic models, and provide atmospheric, ionospheric, and essential ground network data for applications such as space weather forecasting and LEO occultation missions.

There has been an increase in the deployment and operation of high-rate 1 Hz GPS sites which provide both traditional IGS products (30 second sample rate RINEX) as well as high-rate data as part of the IGS LEO pilot project. These sites also produce 1 Hz data streams which are used for real-time global, differential corrections for dynamic positioning. JPL is currently receiving 1Hz data, in real-time, from about 36 global stations.

GGN Network

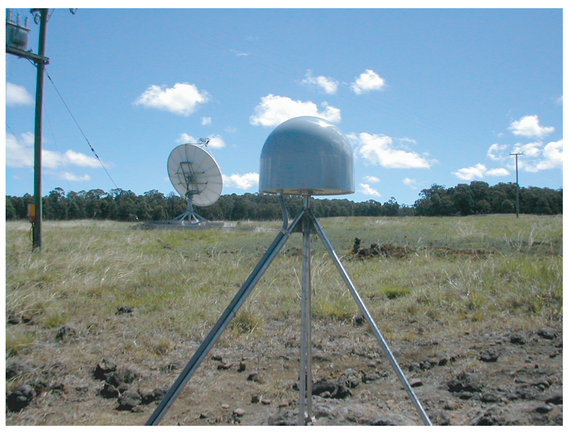


UNAVCO's responsibility has increased to include operational and backup functions for many of these important high rate installations. GGN stations represent approximately 50% of IGS stations that have data available on an hourly basis. UNAVCO also continues to provide data backup and distribution support to JPL for 50 GGN stations.



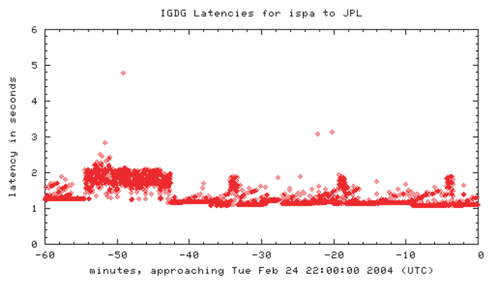
Schematic representation of UNAVCO backup operations of JPL data transfers. UNAVCO maintains a continuous readiness to provide data backup of JPL functions in case of an outage in JPL operations. The backup functions include data retrieval, RINEX conversion, data archiving, and data forwarding to the CDDIS of regular IGS products. In addition, normal station troubleshooting and maintenance tasks are provided during outages.

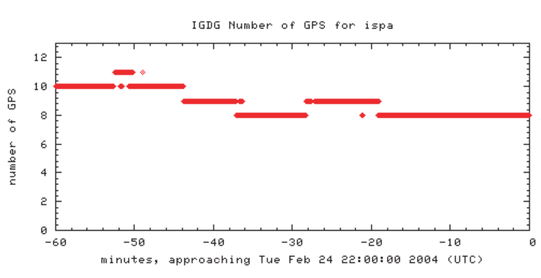
New Easter Island (ISPA) GGN Installation



The newly erected SCIGN stainless steel, short drill-braced monument on Easter Island (ISPA). The new station runs an Ashtech MicroZ receiver with Ashtech Choke Ring Antenna and Tall SCIGN Radome. The station also includes a MET pack for meteorological measurements. Station uses a Linux computer and shares VSAT data communications routing with IRIS Seismic station.

C-band VSAT dish operated by IRIS. UNAVCO/JPL share bandwidth on this link, allowing for high-rate, real-time data streaming back to JPL. The old station EISL will continue to operate for one year to allow for a sufficient tie between the two installations. Operations were moved to the new installation (ISPA) due to limited sky visibility at EISL, and to utilize the new VSAT communication link at the IRIS Seismic station.





Left plot shows latency for 1 Hz data received at JPL. Typical latencies are about 1.5 seconds. Right plot shows number of satellites being tracked.