A Europe-Japan-United States GNSS data-sharing pilot project for the Geohazard Supersites and Natural Laboratories

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[Additions to previous versions of document: (1) Notes about Japan participation and information on GEONET data access, (2) section on GCI]

0. Notes about Japan Participation

The team as well as the GEO secretariat approached the Geographical Survey Institute of Japan (GSI) requesting the participation in the pilot. The GSI declined because the pilot is not compatible with current GSI data policy (see section 8).

1. Purpose of document

At the GEO V-III plenary in Istanbul in November 2011 the Geohazard Supersites and Natural Laboratories initiative was presented to the delegates for information (see section 8). The recommendation was made to develop a GNSS data sharing pilot project between Europe, Japan and the U.S. to advance the sharing of in-situ geophysical data for GEOSS. This document outlines a plan to act upon this recommendation.

2. Why a GNSS data-sharing pilot?

The Geohazard Supersites will lead to a global network of natural laboratories in which regional GPS and seismic data together with InSAR data will be available form a single data portal. The objectives of the data-sharing pilot are:

- To provide a proof-of-concept demonstration for the ease of GNSS date-sharing for this global network. To test web services technology and demonstrate the non-intrusiveness of the approach.
- To provide a vehicle for data-sharing for the many national GNSS networks currently being developed in GEO member states.
- To improve our understanding of the world's large and most destructive earthquakes by merging and harmonizing the data sets of the involved groups like in the Cascadia subduction zone in North America, the Japanese subduction zones, and the Eurasia-Nubia plate boundary

A feature of GNSS data are the common formats, which facilitate virtual connections. One rationale behind this project is that only little efforts are required but it will significantly advances GEOSS.

3. Background: existing networks

The proposed project will provide seamless access to a total of ~3000 GNSS receivers, about half of the worldwide existing receivers for tectonic applications. The following networks will be connected:

Japan: The ~1400 station GEONET network of the Geospatial Information Authority of Japan (GSI), which was initiated in 1993. This is worldwide the densest GPS network (YOSUKE, GSI-REP)

Europe: Networks managed by many organizations at European (e.g., EUREF) and National (e.g., Italy's ~50 station RING network of the Istituto Nazionale di Geofisica e Vulcanologia. ~20 stations network of the IGN Spain)

USA: UNAVCO archives data of ~3000 permanent GPS stations, 1200 of them part of Earthscope's Plate Boundary Observatory (PBO) and ~170 US Geological Survey stations.

Data policies: US and Europe Most of the data are already open or semi-open access, facilitating the rapid implementation of the pilot. The US and several European GPS networks already have open-access data policy. Many more European GNSS networks are in the process of adapting their data policies for the European Plate Observing System (EPOS). They are expected to participate once these changes have been made.

Japan. The data policy for the GEONET data (operated by the GSI) is complex and unclear (see section 8). The data are available, but only upon request. The provision of older data (more than 1 year old) is in some cases associated with a nominal fee. The access to GEONET data is described on a Japanese-only website (see link in section 7) but the actual data policy is not published. Some data are only accessible to users with a *.jp internet domains. In summary, the access to GEONET data is not compliant with GEO's data sharing principles. This pilot project is an important step for the GEO process within Japan.

4. Technical Implementation through Web Services

This project build on concepts and software developed by UNAVCO for the Web Services-enabled Geodetic Seamless Archive Center (GSAC-WS) which virtually connects several U.S. GNSS data centers. Participating organizations maintain a Web Services front-end. Users install a GSAC client for searched of the federated GSAC repository. Web Services (WS) is the technology of choice for virtually connecting geophysical data centers. This technology is widely used in seismology and meteorology.

More information on GSAC-WS is available at: http://facility.unavco.org/data/gsacws/

Instructions for data center participation: http://facility.unavco.org/data/gsacws/participation.html

UNAVCO, the Alaska Satellite Facility, JPL and the University of California, San Diego are also starting a new Web Services-enabled Seamless SAR archive for interferometry analysis that will facilitate the discovery of distributed SAR data and refine web based InSAR processing services.

5. GEOSS Common Infrastructure

All data of this pilot will be available through the GEOSS Common Infrastructure (GCI). The role of the GCI for this pilot needs to be investigated and defined. One milestone of this project is the announcement to the GEO plenary that all data of this pilot are available through the GCI.

6. Next steps: Natural Laboratory pilots for Europe, Japan and Western North America

The GNSS pilot is a first step towards the development of geohazard natural laboratories which also include seismic and InSAR data. Once the GNSS pilot is progressing similar pilots will be developed for seismic and InSAR data. Finally, the three different pilots will be connected for the transition to the operational GEOSS.

Preview on seismic data-sharing pilot. This component appears to be easy to realize. (1) For North America all seismic data sets are already open access and they are virtually connected through the Earthscope and IRIS cyber-infrastructure. (2) For Japan many networks are open access. (3) For Europe the integration of the networks is progressing through EPOS.

Preview on InSAR data-sharing pilot. This component is more complex. (1) For North America, the ESA and JAXA data are currently openly accessible only to U.S. investigators. (2) For Japan, the ESA data are openly accessible to everybody but the JAXA data only to Japanese investigators. (3) For Europe the ESA data are openly accessible to everybody but the JAXA data only to European investigators.   Another complication is that homogenous and complete data sets do not exist yet. ESA has a program in place to remedy this situation, which eventually will provide open-access to all ESA data (but a time schedule has not yet been defined). For JAXA data such a program is not yet in place.

7. Milestones

To be defined in April telecon. Desirable is:

2012 GEO Plenary:

  (1) Announcement of successful pilot.
  (2) Extend invitation to participate to all GEO members

8. Relevant documents

1. Geohazards Supersites progress report presented to 2011 GEO Plenary:
http://supersites.earthobservations.org/SupersitesProgress2011.pdf

2. Description of proposed Japan Natural Laboratory:

http://www.earthobservations.org/art_014_003.shtml

3. Information about access to Japanese GEONET data

> http://terras.gsi.go.jp/ja/ngs040.php

The GEO secretariat contacted GSI regarding participation. Tomoaki Furuya provided the following answer:

"The data are open to the person authorized by GSI for personal use and prohibited to copy for the others. ***Therefore, GEO shall not be authorized to use the data for GEOSS***."