

GGOS Working Group on Ground Networks and Communications Status Update - February 1, 2006

Goals and Objectives:

The Ground Networks and Communications Working Group is working toward the implementation of properly designed and structured ground-based geodetic networks to materialize the reference systems to support sub-mm global change measurements over space, time and evolving technologies. The WG is working with the IAG measurement services (the IGS, ILRS, IVS, IDS and IGFS) to develop a strategy for building, integrating, and maintaining the fundamental network of instruments and supporting infrastructure in a sustainable way to satisfy the long-term (10-20 year) requirements identified by the GGOS Science Council. At the moment, the Working Group is examining options for 1 mm and 0.1 mm/yr reference frame stabilities.

Activities Planned and Underway

Activities of the Working Group include the investigation of the status quo and the development of a plan for full network integration to support improvements in terrestrial reference frame establishment and maintenance, Earth orientation and gravity field monitoring, precision orbit determination, local deformation monitoring, and other geodetic and gravimetric applications required for the long-term observation of global change. This integration process includes the development of a network of fundamental stations with as many colocated techniques as possible, with precisely determined intersystem vectors. This network would exploit the strengths of each technique and minimize the weaknesses where possible.

The final design of the GGOS network must take into consideration all of the applications including the geometric and gravimetric reference frames, EOP, POD, geophysics, oceanography, etc. We will first consider the TRF, since its accuracy influences all other GGOS products. Early steps in the process are:

1. Define the critical contributions that each technique provides to the TRF, POD, EOP, etc;
2. Characterize the improvements that could be anticipated over the next ten years with each technique;
3. Understand the present error sources for each technique (instrument and modeling) and how these errors sources propagate into the analysis products;
4. Using simulation techniques, quantify the improvement in the TRF, Earth orientation and other key products as stations are added and station capabilities (co-location, data quantity and quality) are improved;

The Working Group is assuming that the GNSS and the DORIS Networks will be at least as robust as they are presently and that planned upgrades in the ground systems and the satellites will come to fruition. Some augmentation is also assumed where the present networks would be significantly enhanced with additional stations.

SLR and VLBI are presently investigating the size and density of the networks that will be required to satisfy their individual requirements.

We are still in the process of integrating the role of gravity field measurements within the context of the integrated network.

In a next step, we will examine the current infrastructure in-place, for the analysis of the network-collected data, investigate their adequacy to meet the envisioned future network realizations and the product quality and latency vis-à-vis the GGOS goals, and suggest appropriate actions.

Related to the above, is the question of data and product communications. This needs to be examined once we have a firm idea of the networks of the next decade and the product availability requirements. Our detailed investigation will ensure that the data will reach the analysis centers with minimal delays, and the products will be expeditiously disseminated to the public and the users. In addition to these questions, we will examine the need and possible improvements of communication links between geodetic and other GEOSS-related networks, e.g. oceanographic, atmospheric, seismic, etc., to make sure that data and results from each of these can be made available to all users with minimal effort and delays.

A preliminary discussion of items 1 and 2 above is included in our Poster paper from the IAG Cairns meeting:

M. Pearlman, et al, "GGOS Working Group on Networks, Communication, and Infrastructure" (http://cddis.gsfc.nasa.gov/docs/GGOS_IAG_0508.pdf)

Schedule of Planned Activities

During 2005, the Working Group met at EGU in April, IAG in August, and AGU in December.

The next meeting will be held at EGU in April to review the progress of the SLR and VLBI simulations; the long term plans for the GNSS and DORIS networks, and the role and scope of the gravity field measurements in the integrated network.

Member List of the Working Group

- IGS: Angelyn Moore, Norman Beck
- ILRS: Mike Pearlman, Werner Gurtner
- IVS: Chopo Ma, Zinovy Malkin
- IDS: Pascal Willis
- IGFS: Rene Forsberg, Steve Kenyon
- ITRF and Local Survey: Zuheir Altamimi, Jinling Li
- IERS Technique Combination Research Centers: Marcus Rothacher
- IAS (future International Altimetry Service): Wolfgang Bosch

- Data Centers: Carey Noll
- Data Analysis: Erricos Pavlis, Frank Lemoine, Frank Webb, John Ries, Dirk Behrend