

Working Group on Ground Networks and Communications

GGOS Steering Committee Meeting

San Francisco

December 12, 2007

GGOS Working Group on Ground Networks and Communications

Charter

- Develop a strategy to design, integrate and maintain the fundamental geodetic network of colocated instruments and supporting infrastructure in a sustainable way to satisfy the long term (10 - 20 years) requirements identified by the GGOS Science Council. At the base of GGOS are the sensors and the observatories situated around the world providing the timely, precise, and fundamental data essential for creating the GGOS products.
- Primary emphasis must be on sustaining the infrastructure needed to maintain the evolving global reference frames while at the same time ensuring the support to the scientific applications' requirements.
- Opportunities to better integrate or collocate with the infrastructure and communications networks of the many other Earth Observations disciplines now organizing under GOESS should be taken into account.

Working Group Membership

The Working Group has accumulated participants as topics have been addressed through its meetings and telecons. We have considered all of them to be members of the Working Group; some participate every week, some once in while. Some we don't hear from.

Zuheir Altamimi, David Arnold, Yoaz Bar Sever, Norman Beck, Dirk Behrend, Wolfgang Bosch, Rene Ferland, Rene Forsberg, Richard Gross, Werner Gurtner, Steve Kenyon, Frank Lemoine, Linling Li, Dan MacMillan, Chopo Ma, Zinovy Malkin, Jan McGarry, Angelyn Moore, Ruth Neilan, Carey Noll, Mike Pearlman, Erricos Pavlis, John Ries, Markus Rothacher, David Rowlands, David Rubincam, David Stowers, Frank Webb, Pascal Willis

High Level Tasks

- Develop a model to estimate the stability of the reference frame as a function of the number of collocated SLR, VLBI and GNSS stations, their geographic distribution, and their data quantity and quality to scope the network necessary to provide a stability of 0.1 mm/year;
- Estimate the size and distribution of the GNSS network necessary to distribute the reference frames globally;
- Seek an effective way of monitor inter-technique vectors at collocation sites to support the above tasks;
- Develop an “effective cross section” standard for GNSS satellites and examine options for implementation;
- Provide charts on stations and product information for GGOS, GEO and INDIGO;
- Promote communication and integration among the Services;

Activities to Date (1)

- **Lists of Stations and Data Products from the Services**

- http://indigo.gsfc.nasa.gov/indigo_serva.html

- http://indigo.gsfc.nasa.gov/indigo_news.html

Still need to add gravity, tide gauges, etc.

- **Network scoping simulations underway**

- Driven by Reference Frame stability requirements;

- Examining scale issues with SLR and VLBI

- Examining bias issues – effect on the reference frames

- Simulating networks of 8, 16, 24, and 32 colocated stations to understand improvements (Pavlis, Macmillan, Ries, Altamimi, etc) ;

Activities to Date (2)

- **Ground Survey techniques to monitor co-location vectors**
 - How does the ref. frame quality depend on quality of the inter-technique vectors?
 - How do we monitor the vectors in a “practical manner”?
 - Examining some design layouts to try to optimize measurement;
 - Field demonstrations of some of the state-of-the-art equipment;
 - Routine surveys by Geoscience Australia at field stations show near mm precision;
 - Demonstration by Leica at GSFC;
 - Examining techniques used by civil engineering groups;
 - Meetings with IERS WG-2 at EGU 2007;
 - Organizing participation at the IAG/FAGS conference on deformation analysis/measurement/structural Engineering "Measuring the Changes", 12-15 May 2008, Lisbon;
 - Monitoring of Colocation Vectors using Inverse Colocation with GPS and SLR colocated on low orbiting satellites (Bar Sever, etc)

Activities to Date (3)

- **Retroreflector designs for future GNSS satellites**
 - A standard for retroreflector cross section has been approved by ILRS, GGOS and the IAG;
 - Recent success has been realized with uncoated cubes in GNSS (COMPASS) and synchronous orbits (ETS-8) from current network stations;
 - The Laboratori Nazionali di Frascati is operating an environmental laboratory for comprehensive retroreflector array testing;
 - Hollow cube options being examined by GSFC for higher performance, low weight option
 - Retroreflectors have been approved of the GPS Series III satellites

- **Publications:**

- “GGOS Working Group on Ground Networks and Communications”, Pearlman et.al., Dynamic Planet (ed. P. Thegoning and C. Rizos), Springer, IAG Symposium. Vol. 130, ISBN 978-3-540-49349-5, p719.
- “Global Geodetic Observing System – Considerations for the Geodetic Network Infrastructure”, Pearlman et. Al., Geomatica, Vol 60, No. 2, 2006, p193-204.

- **Meetings and Presentations:**

- Annual meetings at EGU and AGU (December) and at GGOS meeting opportunities;
- Periodic telephone conferences to review GGOS and Service activities;
- Technical presentations at AGU, EGU, IUGG