The Contribution of GGOS to GEOSS and and an Observing System for Geohazards and Disaster Prevention

A summary of Workshop Statements and Conclusions

Opening Session

Chairs: Volker Liebig and Markus Rothacher

Four Presentations: ESA, ASI, NASA, GEO:

- A global, accurate geodetic reference frame is fundamental for satellite missions and Earth observation;
- GGOS infrastructure is a core element in the global Earth observation system of systems;
- Space agencies will strive to maintain the satellite missions and systems providing the signals and observations necessary for GGOS to do its job;
- GGOS with the IAG Services is an example of successful international cooperation and coordination on the basis of best efforts.

Session 1: Observing changes in Earth's shape, rotation and gravity field with an integrated observing system,

Chairs: Ruth Neilan and Michael Pearlman

Seven Presentations:

- GGOS is a complex organization and observing system with many contributors and activists relaying on infrastructure maintained to a large extent by others.
- The (high) accuracy of the reference frame is a key limitation in quantifying global change processes such as sea level changes.
- Achieving consistency across the three pillars of geodesy and between observations and models is a key challenge for GGOS.
- Example VLBI2010: Technological progress driven by user requirements will lead to improved products.
- Example SLR: A key contributor to GGOS/ITRF but also a service in support of satellite mission.
- Network simulations: Can network improvements alone ensure that GGOS reaches its accuracy goals?
- Geodetic infrastructure is not only crucial for Earth-oriented studies (Decadal Study) but also as a telescope for spaceexploration.

Session 2: Understanding the Earth system: The contribution of GGOS

Chairs: Richard Gross and Susanna Zerbini

Four Presentations:

- Mass redistribution at seasonal time scales is well constrained by the three pillars of geodesy, but understanding the driving processes requires a combination of different parameters.
- GRACE facilitated huge progress in monitoring time-variable gravity and understanding the underlying mass redistribution (water cycle), but different processes cannot be separated without additional input (models or observations).
- Geodetic observations provide a sensing of the atmosphere at local and regional scale: Example tropospheric water content.
- Global change and geohazards phenomena are inherently linked with the reference frame: a combination of physical models and geodetic observations may be required in order to facilitate a better understanding of these phenomena.

Session 3: GGOS and Geohazards

Chairs: Hans-Peter Plag, Stuart Marsh

Eight Presentations:

- Prediction and Early warning systems work best if mutually informed and consistent, and GGOS has the bandwidth and should play both roles.
- InSAR is extremely versatile for the early detection of hazardous areas and thus can enable informed decisions on where to invest in dedicated monitoring systems.
- GPS reveals (1) nearly periodic slow seismic events accounting for significant energy release, (2) upward traveling seismic waves in the atmosphere, and GRACE senses gravity signals associated with large seismic event.
- Geodesy/GGOS contributes to tsunami early warning system in several ways.
- Gravity from space can help to mitigate the lack of geodetic infrastructure on the ocean floor.
- Earth surface is no longer frontier of seismology: Remote sensing of seismic waves and tsunamis from space appears possible and could be a component in early warning systems.
- Combining terrestrial and space-geodetic techniques results in comprehensive monitoring of surface displacements at volcanoes and particularly in hazardous areas.
- Understanding the link between the geodetic parameters and magma dynamics is important for early warning applications at volcanoes.