

# MEETINGS

## Geodetic Observations Help to Understand Geohazards and Mitigate Disasters

***The GGOS Contribution to GEOSS and an Observing System for Geohazards and Disaster Prevention; Frascati, Italy, 5–6 October 2007***

Modern space-geodetic observations have revolutionized our understanding of geohazards, and these observations have a great potential for further scientific discovery and applications including early warning.

To discuss this, about 50 scientists from the geodetic and geohazards communities took part in a workshop organized by the Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG) as a contribution to the intergovernmental Group on Earth Observations (GEO). Highest-level representatives of space agencies (European Space Agency, NASA, and Agenzia Spaziale Italiana) emphasized the fundamental importance of the geodetic reference frames for satellite missions and Earth observation. Although high, the present accuracy of these reference frames still is a key limitation in quantifying global

change processes such as changes in ice sheets and sea level. Improvements of the reference frame are a pivotal step toward a better understanding of these processes and their impact on society. The representative of GEO identified GGOS as a core element in the Global Earth Observation System of Systems (GEOSS), which aims to integrate Earth observations in order to better serve users in a number of societal benefit areas, including disasters.

Several speakers emphasized that major scientific and technological challenges for GGOS are consistency across the three areas of geodesy (geometry, gravity, and rotation) and consistency between observations and models. At seasonal timescales, mass redistribution in the fluid envelop of the Earth is well constrained by geodetic observations, but understanding the driving processes

requires a combination of different parameters (surface displacements, gravity changes, Earth rotation perturbations). Global change and geohazards phenomena are inherently linked with the reference frame, and meeting attendees proposed that the integration of physical models with geodetic observations may be required for a better understanding of these phenomena.

Systems aimed at prediction of geohazards and early warning systems work best if they are mutually informed and consistent. GGOS has the necessary bandwidth to cover both roles and for scientific and practical reasons should play both roles. Speakers illustrated the versatility of Interferometric Synthetic Aperture Radar (InSAR) for the early detection of hazardous areas, thus providing a basis for informed decisions on where to invest in dedicated monitoring systems. GPS has revolutionized the understanding of tectonic processes. Other speakers noted that remote sensing of newly discovered seismic waves in the atmosphere and ionosphere, and of tsunamis, from space, seems possible with geodetic techniques and could contribute to early warning systems for tsunamis. GRACE appears to sense gravity signals associated with large

seismic events, and gravity observations from space might help to mitigate the lack of geodetic infrastructure on the ocean floor. It was also demonstrated that geodesy contributes to tsunami early warning systems in several ways, and there is still a significant additional potential to be exploited.

In summary, the workshop underlined the broad contribution of geodetic observations to Earth science and practical applications in the field of geohazards, including early warning. Nonetheless, meeting participants stressed the need to complement the highly accurate measurements with improved models and to better link the providers (GGOS and the geodetic community) to users in geohazards assessment, mitigation, early warning, and disaster prevention and recovery. For more information on the workshop, see [http://geodesy.unr.edu/ggos/ggosws\\_2007/](http://geodesy.unr.edu/ggos/ggosws_2007/).

The full text of this meeting report can be found in the electronic supplement to this *Eos* issue ([http://www.agu.org/eos\\_elec/](http://www.agu.org/eos_elec/)).

—HANS-PETER PLAG, Nevada Bureau of Mines and Geology, University of Nevada, Reno; E-mail: [hpplag@unr.edu](mailto:hpplag@unr.edu); and SUSANNA ZERBINI, University of Bologna, Bologna, Italy.

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