

## **Symposium 6: Applications of Geodetic Techniques and International Frameworks to Geohazard Risk Detection and Reduction**

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(\*Organizers request that the symposium sessions be recorded and be made available to the community in a timely fashion.)

### **Abstract:**

This Symposium comprises sessions that explore geodesy's applications to, and intersections with, various aspects of science, technology, and diplomacy and concepts of multi-lateral cooperative programs. Elements of science and technology policy that address environmental monitoring and reduction of risks associated with geophysical hazards will be discussed.

The successful contribution of geodesy toward major international agendas, frameworks, and initiatives is due largely to open sharing of the rapid scientific and technological advances that benefit the geodetic sciences. These include the growing constellations of geodetic satellites (e.g. GNSS), improved availability and capacity of global broadband communications, the increasing acceptance of cloud computing and machine learning that will democratize and facilitate geodetic data analysis.

Sessions will discuss the important role of science and technology diplomacy in the successful development and sustainable use of geodetic infrastructure and resources, some of which are currently constrained or inaccessible due to national or institutional policies. The potential benefit of increased data and resource sharing will be presented with examples including actual case studies as well as simulations.

Examples aligning geodetic science with the United Nations Sendai Framework for Disaster Risk Reduction will be encouraged, using this framework to identify opportunities, fill gaps, and work toward geodetic contributions for risk reduction and resilience. Along with the Sendai Framework, applications to other major international initiatives, such as the UN Sustainable Development Goals, are welcomed with the aim to promote scientifically defensible studies, projects, and demonstrations of interoperable and transdisciplinary applications grounded in geodesy -- as well as those novel applications that may be catalyzed by geodetic technologies.

Finally the efforts of the UN GGIM Subcommittee on Geodesy, UN International Committee on GNSS, as well as NGOs such as the Group on Earth Observations (GEO) and the Committee on Earth Observation Satellites (CEOS) will be acknowledged for their role in increasing and advocating for the participation of many government agencies, international organizations, and the private sector to provide the needed resources to advance the application of geodetic science for the well-being of global society.

Presenters in all sessions are asked to address at least one element of geodesy's role in science/technology diplomacy, international policy/frameworks including UN SDGs, Sendai Framework, or meeting funding challenges through international frameworks such as the UN GGIM-World Bank Integrated Geospatial Information Framework (IGIF).

**Keywords:** Technology Diplomacy, Science Diplomacy, Policy, Advocacy, Disasters,

## **Symposium 6, Session 1: The role of Diplomacy and Policy in effective geohazard risk reduction and resilience**

Conveners: **TBD**

Geodesy and Geohazards know no political boundaries. However, nations and agencies do impose constraints on the practice of Geodesy and sometimes curb the distribution of information relevant to disaster risk reduction, recovery, and economic health. The session will explore international organizational structures and research approaches that can mitigate national constraints on the application of geodetic science.

This session solicits contributions focusing on aspects of (3-6 items):

- Aligning geodesy with UN frameworks and NGO activities
- Discussion of national policies on the sharing of geodetic data
- Designs of observation and analysis networks that promote the sharing of data and analysis amongst all nations.

The role, actions, and challenges of science and technology diplomacy in geodetic applications and contributions to geohazard risk reduction and resilience will be discussed. The use of geodesy in addressing the targets and indicators of both the Sendai Framework for Disaster Risk Reduction and UN Sustainable Development Goals, along with new frameworks for interlinking efforts, standardizing technology, and facilitating funding will be presented.

Keywords: Tech Diplomacy, Science Diplomacy, Policy, Advocacy, Disasters, Risk

*(Organizer's Note: This session may be expanded to a 6.1A and 6.1B two-part agenda, with 6.1B to include presentations pertaining to the proposed UN Global Geodetic Centre of Excellence (Bonn, Germany) and UN Geospatial Centre of Excellence (Deqing, China). If this is realized, proposed session conveners would include Directors of both UN Centres.)*

**Symposium 6, Session 2: The Intersection of Geodesy in Climate and Geohazards Monitoring [proposed joint session with ICCC]**

Session Conveners: Prof. Dr. Balaji Devaraju (India)

This session will address geodetic monitoring to characterize disaster risk from climate change. Presentations will be multidisciplinary in nature to explore the utility of geodetic observations in evaluating, understanding, and predicting environmental risk arising from climate change and subsequent extreme events.

This session solicits contributions focusing on aspects of (3-6 items):

- The utility of geodetic observations in the estimation of extreme weather events
- Contribution of geodetic sensors in the observation of essential climate variables, and evaluating environmental/disaster risk thereof
- Utility of soil and atmospheric moisture from geodetic sensors
- Results of geodetic sensors in characterizing sea-level change, and land surface conditions
- Geodetic sensors, methods and observations to characterize atmospheric hazards and model systemic risk
- Real-time and near real-time processing of geodetic observations for geohazards monitoring and risk assessment
- Temporal gravity field changes in assessing disaster risk
- Contribution of geodetic sensors (GNSS, altimetry, gravimetry, InSAR) in the observation of essential climate variables, and evaluating environmental/disaster risk thereof.

*(Organizer's Note: This session is proposed to be jointly organized with IAG ICCC.)*

## **Symposium 6, Session 3A and 6.3B: Scientific and Technical Advances in Geohazard Monitoring and Detection**

Session Conveners: **TBD**

Session will discuss advances since the publication of the GTEWS 2017 report (see contributing paper to UNDRR 2019 Global Assessment Report (GAR-19)). Session 6.3A will focus upon ground displacement analysis approaches. Session 6.3B will focus upon the analysis of ionospheric imaging for rapid tsunami scale and tracking. The scientific and technical aspects will focus upon quantitative analysis of tsunami prediction from early onset to propagation, as well as the utility of GNSS-Enhanced Tsunami Early Warning System (GTEWS) for non megathrust events.

An invited talk will will discuss organizational support by the Group on Earth Observations (GEO) and its new Community Activity on Geodesy for the Sendai Framework (Geodesy4Sendai), International Union of Geodesy and Geophysics (IUGG), and the IAG's Global Geodetic Observation System (GGOS).

This session solicits contributions with attention to:

- Network design and analysis system (cloud and machine learning)
- Crustal displacement- post seismic tsunami predictive models and preseismic precursors
- Ionospheric models and monitoring for tsunami onset and propagation tracking
- Importance and role of landslides in tsunami scale
- Utility of GTEWS for non-megathrust events

**Keywords:** Tsunami, GNSS, GPS, landslides, megathrust