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Editorial: Women in science: geohazards and georisks 2022

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Editorial on the Research Topic
Women in science: geohazards and georisks 2022

A gap exists between women and men in sciences (JEM Editorial Team, 2020). At present, less than 30% of all researchers worldwide are women. Long-standing biases and gender stereotypes are discouraging girls and women away from science-related fields, and STEM research in particular. Science and gender equality are, however, essential to ensure sustainable development as highlighted by UNESCO. In order to change traditional mindsets, gender equality must be promoted, stereotypes defeated, and girls and women should be encouraged to follow STEM careers.

To pursue this objective, this Research Topic collects seven papers promoting the work of women researchers, scientists, engineers and specialists across several fields of study related to geohazards and georisks (i.e., gender equality in geoscience, seismology, subsidence, landslides, volcanology). The breadth of research covered by this Research Topic is also coupled with a wide array of case studies that span the entire globe (central Italy, Slovenia, California, western China, Tonga, and several coastal cities distributed across all continents), thus reinforcing the global relevance and diversity of the research presented.

Gender equality in geoscience is a Research Topic addressed in Nardini et al., which focuses on the gender gap within the geoscience academic community. The paper emphasises the role of language and advocates for adopting an inclusive vocabulary to promote a shift in perspective and mindset. It aims to provoke reflection on evolving from gendered to gender-inclusive language in geosciences and other fields. The paper includes a table of alternative terms to illustrate how gender-neutral language can express the same concepts more equitably and suggests that journal editorial boards adopting these changes could foster positive.

Advancements in the field of seismology are thoroughly tackled in the studies by Gallahue et al., Cuius et al., and Wu et al.. The objective of Gallahue et al. is to assess the impact of site response on probabilistic seismic hazard maps for California by incorporating site-specific Vs30 (the time-averaged shear-wave velocity in the upper 30 m of the Earth's crust) values into modern ground-motion models. The study aims to determine how site effects influence hazard predictions at different periods and evaluate whether these effects can account for discrepancies between predicted and observed shaking levels. Cuius et al. shifts the focus from site effects to earthquake source dynamics. The study employs second-degree seismic moments to characterise the spatiotemporal extent of earthquake sources, enabling the estimation of finite source parameters such as rupture length, width, duration, velocity, and propagation direction without relying on a predefined rupture model. To assess the sensitivity and reliability of the results to uncertainties due to observations

and prior knowledge, the study uses apparent source time functions (ASTFs) derived from synthetic seismic signals in central Italy. The findings reveal that substantial uncertainties in hypocentral depth and inaccuracies in velocity models can introduce significant biases, particularly affecting rupture size and average centroid velocity, highlighting the strong influence of ray path calculation in the inversion process. An alternative approach for characterising earthquake sources, based on InSAR coseismic deformation inversion, is explored in Wu et al. In particular, the authors use Sentinel-1A InSAR data to analyse the 2020 Mw 6.0 Jiashi earthquake (western China), where no surface ruptures were observed. They employ a novel automatic method for orbit refinement and invert the jointly constrained deformation field to obtain the fault geometric parameters and slip distributions.

Land subsidence is discussed on a global scale in Pedretti et al., which provides a comprehensive, open-source, peer-reviewed database documenting the main and secondary causes of subsidence in 143 coastal cities. It highlights gaps in understanding and mitigation efforts in some high-risk areas, while also showing that past measures, especially those addressing subsidence due to groundwater extraction, have been successful. The database aims to enhance global awareness and knowledge of subsidence, supporting researchers, stakeholders, and policymakers in better urban planning and development.

Jemec Auflič et al. instead address the Research Topic of landslides in Slovenia. They created a landslide activity map for three pilot areas in Slovenia using Sentinel-1 satellite data from 2017 to 2021. The data was processed with ENVI SARScape and persistent scatterers InSAR data was analysed through GIS integration, field validation, and identification of significant deformations. The map categorises landslide areas into four classes based on geotechnical analyses and velocity data, identifying 21 polygons with different landslide activities. The landslide activity map was created based on the landslide areas categorised into four classes based on the geotechnical analyses, yearly velocity data obtained by PS InSAR, and validation of annual velocity data obtained by *in situ* and GNSS monitoring and field observation. A total of 21 polygons with different landslide activities were identified in three study areas. The overall methodology helps stakeholders in the early mapping and monitoring of landslides to increase urban resilience.

To conclude, the work by Braitenberg deals with volcanology. The study investigates the dynamic evolution of the Hunga volcano in Tonga, focusing on the creation and subsequent disappearance of a new island between Hunga Tonga and Hunga Ha'Apai from 2013 to 2023. The island expanded in 2015 and vanished in January 2022 due to a massive eruption. Using remote sensing data from Sentinel 1-2 and Landsat 8-9, the study tracks changes in the subaerial surface area of the volcano with a Random Forest classification algorithm. The analysis shows variations in island size, suggesting that satellite data can effectively monitor volcanic activity and changes in oceanic regions.

We hope that the readers will find in this Research Topic not only a useful state-of-the-art reference for the various Research Topic covered in the field of geohazards and georisks but also a reflection of the pivotal role that women researchers, scientists, engineers, and specialists play in advancing these disciplines.

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