SESSION 48- GeoEngineering Applications: Geotechnical and Geological Perspectives in Engineering Seismology

Conveners
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Session Description

Understanding how geological and geotechnical conditions influence seismic ground motion and earthquake-induced hazards is fundamental to advancing earthquake resilience. This session highlights interdisciplinary approaches integrating seismology, geology, and geotechnical engineering to improve site characterization, evaluate site-effect and ground-failure mechanisms, and strengthen design practice in earthquake-prone regions. Contributions integrating field data, seismological analysis, and geoengineering interpretation are especially encouraged.

Topics of interest include, but are not limited to:

• Field Methods: Field techniques that capture site-specific seismic response are vital for engineering applications.

Integrated approaches that combine geophysical and geotechnical observations/measurements (e.g., surface-wave Vs profiling, SPT, CPT, microtremor surveys, ground-motion records) are essential for defining subsurface properties and local site effects that control seismic response. We encourage contributions that advance site response analysis, nonlinear soil behavior modeling, and ground-motion prediction frameworks, and that also develop or compare geotechnical and geophysical in-situ testing methods, utilize temporary seismic arrays or instrumented sites, and explore hybrid geophysical–geotechnical approaches, all toward reducing uncertainty in engineering seismology and seismic design. Studies that integrate seismological and geotechnical data, compare field methodologies, or provide high-quality datasets for calibration of numerical and analytical models are particularly encouraged.

• **Earthquake-Induced Landslides:** Understanding how seismic shaking interacts with geological and topographic conditions to trigger slope failures remains a critical engineering challenge. We welcome studies that couple groundmotion characteristics

with slope stability modeling, integrate site effects into landslide hazard assessment, or use remote sensing and field data to map, monitor, and analyze co-seismic landslides. Research employing fiber-optic sensing, UAVs, LiDAR, or other remote-sensing technologies to detect ground deformation, quantify landslide displacements, develop early-warning approaches, or integrate spatial data into numerical and empirical slope-failure models is particularly encouraged.

- **Geoengineering Interpretations:** Understanding how site response and ground amplification influence the performance of critical infrastructure is essential during design. We invite studies that link seismological input with dynamic soil properties, including site-specific analyses for slopes, embankments, and dams. Contributions that combine field observations, such as microtremor measurements and eHVSR analyses, with numerical modeling (e.g., FEM, DEM, etc.) to calibrate or improve predictive models are highly encouraged. Research applying performance-based design principles to enhance the seismic resilience of lifelines and geoengineering systems are also welcome.

The session encourages innovative, data-rich, and cross-disciplinary studies that connect ground motion, soil behavior, and structural performance within a unified framework. Collaboration among seismologists, geologists, and geotechnical engineers aims to identify emerging methodologies, address research gaps, and advance resilient approaches for seismic hazard assessment and engineering design. This session is dedicated to promoting such interdisciplinary efforts.