

SESSION 51- Site Effects in Seismic Hazard: Advances in Ground Motion Modelling, Site Characterization, and Machine Learning Applications

Conveners

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Session Description

Shallow geological layers and interfaces within the upper 1 to 2 km have a profound influence on the seismic ground motions recorded at the surface. While the fundamental physics of site amplification is relatively well understood, real-world amplification remains still not fully captured by deterministic or ergodic models. The need for improved site characterization, combined with advances in computational modelling and artificial intelligence, presents new opportunities for refining seismic hazard assessments and microzonation practices.

This session aims to bring together contributions that advance our understanding of site effects, ground motion variability, and seismic hazard assessment. We invite studies exploring both empirical and numerical approaches that address amplification, attenuation, and frequency-dependent variability across a wide range of frequencies – from frequencies smaller than 1 Hz, relevant to long-period engineering demands, to frequencies larger than 10 Hz, crucial for attenuation and site response analysis.

Particular emphasis is given to (but not restricted to):

- Site response and microzonation studies, including 1D, 2D, and 3D numerical simulations;
- Ground motion prediction and variability quantification;
- Integration of diverse data types (e.g., borehole, geophysical, geotechnical, and instrumental datasets);
- Inverse problem formulations, statistical inference, and uncertainty quantification methods for near-surface characterization;
- Database development;



- Machine learning-based approaches, such as benchmarking and transferability of machine learning models, and generative AI for next-generation ground motion models.

