

**Session ID:** GEO-12

**Title**

EFFECTS OF SOIL NONLINEARITY ON THE BUILT ENVIRONMENT: OBSERVATIONS AND PREDICTIONS

**Convenors**

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**Description**

Soil response during strong ground shaking is governed by rather complex mechanical processes, which is ascribed to hysteretic behavior associated with an increase in energy dissipation, and volumetric-distortional coupling, due to the accumulation of irreversible plastic strains induced by either volumetric responses under drained conditions or pore pressure changes under undrained conditions. The latter volumetric effects may evolve into liquefaction in loose, saturated sandy soils. The amount of soil-nonlinearity mobilized during shaking controls site response and related consequences induced to structures and infrastructures, including strategic facilities like dams, ports, bridges, and pipelines.

This technical session aims to present recent advancements in assessing the effects of soil nonlinearity from multi-scale experiments and case-histories through the current capabilities of synthetic and numerical approaches to simulate soil behaviors.

From an observational perspective, this session includes new approaches or technologies to detect soil nonlinearity from real seismic events, such as the processing/elaboration of recording motions, analyses of damage to the built environment, and laboratory experiments performed through element testing or centrifuge models tests.

From a predictive perspective, this session will discuss both new numerical approaches for modeling soil nonlinearity, including the challenges simulating excess pore water pressure behaviors in saturated soils before liquefaction, and simplified indices that measure soil non-linearity at a regional scale. Within the framework of synthetic methods, validation of new models and methods is particularly interesting in the range of medium-intensity earthquakes, where the efficacy of simplified approaches is more debated.

Contributions from academia and industry are encouraged to critically discuss the state of practice and define the most urgent needs in future developments.

**Invited Speakers**

G. Gazetas <sup>4</sup>, K. Ichii <sup>5</sup>, J. Regnier <sup>6</sup>, F. Dezi <sup>7</sup>, M. Karray <sup>8</sup>, C. Ferreira <sup>9</sup>

**Affiliations**

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