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ADVANCES IN NATURAL HAZARDS SIMULATION

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ABSTRACT

The past few decades have witnessed a notable rise in natural disasters that are extreme and multi-hazard. Based on climate change forecasts, this trend is expected to escalate in the coming years. Many of these hazards are driven by hydrological processes, such as floods, mudslides, landslides, avalanches, and tsunamis.

Recent developments and improvements in numerical methods, together with the increase in computing power, have encouraged the application of computational tools for simulating natural hazards.

Shallow water models, advanced finite elements and finite volumes schemes, and in particular Particle-Based methods (e.g., the Smoothed-Particle Hydrodynamics (SPH), the Discrete Element Method (DEM), the Material Point Method (MPM), the Particle Finite Element Method (PFEM), etc.), can be used and coupled to simulate such complex scenarios and to evaluate the impact of these extreme events. Moreover, some of these methods' good CPU or GPU parallelization makes them suitable for large-scale 3D simulations.

The aim of this thematic session is to present and discuss recent developments in numerical simulations of the initiation and dynamics of natural hazards. Additionally, the event seeks to facilitate collaboration among experts in this field to promote productive discussions around this critical topic. Although the focus of this thematic session is primarily on hydrological hazards, we also welcome numerical methods applied to other types of natural events, including geological and meteorological phenomena. In particular, all those numerical methods that analyze multi-hazard events (e.g., landslides triggered by earthquakes or tsunami waves generated by landslides) will be appreciated. To account for possible interactions with civil constructions, contributions within the framework of fluid-structure or fluid-soil-structure interactions will also be appreciated.