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# A web-based platform for simulating seismic wave propagation in 3D shallow Earth models with DEM surface topography

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Realistic shallow seismic wave propagation simulation is an important tool for studying induced seismicity (e.g., during geothermal energy development). However over a long time, there is a significant problem which constrains computational seismologists from performing a successful simulation conveniently: pre-processing. Conventional pre-processing has often turned out to be inefficient and unrobust because of the miscellaneous operations, considerable complexity and insufficiency of available tools. An integrated web-based platform for shallow seismic wave propagation simulation has been built. It is aiming at providing a user-friendly pre-processing solution, and cloud-based simulation abilities. The main features of the platform for the user include: revised digital elevation model (DEM) retrieving and processing mechanism; generation of multi-layered 3D shallow Earth model geometry (the computational domain) with user specified surface topography based on the DEM; visualization of the geometry before the simulation; a pipeline from geometry to fully customizable hexahedral element mesh generation; customization and running the simulation on our HPC; post-processing and retrieval of the results over cloud. Regarding the computational aspect, currently the widely accepted specfem3D is chosen as the computational package; packages using different types of elements can be integrated as well in the future. According to our trial simulation experiments, this web-based platform has produced accurate waveforms while significantly simplifying and enhancing the pre-processing and improving the simulation success rate.