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Advanced Simulation of Coupled Earthquake and Tsunami Events (ASCETE) – Simulation Techniques for Realistic Tsunami Process Studies

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At the End of phase 1 of the ASCETE project a simulation framework for coupled physics-based rupture generation with tsunami propagation and inundation is available.
Adaptive mesh tsunami propagation and inundation by discontinuous Galerkin Runge-Kutta methods allows for accurate and conservative inundation schemes. Combined with a tree-based refinement strategy to highly optimize the code for high-performance computing architectures, a modeling tool for high fidelity tsunami simulations has been constructed. Validation results demonstrate the capacity of the software.
Rupture simulation is performed by an unstructured tetrahedral discontinuous Galerking ADER discretization, which allows for accurate representation of complex geometries. The implemented code was nominated for and was selected as a finalist for the Gordon Bell award in high-performance computing. Highly realistic rupture events can be simulated with this modeling tool.
The coupling of rupture induced wave activity and displacement with hydrodynamic equations still poses a major problem due to diverging time and spatial scales. Some insight from the ASCETE set-up could be gained and the presentation will focus on the coupled behavior of the simulation system.
Finally, an outlook to phase 2 of the ASCETE project will be given in which further development of detailed physical processes as well as near-realistic scenario computations are planned. ASCETE is funded by the Volkswagen Foundation.