



Study of the tsunamigenic rupture process of the 2011 Tohoku earthquake using a 3D Finite Element Model

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The study of the 2011 Tohoku earthquake revealed some new aspects in the rupture process of a megathrust event. Indeed, despite its magnitude M_w 9.0, this earthquake was characterized by a spatially limited rupture area and, contrary to the common view that the shallow portion of the subduction interface mainly experiences aseismic slip, the seismic rupture propagated onto the Japan trench with very large slip (> 50 m). Starting from slip distributions obtained by joint inversion of tsunami and geodetic data, we discuss the sensitivity of the tsunami impact predictions to the complexity of the modelling strategy. We use numerical tools ranging from a homogeneous half-space dislocation model (considering only vertical sea-floor displacement and tsunami propagation in the linear shallow-water approximation) to the more complex 3D-FEM model (with heterogeneous elastic parameters derived from 3D seismic tomography), including horizontal displacement and non-hydrostatic dispersive tsunami modeling.

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