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Numerical and analytical study on fault plane parameters influencing tsunami runup

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The application of the one-dimensional analytical runup theory could be a proficient tool for tsunami rapid early warning systems. Runup could be estimated reasonably well through analytical studies once initial wave profile is identified. However, this raises the need for a better understanding of the impact of the fault plane parameters on the runup. To achieve this, we schematically change the dip, the depth and the width of the fault and compute the initial conditions for the tsunami numerical model and analytical studies. Our synthetic bathymetry domains include a sloping beach of one degree and the same sloping beach connected to 5000 m constant depth to investigate the initial value problem and the boundary value problem. To model tsunami propagation and inundation, we used a nonlinear shallow water numerical model comprising coupled 4-layer coupled nested grids. We compare the results of the simulations and the results of the analytical runup formulae. Our study shows that for dip values between 30 - 50 degrees and fault depths up to 20 km, the analytical formulae and numerical model produce runup heights with a maximum difference of 15%.
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