ADJOINT INVERSION OF TSUNAMI SOURCE AND ITS APPLICATIONS TO RECENT TSUNAMI-GENIC EARTHQUAKES

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We develop an adjoint-state full waveform inversion procedure to recover the initial water elevation of a tsunami event. Traditional finite-fault tsunami source inversion methods suffer from the uncertainty of fault parameters or crustal rigidity. Moreover, the heavy computational burden of calculating Green's functions results in limited spatial resolution and hinders the real-time applicability of the traditional methods to tsunami early warning. In this work, we apply the adjoint-state full waveform inversion method to the tsunami source inversion. The benefits of the adjoint inversion are two folds: 1) independence of fault parameters, and 2) high computational efficiency, especially for dense tsunami arrays. We valid this approach with synthetic tsunami sources, and apply it to the 2017 Tehuantepec event, the 2014 Chile-Iquique tsunami event and the 2011 Tohoku event. Both synthetic and real-data preliminary results show that the adjoint-state method is of high efficiency and high resolution, outperforming the traditional tsunami source inversions.