# What Can We Do to Forecast Tsunami Hazards in the Near Field Given Large Epistemic Uncertainty in Rapid Seismic Source Inversions?

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The variability in obtaining estimates of tsunami inundation and runup on a near real time tsunami hazard assessment setting is evaluated. To this end, 19 different source models of the Maule 2010 Earthquake were considered (Fig. 1) as if they represented the best available knowledge an early tsunami warning system could consider. Results show that large variability can be observed in both coseismic deformation and tsunami variables such as inundated area and maximum runup. This suggests that using single source model solutions might not be appropriate unless categorical thresholds are used.

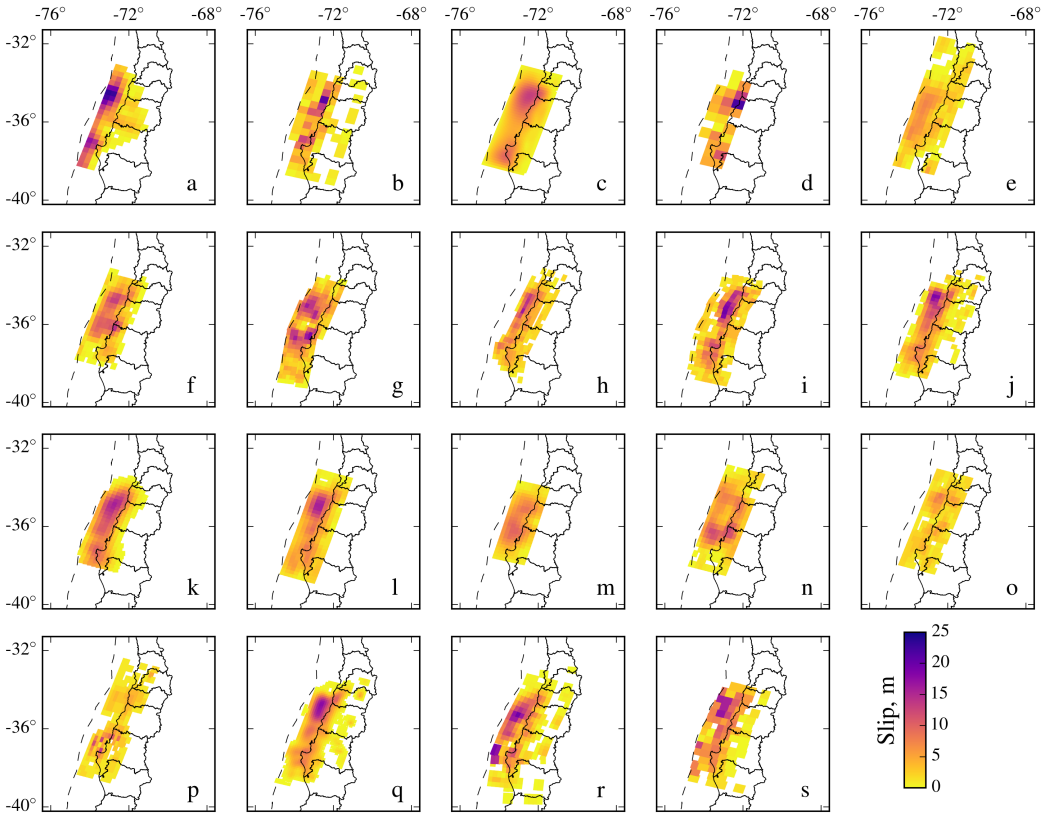


Fig. 1 - Slip distributions for each rupture model considered in the analysis.

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Nevertheless, the tsunami forecast obtained from aggregating all source models is in good agreement with observed quantities (Fig. 2), suggesting that the development of seismic source inversion techniques in a Bayesian framework or generating stochastic finite fault models from a reference inversion solution could be a viable way of dealing with epistemic uncertainties in the framework of nearly real time tsunami hazard mapping.

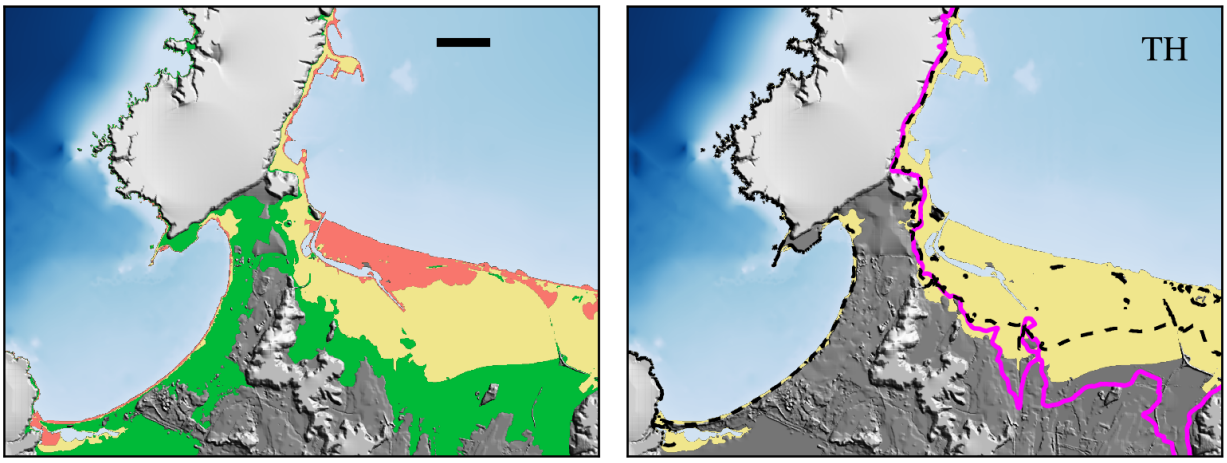


Fig. 2 - Inundation map for Talcahuano. Scale bar represents 1 km. (left) Orange, yellow, and green parts of the maps denote the areas that are inundated by the 97.5%, 50%, and 2.5% of the models, respectively. (right) The yellow part of the map represents the area inundated by 50% of the models, the magenta line indicates the maximum inundation runup estimated from post-tsunami surveys.

Our aim is to analyze to which extent inherent epistemic uncertainties associated to seismic source inversions affect tsunami hazard forecasts and their implications for future developments of operational Tsunami Early Warning Systems (TEWS). To this end, it is important to address whether Near-Real-Time Tsunami Hazard Assessment (NRTTHA) can provide meaningful estimates from the available knowledge and techniques.

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