Techniques being developed to improve tsunami forecasts though near-real-time tsunami source characterization in the U.S.

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Much of the uncertainly associated with tsunami height forecasts can be traced to our ability (or inability) to characterize the tsunami source itself. Many of these uncertainties can be addressed through a new generation of seismic and geodetic processing techniques, combined with advanced ocean sensing capabilities. The Centroid Moment Tensor (CMT) based on identification of an originating earthquakes "W-phase" can yield importation information about the earthquake source mechanism within 45 minutes of origin. Ocean bottom pressures can be measured over dense, multi-sensor grids linking stand-alone buoy systems with emerging capabilities like commercial fiber-optic cables. In addition, a growing array of coastal GNSS sensors may be able to infer the solid-earth data needed to more precisely define seismic tsunami sources in the short timescales required. When combined with continued advances in traditional seismology, and state-of-the-art modeling and computational resources, these capabilities will enable more timely and accurate tsunami detection and measurement. Because of these advances in detection and measurement, the opportunity exists to greatly reduce and/or quantify uncertainties associated with forecasting tsunamis. Providing more timely and accurate information related to tsunami location, arrival time, height, inundation, and duration would improve public trust and confidence and fundamentally alter tsunami emergency response both in the U.S. and around the world.

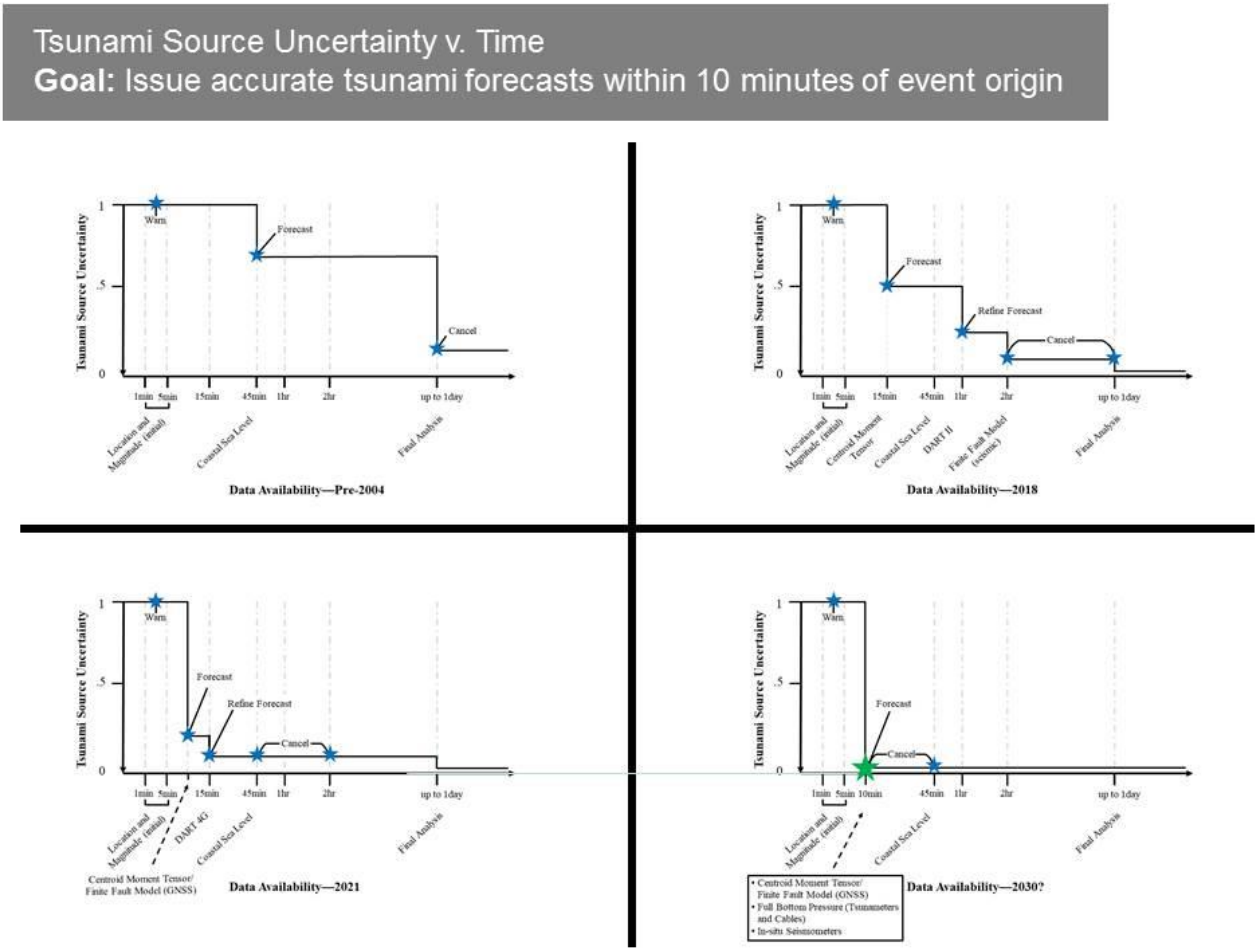

Figure 1. Generalized relationship between Tsunami Source Uncertainty any Time After Origin pre-2004 (to pleft), at present (top right), anticipated in 2021 (bottom left) and projected by 2030 (bottom right)