A Synthesis of Estimates of Co-seismic Slip Distribution for the 11 March 2011 Tohoku Earthquake and its Application to the Alaska Peninsula for a USGS Tsunami Scenario Exercise for California and Hawaii Shorelines

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The March 11, 2011 subduction earthquake and the tsunami waves that it spawned has prompted a re-evaluation of the tsunami potential for subduction zones elsewhere. Three well documented and related observations about this subduction earthquake source are relevant to this re-evaluation: 1) The source for this Mw 9.0 earthquake was extremely compact and hence the average slip was exceptionally high. 2) The region of highest slip was near the Japan Trench, making it a potent near-field tsunami source. 3) The geologic setting of the Tohoku earthquake source region resembles those of many other subduction zones, including the Alaska Peninsula in the state of Alaska in the U.S., and hence there is potential that such a tsunamigenic earthquake could occur outside of Japan. As a part of the USGS effort to improve preparedness over a range of natural hazards, the Survey's Multihazards Demonstration Project (MHDP) has with its local and state government and private-sector partners conducted earthquake, wildfire, and extreme storm exercises in southern California over the last five years. The MHDP has been reauthorized for the next 5 years and mandated to have a national scope. Its first scenario preparedness activity will be a Tsunami Scenario Exercise that is scheduled for the spring of 2014. The USGS Tsunami Source Working Group has developed a M9 subduction earthquake model that incorporates key features of the 11 March 2011 Tohoku earthquake source as synthesized from published and publicly-presented investigations of this source. The tsunami wave field has been modeled using this slip distribution and the tsunami runups and inundations form the basis for the scenario exercise. This presentation describes the scientific thinking that went into the synthesis of slip distribution for the March 11th event and the scientific reasoning for positioning this source along the Alaska marine margin between Kodiak Island and the Shumagin Islands.