

JTRACK: Tracking Tsunamigenic Slips Across and Along the Japan Trench

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Understanding the huge slip and associated devastating tsunami of the 2011 Tohoku-oki earthquake is a high priority challenge for IODP with important societal impacts. A primal objective of JTRACK is to define spatially-varying physical and chemical properties and conditions of the sediments and fluids of the near-trench megathrust that contribute to huge fault displacements and very large tsunamis. Following recommendations from the IODP Science Evaluation Panel and community input at the JTRACK Workshop (May 17-19, 2014, Tokyo), JTRACK focuses on the 2011 Tohoku-oki rupture zone by drilling two transects across the Japan Trench in regions of large and small coseismic slip. We will investigate the detailed geologic structures and rock properties of the fault zone, especially frictional and strength characteristics. Permeability and chemical studies will be used to infer the local hydrological structure and its effect on the earthquake rupture. Combining these observations and using comparisons of similar measurements for areas of high and low slip during the 2011 earthquake, we will try to infer key factors that control the amount of displacement during large earthquakes. In addition, time-dependent observations will be carried out to study fault healing after a large earthquake. These will focus on how the local hydrological and stress conditions change during the few years following the large fault displacement during the earthquake. Based on seismic images as well as associated geophysical data, the two 2-hole transects across the Japan Trench are selected in an area of large slip (>50 m) and smaller slip (1/3~1/2 of the large slip). Each transect has an 'inner trench slope' site mainly targeting the plate boundary fault zone, and an 'input' site seaward of the trench as a reference site.

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