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The Nicoya segment of Middle American Trench: an Excellent Target for Drilling and Monitoring the Shallow Portion of the Seismogenic Zone

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Abstract

The Nicoya segment of Middle America Trench has generated large earthquakes in 1883, 1900 and 1950. Since the Nicoya peninsula sits right over the seismogenic zone, it has proved to be a unique site for near field monitoring of interplate interactions. Crustal deformation data indicates that locking on this plate boundary starts 30 km from the trench where the plate interface is around 6 km below the ocean floor. These results make this subduction segment an attractive target for drilling the plate interface and seismogenic zone at several different depths (all within Chikyu drilling capabilities) in a margin where collected data suggests it is close to rupture. This temporal proximity to failure gives a chance to monitor several parameters (such as fluid flow, geochemistry, strain, temperature, tilt, among others) in holes at several distances from the trench prior. The Nicoya segment of the Middle American Trench was one of the target regions of both, the Seismogenic Zone Experiment (SEIZE) and the Subduction Factory (SUBFAC) initiatives of MARGINS. As part of those initiatives and even earlier, this region has been studied for many years with different techniques (high resolution marine seismics, refraction profiles, broad band land and ocean seismic stations, scan mapping, an ALVIN cruise, ODP legs, CGPS, electronic tiltmeters). Therefore, there is already sufficient information to start an IODP proposal.