Seismogenic Zone Processes at the Costa Rica Convergent Margin

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The Costa Rica Seismogenic Zone Experiment (CRSEIZE) was a large international effort conducted in 1999-2001 to collect GPS, fluid flow and seismic observations in Costa Rica in order to better understand the mechanical behavior of the seismogenic zone. The seismic component consisted of two OBS and PASSCAL deployments, one primarily recording aftershocks of the 1999, Mw 6.9 underthrusting earthquake in central Costa Rica and the other on and offshore the Nicoya Peninsula (Figure 1). Using arrival time data from our local seismic array and 3D absolute and relative earthquake location techniques, we precisely located seismicity defining the seismogenic zone geometry and up and down dip limits. For northern Costa Rica, well-located earthquakes beneath the Nicoya Peninsula reveal significant along-strike variation. Shallowing of the up dip limit of microseismicity from ~20 to ~15 km occurs where the origin of subducting oceanic crust changes from East Pacific Rise (EPR) to Cocos-Nazca Spreading Center (CNS). The geodetically locked region of the plate interface locates up dip of the onset of microseismicity, while the more freely slipping regions have abundant microseismicity (Figure 2). Research supported by NSF’s Margins and Geophysics programs; land instrumentation provided by IRIS PASSCAL.