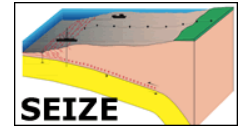


# Imaging 3D Seismic Velocity and Attenuation Structure Along the Seismogenic Zone of Costa Rica and Nicaragua



MARGINS-Related

H. DeShon<sup>1</sup>

<sup>1</sup>University of Memphis

The Costa Rica and Nicaragua segment of the Middle America subduction system exhibits significant variability in morphology, upper and lower plate composition, and seismicity along-strike; is a type location of subduction erosion; and is known to generate large and tsunami earthquakes. The setting offers a unique opportunity to correlate regional changes with seismicity patterns and seismic velocity and attenuation heterogeneity within the shallow seismogenic zone. Physical and material properties within the shallow subduction zone can be imaged through inversion of local earthquake arrival time data for compressional and shear velocities and attenuation in addition to high precision earthquake locations. Thousands of local earthquakes were recorded at onshore/offshore passive seismic networks along Nicaragua and Costa Rica from 1999-2006 as part of the German SFB 574 and NSF Margins SEIZE experiment CRSEIZE<sup>+</sup>, and this data is currently being integrated. We are pursuing a range of velocity and attenuation tomography studies to constrain along-strike changes in upper and lower plate hydration, subduction erosion and seismogenesis. The resulting earthquake locations provide high-resolution images of the seismogenic zone and of intraplate seismicity for correlation with pre-existing geological, hydrological, and geophysical datasets. Precision earthquake relocations and 3D velocity and attenuation structure are being compared with thermal and geodetic models to determine the interrelationship between the bulk structure, fluids, and locking along the megathrust.

<sup>+</sup>Collaborative Research: Imaging the Seismogenic Zone with Geodesy and Seismology: Two Land Ocean Transects Across Costa Rica and the Middle America Trench--Pls S.Y. Schwartz, L.M. Dorman, and T. Dixon.

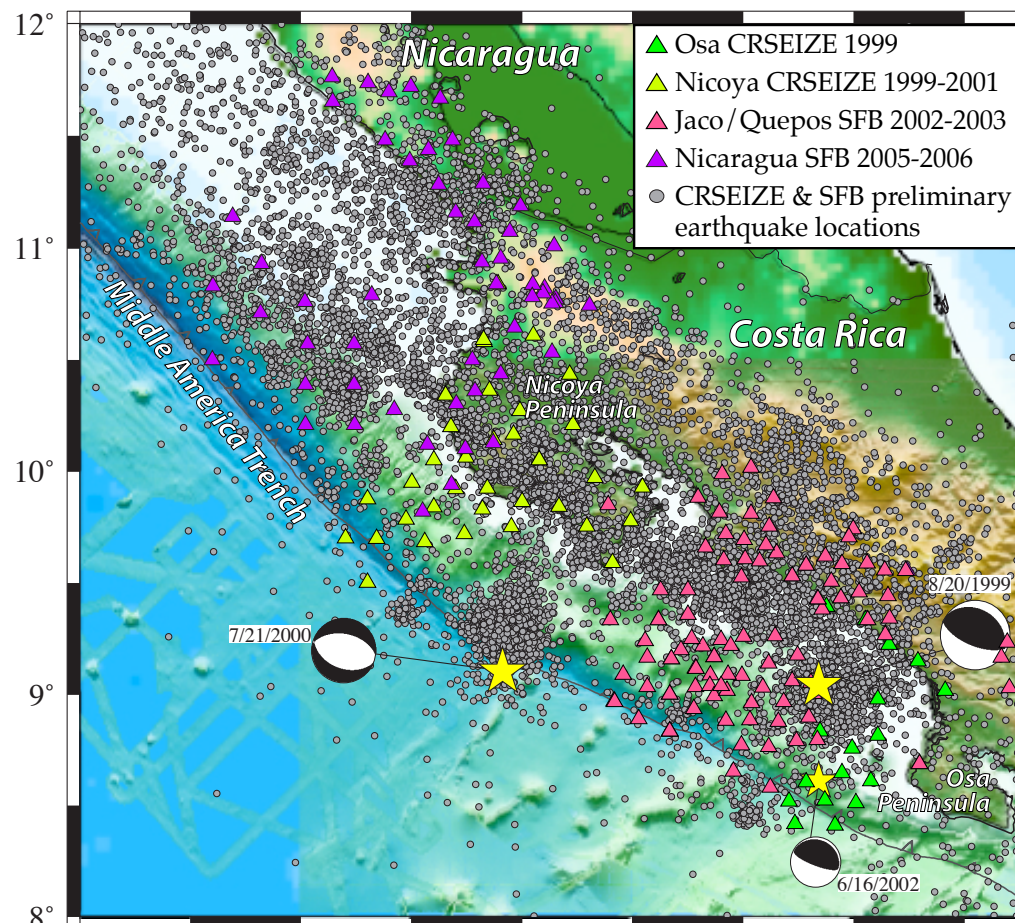


Figure: CRSEIZE Margins and SFB 574 passive seismic networks (triangles) recorded thousands of small and mid-magnitude local earthquakes (gray circles) for use with high-resolution velocity and attenuation studies. The networks recorded from 3 months to 2 years; dates indicate the recording year(s). Events occur within the seismogenic zone, as well as in the upper and lower plates. The data include aftershock sequences for the Mw 6.9 1999 Quepos earthquake, the Mw 6.4 2000 Nicoya near trench earthquake, and the 2002 Mw 6.4 Southern Costa Rica earthquake. Bathymetry is from Ranero and von Huene [2000]\*.

Norabuena, E.O., T. H. Dixon, S. Schwartz, H. DeShon, A. Newman, M. Protti, V. Gonzalez, L. Dorman, E. Flueh, P. Lundgren, F. Pollitz, D. Sampson, Geodetic and seismic constraints on some seismogenic zone processes in Costa Rica, *J. Geophys. Res.*, 109, B11403, doi 10.1029/2003JB002931, 2004

