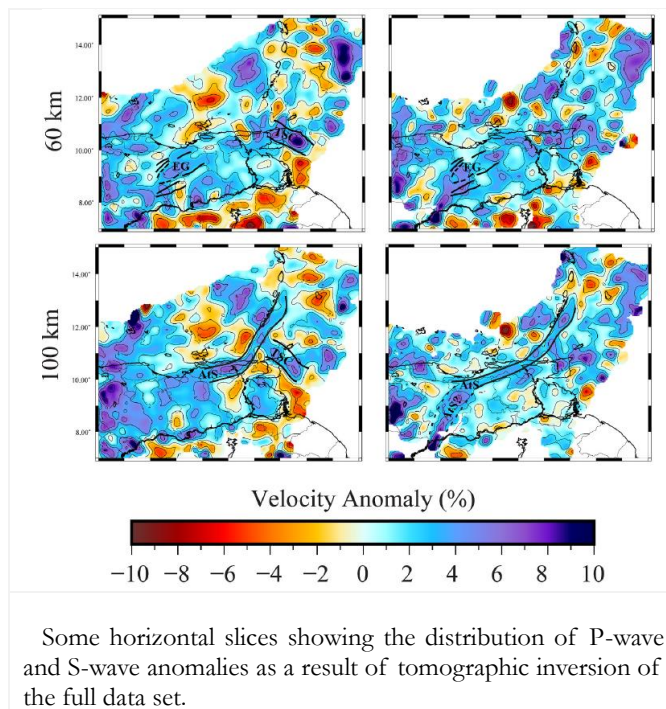


INSIGHTS ON NORTHEASTERN SOUTH AMERICA TECTONICS FROM LOCAL EVENT TOMOGRAPHY

Mariano S. ARNAIZ-RODRÍGUEZ¹, Noel CRASTO, Ana JARAMILLO, Ivan KOULAKOV,
Ana K. SÁNCHEZ-GAMBOA, Franck A. AUDEMARD, Carlos E. REINOZA & Michael SCHMITZ

Abstract

We present results from local earthquake tomography in northeastern Venezuela, where the Caribbean and South American plates meet. The region, dominated by strike-slip faulting, subduction and inhabited by the Paria Seismic Cluster, offers a unique setting for studying the mechanisms of lithospheric tearing, Subduction-Transform Edge Propagator structures and seismic cluster formation. To perform the tomography, we use a compilation of data, including: the ISC catalog, the database of the University of the West Indies, and the data collected by the temporary array of the BOLIVAR (Broadband Ocean-Land Investigation of Venezuela and the Antilles Arc Region) Project. The combined and revised dataset was composed of 286 stations, 4384 events, 70891 P-wave arrivals and 42532 S-wave arrivals. In our results, the Paria Seismic Cluster appears as a weak region (P-wave low velocity zone) where the lithosphere beneath the active strike-slip system and the subduction slab meet. Hence, the lithosphere tears in response to the dominant shear stress aided by the slab. Furthermore, the cluster appears to be a superposition of the seismicity derived from this process and that of the subducted slab. Crustal-scale high velocities in the Paria Peninsula, associated with the intrusive bodies documented in the area are indicative of subduction-related volcanism active beneath the continent from the Late Miocene to Early Pliocene. Furthermore, we image a high-velocity and seismically active zone beneath Trinidad, which is interpreted as a piece of the Atlantic slab that was torn before subducting underneath the South American lithosphere. Finally, we identify several magmatic chambers beneath the southern Lesser Antilles Arc, as well as an LVZ that we interpret as an upwelling that feeds the volcanism.



Forma de citar: Arnaiz-Rodríguez, M. S., Crasto, N., Jaramillo, A., Koulakov, I., Sánchez-Gamboa, A. K., Audemard M., F. A., Reinoza, C. E. & Schmitz, M., 2026. Insights on Northeastern South America Tectonics from Local Event Tomography. *Journal of South American Earth Sciences*. <https://doi.org/10.1016/j.jsames.2025.105936>

¹ Correo-e.: marianoarnaiz@gmail.com