Variability in slab behavior within the South America subduction zone: New observations from continent-scale teleseismic P-wave tomography

Daniel Evan Portner, Susan Beck, George Zandt, Emily Rodriguez, Alissa Scire, Marcelo Rocha, and Marcelo Assumpção

Despite a relatively simple Cenozoic convergence history, the Nazca-South America subduction zone exhibits a surprising degree of internal variability from the surface into the lower mantle that complicates our basic understanding of subduction processes. Much of this variability is attributed to complexity in the slab itself. With this study, we use finite-frequency teleseismic P-wave tomography to image the seismic velocity structure of the Nazca slab and the surrounding mantle. We combine data from more than 1,000 seismic stations across South America from a variety of temporary and permanent seismic networks into a single tomographic inversion. This vastly expanded dataset allows us to produce high resolution images of the Nazca slab from ~100 km depth into the lower mantle across the majority of the convergent margin. Preliminary results reveal the detailed structure of the Nazca slab, including dip in the shallow mantle ranging from 0-30°, at least one significant gap in the slab, significant variability in the slab's seismic velocity, and flattening of the northern Nazca slab at ~1000 km depth.