Mantle heterogeneity across the Andean subduction zone from preliminary teleseismic S-wave tomography

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We present a finite-frequency teleseismic S-wave tomography model of the Andean subduction zone. The model incorporates data from more than 850 temporary and permanent seismic stations deployed across South America. We image the subducting Nazca slab and surrounding mantle. Preliminary results show a continuous Nazca slab from the top of our model, at ~100-150 km depth, into the lower mantle from 5 to 45°S. The structure of the slab is consistent with previous seismic imaging studies, including the existence of a tear beneath the Sierras Pampeanas region in Argentina at depths of ~250-400 km depth. The Nazca slab penetrates into the lower mantle in most regions where we have good resolution. The mantle surrounding the slab appears heterogeneous in both magnitude and polarity of velocity perturbations. In the region of the Bolivian orocline, a slow velocity anomaly (as low as -9%) is imaged above the Nazca slab extending from the top of the mantle transition zone to the top of our model. Directly beneath the slab, mantle velocities are observed to be slow, with an anomaly which parallels the slab across its entire resolvable length. In the region of the Pampean flat slab, this anomaly is segmented by a fast sub-slab anomaly which appears continuous into the lower mantle. Using an expanded data set of direct and core S phases we have produced a higher resolution S-wave tomography model of the Nazca slab and surrounding mantle than previous studies.