

CHARGE: The Chile Argentina Geophysical Experiment

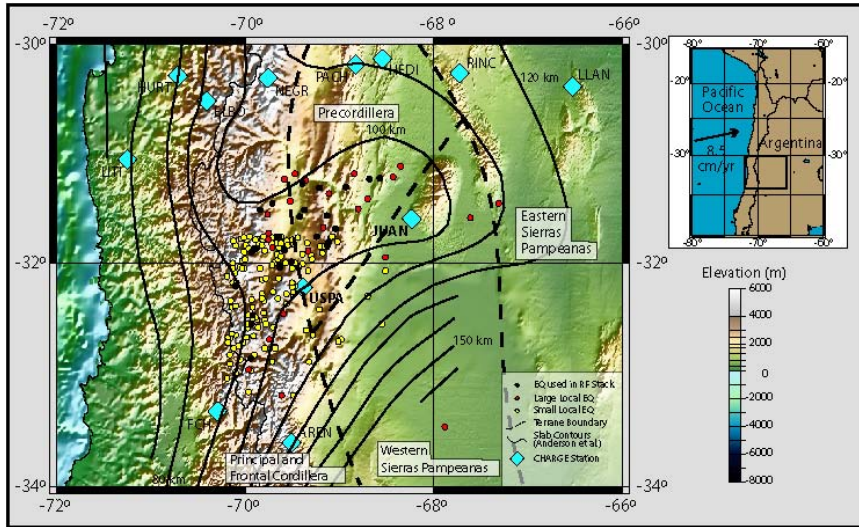


Figure 1: Map showing location of CHARGE stations, earthquakes, and slab contours (after Anderson et al., 2006, *Geophys. J. Int.*)

The project was designed to constrain the geometry of the shallowly subducting portion of the slab and investigate its influence on the overriding plate, determine the structure and composition of the crust beneath the Sierras Pampeanas, where deformation extends up to 800 km inboard from the trench, and shed light on the nature of the mantle above the flat slab.

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Along the western margin of South America, the subducting Nazca plate undergoes a dramatic change in geometry, going from a normally subducting slab with a relatively constant dip of about 30° to a flat slab in which the plate descends to 100 km depth and then flattens, traveling horizontally for several hundred kilometers before resuming its descent into the mantle. In central Chile and Argentina, this flattening is associated with the basement cored uplifts of the Sierras Pampeanas, which have been considered modern analogues to the Laramide deformation in the western U.S.

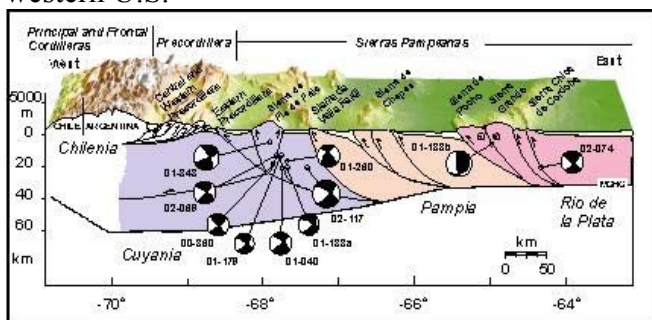


Figure 2: Crustal earthquakes in the Sierras Pampeanas occur primarily on reverse faults. (Alvarado et al., 2005, *Geophys. J. Int.*)

The Chile Argentina Geophysical Experiment (CHARGE) consisted of 22 broadband portable seismometers deployed for 18 months beginning in late 2000. Stations were deployed primarily in two E-W transects, one at 30°S and one at 36°S .

Findings:

- New slab contours resulting from earthquake relocation (Anderson et al., 2006, *Geophys. J. Int.*) show the zone of flattening is narrower than previously thought and correlates with the inferred location of the Juan Fernandez Ridge (Fig. 1).
- The general eastward thinning of the crust in the Sierras Pampeanas corresponds with variations in composition and density related to pre-Andean terrane boundaries (Fig. 2) (Alvarado et al., 2005, and Gilbert et al., 2006, *Geophys. J. Int.*).
- The high V_s , low V_p/V_s anomaly imaged by body wave tomography indicates the mantle wedge above the flat slab is cold, dry, and depleted (Fig. 3) (Wagner et al., 2006, *EPSL*).

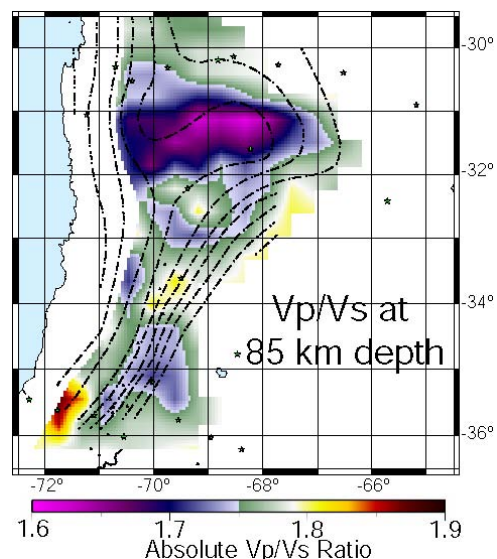


Figure 3: P and S wave tomography results reveal a region with an abnormally low V_p/V_s ratio in the mantle above the flat slab.