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Shear-wave velocity anomalies in Southern Andes within latitudes 35°S and 37°S: model and interpretations from seismic ambient noise

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The volcanic arc of the Southern Andes is linked to the oblique convergence of Nazca plate beneath the South American plate (subduction velocity of $\sim$ 66 mm/yr). The volcanic arc accounts for about sixty active volcanoes of Pleistocene-to-Holocene ages.

Here we present a regional-scale (i.e. 35°S and 37.5°S) Rayleigh surface-wave tomography from seismic ambient noise that highligths the three-dimensional shear-wave velocity structure at crustal depths. This study is, to the best of our knowledge, the first attempt of a regional-scale Ambient Noise Tomography of a volcanic arc. We find that velocity anomalies are in agreement with the geological setting and the spatial distribution of the present-day volcanoes. The crystalline Cenozoic basement, represented by the outcrop of Mio-Pliocene plutons shows high-velocity anomalies greater than 3%. On the other hand, Descabezado Grande, Puelche and Laguna del Maule volcanic fields show low-velocity anomalies ranging within $3 - 6\%$ located at $5 - 10$ km depth. Nevados de Longaví, Chillán and Antuco volcanoes also show strong low-velocity anomalies. We interpret that mid-crustal low-velocity anomalies are associated with a mechanically weakeaned regions, due to a high porous crust or, the presence of fluids and thermal anomalies.