



Seismic Imaging of the Subduction Zone in Southern Central Chile

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With a quarter of the worldwide seismic energy in the last century having been released in the Chilean region alone, the Andean subduction zone is a natural laboratory for seismogenic studies. The overarching purpose of project TIPTEQ (from The Incoming Plate to mega-Thrust Earthquake processes), which comprises 13 sub-projects, is to investigate processes active at all scales in the seismogenic coupling zone which hosted the rupture plane of the 1960 Valdivia earthquake ($M_w = 9.5$) in south central Chile. The controlled-source seismology survey described here aims at imaging and identifying the structural and petrophysical properties within the seismogenic coupling zone at 38.2° S.

The application of Kirchhoff prestack depth migration as well as two advanced imaging techniques (Fresnel Volume Migration, Reflection Image Spectroscopy) reveal the subducted Nazca plate with varying reflectivity. Below the coast the plate interface occurs at 25 km depth as the sharp lower boundary of a 2-5 km thick, highly reflective region, which we interpret as a subduction channel. The plate interface can be traced down to depths of 50-60 km below the Central Valley. We observe strong reflectivity at the plate interface and in the continental mantle wedge further down-dip than the seismogenic coupling zone. The sections show a segmented forearc crust in the overriding South American plate. Major features in the accretionary wedge, such as the Lanalhue fault zone, can be identified. At the eastern end of the profile a bright west-dipping reflector lies perpendicular to the plate interface and may be linked to the volcanic arc.