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Thickness of the subducting Nazca lithosphere in northern Chile as seen by S receiver functions

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Installation of observatories in northern Chile started in 2006 in a close cooperation of the Universidad de Chile (Santiago), the Universidad Catolica del Norte (Antofagasta), the IPGP (Paris), and the GFZ Potsdam. Currently we operate 15 modern seismological stations equipped with STS-2 broadband seismometers. One GEOFON station operated since 2001 completes our dataset in northern Chile. We combined here two methods (P and S receiver function) to have the best vertical as well as horizontal coverage of the area and map the geometry of the subducting Nazca plate. Our high resolution results image the penetration of the Moho of the subducting Nazca plate at depths ranging from 35 km beneath the Coastal Cordillera to an average depth of 80 km beneath the Longitudinal Valley and about 100 km beneath the Precordillera. We found a significant variation in the dip of the subducting Nazca plate obtained from stations located in the northern part (over latitude of 21 deg. South) compared to those located below this latitude. The shape of the Nazca plate shows a shallow dip beneath the southern part and becomes steeper and deeper beneath the northern part of the area, which is coherent with the intermediate seismicity. On the basis of our P and S receiver functions, the lithosphere-asthenosphere boundary of the subducting Nazca plate is at 80 km depth beneath the Coastal Cordillera and dips to a depth of about 120 km beneath the Longitudinal Valley. It becomes 150 km underneath the Precordillera.