



High-Resolution Seismicity Image of the Shallow Part of the Subduction Zone Beneath Mejillones in Northern Chile

Jörn Kummerow (1), Wasja Bloch (1), Pablo Salazar (2), Peter Wigger (1), Günter Asch (3), and Serge A. Shapiro (1)

(1) Freie Universität Berlin, Berlin, Germany (joern@geophysik.fu-berlin.de), (2) Universidad Catolica del Norte, Antofagasta, Chile, (3) Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum

We analyze slab-related seismicity which has been recorded by a recently (June 2013) installed local seismic monitoring system on the Mejillones peninsula in the forearc region of Northern Chile. The monitoring system consists of 20 seismic stations and is complemented by components of the permanent IPOC (Integrated Plate Boundary Observatory Chile) seismic network, providing a singular on-shore possibility to study in detail the relatively shallow seismicity of the subducting Nazca slab.

To date, about thousand local seismic events have been identified. Precise earthquake relocation involving a local 2.5D velocity model and improved arrival time picks from an iterative cross-correlation based technique allows to trace sharply the slab interface between 25 km and 40 km depth. Furthermore, we observe distinct and continuous seismic activity on a near-vertical structure which transects the subducting oceanic crust from 40 km to 50 km depth. Location, orientation and size of this plane correspond to the rupture fault of the M_W 6.8 Michilla intraslab earthquake which occurred weeks after the M_W 7.7 Tocopilla earthquake of November 2007. We discuss here particularly the results from cluster analysis and the spatio-temporal signatures of the recorded seismicity.