Geophysical Research Abstracts
Vol. 15, EGU2013-5565, 2013
EGU General Assembly 2013

High-resolution image of seismicity at the fore-arc of the northern Chilean Iquique segment

Nikolai Wasja Bloch, Jörn Kummerow, and Peter Wigger
Freie Universität Berlin, Geowissenschaften, Geophysik, Berlin, Germany

We present a dataset of seismicity from a temporary local network that was installed in the Iquique segment of the northern Chilean subduction zone. The segment has experienced its last activation 135 years ago and is hence expected to be in the late interseismic phase of the earthquake cycle. The dataset exhibits great details and fine structures of the fore-arc subduction system in general and the plate-interface in detail.

We performed a state-of-the-art relocation procedure that features a waveform-based correction of arrival-time pick uncertainties, the incorporation of an independently obtained velocity model, and the application of source-specific station terms to reduce effects of inconsistencies in the latter. This yielded locations of nearly 5,500 events with a mean RMS-misfits as low as 30ms.

We find a high downdip-variability in seismic activity along the plate interface. This includes well-defined, platy shaped patches of enhanced seismicity at depths around 35 and 45km, respectively, and a sudden downdip end of seismicity near the tip of the continental mantle wedge. Seismicity at the plate interface correlates tightly with the previously obtained reflectivity image of the down-going slab from the ANCORP'96 experiment.

More details are revealed in the direction perpendicular to the slab. Whilst seismicity is highest within a few kilometer thick layer directly at the plate contact, an overlying region of reduced seismicity separates this from the also abundant seismicity within the deforming continental crust of the overriding plate. Apart from seismicity at the plate interface, we also find a second band deeper inside the slab near the oceanic Moho and a well defined third band approximately 15km below the oceanic Moho inside the oceanic lithospheric mantle that streches from a depth of only 40km offshore to 90km near 69.0°W.