

The Impact of the descending, rough surface Nazca plate on the hazard potential of the Peruvian convergent margin

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We use new swath bathymetry data acquired during the RV Sonne cruise GEOPECO and complement them with swath data from adjacent regions to analyse the morphotectonics and hazard potential of the Peruvian convergent margin. The Nazca plate is not covered with sediments and therefore has a rough surface along the entire Peruvian trench. The styles of roughness differ significantly along the margin with linear morphological features trending in various directions, most of them oblique to the trench and roughness magnitudes of a few to several hundred meters. The fore-arc undergoes crustal loss through subduction erosion which causes a transtensional stress regime in the outer fore-arc. The Peruvian margin experiences $M_w > 8$ seismic events with recurrence intervals of about hundred years in each region. An exceptional number of the large earthquakes have been identified as tsunami earthquakes. However, seismicity is not uniformly distributed along the margin but several segments can be identified which correlate with lower plate morphological styles. The anomalous roughness of the Nazca plate and e.g. the ripple-morphology of the MFZ may explain the frequency of tsunami earthquakes at the Peruvian margin. Therefore, combining geomorphological and geophysical analyses have a high potential to better assess convergent margin hazard.