



The state of stress along the Reykjanes Peninsula oblique plate boundary, southwest Iceland

M. Keiding (1), B. Lund (2), T. Árnadóttir (1)

(1) Nordic Volcanological Centre, Institute of Earth Sciences, University of Iceland, (2) Department of Earth Sciences, Uppsala University, Sweden

We use focal mechanisms from the SIL seismic network, from 1997-2006, to estimate the state of stress along the oblique Reykjanes Peninsula plate boundary. We observe a systematic variation from normal faulting in the western part of the peninsula to strike-slip faulting in the eastern part, reflecting the gradual transition from the mid-oceanic Reykjanes Ridge in the West to the transform South Iceland Seismic zone in the East. We also observe a rotation of the maximum compressive horizontal stress from SSW–NNE in the West to SW–NE in the East.

Earthquakes occur along the entire plate boundary, but the highest seismicity rates are observed within two areas, Fagradalfjall and Krísuvík, in the central part of the peninsula. The seismicity in the Fagradalsfjall area is characterised by pronounced swarm activity superimposed on a slightly elevated background rate. The Krísuvík area is characterised by a high and variable background rate, with superimposed mainshock-aftershock sequences. The state of stress, as inferred from the earthquakes, is mainly strike-slip with some normal faulting influence in both areas.

The Krísuvík area is an active geothermal area, with hot springs emerging at the surface in several places. The elevated background seismicity in the Krísuvík area may thus be related to geothermal activity, whereas no geothermal activity is apparent in the Fagradalsfjall area. There is a large component of normal faulting in the Krísuvík focal mechanisms, indicating that extension is accommodated seismically in the area. The driving mechanisms for the seismicity in the Fagradalsfjall area are as enigmatic as the Krísuvík seismicity, but less studied.