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Pliocene-Holocene Tectonics of an oceanic transform fault zone revealed by brittle tectonic analysis in the South Iceland Seismic Zone

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The largest earthquakes in Iceland are associated with strike-slip faulting in the South Iceland seismic Zone (SISZ), a 20-60 kmwide and 70 km long zone located between two branches of the icelandic rift: the West Volcanic Zone and Reykjanes peninsula to the West and the East Volcanic Zone to the East. A large number of data, geological and seismological has been acquired in the SISZ, during the two last decades, providing a firm basis for a deeper understanding of the sismo-tectonic deformation.

A brittle tectonic analysis has been carried out in this area and particular attention bas been paid to the comparison between present-day fault activity and recent faulting. The stress regimes that prevailed in the SISZ area during the last 2-3 millions years are reconstructed based on systematic inversion of fault slip data, collected in the field, in order to be compared with the stress regimes obtained from focal mechanisms of earthquakes.

Our study of fault traces is focussed on selected areas where the brittle mechanisms can be reconstructed from both the geological and seismological observations, between Hengill to the West to the Hvolsvöllur area to the East. The results indicate that there are three main regimes, with NW-SE, NE-SW and about N-S extension directions, respectively. All these regimes display inhomogeneous data sets, related to extensional and to strike-slip faulting. The dominating stress regime (NW-SE extension) is in agreement with both the general behaviour of the SISZ as a left-lateral transform zone and the opening of the rift segments. The two other regimes reflect stress permutation, dyke injection and maybe partly decoupling.

The results of the focal mechanisms of earthquakes show a similarity in terms of stress directions. However the proportion of strike-slip faulting *versus* normal faulting is different for geological and sismological data, revealing an evolution from rifting to transform motion since the end of Pliocene.