Geophysical Research Abstracts
Vol. 21, EGU2019-6115, 2019
EGU General Assembly 2019

Ölfus seismicity in Iceland - I: relative seismic relocations and spatio-temporal evolutions

Bergthóra S. Thorbjarnardóttir, Revathy M. Parameswaran, and Ingi Th. Bjarnason
Inst. of Earth Sciences, University of Iceland, Reykjavik, Iceland (revathy@hi.is)

The South Iceland Seismic Zone (SISZ) is one of two transfer zones within the aerial part of the Mid-Atlantic Ridge (MAR) in Iceland. The SISZ exhibits transform faulting that bridges the eastward offset of the divergent plate boundary from the main trend of the MAR in this region. This eastward 'jump' is caused by the interaction of the MAR with the Iceland hotspot, thereby forming the Western Volcanic Zone (WVZ) and Eastern Volcanic Zone (EVZ) on either side of the SISZ. The zone is proximal to a hypothesized triple junction near the Hengill volcanic system, that constitutes the southern part of the WVZ. The Hengill central volcano eruption history spans hundreds kA, although it hosts a continuing array of earthquake swarms throughout recorded times. Earthquake swarms in the Hengill area have shown an interactive pattern with the Ölfus region, the westernmost part of the SISZ to the south of the Hengill volcanic system. The seismicity in Ölfus displays an ∼E-W trend coherent with the trend of the SISZ. However, seismic data suggests the existence of smaller N-S striking faults that stitch across the main E-W trending transform. The conversation between Hengill and Ölfus was further exemplified following the M5 earthquake in Hengill in June 1998, that generated a ∼15-km-long N-S trending seismic pattern extending to the E-W Ölfus belt. This volcano-lowland setting is ideal for the study of tectonic and geodynamic interaction of an active volcano with its neighbouring regions. This is facilitated by a wealth of seismic data recorded by the South Iceland Lowlands (SIL) network, managed and operated by the Icelandic Meteorological Office (IMO). The first leg of this study uses SIL data from 1991-1999 to constrain earthquake locations within the Ölfus belt. The study applies the double-difference relative location method formulated by Waldhauser and Ellsworth (2000). The relocated earthquakes are employed to identify temporal and spatial trends that mirror or follow the seismic activity in the Hengill region and to understand a transform zone in a nascent state of development. The data is further used for stress inversion studies in the second part of this work. Future work involves the use of these relocated earthquakes in 4D seismic tomography of SISZ.