EGU21-9052
https://doi.org/10.5194/egusphere-egu21-9052
EGU General Assembly 2021

Mapping and dynamic analysis of faults in the Hengill volcanic area, SW-Iceland

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From 1993 to 1998, the Hengill volcanic area in SW-Iceland was subjected to a volcano-tectonic event which caused a local uplift of the crust of 8 cm and triggered over 90.000 earthquakes. Relocating a sub-set of 12.000 earthquakes in the direct vicinity of the uplift centre improved resolution and enabled the mapping of 25, mostly NNE-SSW and ENE-WSW oriented sub-vertical groups of earthquake which are interpreted as faults. Focal mechanisms were calculated, using the best fitting plane through a group of earthquakes as additional constraint. Slip on the interpreted faults could be estimated averaging slip of all earthquakes within that group. Most faults show strike-slip movement with a small normal component. Right-lateral slip prevails. We modelled Coulomb stress changes that the uplift would have caused and compared them to out results. The Coulomb stress changes can only explain the observed movement on some of the faults but on others fault movements is impeded, that is, the Coulomb stress change is negative. Varying the location of the uplift within its error margin increases the number of faults on which the observed movement is promoted but the slip on a number of faults remains unexplained.