

ICDP DSeis: Mineralogical, chemical, and frictional characteristics of fault-related rocks recovered from the Moab Khotsong gold mines in South Africa

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Drilling into the rupture zone of M5.5 Orkney earthquake was conducted at the Moab Khotsong gold mine at 2.9 km depth, and core samples, including fault-related rocks, were successfully collected. The samples are divided into the Roodepoort formation, the Crown formation and the Babroscio formation, and the fault zone developed in igneous intrusion within the Crown lava. By performing mineralogical and chemical analyses and microscopic observation, the main fault is mainly composed of talc, biotite, amphibole (tremolite), and calcite, whereas the host rocks contains quartz, feldspar, and chlorite. Shear foliation is microscopically observed in the fault. The frictional coefficient of the fault is 0.54 whereas those of surrounding host rocks are 0.68 –0.75.

The intrusion and main fault are intensively altered, but the original rock type of the intrusion is estimated to be Lamprophyre on the basis of the mineral and chemical compositions, thus indicating that seismic deformation is concentrated in the lamprophyre with high amount of talc and low frictional coefficient.

Keywords: Deep drilling of fault