南アフリカ金鉱山の地震観測網による2014年オークニー地震の余震分布と発震機構解
Aftershock distribution and focal mechanisms of 2014 M_w5.4 Orkney earthquake, South Africa, by using underground seismic networks in gold mines

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The M_w5.4 Orkney earthquake occurred on August 5, 2014, near Orkney town, South Africa. The mainshock and aftershocks were recorded by underground networks in gold mines, which are composed of 46 three-component geophones installed at 2-3 km depths. The sampling rate is 6 kHz. The observed waveforms have high signal-to-noise ratios and contain higher frequency components up to at least 1 kHz, which provide the opportunity for precise determination of aftershock distribution and source parameters. We determined hypocenters of 2000+ aftershocks by automatic earthquake location software from Home Seismometer Corp. (Horiuchi et al., 2011). Aftershocks distributed at depths from about 4 to 7 km forming a 8 km-long in the NNW-SSE direction. The distribution agrees with one of nodal planes of the mainshock focal mechanism, suggesting that the mainshock represents a left lateral strike-slip fault. Aftershock focal mechanisms were determined from P-wave polarity data as well as body wave amplitudes. As a preliminary analysis, we analyzed aftershocks with at least 15 P-wave polarities and obtained 137 well-determined solutions. Most of aftershocks show a pure strike-slip mechanism that is similar to the mainshock. We also found some aftershocks whose P- and T- axis deviates from the general trend and contain normal or reverse faulting components. These events seem to distribute at the middle and the north of the aftershock distribution, suggesting the existence of local stress heterogeneity. Further analysis of aftershocks is needed to elucidate whether the heterogeneity was caused by stress changes due to the mainshock and/or associated with locally formed pre-mainshock stress regime.
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