



In-situ stress around earthquake source faults in and beneath South African deep gold mines

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As a part of ICDP-DSeis project, we determined in-situ stress states around the source faults of three earthquakes: a Mw2.2 earthquake at ~ 3.3 km depth in Mponeng mine, a M3.5 earthquake at ~ 3.5 km depth in Savuka mine, and the Orkney earthquake (Mw5.5), with its hypocenter ~ 5 km beneath Moab Khotsong mine. Criteria of core diking and borehole breakout were evaluated to constrain stresses in Mponeng mine. The Diametrical Core Deformation (DCDA) and the Deformation Rate Analysis (DRA) were applied to determine the differential and the normal stresses, respectively, from core samples recovered at Mponeng and Moab Khotsong mines. The Compact Conical-ended Borehole Overcoring (CCBO) was carried out in Savuka mine. By integrating these data, we extracted characteristics of the stress state in the earthquake source region.