

ICDP DSeis 7: compilation of stress information and comparison with calculated stresses in the M5.5 aftershock zones

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ICDP drilling into the aftershock zone of the 2014 M5.5 earthquake near Orkney, South Africa commenced on 2017 and was completed in 2018. Spatial variation in stress was measured by Ishida et al. (2018) and Sugimura et al. (2019; ICDP DSeis 5) by DCDA method (Funato and Ito, 2017) and Kanematsu et al. (2019; ICDP DSeis 6). This poster reports on compilation of stress information including the other information sources and compares with calculated stress.

We first compared with a 3D stress state that Ogasawara et al. (2012) measured in 2011 at 98L (3.0 km depth from surface). We assume zero stress on surface, the measured 3D stress (normal faulting stress regime) at 3.0 km, and stress linearly increasing with depth. The calculated stress was consistent with DCDA results measured in the initial 100m section in Hole A, while inconsistent in deeper section. The calculated direction of maximum stress in a plane perpendicular to the borehole axis was also inconsistent with the measured stress information (Yoshida et al. 2019 JpGU; ICDP DSeis 5). Except for the stress concentration measured at intrusives, the measured DCDA results were systematically lower than the calculated stress. In a stress regime that caused the left-lateral horizontal slip on the M5.5 fault, horizontal stress should be larger, which will increase horizontal stress component in a plane perpendicular to the Hole A axis. This increase should decrease difference in stress in the plane perpendicular to the Hole A axis. By JpGU 2019, we will make additional effort to interpret more from the comparison between the measured and calculated stress.

This is one of nine papers (ICDP DSeis 1-9). Refer other papers for other topic on drilling, logging, other stress measurement, fault materials, legacy 3D seismic reflection data, and relocated aftershocks.

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