

DSeis Report 5: Compilation of 452 measurements of DCDA core stress around the upper fringe of the aftershock zone of the M5.5 Orkney M5.5 earthquake

*Yoshihiro Mima¹, Hiroshi Ogasawara¹, Yasuo Yabe², Akio Funato³, Takatoshi Ito²

1. Ritsumeikan University, 2. Tohoku University, 3. Fukada Geological Institute

With additional measurements in 2021, we could compile all available DCDA core stress measurements to have detailed stress spatial variation around the upper fringe of the aftershock zone of the 2014 M5.5 Orkney earthquake, South Africa. This aftershock zone was elucidated by DSeis report 4 in this session (S-SS007).

The core we measured was recovered by the project "Drilling into Seismogenic zone of M2.0-5.5 earthquakes in South African gold mines (DSeis; Ogasawara et al. Afrirock 2017)". International Continental Scientific Drilling Program (ICDP) approved this project in 2016, accomplishing drilling and downhole logging in 2018 (Ogasawara et al. Deep Mining 2019; ICDP Thrill to Drill). The drilling intersected Archean metasedimentary rock formations as well as mafic sills. When we intersected the aftershock zone of the M5.5 earthquake, the altered ultramafic dyke material was recovered, followed by the core loss one. Our core also included the other dyke with the similar trend but didn't host any aftershocks and hosted the hypersaline brine (the Onstott dyke). We measure stress with the core of a total of 1.6 km length.

Before the compilation, we could salvage some abandoned data by processing data with some lack. We could reduce RSM of the residuals by coping with outliers. It is getting clearer that the stress localized at the Onstott dyke intersection and the upper fringe of the after shock zone (Figure).

The outcomes of the FY2021 are found in other reports in M-GI32 and B-GM02.

The DSeis team consists of seismologists, geologists, geomicrobiologists, rock mechanists, mining engineers from Japan, South Africa USA, Switzerland, Germany, India, and Australia. The DSeis project is build on JST-JICA SATREPS project and Kakenhi (21224012) and is supported by ICDP, JSPS Core-to-Core Program, Ritsumeikan University, MEXT 2nd Earthquake and Volcano Hazard Reduction Research, and Kochi Core Center.

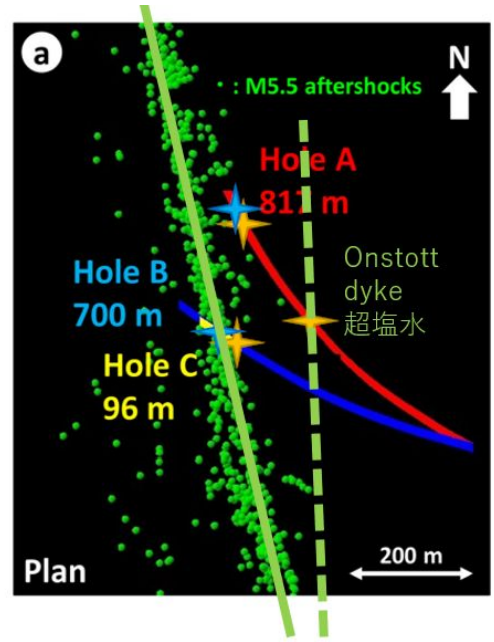
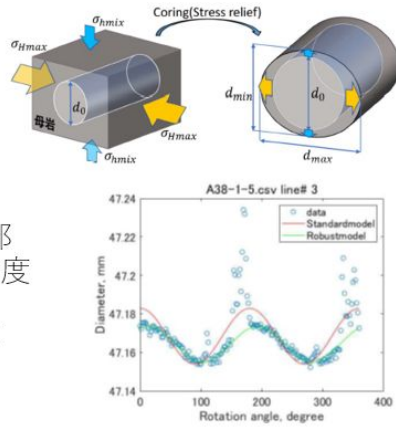
Keywords: Seismogenic zones, DCDA stress measurements, The 2014 Orkney M5.5 earthquake

測定ギャップ埋める追加測定(2021@KCC)
 欠測値が少ない測定値の救済
 外れ値の適切な処理
 弾性空間変化により適切に対応



より良質な結果
 予備解析と同様な結果
 面白い応力変化：

- Hole A
 Onstott dyke交差部
 余震発生带上縁深度
- Hole B
 余震発生帯交差部



断層レオロジーの議論に資する地震発生場稠密実測応力