Depth variation of paleostress and fluid pressure using healed microcrack in the granite wellbore at Gifu prefecture, Central Japan.

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Several paleostress analysis techniques have been used to reconstruct the paleostress tensor (the principal stress axes) from geological data. Recently, a newly developed analytical method can estimate three principal stress axes for dilatant fractures, such as dikes or microcracks.

The healed microcrack (HC) is a fluid inclusion plane where the microcrack's plane was healed by the same mineral as the host mineral. It is preferably formed perpendicular to the minimum principal stress axis. The HC in the granite core samples is used for the paleostress analysis. We analyze HC from twenty oriented pieces from 200 to 1000-meter depth of the core No. DH-15 drilled by JAEA (the same sample described in Takagi et al., 2008). Three orthogonal thin sections prepared for each granite sample. We use the analytical method (mixed Bingham method) from Yamaji and Sato (2011). Three principal stress axes and stress ration can be estimated using this method. We also use the Driving Pressure Index (DPI), introduced by Faye et al. (2018) based on a mixed Bingham method, to estimate fluid pressure on HC formation. Using DPI, we could overcome the uncertainty of the fluid pressure value from HC formation regardless of their orientation.

The distribution of HC from twenty samples present one to three concentrations. The HC tends to form on N-S trending of the maximum principal axis orientation based on the mixed Bingham method. We will discuss the variation in the stress ratio and the DPI depending on the depth of the core samples.

Keywords: depth variability, paleo-stress and fluid pressure, healed microcrack

