

Applications of DCDA method for in-situ crustal stress measurement - Rock core samples from NIED seismic observation wells -

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In-situ crustal stress is an important factor to understand earthquake mechanism and tectonic activities. However, the reliable in-situ stress data seems to be poor related with seismic or strain observation data. We tried to apply the DCDA (Diametrical Core Deformation Analysis) method for in-situ crustal stress measurement using boring rock core samples. DCDA method measures the circumferential diameter variation and elastic constants of core sample without complicate procedures in the borehole. We expect the method can be applied to old-time boring rock cores from seismic observation wells, and we may collect global in-situ crustal stress data in Japan island.

We used recovered hard rock cores from 7 Hi-net observation wells of NIED (more than 10 years ago) from the depth about 100m - 200m (one is from the depth of 2000m). The circumferential core diameter variation was measured by an especially designed apparatus that consists of an optical micrometer, a pair of motor-driven rollers and a data processing system (Funato and Ito, 2017, IJRMMS). We got the sine curves of circumferential diameter variation associated with stress relief. However, in some cases, we got the sine curve of circumferential diameter variation obviously related petrological structure of sedimentary rocks. The data suggest that the DCDA method is applicable to boring cores from shallow seismic observation wells, except for sedimentary rock cores.

Keywords: DCDA method, in-situ crustal stress, rock core, seismic observation well