

## Deep underground stress states in Japan (1)-Stress measurement in geologically stable area-

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Knowledge of in-situ stress state is of great importance when planning the high-level nuclear waste repository. It has been measured by the hydraulic fracturing method mainly for the earthquake prediction researches and by the stress relief methods mainly in civil engineering. Cho (2001) discussed the deep underground stress state from stress data, which were measured at 23 sites by the hydraulic fracturing. He pointed out that the relation between stresses and depths in soft rocks and that in hard rocks were different and that stresses increased stepwise at the depth of 600-800m in hard rocks. Cho et al. (2004) collected the stress data measured at 62 points by the stress relief methods and discussed the general tendency of the stress state.

Underground stress measurements have been done in the Kanto-Tokai area, earthquake swarm areas, around the active faults and mountain areas in Japan. These areas are geologically active areas. Stress measurements in the geologically stable areas have not been done except Tanaka (1991, 1992).

We selected around Okayama city as the geologically stable area, drilled a borehole of 750m depth and measured underground stresses by the hydraulic fracturing. The underground rocks were composed of coarse granites and fine granites. Shmin (the minimum horizontal stress) and SHmax (the maximum horizontal stress) were about 7MPa and 10MPa from GL-150m to GL-420m, respectively, where rock mass classifications were CM-CH. Blow GL-424m to GL-750m, where rock mass classifications were B-A, Shmin and SHmax were 10-17MPa and 19-31MPa, respectively. There was a fracture zone (N-S strike and 70 dip toward E) between GL-420m to GL-424m. Stresses in the geologically stable area were smaller than those in the geologically active areas. The direction of SHmax was about E-W. This direction was coincided with the direction of the principal axis of strain rate obtained from geodetic data (Geographical Survey Institute, 1997).