

Geosphere Stability Project (4) Numerical modeling techniques for crustal movement

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The basic framework for assessment of deep geological repository of high-level radioactive waste is extrapolation of the crustal deformation over the past a few hundred-thousand years. However, the quantity and reliability of information for crustal deformation vary from era to era and from area and area. The crustal deformation predicted by extrapolation includes a certain level of uncertainty. Japanese islands have received crustal shortening due to the subduction of oceanic plates for a long time, which is characterized by complicated topography and crustal deformation as a result. In this study, we try to establish the method to estimate the crustal deformation for a long period, using the crustal strain rate in geological time scale (geological strain rate) and numerical simulation considering visco-elastic or elasto-viscoplastic behavior of the crust and upper mantle. At first, we report geological strain rate estimated from active fault database of Japan which is collected by National Institute of *Advanced Industrial Science and Technology*. Next, we report the result of numerical simulation to account for the anomalous crustal deformation around the source region of earthquake swarms by introducing visco-elastic material. This study was carried out under a contract with Agency of Natural Resources and Energy (ANRE), part of Ministry of Economy, Trade and Industry (METI) of Japan as part of its R&D supporting program for developing technology of geological disposal of high-level radioactive waste.

Keywords: deep geological repository of high-level radioactive waste, plate interaction for a long time, geological strain rate, simulation of crustal deformation, visco-elastic heterogeneity