

Granitoid in Japan as a host rock of high-level radioactive wastes

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Japan is in a tectonically active region and is one of the countries where the siting or a repository for high-level radioactive waste is very difficult. Public identifies the crustal movements including fault movement, earthquake, volcanic eruption, and upheaval as the most important issues. Ministry of Economy, Trade and Industry published a map showing scientific characteristics for a repository. However, even though the direct impact of those crustal movements are avoided, actual disposal could not be achieved if isolation of radioactive nuclides is guaranteed with social acceptability is obtained. To do so, the pathways of groundwater, which might transport the nuclides, need to be properly evaluated. Sedimentary rocks and crystalline rocks have been examined as a potential host rock for the repository in Japan. Although accretionary complexes and pyroclastic rocks also need to be examined separately, but here in this paper, I would like to focus on granitic rocks on the basis of recent knowledge. The most adverse properties of granitic rocks are that they have many fractures as possible water pathways and that they are not easily detected by non-destructive measures. We have a strong impression that granitic rocks generally have many fractures in Japan. However, I have been studying spheroidal weathering of granitic rocks, and although incidental, I found that cooling columnar joints are made just below the roof of a granite pluton and that below this jointed zone is a wide area of massive rocks with much less fractures. Highly-fractured granites with columnar joints are common for example in the Suzuka Mountains and also in Hiroshima granite area. If we see such fractured granite regularly, it is natural that many people have an adverse impression to granite, which is not true. The Japanese islands have a wide range of granite ages; older granitic rocks have experienced much more tectonic movements so that they have more fractures. On the other hand, young granitic rocks like Miocene granite in the outer belt of the Southwest Japan may have much less fractures, which is unfortunately not supported by actual data. Scientific examination of granitic rocks in those areas is highly recommended rather than a routine literature survey.

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