

Challenges to Explore the Terrestrial Subsurface Biosphere in Japan

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It is becoming increasingly clear that the terrestrial subsurface harbors microbial ecosystems as abundantly and diversely as microbial provinces in the seafloor. As the Japanese arc system is associated with the subduction of oceanic crusts and resulting volcanic fronts, the terrestrial subsurface biosphere is expected to vary from one setting to another. Due to the limited accessibility to the deep subsurface, previous microbiological investigations have been conducted at pre-existing facilities to exploit mineral deposits and fossil fuels. In recent years, the technical framework of site characterizations of potential underground repositories for geological disposal of nuclear wastes are being developed alongside the construction of underground research laboratories (URL). Microbiological studies that utilize the URL have advantages with respect to obtaining high-quality subsurface samples and in-situ physicochemical properties. This presentation is aimed to summarize (1) similarities and differences in subsurface microbial populations previously found to thrive in a variety of geological settings in Japan and (2) technical advances achieved by, and key indigenous and contaminant microbial populations revealed by, research efforts to establish the site-characterization procedures for potential geological repositories.

Keywords: subsurface microbiology, molecular phylogeny, aseptic drilling, underground research laboratory, deep biosphere