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## Unveil the Depth of Methanogenesis in Deep Subsurface and Microbial Ecology

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Bubbles of methane in the ground water coming up from deep subsurface in a sedimentary rock area of Hokkaido, North Island of Japan were shown biological contribution to their origin from stable isotope signature of  $\delta^{13}\text{C-CH}_4$ . Gene sequence of archaeal small subunit rRNA derived from 500 m water showed an existence of various methanogenesis archaeal Genus there. Incubation experiments carried out for the subsample of 500 m ground water revealed that these archaeal community exhibited methanogenesis activity under the in situ or somewhat higher temperature of 30 to 40/45 C with anoxic condition, but not at neither 20 C nor 50 C. Similar incubation applied to the ground water of 140 m deep did not show any methanogenesis under even absolute anoxic condition so far examined for 90 days at both in situ and higher temperature as 16 C and 30 C, respectively, though the stable isotope signature of  $\delta^{13}\text{C-CH}_4$  in the bubbles obtained from this depth was as low as -57 per mil suggesting methane was biogenic and methanogenesis archaeal genes were found.

Keywords: Subsurface, Methanogenesis, Microbial Ecology