

## Possible Fe(II) Fueled Microbial Ecosystem at the Carbonate Rich Hot Spring Okuoku-hachikuro Onsen, a Possible Early Ocean Analog Site

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The Okuoku-hachikuro (OHK) hot spring in Akita Prefecture, northeastern Japan has iron and carbonate rich water and sediments. At the spring, iron and carbonate deposits exhibit sub-millimeter lamination textures resembling banded iron formations [1]. Iron-rich deposits are commonly thought to be formed by microbial activity in various marine and fresh water environments [2, 3, 4]. In this study, we report our preliminary data about biomass distributions different sites along the hot spring fluid flow. Surprisingly, the majority of cells are at depth, implying redox or nutritional gradients drive specific niches (Fig. 1) and almost all microbes are observed on the mineral particles. In the hot spring, we hypothesize there is a ferrous iron fueled ecosystem at depth which cannot exist on the surface because ferrous iron is depleted by microbial oxidation and also with O<sub>2</sub>.

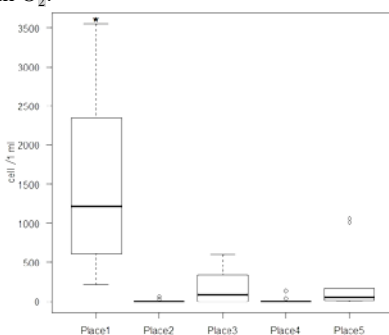


Fig. 1. The number of cells from different sites along the hot spring fluid flow. Place 1 is the hot spring source. Place 2 is the surface at the edge of source pool. Place 3 is the surface in low flow and Place 4 is flowing site. Place 5 is a terminal small pool.

[1] TAKASHIMA, C., OKUMURA, T., NISHIDA, S., KOIKE, H. and KANO, A. (2011), *Island Arc*, **20**: 294–304. [2] Widdel F., Schnell S., Heising S., Ehrenreich A., Assmus B. & Schink B. 1993. *Nature* **362**, 834–6. [3] Kennedy C. B., Scott S. D. & Ferris F. G. 2003. *Geomicrobiology Journal* **20**, 199–214. [4] Kappler A. & Newman D. K. 2004. *Geochimica et Cosmochimica Acta* **68**, 1217–26.