

Anoxic Fe-oxidizing bacteria are using deep carbon in hot spring environments

KAKEGAWA, Takeshi^{1*} ; TERAJIMA, Shogo¹ ; NARA, Fumiko¹

¹Graduate School of Science, Tohoku University, ²tohoku, ³tohoku

Oku-oku hachikuro hot spring is discharging anoxic, CO₂- and Fe-rich water. Hot spring water is flowing in distance from vent forming carbonate terrace. Various forms of aragonite (bundle of needle shape, radial aggregates, plate, etc.) comprise terrace. Those aragonites are most likely formed by inorganic processes. Near the vent, significant amounts of iron hydroxides are precipitating. Microscopic and SEM observation identified two forms of iron hydroxides; iron hydroxides covering sheath and stromatolite-like aggregates. Fe-rich precipitates disappear with distance where cyanobacteria start to form mats. Stable carbon isotope compositions of Fe-oxidizing bacteria are similar to that of cyanobacteria. However, radiogenic carbon isotope compositions are significantly different between Fe-oxidizing bacteria and cyanobacteria. Cyanobacteria are using atmospheric CO₂ with abundant ¹⁴C. But Fe-oxidizing bacteria are using dead carbon derived from deep underlying rocks rather than atmospheric CO₂. Those data may constrain carbon ecosystem of Fe-oxidizing bacteria in anoxic hot spring environments.

Keywords: Deep Carbon, Fe-oxidizing, hot spring