

BBG005-14

会場: 301B

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化学合成生態系におけるH₂消費を安定同位体比を用いて評価する

Stable isotope ratio is useful for quantitative estimation of hydrogenotrophs at hydrothermal ecosystems

川口 慎介^{1*}, 高井研¹

Shinsuke Kawagucci^{1*}, Ken Takai¹

¹海洋研究開発機構プレカンラボ

¹PEL, JAMSTEC

Hydrogen gas (H₂) is a key molecular for deep-sea hydrothermal ecosystem because of its abundance and strong reducing power relatively to the other inorganic components. Although hydrogenotroph is one of the most important primary production processes, H₂ utilization efficiency within seafloor low-temperature hydrothermal ecosystem has not been quantitatively estimated due to lack of effective tracers.

The use of stable isotope ratio is an approach for quantitative estimation of seafloor H₂ metabolisms. The stable isotope ratio of H₂ at hydrothermal site varied from ~-400permil at high temperature fluid to ~-750permil at low temperature biological habitat. It is likely due to water temperature change and subsequent temperature-dependent isotope equilibrium reaction between H₂ and H₂O, catalyzed by hydrogen metabolisms. Advantages of the use of the isotope ratio are 1) Large variation of the isotope ratio (>350permil) compared with analytical errors (<10permil), 2) Robustness for water mixing between hydrothermal fluid and seawater because of little H₂ in the seawater, and 3) No requirement of in-situ and onboard experimental procedures, such as a radioisotope use, for example, other than gas extraction.

In addition to the hydrothermal observation, incubation experiments using stable isotope label to reveal a relation between H₂ concentration and the isotope change, like an isotope fractionation factor, by each hydrogen metabolism will be presented. The results show a potential of the stable isotope use also to estimate a dominant counter part (oxidant) of hydrogenotrophic metabolisms.

キーワード: 水素, H₂, 安定同位体比, 熱水生態系

Keywords: molecular hydrogen, H₂, stable isotope, hydrothermal ecosystem