Temperature, growth rate, and pressure dependence on S isotope fractionation in *Desulfovibrio hydrothermalis*

G. SELVA[1,2*], P. SANSJOFRE[2], M. JEBBAR[1], C. THOMAZO[3], T. COCQUEREZ[3], S.V. LALONDE[2]

[1] Laboratoire de Microbiologie des Environnements Extrêmes (LM2E), IUEM, UBO, 29280 Plouzané, France (*correspondence: Gwendoline.Selva@univ-brest.fr)

[2]CNRS-UMR6538 Laboratoire Géosciences Océan, IUEM, UBO, 29280 Plouzané, France

[3]Laboratoire Biogéosciences UMR 6282 UBFC/CNRS, Univ. Bourgogne Franche-Comté, 21000 Dijon, France

Sulfate reduction is today one of the most important anaerobic pathways of organic matter respiration in the marine realm. The associated sulfur isotopic fractionation has commonly been used for paleoenvironment reconstruction and mass balance calculations of the global sulfur and carbon cycles. In this work, we investigated the isotopic fractionation ($^{34}S/^{32}S$) associated with the piezo- and meso-philic bacterium *Desulfovibrio hydrothermalis*. This bacterium is commonly found in the East Pacific at depths below 2600 m.

We tested the impact of temperature and growth rate on the isotopic fractionation of sulfur isotopes as well as the effect of pressure using a newly developed protocol in high pressure–high temperature incubators. We performed both monitoring of single cultures during growth as well as sacrifice experiments. Experiments were performed at 20°C, 35°C, 40°C, and at three sulfate concentrations (15mM, 22mM and 36mM), with sampling of sulfate and sulfide performed at different phases of batch culture growth.

$^{34}S/^{32}S$ fractionation factors ($^{34}\varepsilon$) ranged from <1‰ to ~11‰, and for all temperatures and sulfate concentrations, we found the highest S isotope fractionation during stationary phase. Across temperatures, fractionation factors were highest at 35°C and under sulfate-rich conditions. The first results obtained for cultures under high pressure show similar trends, but with slightly higher fractionation under high pressure. Our findings are similar to [1] in that culture experiments using exponential phase biomass may underestimate S isotope fractionation factors compared to what occurs in natural environments. These results highlight the need to better understand microbial physiological processes that may influence S isotope fractionation in order to adequately understand sedimentary records of S cycling in the past.

[1]. Matsu'ura *et al*. (2016) *Chem Geol* **431**, 1-9.