Si isotope fractionation during reductive dissolution of Fe-Si gel in Artificial Archean Seawater (AAS) by *Desulfuromonas acetoxidans*. T. R. Reddy[1,2], Z. Xin-Yuan[1,2], B. L. Beard[1,2], and C. M. Johnson[1,2]. [1]Department of Geoscience, University of Wisconsin-Madison, 1215 West Dayton Street, University of Wisconsin, Madison, WI 53706, trreddy@wisc.edu. [2]Department of Geoscience, University of Wisconsin-Madison, NASA Astrobiology Institute, 1215 W. Dayton St., Madison, WI 53706.

Silicon cycling in the Precambrian ocean has been of interest in studies of the early Earth because, prior to evolution of silica-precipitating organisms, the silica cycle is thought to provide information on hydrothermal and continental sources to the oceans. It has been proposed that the coupled cycling of Fe and Si account for the alternating Si- and Fe-rich banding in iron formations (IF) because Si is predicted to be bound with Fe (hydr)oxides as Fe-Si gel which is then sequestered to deep water sediments [1]. It has been suggested that microbial iron reduction of Fe-Si precipitates mobilizes Fe, and produces large Fe isotope fractionation recorded in marine sedimentary rocks [2]. However, potential Si isotope fractionation associated with mobilization of Si during these microbial Fe reduction processes have never been explored.

In this study, the Si isotope exchange and fractionation between stimulated artificial Archean seawater (AAS), closely replicating the Precambrian seawater environment, and an amorphous Fe-Si gel, was monitored during the reductive dissolution of the Fe species in the gel by the marine iron-reducing bacterium *Desulfuromonas acetoxidans*. Microbial reduction of the Fe-Si gel resulted in a solid that was isotopically lighter ($\delta^{30}Si = -0.12 \pm 0.23‰$) and aqueous silica that was isotopically heavy ($\delta^{30}Si = 3.28 \pm 0.23‰$). A second set of experiments involving the three-isotope method (^{30}Si-^{29}Si-^{28}Si), using ^{29}Si as the tracer to track exchange between the AAS (in the absence and presence of Si) and Fe-Si gel is underway. These results will form the basis for better understanding and interpreting the relationship between adsorption of Si to Fe (hydr)oxides and Si isotopic data recorded in the Precambrian sediments.

References:

[1] Fischer W.W. et al. (2009) *GSA Bulletin, 121*, 222-235. [2] Percak-Dennett E.M. et al. (2011) *Geobiology, 9*, 205-220.