

Isotopic and mineralogical properties of surface sediment from the circum Arctic

JENNY MACCALI^{1*}, CLAUDE HILLAIRE-MARCEL¹

¹GEOTOP-UQAM, Montréal, Canada, jenny.maccali@gmail.com (* presenting author)

Radiogenic isotopes (RI) have been used to trace sediment origin in various ocean basins [1, 2, 3, 4, 5, 6]. This method is particularly useful in sites where ice-rafting deposition (IRD) represents an important sediment transport mechanism, as illustrated recently by RI-analyses in cored sediments from Fram Strait [7], the main sea-ice exit pathway from the Arctic Ocean towards the North Atlantic. Mineral-lattice bound Pb-, Sr- and Nd- isotopes (i.e., linked to detrital sediment supplies) from this sedimentary sequence displayed two distinct temporal trends since the Last glacial Maximum [7]. In this study, three main detrital supply areas were defined, based on literature data, respectively, the Canadian and Russian margins, and northern Greenland. Broad sea-ice paleocirculation patterns were then proposed based on the Fram Strait RI-record. In order to refine sea-ice paleo-circulation reconstructions, we have undertaken a more detailed survey of potential circum-Arctic sediment sources, using surface-sediment samples from the Canadian Arctic Archipelago, the Beaufort Shelf, Bering Strait, the Chukchi Sea, the East Siberian, Laptev, Kara and Barents seas. Nd- and Sr- isotope data now define more detailed isotopic domains with, for instance, low epsilon Nd values corresponding to North American cratons, and high epsilon Nd values linked to Pacific inputs through Bering Strait. These domains are compared with relevant mineralogical information (e.g. iron-oxides) from Darby [8]. This 'RI-mapping' data set should improve quantitative estimates of IRD sources and mixing in sedimentary records from the Arctic, thus of the dynamics of surrounding continental ice-margins during the Quaternary.

[1] Fagel et al. (2004) *Paleoceanography* **19**, 1-16. [2] Frank et al. (2002) *Reviews of Geophysics* **40**, 1-38. [3] Haley et al. (2008) *Paleoceanography* **23**. [4] Tütken et al. (2002) *Marine Geology* **182**, 351-372. [5] Winter et al. (1997) *Geochimica and Cosmochimica Acta* **19**, 4181-4200. [6] O'Nions et al. (1978) *Nature* **273**, 435-438. [7] Maccali et al. (2012) *Paleoceanography* **27**. [8] Darby (2003) *Journal of Geophysical Research: Oceans* **108**, 13-1.

In Situ Determination of Sulfide Oxidation Rates in the Green Sulfur Bacterium *Chlorobaculum tepidum*

Daniel J. MacDonald^{1*}, Alyssa Findlay¹, Kevin Shuman¹, Daniel Hess¹, Thomas E. Hanson¹, and George W. Luther¹

¹College of Earth, Ocean, and Environment, University of Delaware, Lewes, DE 19958
*uri@udel.edu

Sulfur cycling in many environments is regulated by microbial activity. As the most reduced form of sulfur, H₂S, is toxic to many aerobic organisms; however, *Chlorobaculum tepidum* uses sulfide as an electron donor during photosynthesis. Microbial sulfide oxidation is a major sulfide removal mechanism, yet the relevant microbial oxidation rates are relatively unknown. In a recent study biological sulfide oxidation rates were determined to exceed abiotic oxidation rates by several orders of magnitude¹. Voltammetric data will be presented that examines the rate of sulfide loss due to microbial uptake and oxidation over a variety of physical and biochemical parameters, such as the effects of light intensity, biomass concentration and total sulfide concentration. Speciation of sulfide oxidation products, such as elemental sulfur and polysulfides, and the rates at which these products form, will be presented. Initial data show that these organisms follow Michaelis-Menten kinetics with an approximate apparent saturation rate of 100 μM sulfide.

[1] Luther et. al. (2011) "Thermodynamics and Kinetics of sulfide oxidation by oxygen: a look at inorganically controlled reactions and biologically mediated processes in the environment" *Frontiers in Microbiology*. **2**.