

Experimental investigation of Si isotope fractionation during dissolution of river suspended particulate matter into seawater

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Recent elemental oceanic budgets have highlighted the importance of taking into account continental margins as a source of elements to oceans and as one of the key mechanisms explaining “boundary exchange” [1, 2]. For silicon, in particular, the quantification of silicic acid addition from dissolution of lithogenic material at the margins remains to be determined, both in the field and experimentally. To explore the potential impact of this process on Si addition in the NE Pacific, we have investigated the dissolution of mineral particles discharged by one of the largest rivers in NE Canada (Fraser River, BC Canada) in seawater from the Strait of Georgia (BC).

About 10g of untreated and pre-treated (HgCl₂ and H₂O₂) SPM were sampled from the freshwater end-member of the Fraser estuary and incubated in 1L filtered surface seawater from Georgia Strait, which initially contained 45 μM of dissolved silica. Silicic acid concentration and isotopic composition are being monitored over the course of several months. Data obtained to date show a rapid increase in the concentration for dissolved silicic acid during the initial stages of the experiment. Over the course of a month and a half, concentration has almost doubled and the different sample treatments reveal significant differences in reaction rates.

Si isotopes are being measured on a HR-MC-ICP-MS Nu 1700 at PCIGR (UBC), after preconcentration of 5 μg of Si for subsequent purification and analysis [3]. Si isotopic measurements are being validated using reference materials Diatomite, BHVO-2 and different preparations of synthetic preconcentrated seawater. Precision and reproducibility of the method are comparable to previous studies.

[1] Jeandel *et al* (2011). *Eos*, **92**, 217–224 [2]Tréguer & De La Rocha (2013). *Annu. Rev. Marine*, **5**, 477-501 [3] Georg *et al* (2006). *Chem. Geol*, **235**, 95-104