

Abstract Preview - Step 3/4

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Title: Cycling of DMS,P in early-winter Ross Sea pack ice during the PIPERS project

Author(s): Gauthier Carnat¹ (gauthier.carnat@gmail.com), Bruno Delille², Fanny Van der Linden¹, Johannes de Jong³, Célia Sapart¹, Boris Wittek¹, Stephen Ackley⁴, Sharon Stammerjohn⁵, Jean-Louis Tison¹

Institute(s): ¹Université Libre de Bruxelles, Laboratoire de Glaciologie, Brussels, Belgium, ²Université de Liège, Unité d'Océanographie Chimique, Liège, Belgium, ³Université Libre de Bruxelles, Laboratoire G-Time, Brussels, Belgium, ⁴University of Texas at San Antonio, Snow and Ice Geophysics Laboratory, San Antonio, United States, ⁵University of Colorado, Institute of Arctic and Alpine Research, Boulder, United States

Text: Ice-algal assemblages are known to produce large amounts of the sulfur metabolite dimethylsulfoniopropionate (DMSP), and of its volatile degradation product dimethylsulfide (DMS). Sea ice DMS is subsequently released to the polar ocean and atmosphere where it plays multiple roles in the sulfur and carbon cycle, and mediates the formation of climate cooling sulfate aerosols. Previous studies on the cycling of DMS and DMSP in sea ice are mostly limited to the spring/summer seasons, when large blooms develop in first-year ice due to favourable light and nutrient regimes. In contrast, there is much less information about the production of DMS,P during the first stages of sea ice formation in light-limited early-winter. In this context, we carried out measurements of sea ice DMS,P concentrations in the Ross Sea from April until June 2017 in the framework of the PIPERS project. Multiple ice types and thicknesses were sampled (frazil, unconsolidated and consolidated pancakes, first-year ice) together with sea water and brine, in contrasted areas (marginal ice zones, polynyas, and the central Ross sea pack ice). Sea ice DMS,P concentrations (maximum of 95 and 492 nM) were lower than values typically reported during ice-algal spring blooms, but still significantly higher than sea water concentrations at the time of sampling (maximum of 3 and 15 nM). We present and discuss working hypotheses to explain how these concentrations build up through the different steps of sea ice formation.

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