Sea-ice influence on carbon and silicon biogeochemical cycles in the Southern Ocean

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Sea ice plays a fundamental role in the regulation of global climate, particularly by the formation of dense waters as observed on the continental shelf off Adélie Land (Southern Ocean). There, diatoms are major primary producers and key exporters of organic matter and silica. Their impact on carbon (C) and silicon (Si) cycles in this zone has great implications on the global ocean biogeochemistry. As they fractionate C and Si isotopes during their growth, their isotopic compositions ($\delta^{13}C$ and $\delta^{30}Si$) are closely linked to the primary production (PP) and the degree of silicic acid utilization in surface waters.

Sediment trap samples from mooring deployed there showed a massive sedimentation event in January that represent more than 90% of the total annual sedimentation and is probably linked to the PP in the Mertz Polynya area. The main variation of $\delta^{30}Si$ occurred during this short event (from 0.2 to 0.5‰). This flux was likely composed by a mixing between isotopically heavy sea-ice diatoms ($\delta^{30}Si$ from 0.41 to 0.86‰, [1]) and light planktonic diatoms ($\delta^{30}Si$ from -0.93 to -0.06‰ as measured in the mixed-layer – ML – above the mooring) whose contribution to the flux varies along the season.

By comparing Si and C fluxes and stocks from ML to deep layers with their respective isotopic signatures, we will discuss the nutrient dynamics and their links with ML PP, and understand how the isotopic signature of exported opal is preserved from the euphotic zone to the underlying sediments.

[1] Fripiat et al. (2007) *J. Geophys. Res.*, **112**, G02001