



Calcium carbonate as ikaite crystals in Antarctic sea ice

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CaCO₃ crystals have not been observed to date in natural sea ice, despite evidence for CaCO₃ precipitation from laboratory experiments and thermodynamic modelling. Here, we present the first observation of calcium carbonate crystals in sea ice from the Weddell Sea and Dumont D'Urville Sea, Antarctica and surprisingly in the form of ikaite (CaCO₃·6H₂O). We found up to 19.4 mg of ikaite per litre of both new, first and multi-year sea ice. Calcium carbonate (CaCO₃) precipitation in sea ice is an emergent by-product of the physico-chemical changes associated with seawater freezing. Along with internal primary production it has an impact on the carbonate system, thus evidently contributing to the sea-ice driven carbon pumps and possibly to the chemical transformation of bromine on sea ice surfaces that leads to tropospheric ozone depletion events in polar regions. Based on our observations, a former estimate of the impact of CaCO₃ precipitation on the global carbon cycle has been reduced by two orders of magnitude. Nevertheless, the influence on the carbonate system in sea ice is appreciable and thus has to be taken into account when investigating transformation

processes which affect atmosphere and ocean and sea ice.