CO_2 bonds in sea ice: Small living creatures with major impact

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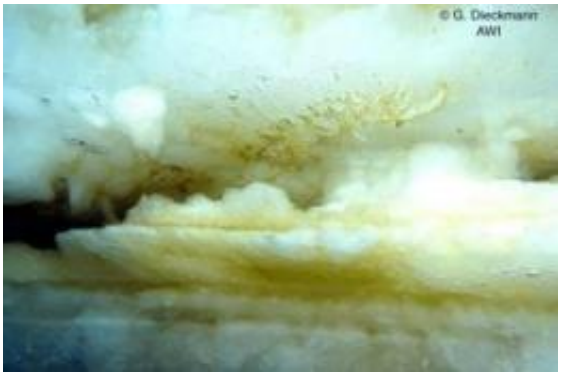

The high salt concentration permits the contents of brine channels to remain in a liquid state even at lower temperatures, and they serve as a habitat for microorganisms. Photo: Gerhard Dieckmann /Alfred Wegener Institute

Due to the presence of salts, the freezing point of sea water is below zero. During freezing, channels in which the salt accumulates, so-called "brine channels," are formed in the ice. They serve as a habitat for microorganisms. Together with collegues, a scientist from the Helmholtz-Zentrum Dresden-Rossendorf is currently analyzing the characteristics and distribution of these channels in which CO_2 is bound by the organisms which, in turn, diminishes the greenhouse effect.

Under normal conditions, water freezes at zero degrees Celsius. But not salt water: Due to the presence of salts, the freezing point of sea water is below zero. And sea water tends to freeze unequally. During freezing,

channels in which the salt accumulates, so-called "brine channels," are formed in the ice. The high salt concentration permits the contents of these channels to remain in a liquid state even at lower temperatures, and they serve as a habitat for microorganisms. Together with colleagues, a scientist from the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) is currently analyzing the characteristics and distribution of these channels in which CO2 is bound by the organisms which, in turn, diminishes the greenhouse effect.

The existing microorganisms are called diatoms and are at the bottom of the food chain in the marine ecosystem of the polar region. They also convert about 20 percent of the global CO2. The scientists want to understand how the tiny channels and their dwellers are distributed in the ice, what structures they exhibit, and under which circumstances they change. "Direct measurements of these structural properties are not possible without impairing the habitat," explains Dr. Sibylle Gemming from the HZDR. "That's why we're developing mathematical models which will be the basis for computer simulations." The comparison of simulated and measured properties will permit conclusions to be drawn about the channel formation process.

According to the scientists, the findings of their research could serve as input variables for global climate models. That is why German researchers from Dresden, Bremerhaven (Alfred Wegener Institute for Polar and Marine Research within the Helmholtz Association), and Münster (Münster University of Applied Sciences) are also cooperating with colleagues from the Norwegian Polar Institute in Tromsø. The project, which is subsidized by the German Academic Exchange Service (DAAD) and the German Research Foundation (DFG), is headed by the quantum particle physicist Prof. Klaus Morawetz (Münster University of Applied Sciences).

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