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Improved in-situ measurements of sea-ice salinity

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We present improved in-situ measurements of sea-ice salinity during sea-ice growth and decay as obtained from a newly developed instrument (Harp3d).

Such measurements are important since the physical properties of sea ice and its sensitivity to a changing climate depend crucially on its salinity. Nevertheless, reliable measurements of sea-ice salinity are still largely lacking.

The instrument we developed is based on impedance measurements between thin platinum wires frozen into the ice, similar to the device described by Notz et al. (2005). The improved version allows the determination of horizontal inhomogeneities in sea-ice solid fraction and salinity. Additionally, the resistive and capacitive impedance are now measured independently, which improves the accuracy of the measurements. We carried out a number of tank experiments in which a sodium chloride solution was cooled either from above or below to form artificial sea ice. During some of these experiments, supercooling of the water in the tank was observed, which is also discussed.