Improving projections of the fate of Earth’s sea ice and its ecosystems depends on a better understanding of key processes such as melt pond evolution, snow-ice formation, and nutrient fluxes. The results open the door to new ways of analyzing and remotely studying such processes.

The rule of fives governs sea ice transport processes. Our results provide the first observations and theory of the electrical signature of this “on-off” switch for fluid flow in sea ice, thus enabling new techniques for monitoring processes that are important to the climatology and biology of sea ice.

The results impact the study of sea ice in the climate system, as well as gauging the effects of global warming through remote sensing of sea ice thickness. Scientists interested in the following areas will be impacted: polar climate, sea ice biogeochemistry, sea ice modeling, and porous media.

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Data on the conductivity of sea ice were taken in the Arctic and Antarctic

A strong electrical response near the brine percolation threshold is observed

The results enable remote monitoring of key processes and transitions