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The influence of an antifreeze protein from a polar diatom on ice crystal orientation and growth

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While aiming for cold adaptation, organisms living in sea ice use, among others, antifreeze proteins to shape the ice properties as needed. Some antifreeze proteins, such as found in the polar diatom *Fragilariopsis cylindrus*[1], can bind to certain ice crystal planes. In combination with the high growth anisotropy of the hexagonal ice crystal this binding results in a peculiar microstructure, which differs significantly from pure anorganic ice crystal growth.

We present results from laboratory grown ice with and without antifreeze proteins using optical microscopy and crystal orientation measurements in order to characterize the microstructure caused by the *Fragilariopsis cylindrus* antifreeze protein.

[1] Bayer-Giraldi, M.; Weikusat, I.; Besir, H. Dieckmann, G. Characterization of an antifreeze protein from the polar diatom *Fragilariopsis cylindrus* and its relevance in sea ice. Cryobiology, 2011, 63, 210-219, doi:10.1016/j.cryobiol.2011.08.006