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Constraints on ice thermodynamics and ocean dynamics associated with sea ice freezing, aging and melting

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The sea ice freeze-melt cycle separates freshwater from salt water and displaces it geographically. Ocean pressure gradients build up near dense water formation regions such as coastal polynyas. The freshwater that is transported in solid and liquid form e.g. in coastal currents can prevent ocean vertical exchange. While these mechanisms are understood in principle, quantitative expressions and manifestations are often not well developed. The bulk salinity of new and warm sea ice is poorly known. The salt release is distributed in time and space as the ice ages. It can be affected by both thermodynamic conditions (heating from above and below) and dynamical processes such as rafting. It also depends on small scale properties of sea ice. We here present a review of recent published observations and models that can shed some light on the the role of sea ice - ocean interaction and feedbacks. Particular emphasis is put on sea ice representation in models of a melting and thinning Arctic ice cover.