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Ice-T: an autonomous float for real-time measurement of ice thickness and thermal exchanges at the ocean-ice-atmosphere interface

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The " Ice-T " (Ice-Thickness) float, developed at LOCEAN since 2005, is a prototype instrument for automated measurement of sea-ice thickness together with the terms entering the thermodynamical sea-ice mass balance. The objective is to have a versatile floating instrument that can be deployed in ice or no-ice conditions. The latter capability is interesting for process-oriented studies of the initial phase of ice formation, or for regions where the presence of ice is intermittent such as coastal polynia, where dense water forms. The instrument is made of two bodies: a surface float trapped in the ice, and a subsurface weighting float (or "fish"), hanging below the ice layer, connected with a cable for data and energy transmission. The latter is equipped with an upward looking sonar altimeter, pressure sensor, and an inclinometer/compass. These sensors (together with a barometric pressure sensor included in the surface float) provide a measurement of the ice draft. A thermistor string along the surface float provides an estimate of conductive heat fluxes and thermal content of the sea ice and snow layers. The hydrodynamics of the subsurface float has been extensively studied: the shape and mass repartition have been engineered such that the horizontal velocity at the base of the ice can be estimated with good accuracy based on inclinometer measurements. The absolute current can be estimated since a GPS measures the drift of the float. An estimate of horizontal heat fluxes at the base of the ice should therefore be possible. The prototype is functional for the IPY and we present observations from a

7-week deployment in the Storfjord (Svalbard) in the spring 2007. Other deployments are programed in relation with the DAMOCLES project. New technological developments are envisioned to complete the estimate of fluxes both at the ice surface and at the ocean-ice interface.