**Thin sea ice detection with CryoSat-2**

 Map

Description automatically generated

*Plot shows the November 2017 sea ice thickness thinner than 0.5 m from CryoSat-2 (left) and SMOS (right).*

Over the past two decades sea ice in the Arctic basin has transitioned from mainly thick, old multi-year ice to thinner, younger first-year ice types, as the northern polar climate has warmed at a rate 3-4 times faster than the global average. The thickness of the ice is a critical consideration for maritime vessels navigating ice-covered waters, for instance in the region around Svalbard, so it is a high priority of the Norwegian Ice Service to remotely detect the ice thickness from space.

We can detect the thickness of sea ice with the spaceborne SAR Altimeter CryoSat-2; however, previous research has suggested that CryoSat-2 has very low accuracy when the ice is thinner than ~1 meter in thickness.

In this project we will re-evaluate the lower detection limit of CryoSat-2 to see if we can get reliable measurements down to a few 10s cm in thickness. For this goal, we will use the latest physically based dataset of CryoSat-2 sea ice freeboard derived from a [SAR waveform model applied to the altimeter observations](https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019JC015820). The student will compare to independent thin sea ice measurements from the SMOS L-band radiometer and to airborne measurements collected on the [European Space Agency SMOSice campaign](https://earth.esa.int/eogateway/campaigns/smosice). Re-setting the thin ice capability of CryoSat-2 will be valuable for the Norwegian Ice Service to provide accurate sea ice thickness data to its users.

Contact: Jack Landy ([jack.c.landy@uit.no](mailto:jack.c.landy@uit.no))