

MS Thesis at SEE: Ice Floe Probability Mapping with Microwave Satellite Sensors



Background:

Ice floes in the ocean pose a navigational hazard for ships. Outside the marginal ice zone, there is also a risk of ice floes in the open ocean. Spaceborne satellite observations, especially from microwave sensors like Synthetic Aperture Radar (SAR), can help us in direct observations of these ice floes, but regular data is not available.

The ice floe drift out of the ice edge primarily depends upon wind. If the wind direction has a large component facing away from the ice edge, it can spread the ice floes out of the marginal zone, and the probability of finding an ice floe out of the ice edge increases. Furthermore, the ice floe decay also needs to be considered, which is influenced by parameters such as its life-time, ice floe size / thickness, sea state, etc.

Thesis Project:

For this MS thesis, the goal is to use data from satellite-based microwave sensors over a few years to develop a first prototype of ice floe occurrence probability map. This will involve not only processing and analysis of microwave satellite data, but also constructing a model to include the impact of physical met-ocean parameters on ice floes outside the ice edge.

The project consists of three modules:

- i. The first version or module will be development of the ice floe probability map using the primary variables of wind, sea-ice edge and sea-ice thickness. The ice-floe life-time and decay will also be included.
- ii. Depending on progress with the first module, other significant variables such as waves and currents will be included in the next module.
- iii. The third module will include secondary parameters like sea surface temperature and salinity, and more complex models of ice floe decay.

The module scoping for the thesis project will be done in discussion with the supervisor.

This thesis will be conducted with the support of industry partner Offshore Monitoring Ltd (www.offshoremonitoring.com)

Pre-requisites: Basic to good coding skills in MATLAB / Python.

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