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Satellite monitoring for the Arctic sea ice thickness

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Arctic Ocean freezes up entirely in winter, about 60 % of ice such as second-year and multi-year ice survives over summer. Summer sea ice reflects 90% of sunlight. Therefore it has an important role in cooling as a radiator of earth system. In 2007, a large decrease occurred beyond the the Global Warming scenarios [Levinson and Lawrimore, 2008; Strove et al., 2008]. Changing the Arctic Ocean into seasonal ice covered area may accelerate global warming larger. On the other hand, a remarkable multi-year ice thinning (0.5m/decade) have been reported from field observations [Rothrock et al., 2008]. Those field observations were limited time and place has been. Therefore developing of quantitative satellite monitoring of sea ice thickness is one of the important for international research project.

This study aims to estimate the Arctic sea ice thickness from satellite sensors based on the field observations in the Canada Basin using an electromagnetic induction ice thickness profiler (EM) and passive microwave radiometer (Passive Microwave Radiometer: PMR) mounted on the icebreakers since 2008. An ice thickness estimation algorithm has been developed from the record of EM thicknesses and PMR brightness temperatures distribution. this algorithm applied to satellite PMR data to survey long-term changes of Arctic ice thickness since 1978.

Keywords: Arctic Ocean, Sea ice thickness, Satellite remote sensing