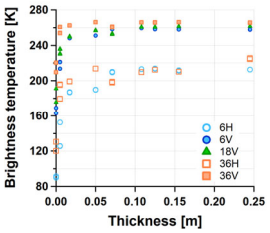
EORA2 3-year highlight

PI:Kazutaka Tateyama

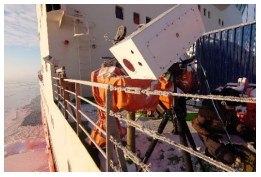
Improvement of the algorithm for the estimation of the first-year and multi-year sea ice thickness using AMSR2

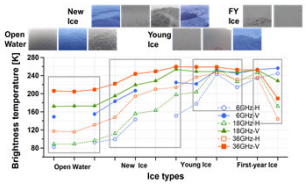
The purpose of this study is to properly define qualitative types of sea ice and apply quantitative scale of sea ice thickness to those ice type categories based on a theoretically correct radiation transfer model.

In **Ice tank** experiments during FY2020 and FY2021, the physical characteristics and microwave radiation characteristics of new and young ice up to 30 cm were obtained.



From **Field observation** in the Saroma-ko lagoon and the Arctic Ocean during FY2020 and FY2021, the effect of snow cover and refreezing melt pond related to seasonal fluctuations of the brightness temperature were considered.





Radiation transfer model

- Thin ice thickness
- Medium and thick first-year ice thickness
- Multi-year ice thickness

Development

ULS
Sea ice draft

Drill-hole
Sea ice thickness
Snow thickness

SIRAL2
Sea ice thickness
Snow thickness

MIRAS
Sea ice thickness
Sea ice salinity

Validation Improvement

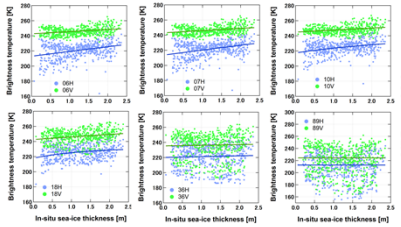
TOPAZ4
Sea ice thickness
Snow thickness

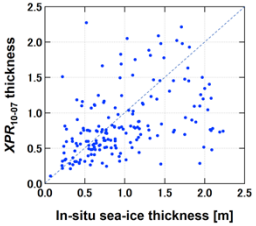
Evaluation

AMSR2
Sea ice thickness

Drill-hole data

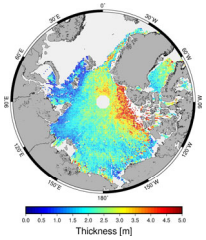
: As a result of examining 182 combinations of brightness temperature ratio, XPR_{10V-7H} showed the highest correlation coefficient with in-situ thickness.

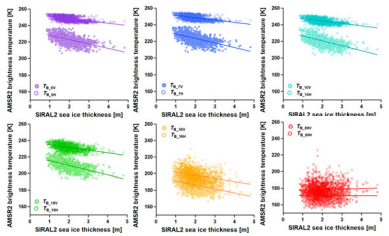


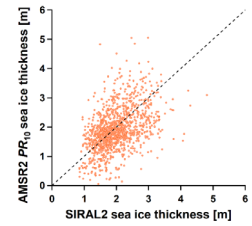


SIRAL2 and MIRAS data

: $XPR_{36H-10V}$ and PR_{10} showed the highest correlation coefficient with the thicknesses of first-year ice and multi-year ice respectively.







TOPAZ4 data

:Since TOPAZ4 data provides sea ice thickness and snow depth during the freezing period as well as the melting period, the estimation accuracy of AMSR2 sea ice thickness throughout the year is evaluated.