Validation results of Cryosphere products - OKID

- Accuracy requirements and evaluation methods of SGLI Cryosphere standard products

Products	Release Accuracy	Standard Accuracy	Target Accuracy	Evaluation Methods
Snow and Ice covered area (including cloud detection)	**10%**	**7%**	**5%**	Comparison with other satellites data (e.g. MODIS, VIIRS, Sentinel-3…).
Okhotsk sea-ice distribution	**10%**	**5%**	**3%**	Comparison with other satellites data (e.g. MODIS, VIIRS, Sensinel-3…).
Snow and ice surface Temperature	**5K**	**2K**	**1K**	Comparison with in-situ observation (Automatic weather station thermal radiometer data) and other satellites data (e.g. MODIS, VIIRS Sentinel-3…).
Snow grain size of shallow layer	**100%**	**50%**	**30%**	Comparison with climatology (relationship between snow surface temperature and snow grain size) for the release accuracy threshold. In addition, comparison with in-situ data for the standard and target accuracy thresholds.

- Version 2 Major changes and validation data details

Major Change for the C1AB - Snow and Ice cover area algorithm
- Revised cloud detection/surface classification algorithm from ordinary threshold method to Neural network machine learning method
- All training data were simulated by DISORT radiative transfer model

Major change for the C1C - Okhotsk sea-ice distribution algorithm
- Revised cloud detection/surface classification algorithm from ordinary threshold method to Neural network machine learning method partly
- All training data using Neural network were simulated by DISORT radiative transfer model

Validation data for the C1AB/ SICE - Snow and Ice cover Extent product (snow/ice fraction > 15%*)
- Snow area: MOD10C2 Snow Cover Extent Product
- Sea ice area: MOD29E1D Sea Ice Product

Validation data for the C1C/OKID - Okhotsk sea-ice distribution product (sea ice fraction > 15%*)
- Sea ice area :MOD29E1D Sea Ice Product

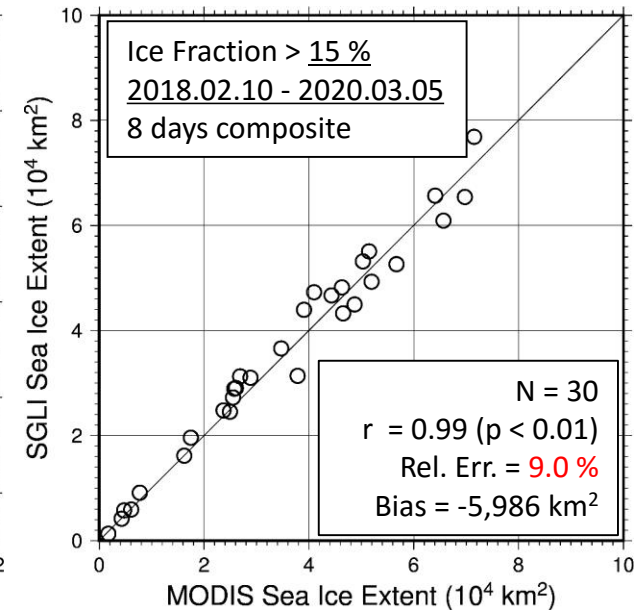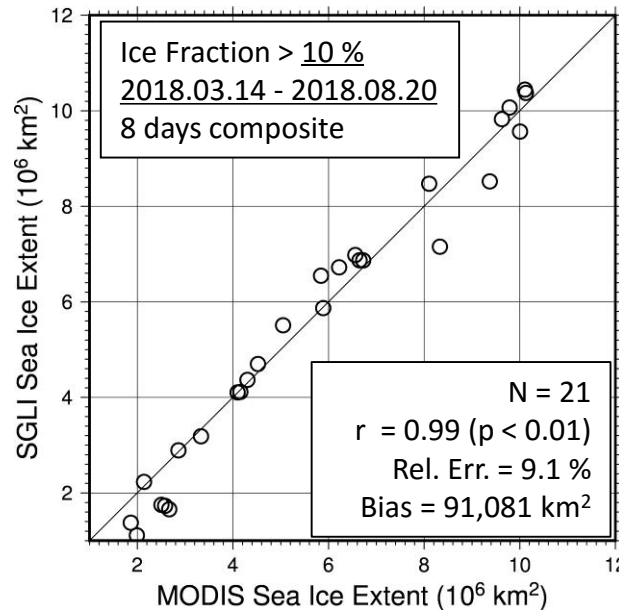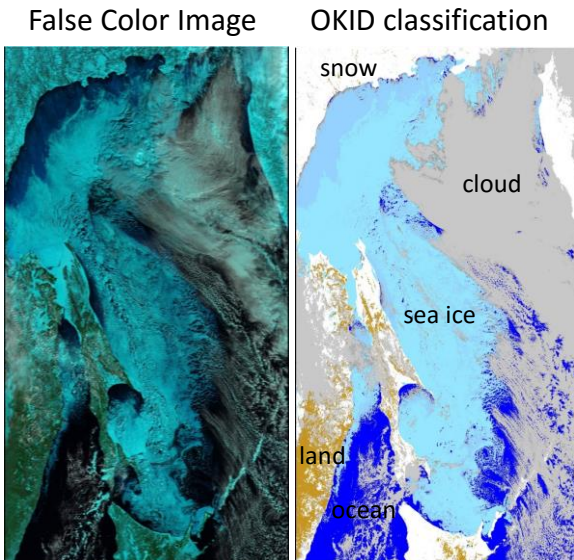*NSIDC defines sea ice exists in case of the ice fraction/ice concentration more than 15%.

Validation results of Cryosphere products - OKID

- Okhotsk sea-ice distribution product validation results using other satellite products

Ver.2 sample image 2020.02.27

False Color Image   OKID classification

Validation result of Ver. 1

Ice Fraction > <u>10 %</u>
2018.03.14 - 2018.08.20
8 days composite

N = 21
r = 0.99 (p < 0.01)
Rel. Err. = 9.1 %
Bias = 91,081 km²

Validation result of Ver. 2

Ice Fraction > <u>15 %</u>
2018.02.10 - 2020.03.05
8 days composite

N = 30
r = 0.99 (p < 0.01)
Rel. Err. = 9.0 %
Bias = -5,986 km²

1. Validation period was expanded: 0.5 year to 2 year.
2. Surface classification was improved from visual evaluation compared with False color image.

Validation result	Release accuracy	Standard accuracy	Target accuracy
Ver.1: 9.1 % (Mar. 2018 - Aug. 2018) Ver.2: **9.0 %** (Feb. 2018 - Mar. 2020)	10 %	5 %	3 %

OKID product needs more detail evaluation using high resolution satellite images