Comparison of sea ice concentrations from ASI, BT and NT2 algorithms with ERA-Interim dataset in the Arctic and Antarctic regions

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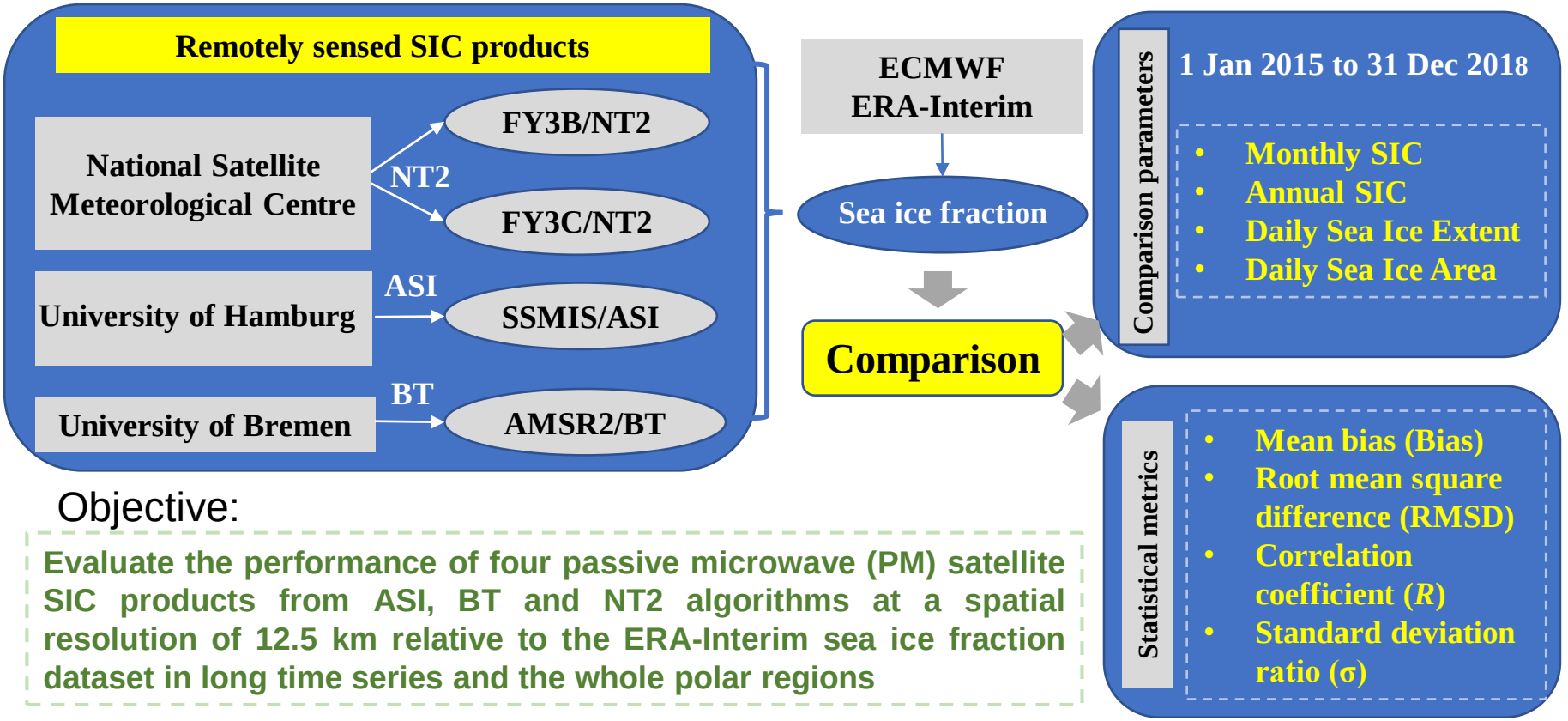
Flowchart:

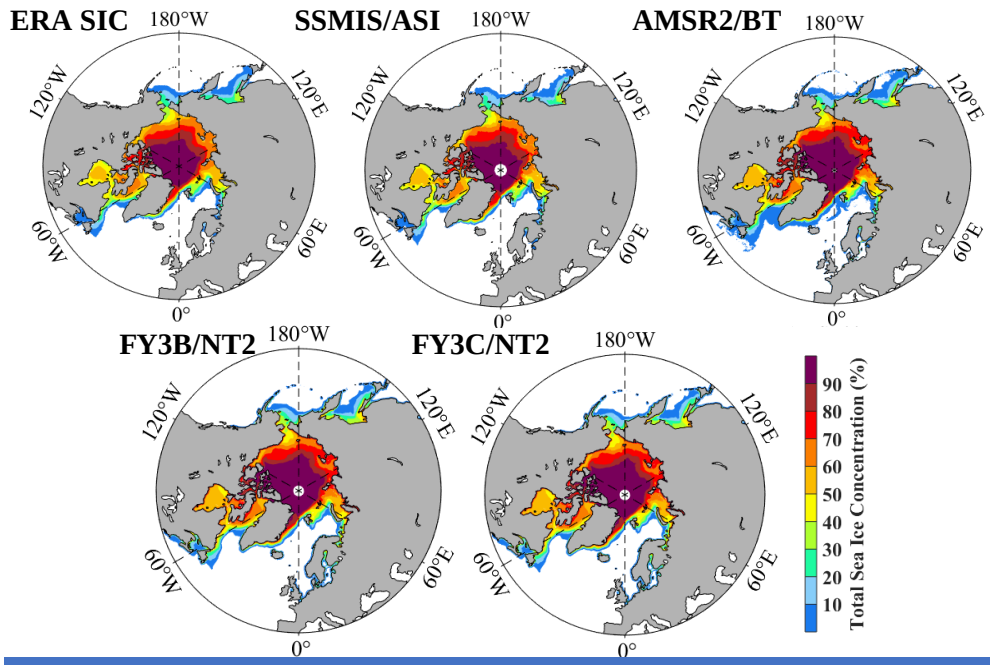


Objective:

Evaluate the performance of four passive microwave (PM) satellite SIC products from ASI, BT and NT2 algorithms at a spatial resolution of 12.5 km relative to the ERA-Interim sea ice fraction dataset in long time series and the whole polar regions

Comparison of monthly SIC with ERA-Interim in Arctic

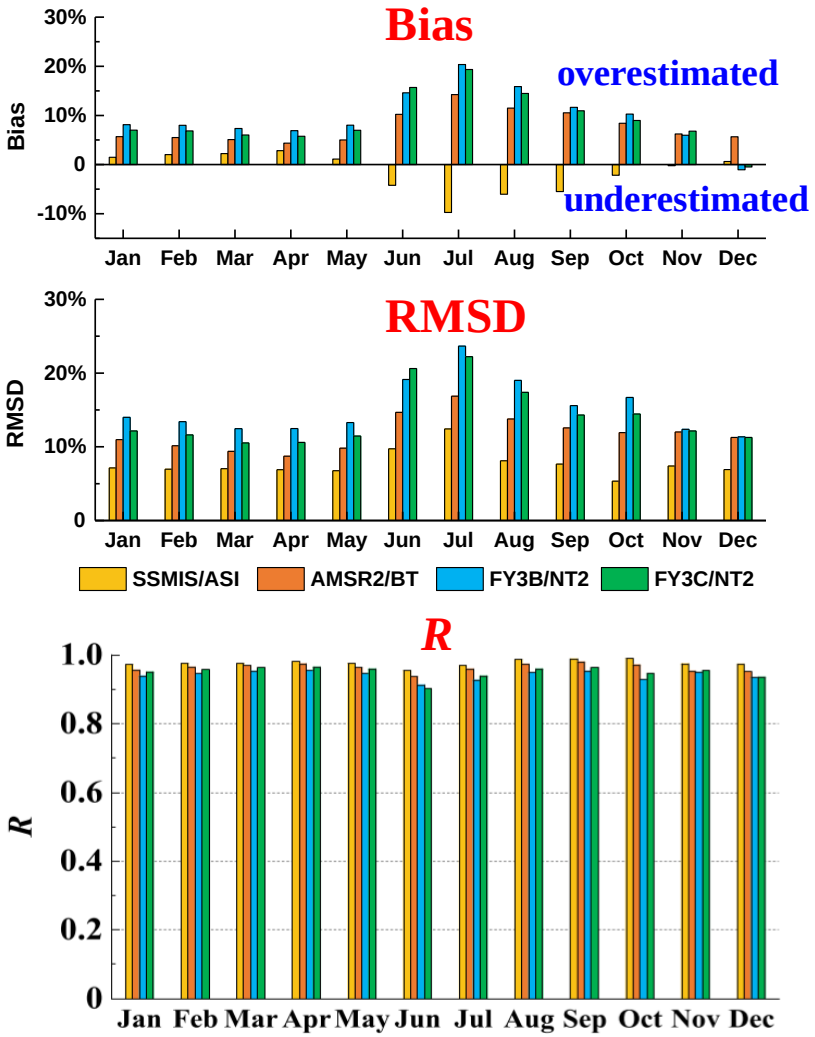
Daily average PM and ERA SIC products in the period of 2015-2018



Metrics of monthly SIC between four PM SIC and ERA SIC in Arctic

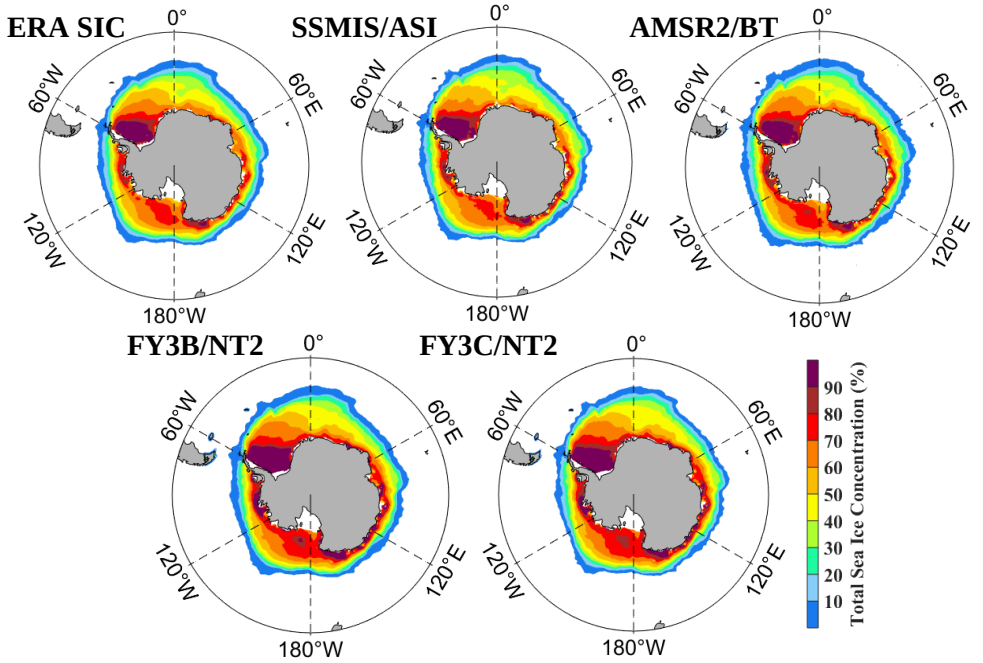
Products	Statistical metrics			
	Bias(%)	RMSE(%)	*R*	*Sample*
SSMIS/ASI	-1.46	7.70	0.98	864141
AMSR2/BT	7.71	11.84	0.96	927216
FY3B/NT2	9.67	15.29	0.94	890505
FY3C/NT2	9.03	14.06	0.95	887158

Monthly SIC error metrics between PM SIC products and ERA SIC in Arctic



Comparison of monthly SIC with ERA-Interim in Antarctic

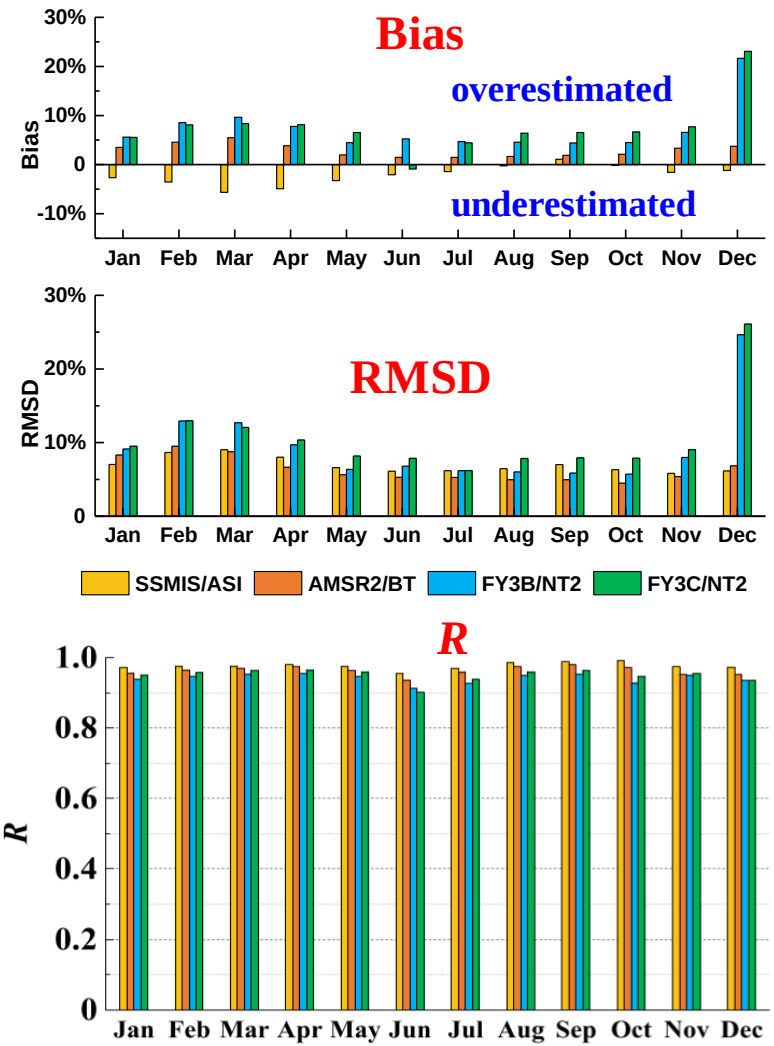
Daily average PM and ERA SIC products in the period of 2015-2018



Metrics of monthly SIC between four PM SIC and ERA SIC in Antarctic

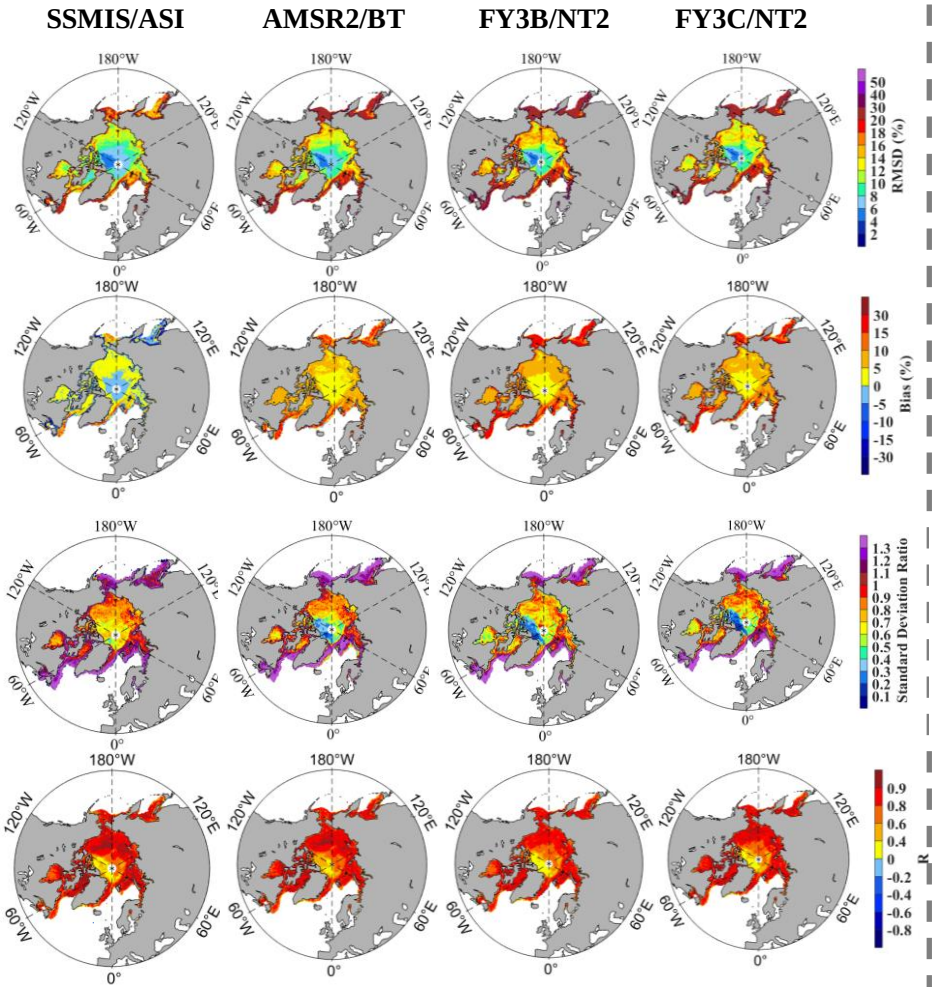
Products	Statistical metrics			
	Bias(%)	RMSE(%)	*R*	*Sample*
SSMIS/ASI	-2.13	6.95	0.98	1176532
AMSR2/BT	2.96	6.34	0.98	1200084
FY3B/NT2	7.31	9.50	0.95	1197869
FY3C/NT2	7.55	10.49	0.98	1189621

Monthly SIC error metrics between PM SIC products and ERA SIC in Antarctic

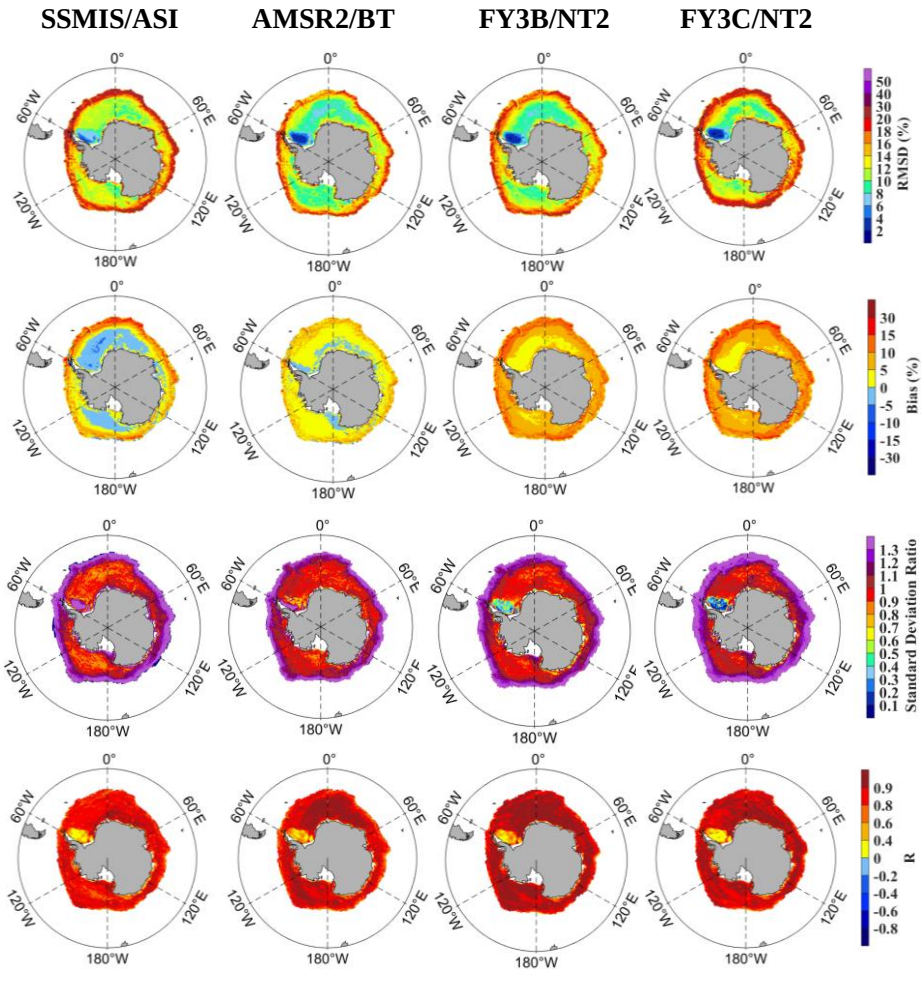


Comparison of annual SIC with ERA-Interim in Arctic

Arctic region

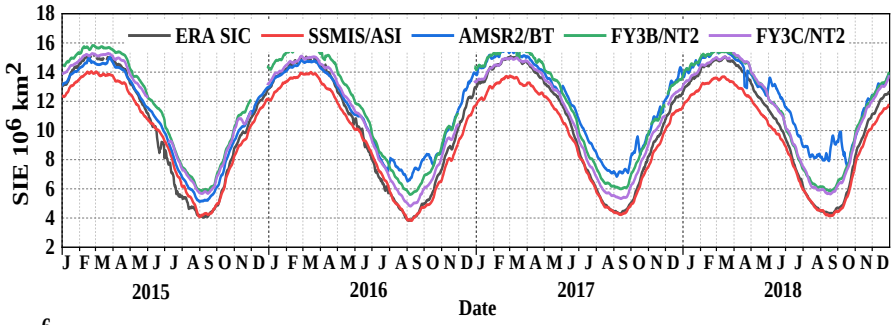


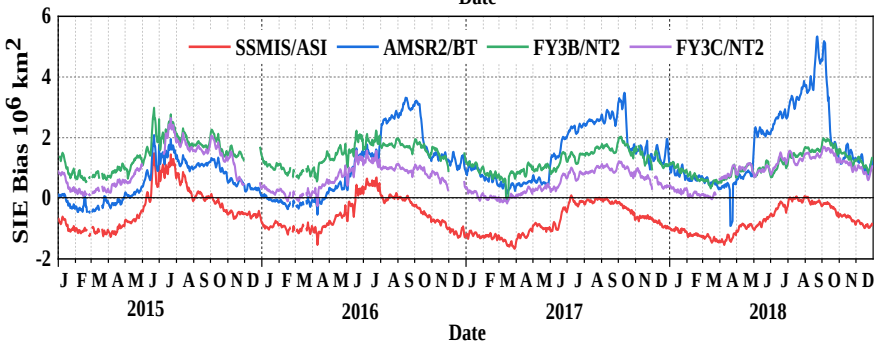
Antarctic region

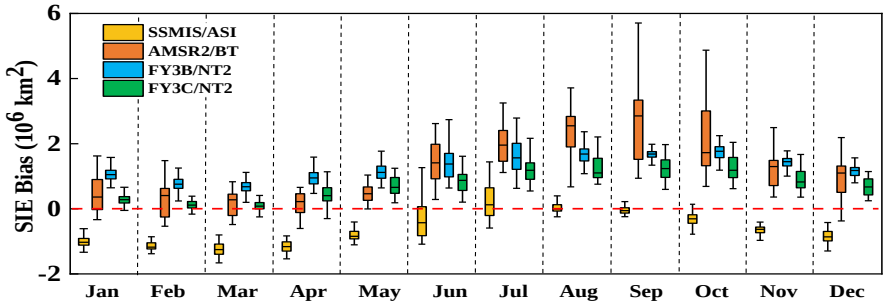


Comparison of daily sea ice extent (SIE)

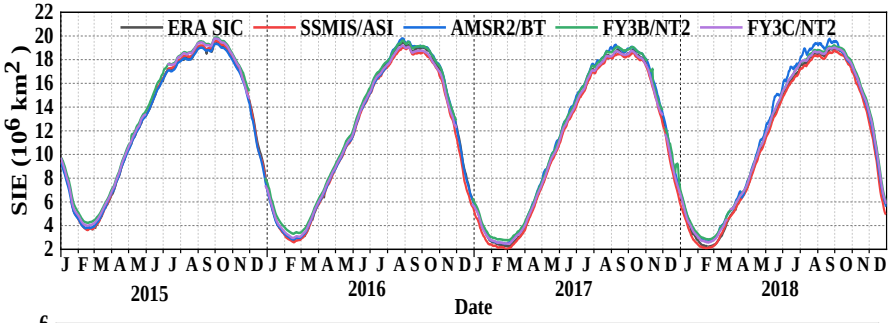
Arctic region

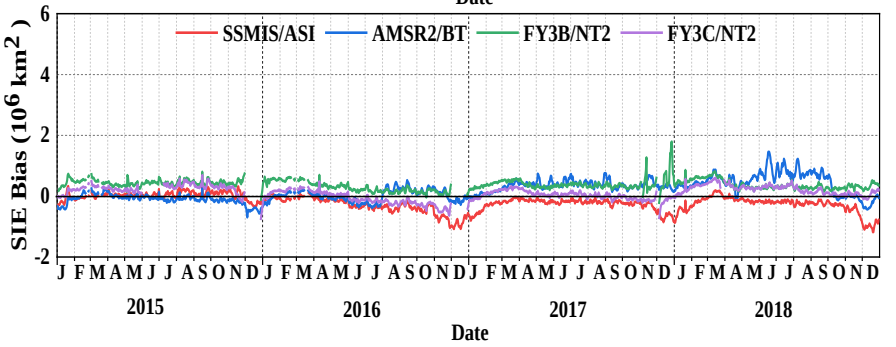


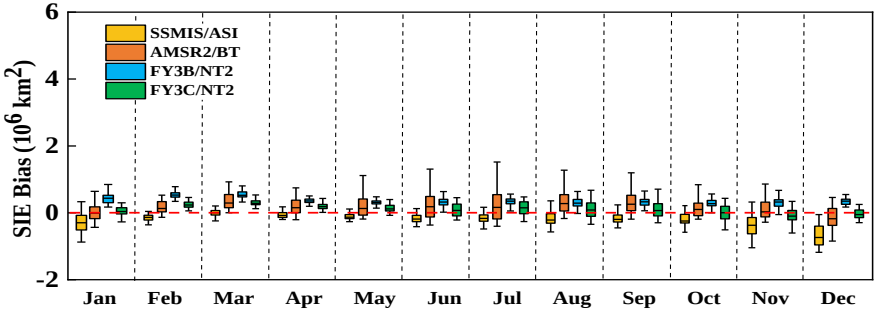




Antarctic region

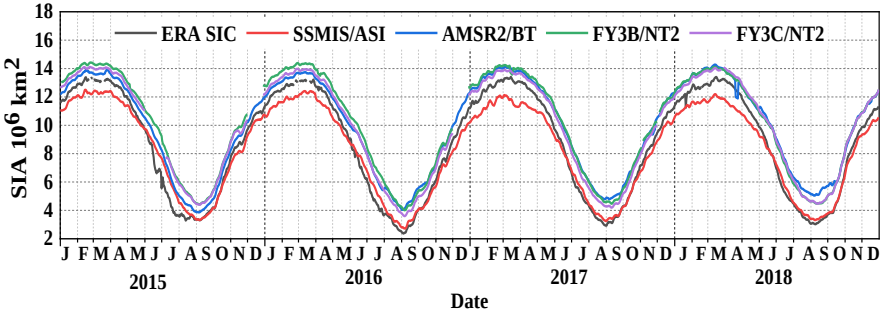


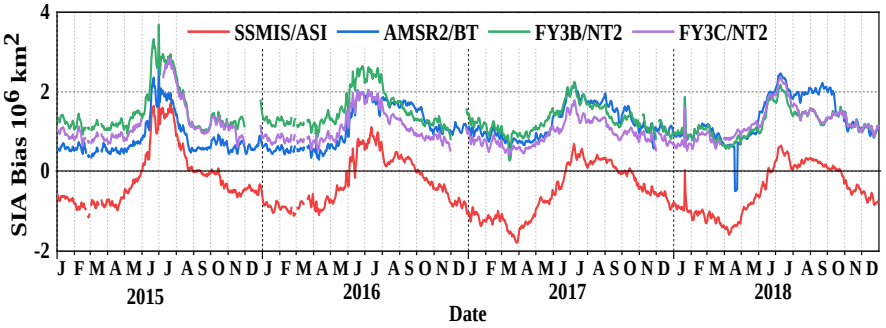


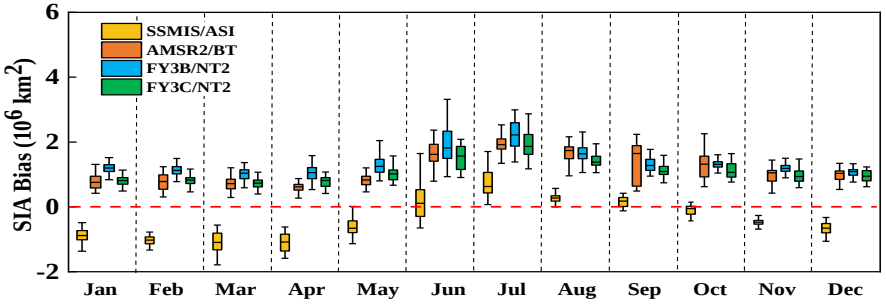


Comparison of daily sea ice area (SIA)

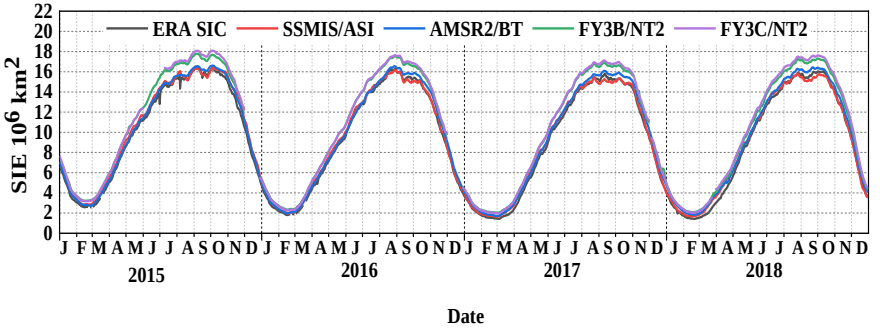
Arctic region

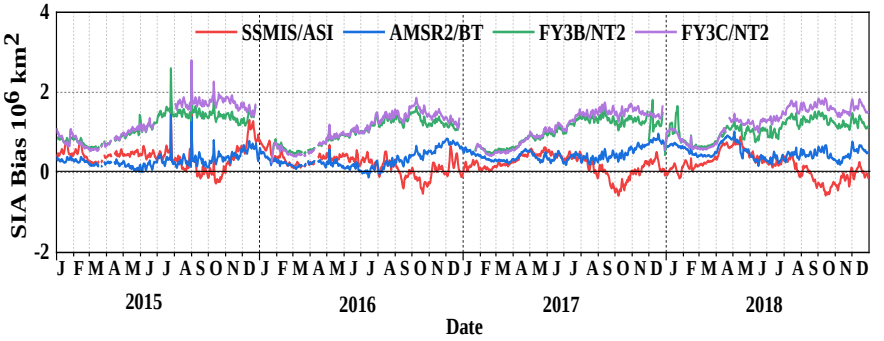


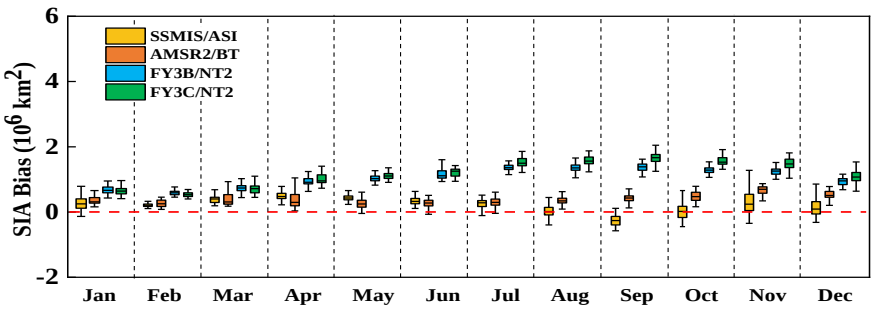




Antarctic region







CONCLUSION

- The spatial patterns of four PM SIC products (i.e., SSMIS/ASI, AMSR2/BT, FY3B/NT2 and FY3C/NT2) generally agree well with ERA-Interim SIC.
- The most noticeable difference for all the four PM SIC products mostly occurs in summer and marginal ice zone, indicating that large uncertainties exist in satellite SIC products in such period and areas.
- The skill of PM SIE and SIA varies seasonally, and the discrepancy between PM and ERA-Interim data is larger in Arctic than in Antarctic.
- Compared with ERA-Interim data, the SSMIS/ASI performs the best in Arctic but underestimates SIC, while AMSR2/BT performs the best in Antarctic but overestimates SIC.
- The hybrid of multiple algorithms is a promising way to improve the accur acy of SIC retrievals.

ACKNOWLEDGEMENTS

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- This work was supported by the National Key Research and Development Program of China (No. 2018YFA0605403). Jiangyuan Zeng was supported by the Youth Innovation Promotion Association CAS (No. 2018082).

- The authors thank the University of Hamburg, University of Bremen, and National Satellite Meteorological Centre (CNSMC) for providing the satellite sea ice concentration products, and the European Centre for Medium-Range Weather Forecasts (ECMWF) for providing the ERA-Interim dataset.