

## Summary of the medium-range forecast of the Arctic sea ice

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Sea ice is a vital component of the global climate system. We need to monitor the current condition of sea ice and to predict the future change of it. Especially, summer Arctic sea-ice extent has shrunk in recent years. This reduction enables us to use the new shipping route through the Arctic. Ice forecast is necessary for usage of the route.

We have developed a way to predict the ice cover in summer Arctic and released the medium-range (seasonal) forecast of the ice cover (e.g. [https://csr.aori.u-tokyo.ac.jp/~kimura\\_n/arctic/2020-1.html](https://csr.aori.u-tokyo.ac.jp/~kimura_n/arctic/2020-1.html)). The first report of the forecast predicting the daily ice cover from July to September was released in May. The prediction is based on the relationship between winter sea ice motion and summer ice concentration (Kimura et al., 2013) using a daily sea ice data from 2003 observed by the satellite microwave sensors Advanced Microwave Scanning Radiometer-Earth Observing System (AMSR-E) and AMSR2 images. The method of the prediction has been improved from year to year, in the consideration of long-term trend, initial ice thickness, ice age and exceptional events.

This study validates the accuracy of the prediction by focusing on the ice concentration anomaly from the climatological mean (Figure 1), and the opening date of the sea route (Table 1). We aim to reveal the strong and weak points of the each prediction method and improve the method for the coming years.

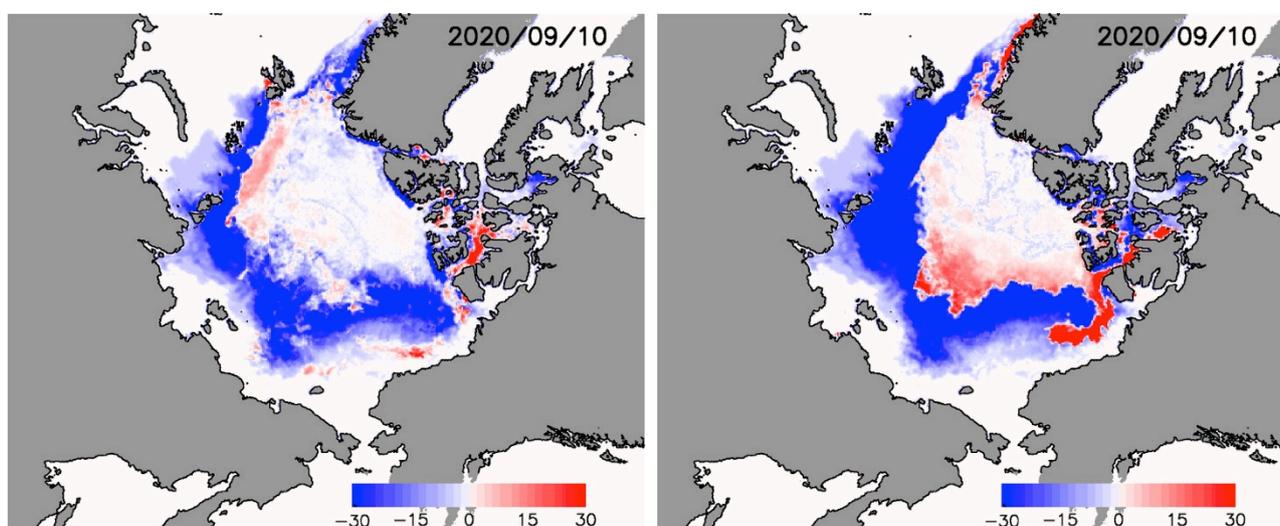


Figure 1. Anomaly of the predicted (left) and observed (right) ice concentration from the 2003-2020 mean, for an example of September 10, 2020.

Table 1. Forecasted and observed opening date of the Northern Sea Route

Year	Forecast	Observation	Difference
2015	August 24	August 16	+8 days
2016	August 25	August 31	-6 days
2017	August 20	August 23	-3 days
2018	August 15	August 15	0 day
2019	August 15	August 9	+6 days
2020	August 1	August 2	-1 day

### References

Kimura, N., A. Nishimura, Y. Tanaka and H. Yamaguchi, Influence of winter sea ice motion on summer ice cover in the Arctic, *Polar Research*, 32, 20193, 2013.