NowIce – Predicting transit times of ships in winter navigation

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Logistics planning requires accurate estimates of transportation times. This is difficult in wintertime when sea ice causes merchant vessels to be delayed as a consequence of slow down due to ice resistance, longer voyages or due to idling waiting for icebreaker assistance.

Satellite images give a good overall view of the ice situation. To get a quantitative estimate of the travel times, it may be more useful to build the estimates based on observed slow downs of ships that have recently traversed the same waters and use this information as the input to the estimation algorithm. The slow down of the ships is obtained by analyzing archived AIS data collected during the target week. The slow down of a ship is measured as the average speed in ice compared to the open water speed of the same ship.

To test the accuracy of such an approach we have performed a series of tests based on 8 days in March 2013 with rather severe ice conditions in the Baltic Sea.

The test is done for all ships not in port, calculating their position with 1 h intervals, then looking forward 2, 6 and 12 hours and estimating the travel times from the starting position to the future position. A comparison in then done between estimated and real times thus obtaining a quantitative estimate of the forecasting algorithm.

Although the result cannot be directly applied to arrival time estimates, it gives an indication of the accuracy of predicting travel times based on the performance of ships that have recently steamed in the same regions and may thus be used to guide the development of services that improve logistics planning.

References:

[1] Berglund, R. and Molinier, M. 2012. *IceTrafPrep — a feasibility study of a trafficability ice chart service.* Winter Navigation Research Board report 80.

[2] Lensu, M., and Kokkonen, I. 2017. *Inventory of ice performance for Baltic IA Super traffic 2007 - 2016.* Winter Navigation Research Board report 95.