Shipping Trends in Arctic Waters using six years of SAT-AIS data

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ABSTRACT

The objective of this paper is to present geographic variations as well as temporal trends in shipping in the Arctic. The AIS data collected with AISSat-1 and AISSat-2 since 12 July 2010 and 8 July 2014, respectively, serve as basis for the count of the number of unique ships observed per month. The analysis is done within various geographic areas for vessels using AIS class A and B equipment, and results are also made for each flag state.

North of the Arctic Circle the counts are made both for the entire area and for eight sectors of 45° longitude. In general there are distinct seasonal variations as well as an increase in the number of ships for a given month from year to year. For the entire Arctic, a monthly linear-trend analysis of the number of ships per month from 2011 – 2015 shows that the largest monthly increase is in June, 203 ships per year; the smallest increase is in February, 124 ships per year. The number of ships peaked to 2,385 in August 2016, and the latest minimum was 1,733 ships in December 2015. The summer of 2016 shows a more flat curve than earlier years, and in September (the latest month analysed at present) the total number of ships was for the first time lower than in the same month the previous year. Class A and B have different seasonal variations: Whereas class A peaked to 1,967 ships in August 2016, class B peaked to 740 ships in March 2016. Class B constituted 35 % of the total in March and 18 % in August.

The analysis made for geographic sectors shows that 97 % of the ships are in the sector from 0E° – 45°E in winter and 72 % in summer; the sector partly consists of sea areas heated by the Gulf Stream, from off the coast of Norway up to Svalbard. The second highest number of ships per month is found from 45°E – 90°E, north of Russia; in this sector the largest relative growth is found. The sectors from 45°W – 180°W, north of America, have the fewest months of shipping per year and also show larger annual variations; even though the five-year trend shows growth in number of ships, the data do not match a linear model well.

The shipping inside the Arctic-waters delimitation of the IMO Polar Code has also been studied. The number of ships per month shows strong seasonal variations: The minimum in winter has been in the range 200 – 350 ships per month; summer has peak values growing from 930 ships per month in 2010 to 1,400 in 2016.

Ship counts made on a 1°x1° grid show the ship density, whereas the sum of the ship counts over all the grid cells, referred to as ship-months, is used as an aggregated figure for the shipping intensity. The ranking of the flag states present in the Polar Code polygon by ship-months shows that, in addition to the Arctic countries, flag states such as the Netherlands, Bahamas, Panama and Hong Kong (China) are present.

Analysis of temporal trends up till first quarter 2017 will be done before the conference and shown in the presentation, as will examples of ship-density maps and the number of ships per flag state.