Vessel tracking using Automatic Identification System data in the Arctic

Torkild Eriksen and Øystein Olsen

ShipArc2015

Malmö, 26 August 2015

Content

- Use of SAT-AIS data from AISSat-1 and AISSat-2 for trend analysis as well as situational awareness
- Number of ships per month north of 67°
 - In the entire area north of 67° (Arctic)
 - In sectors of 45° longitude
 - By flag state
 - By ship type
- Number of ships through the Northeast Passage
- Ship densities and tracks
- Quality of SAT-AIS service

Views on the Arctic, sea ice, and ship traffic

Number of ships per month

- 5 years; class A, B, and total number of ships

Number of ships per month

- 4 years; monthly trend lines (August example)

Number of ships per month

- Average annual growth (from trend lines)

Number of ships per month

- 2015; Observations and prediction intervals

Number of ships per month

- 2015; Observations and prediction intervals

Number of ships per month

- 5 years; by ship type

Geographic distribution in 45°-lon sectors - 5 years; total number of ships

Geographic distribution in 45°-lon sectors - 5 years; total number of ships (zoom)

Geographic distribution in 45°-lon sectors - growth in total numbers from 2013 to 2014

	-157.5	-112.5	-67.5	-22.5	22.5	67.5	112.5	157.5	Total
Jan	1	1	3	-2	204	9	0	1	217
Feb	0	1	6	-10	163	-10	1	2	153
Mar	-2	0	3	-15	218	29	-2	0	231
Apr	1	1	4	-25	204	7	3	3	198
May	1	-1	9	-7	141	9	8	-2	158
Jun	4	-2	10	1	142	85	8	3	251
Jul	-10	-5	23	36	144	108	9	12	317
Aug	2	5	18	29	195	149	14	27	439
Sep	4	2	15	11	166	157	23	27	405
Oct	-1	1	11	1	164	117	-6	1	288
Nov	-3	0	16	12	153	4	0	-1	181
Dec	-1	3	5	-12	138	31	0	-2	162
Total	-4	6	123	19	2032	695	58	71	3000

Geographic distribution in 45°-lon sectors - growth in total between 2011 and 2014

Geographic distribution in 45°-lon sectors - growth in total between 2011 and 2014 (zoom)

Geographic distribution in 45°-lon sectors - relative growth in total between 2011 and 2014

Number of ships counted by flag state - August 2014 in the entire Arctic north of 67°N

Number of ships counted by flag state - August 2014 in sectors of 45° longitude

Ships crossing the Northeast Passage - 5 years; Count of ships per month

Ships crossing the Northeast Passage

- 5 years; Total ship-months with uncertainty

Observed total annual ship-months with prediction interval
as well as prediction for 2015

Seasonal variations in ship tracks

August
2014

November
2014

February
2015

May
2015

Annual ship densities in July 2011 - 2014

July 2011

July 2012

July 2013

July 2014

Ship tracks on 14 August 2014

Ship positions coloured by the number of observations for each ship

Quality of service parameters distributions

Summary

- The number of reporting ships per month has varied from 1073 (December 2010) to 2272 ships (August 2014).
- The growth in number of reporting ships varies with month; from 113 at the minimum in November to 201 ships/year at the maximum in July.
- The growth is partly due to changes in regulations, i.e. EC 1224/2009 (the Control Regulation) by 31 May 2014 all fishing vessels above 15m.
- The highest number of ships are in the 0-45°E sector, 1723 of 2272 ships in August 2014. The annual growth has been around 10%.
- The highest relative growth is in the following three eastern sectors, having an average growth between 15% and 24% per year.
- Monthly ship-type counts give 600 fishing vessels, 430 cargo ships, 120 tankers, 100 passenger ships, 100 tugs and 280 other ships (in 2014).
- Up to 1200 vessels are observed per day, of which 1100 are using AIS Class A and 100 Class B.
- The median number of position updates per ship per day are typically 13 and the largest daily time gaps are smaller than 6.7 hours.

Number of ships counted by flag state - August 2014 by sector

Number of vessels v.s. month and flag in the sectors
Class A, August 2014