

Trends and seasonal variations in Arctic shipping activities from five years of satellite AIS data

6th Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations

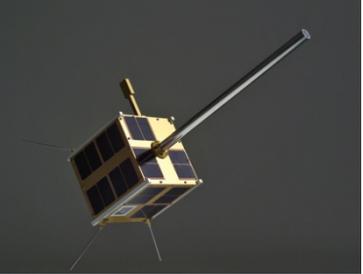
July 15th, 2015

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The AIS System

- AIS is a marine anti-collision system
- Ships exchange data: Position, course, speed, identity ++
- Mandatory for all SOLAS Class A vessels
- Quickly put to use as a coastal traffic monitoring system





AISSat-1

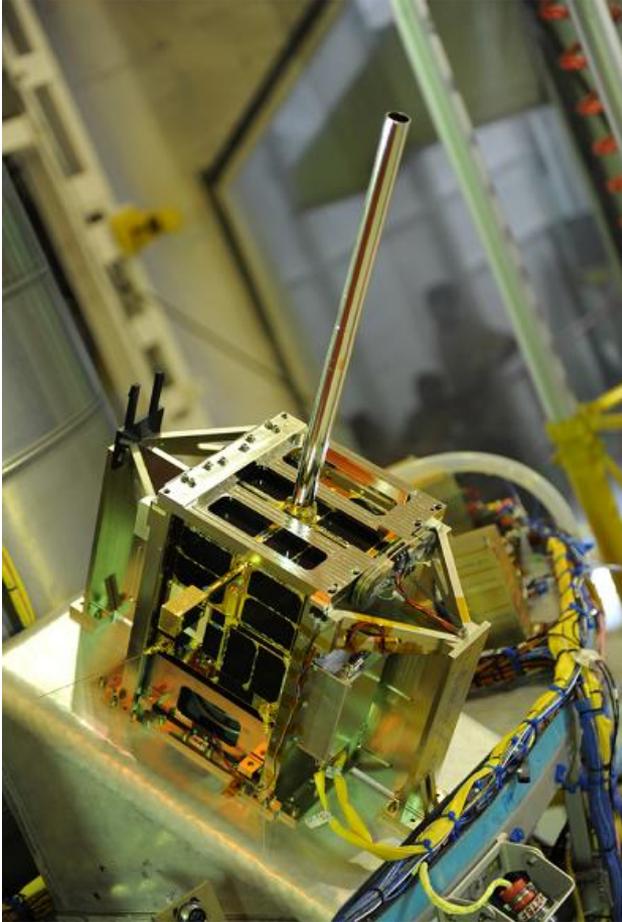
- National demonstration of wide area maritime surveillance
- Project Leader: FFI
- Industry partners: Kongsberg Group
University of Toronto
- Government partners:
 - Norwegian Space Centre – funding
 - Norwegian Coastal Administration – Data management and dissemination





AISSat-1 launch from India

03:52 UTC, July 12th 2010

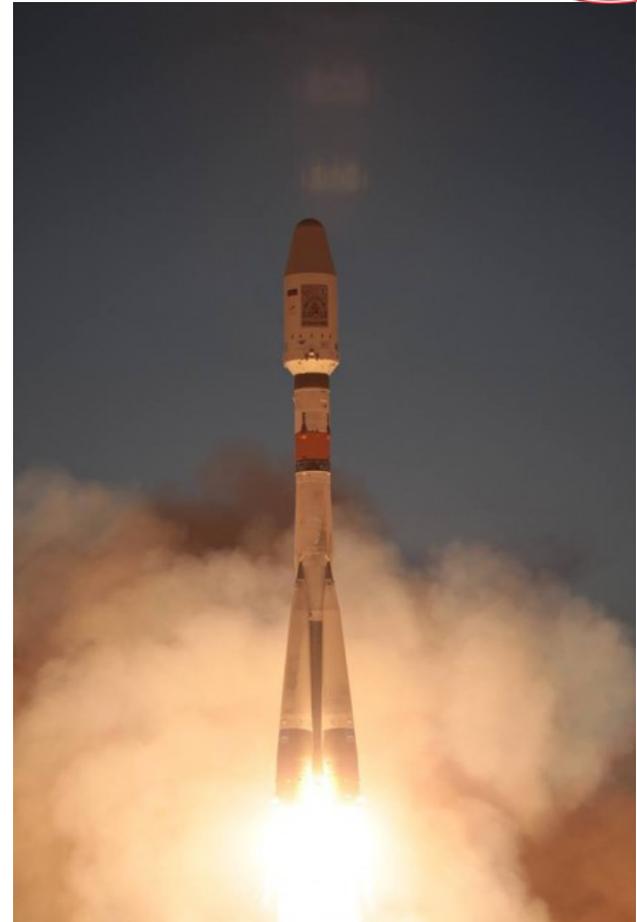
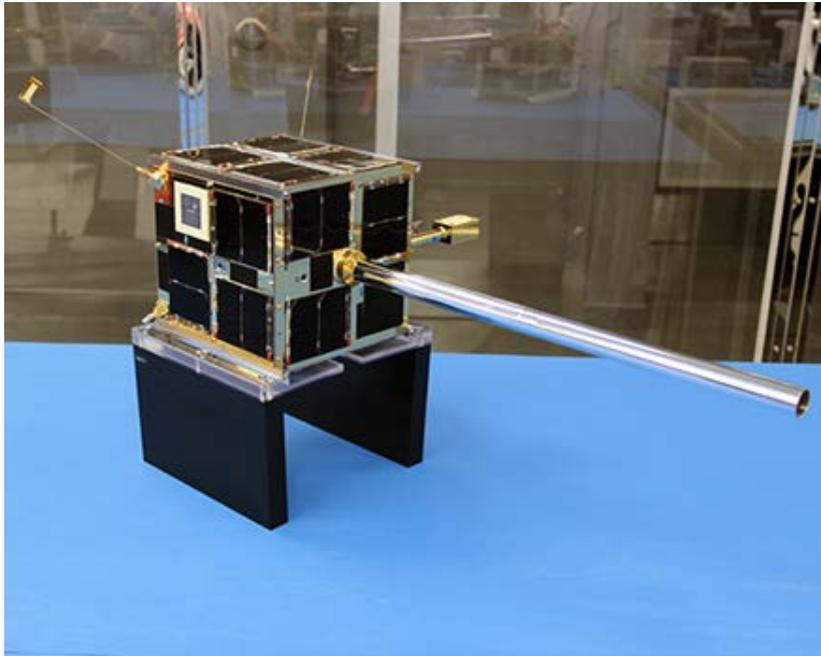


20 cm x 20 cm x 20 cm



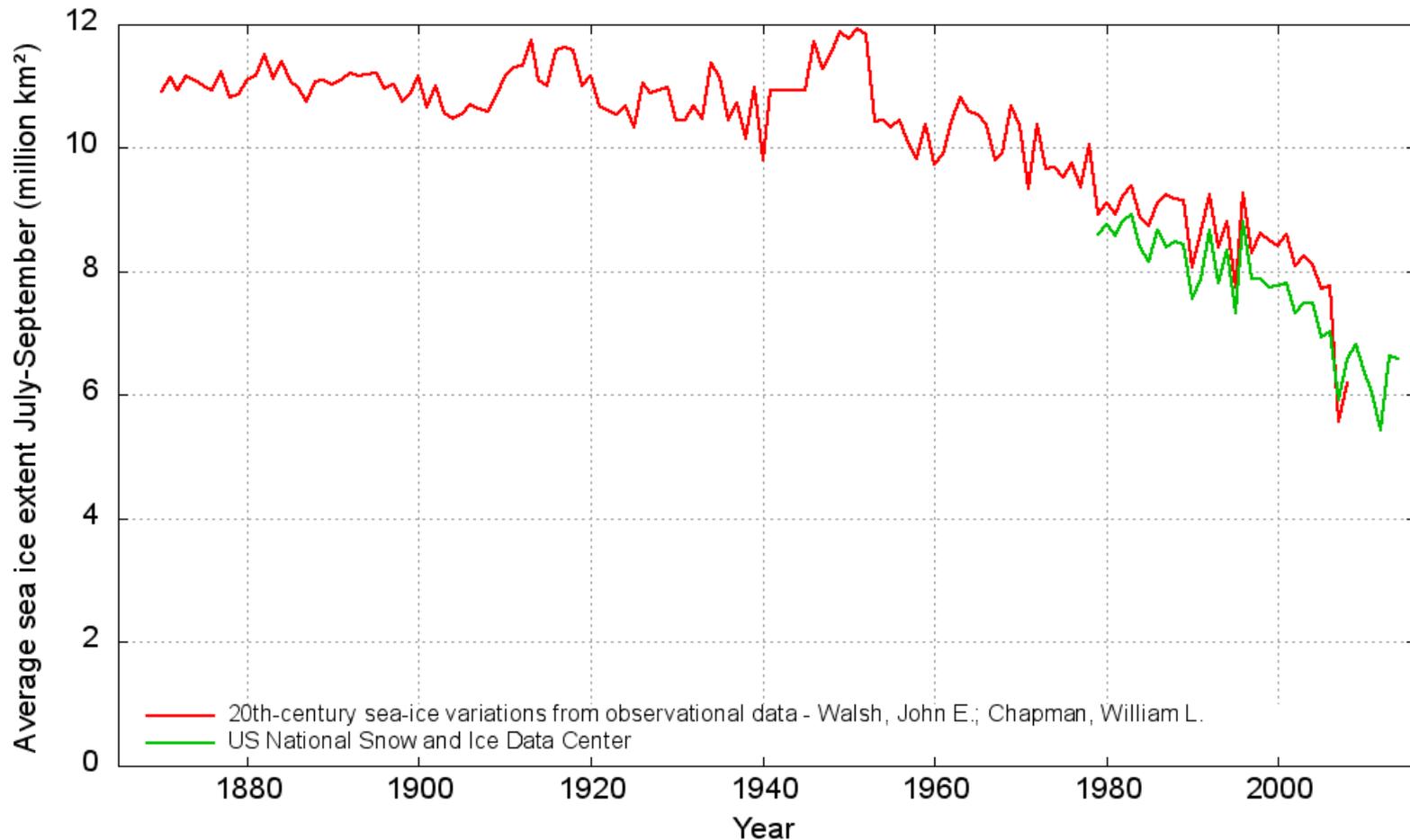
Placed into a 635 km Circular Polar Orbit

AISat-2 launched from Baikonur 15:58 UTC, July 8th 2014

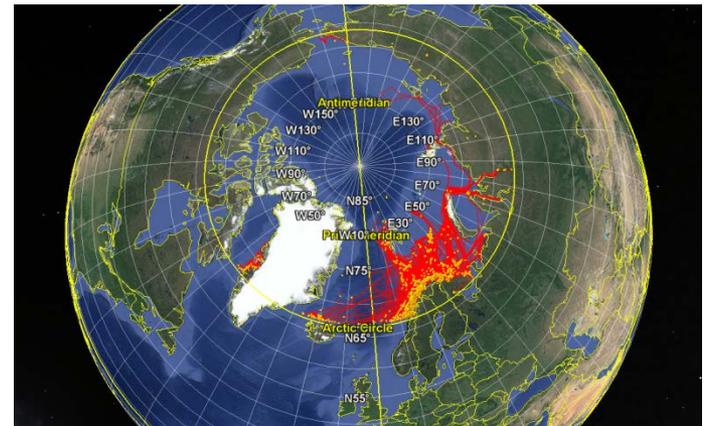
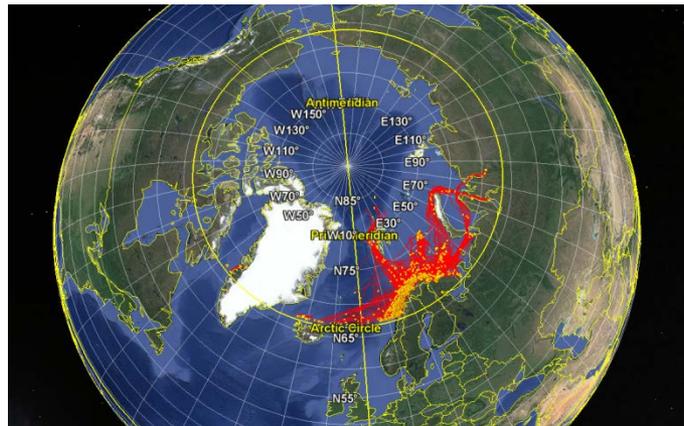
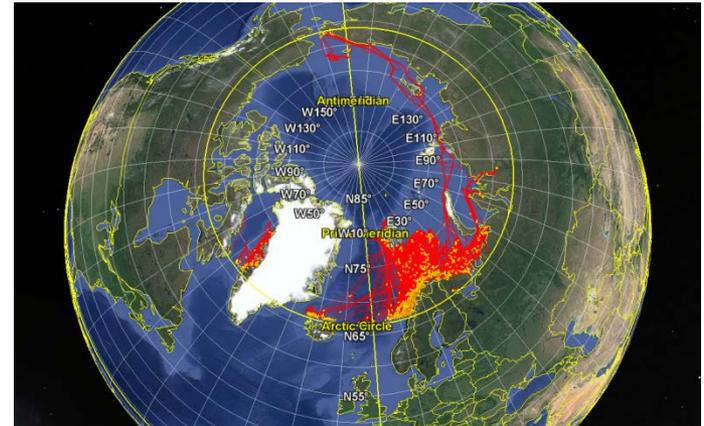
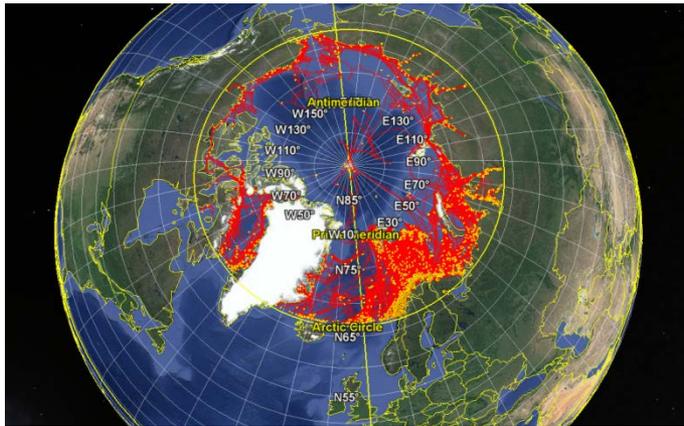


Bilde: Roscosmos

Changing conditions – Arctic sea ice extent

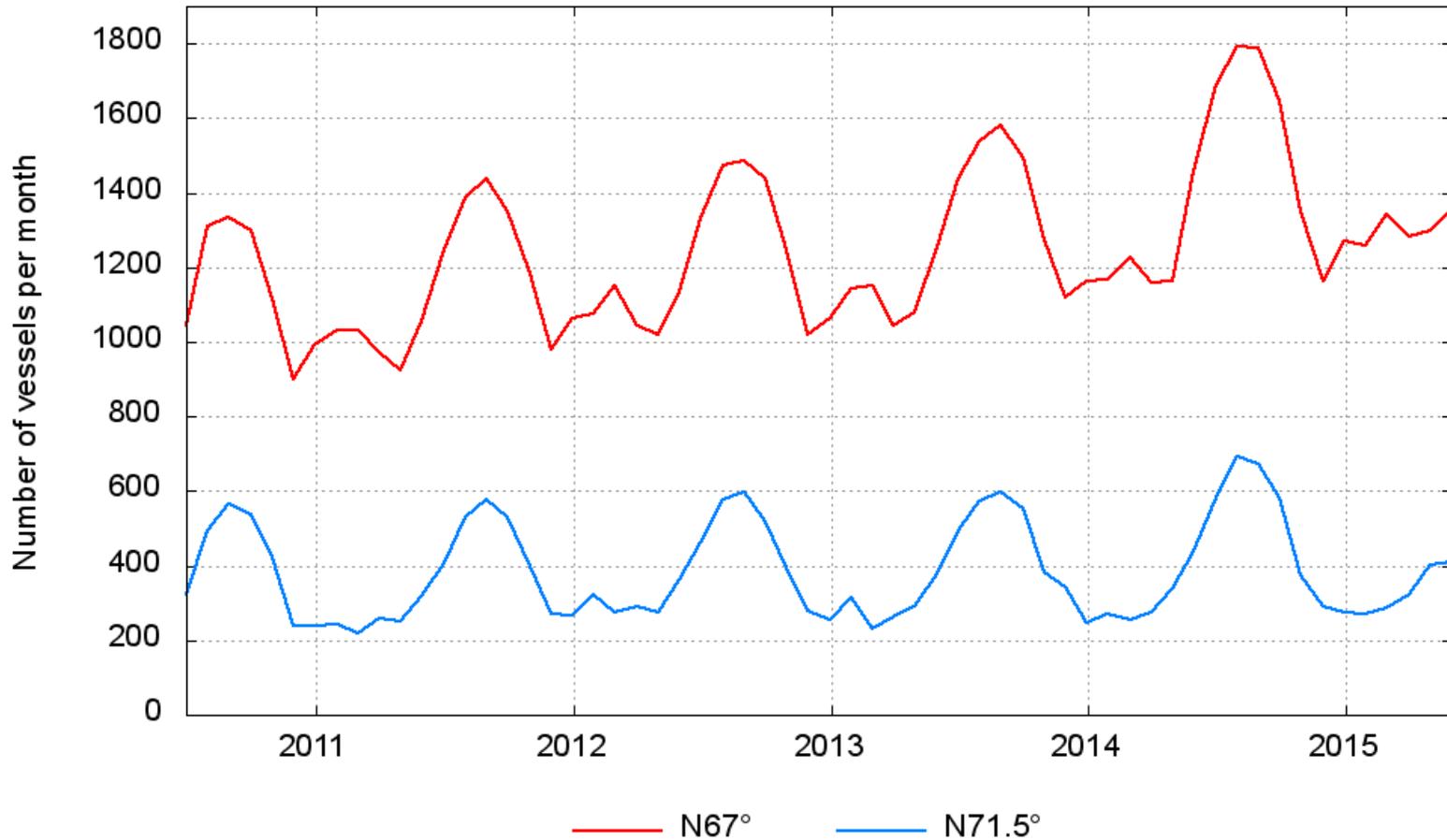


Changing conditions – Seasonal variations



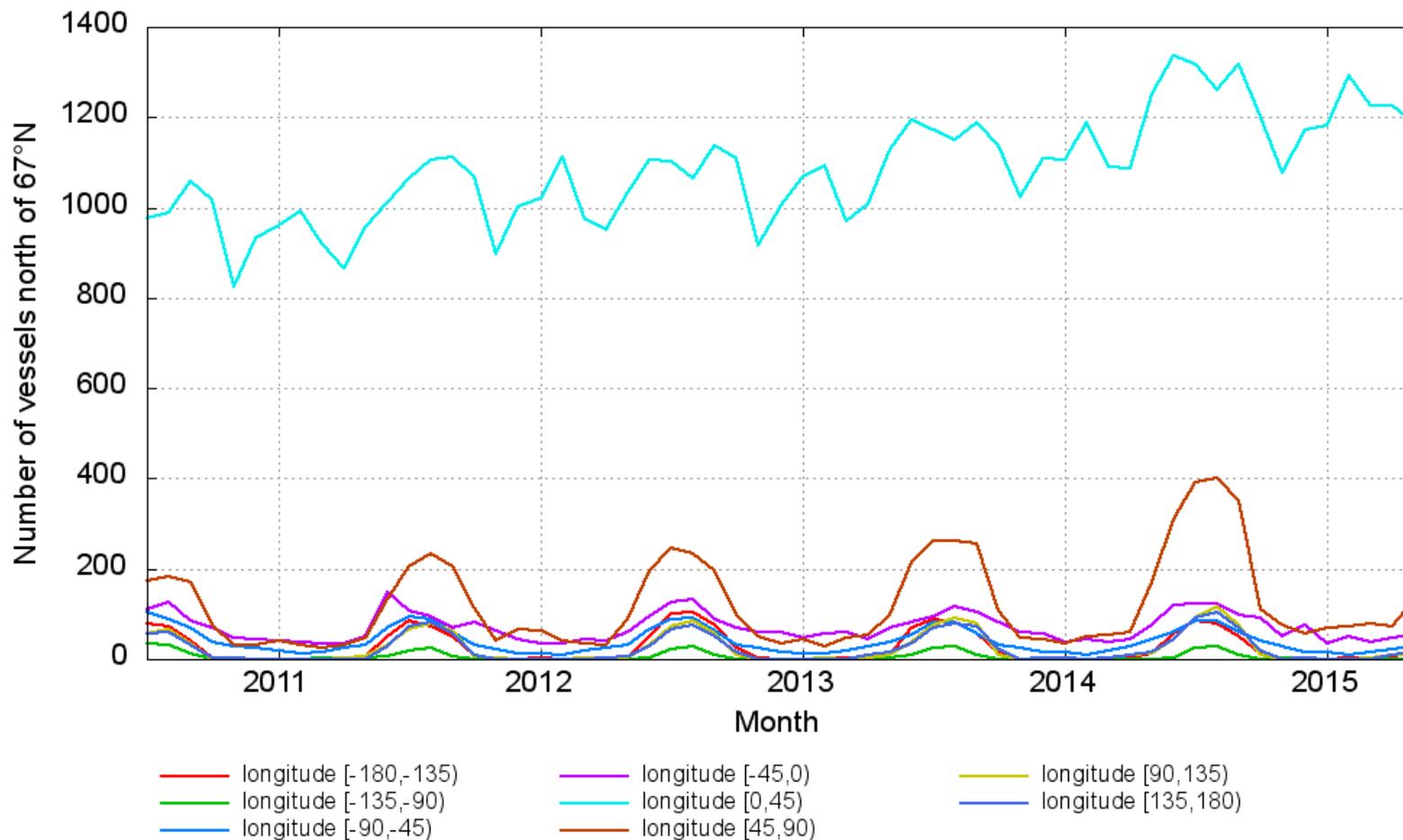
Vessel tracks August 2014, November 2014, February 2015 and May 2015

Number of vessels



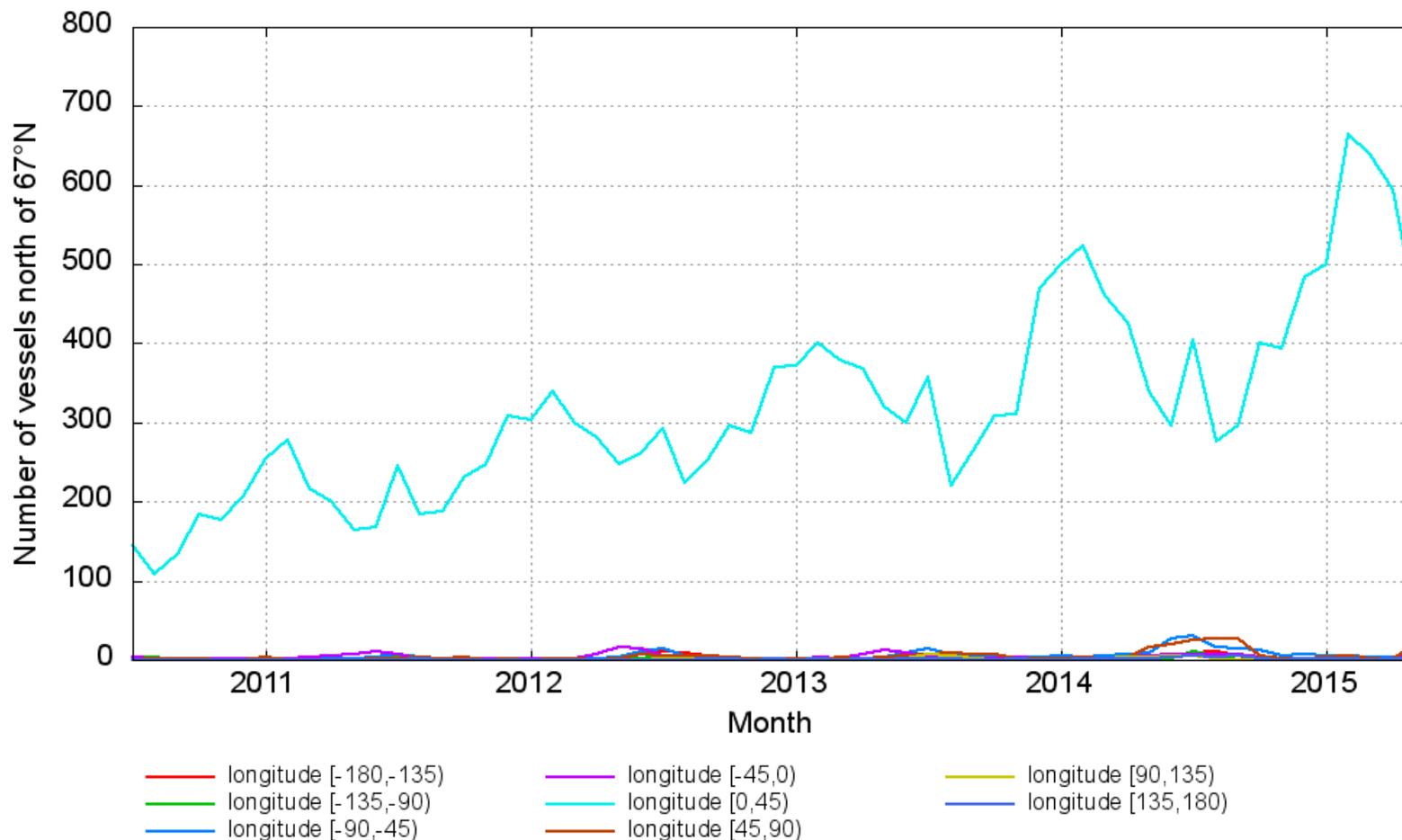
Total number of detected vessels per month north of 67°N and north of 71.5°N.

Number of vessels



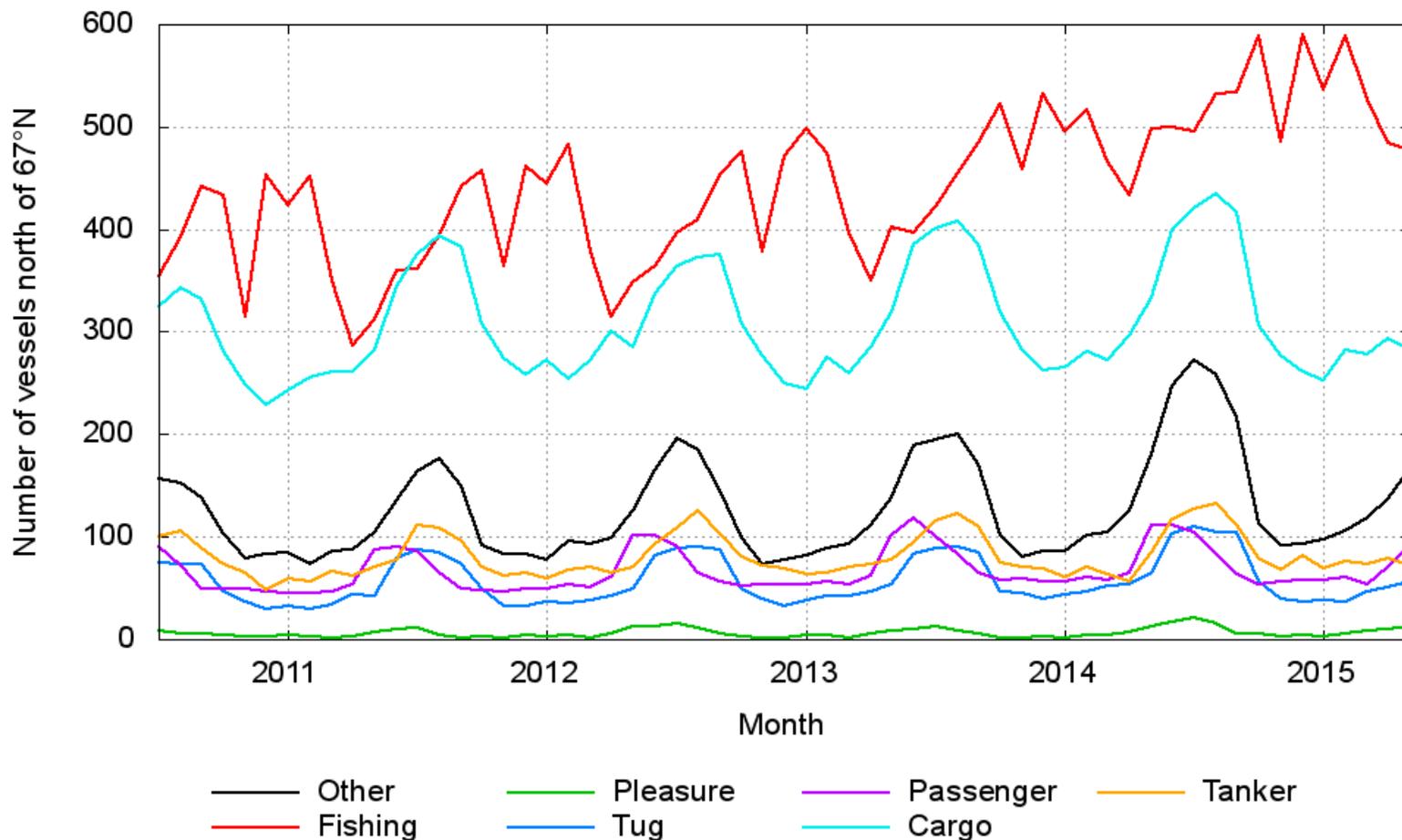
Total number of vessels per month in 45° sectors of longitude north of 67°N.

Class B – small fishing and leisure vessels



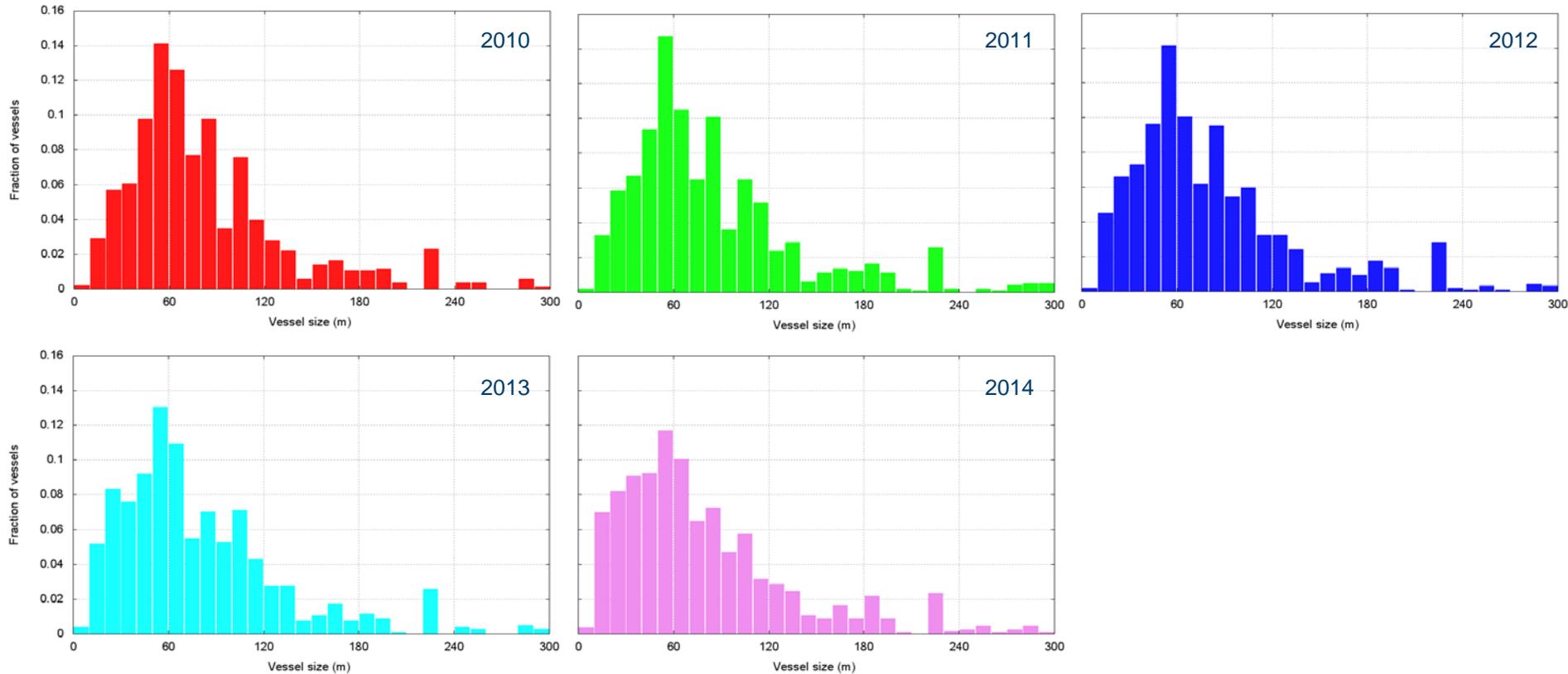
- Trend is likely due to more people acquiring Class B transponders than any growth in the number of vessels
- No class B vessels near Svalbard in the winter, around 20 vessels in August 2011 and 40 in August 2014.
- Spike in August is probably caused by leisure vessels

Vessel types



- **Cargo and tankers:** Seasonal variation east of the Kola Peninsula.
- **Passenger ships:** Increasing numbers in the High Arctic (Svalbard)
- **Fishing:** Regulatory changes in Europe forced smaller vessels to acquire class A equipment by May 2014

Vessel sizes (September)

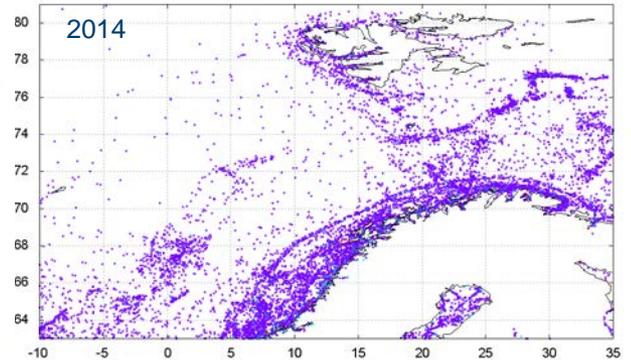
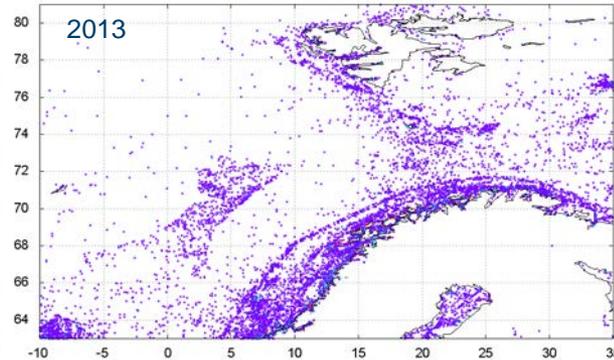
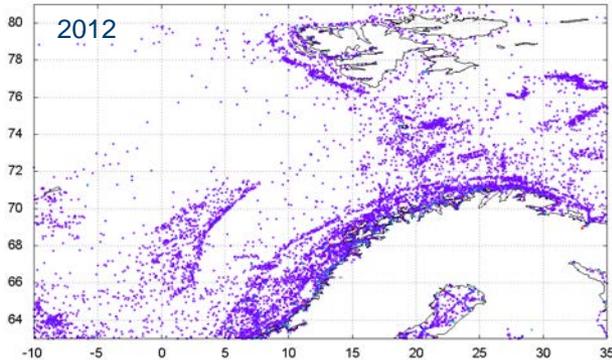
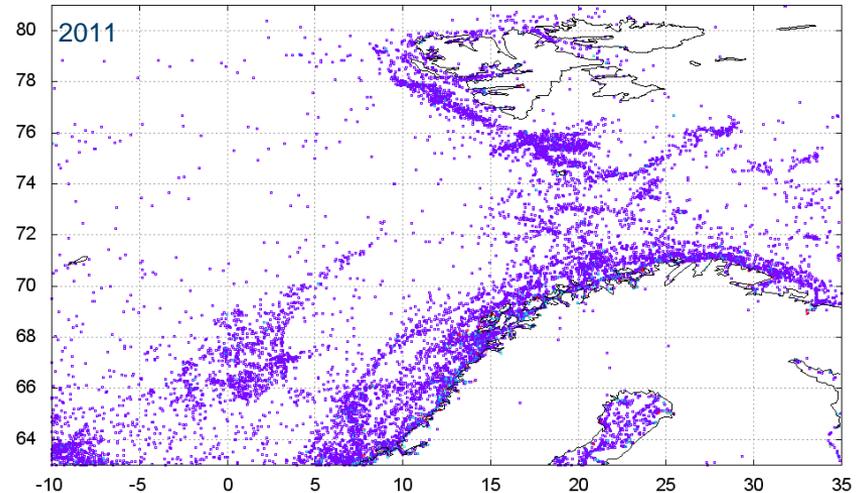


- During the last four years the median vessels size has decreased with 5 – 7 meters in the months August through December
- No year by year trend in the winter months
- No year by year trend north of 71.5°N
- Smallest vessel median sizes in May and June, largest in August and September
 - Difference is around 10 meters

Geographical distribution (July)

Probability of seeing a vessel on any given day on July 2011-2014:

- Large variations in the Banana Hole (Smutthavet)
- Fewer fishing vessels west of Svalbard and north of the Bear Island
- Fishing fleet moves towards cooler waters as the waters warm up



Northern Sea Route

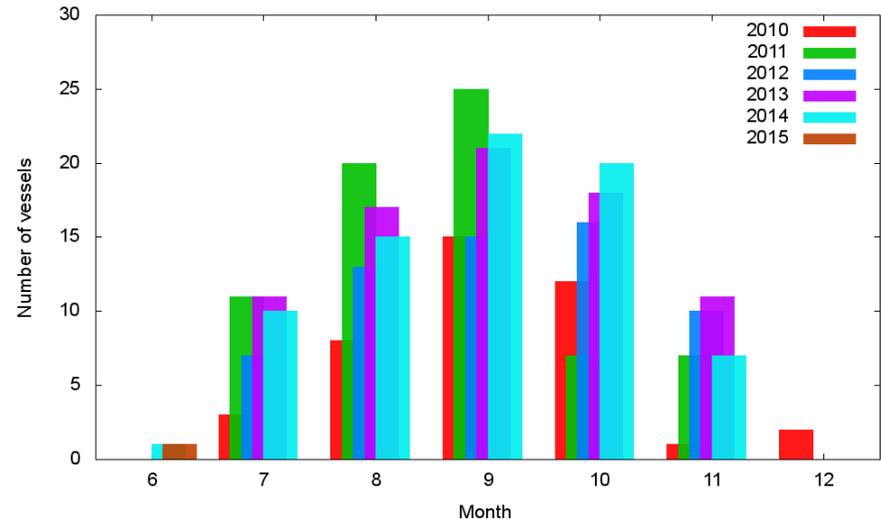
No trend in the total number of vessels.

Basic infrastructure is missing:

- Network of weather stations and bases for repair of ships
- No new Russian ice breakers expected before 2020
- Long response times to emergencies
- New vessels needed to handle the conditions

(Arctic-info, Infrastructure of the Northern Sea Route and Environmental Protection in the Arctic)

One of the largest industrial project in the Arctic (Yamal LNG) is scheduled to come online by 2017 and with full capacity by 2021. It will use 16 vessels for year round LNG transport.



Summary

The number of detected vessels in the Arctic has increased over the last five years. Regulatory changes for fishing vessels caused at least some of this increase.

There are regional trends:

- Increasing number of passenger and leisure vessels around Svalbard
- Increasing number of cargo vessels east of the Kola peninsula
- Fishing "fleet" in the Banana Hole changes from year to year

The Northern Sea Route shows no trend in the data. It will not be a significant transport route in the next few years due to missing infrastructure and due to the relative high cost of sailing this shipping lane.

A wide-angle photograph of a snowy, flat landscape at dusk. Several large, spherical radar domes are scattered across the scene, each illuminated from within, casting a warm glow. The sky is a deep, clear blue. In the background, there are low, snow-covered hills or mountains. The foreground shows the texture of the snow, with some tracks or depressions.

Thank you for listening!

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