

Arctic navigation support by Weathernews

Weathernews Inc.

SAGAWA Genki



27-28 June 2018

3rd Top of the World Arctic Broadband Summit, Sapporo

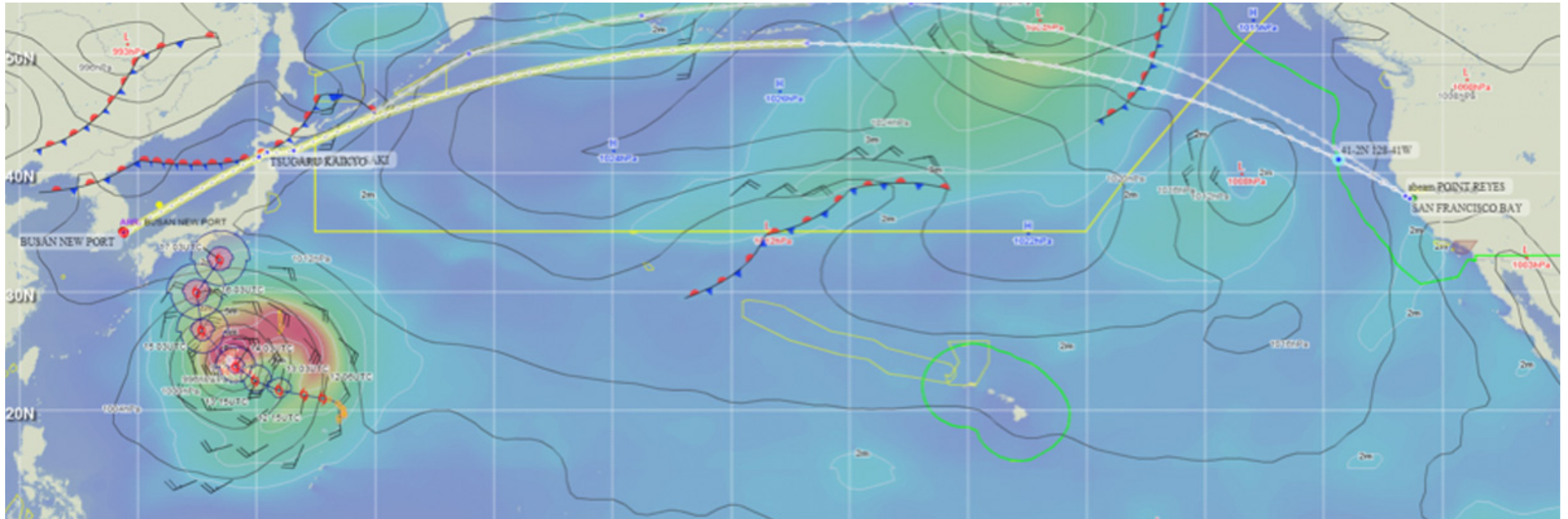
Our company

Founded	June 11, 1986
Headquarters	Chiba, Japan
Capital stock	1,706 million yen
Consolidated sales	14,542 million yen (2016 FY)
Number of employees	826 (May 31, 2017)
Number of offices	34 offices in 21 countries



Weather service for voyage planning

- Supporting more than 6000 vessels on each day
 - Voyage plan management by weather / ocean / ice information





Traffics in Northern Sea Route

01 Sep 2016 00:00

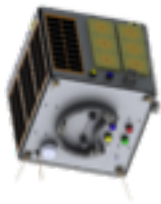
Arctic Navigation Service History

- 2010
- Arctic ice information (1 voyage)
- 2011
- NSR(Northern Sea Route) navigation support
- 2012
- 2013
- 2014
- 2015
- 1-10 voyages / year
 - Transit voyages →
- 2016
- 100 voyages / year
 - Transit voyages (10%)
- 2017
- Destination voyages (90%) → **YAMAL LNG Project**
- 2018
- Arctic LNG transportation support



Arctic navigation support service

Data

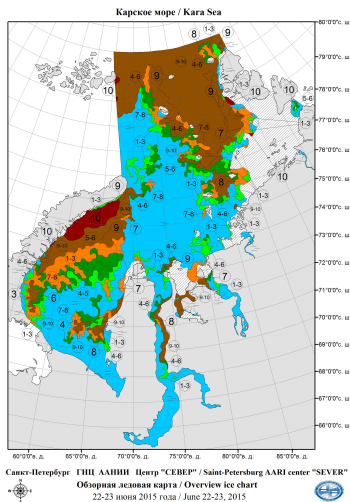


Satellite



Model
forecast

Ice chart



Risk

Sea ice



Icing



Action

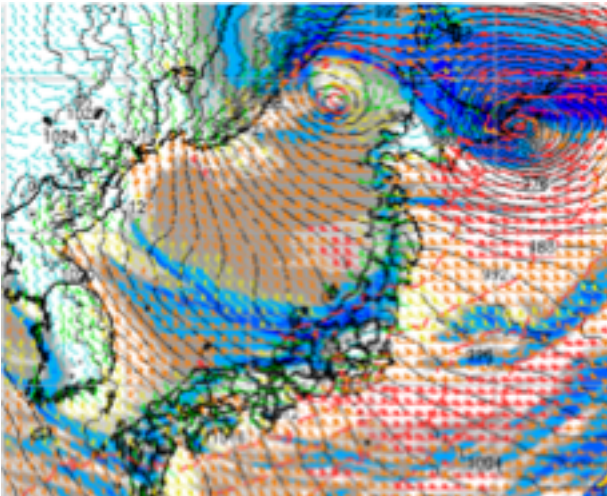
Go/NG

Route
Optimization

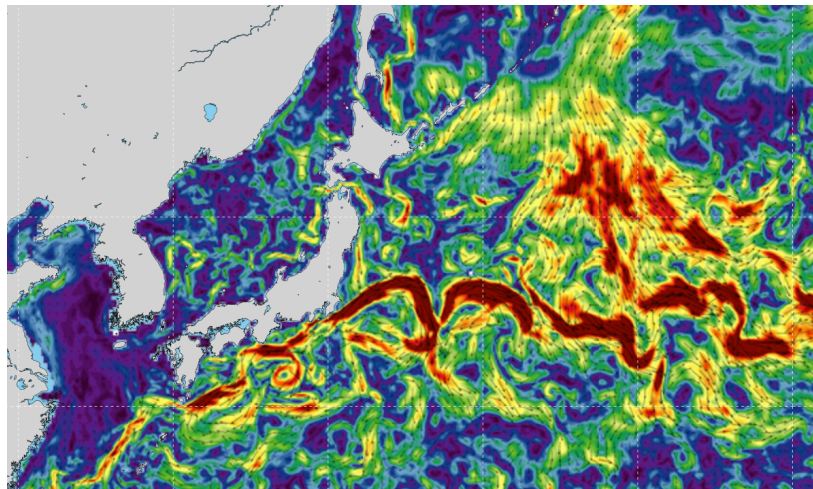
Anti-ice
De-ice

Forecast model / forecast data

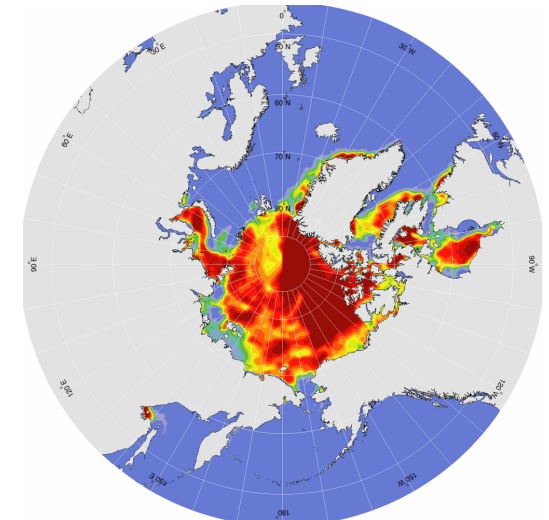
	Model	Data
Weather	WRF	NCEP GFS
Ocean	-	HYCOM
Wave	Wave Watch III	-
Ice	WNI ice model	-



Weather forecast model

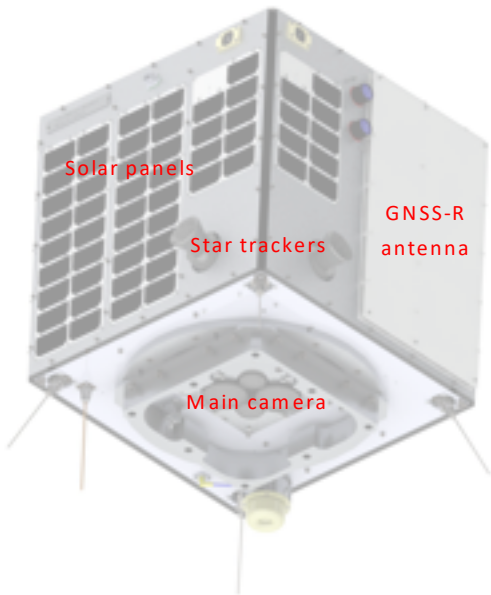


Ocean current data

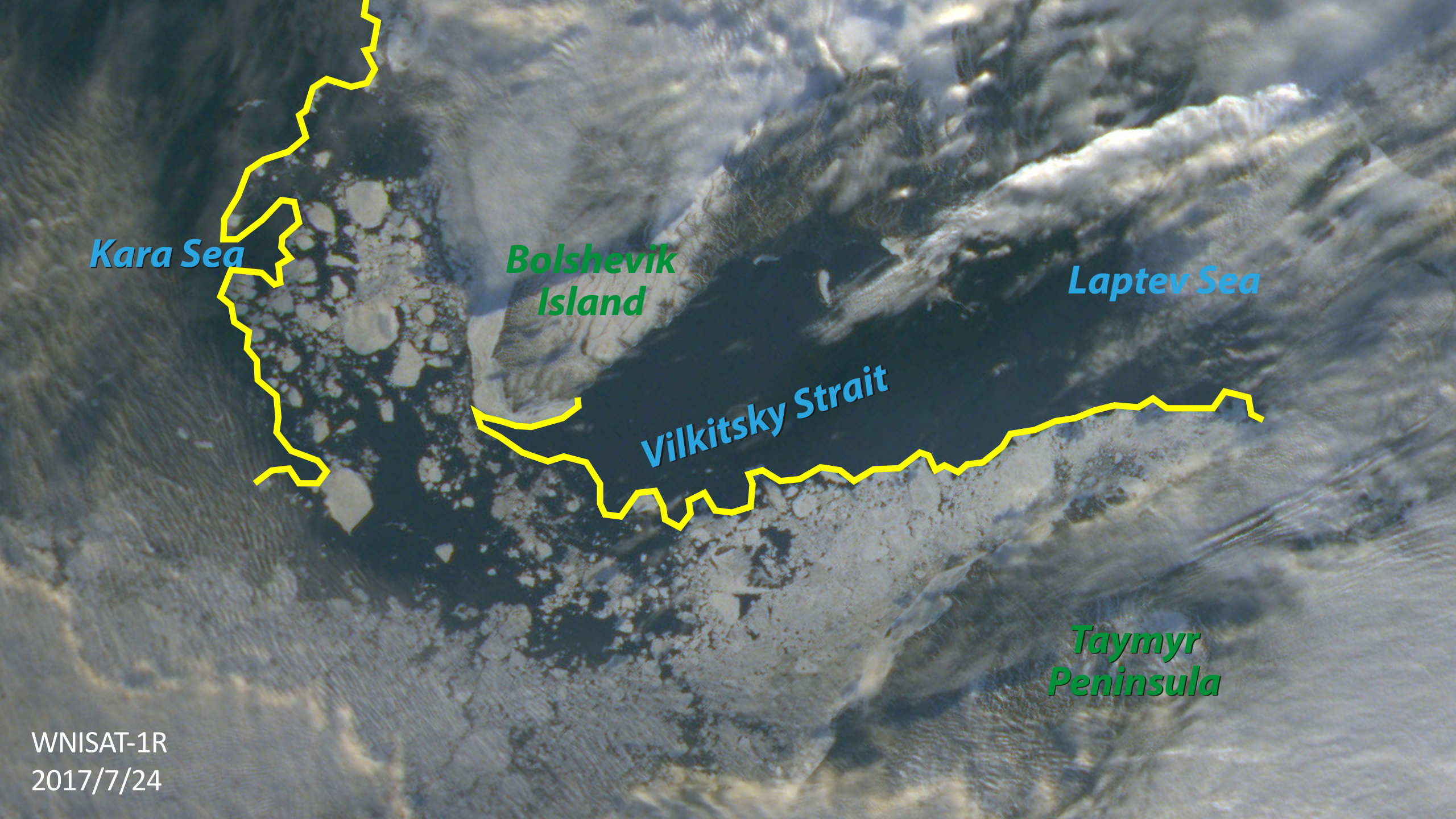


Sea ice model

Our satellite



Name		WNISAT-1R		
Dimensions		524 x 524 x 507 mm		
Mass		43 kg		
Mission modules		Optical sensor (Camera) GNSS-R antenna		
Camera			Wavelength [μm]	Ground Resolution [m]
	Channels	Panchromatic	450 - 650	200
		Green	535 - 607	200
		Red	620 - 680	400
		Infrared	695 - 1005	400
	Pixel Count	2048 x 2048		
Launch	Date/Time	14 July 2017 6:36:49 UTC		
	Site	Baikonur Cosmodrome, Kazakhstan		
	Rocket	Soyuz		
	Orbit	Sun synchronous, 600km altitude		



A satellite image of the Arctic region showing the Kara Sea, Laptev Sea, and Taymyr Peninsula. A yellow line outlines the coastlines of the Kara Sea, the Taymyr Peninsula, and the islands of the Laptev Sea. The Vilkitsky Strait is visible between the Kara Sea and the Laptev Sea. The image is labeled with the names of these geographical features in blue and green text.

Kara Sea

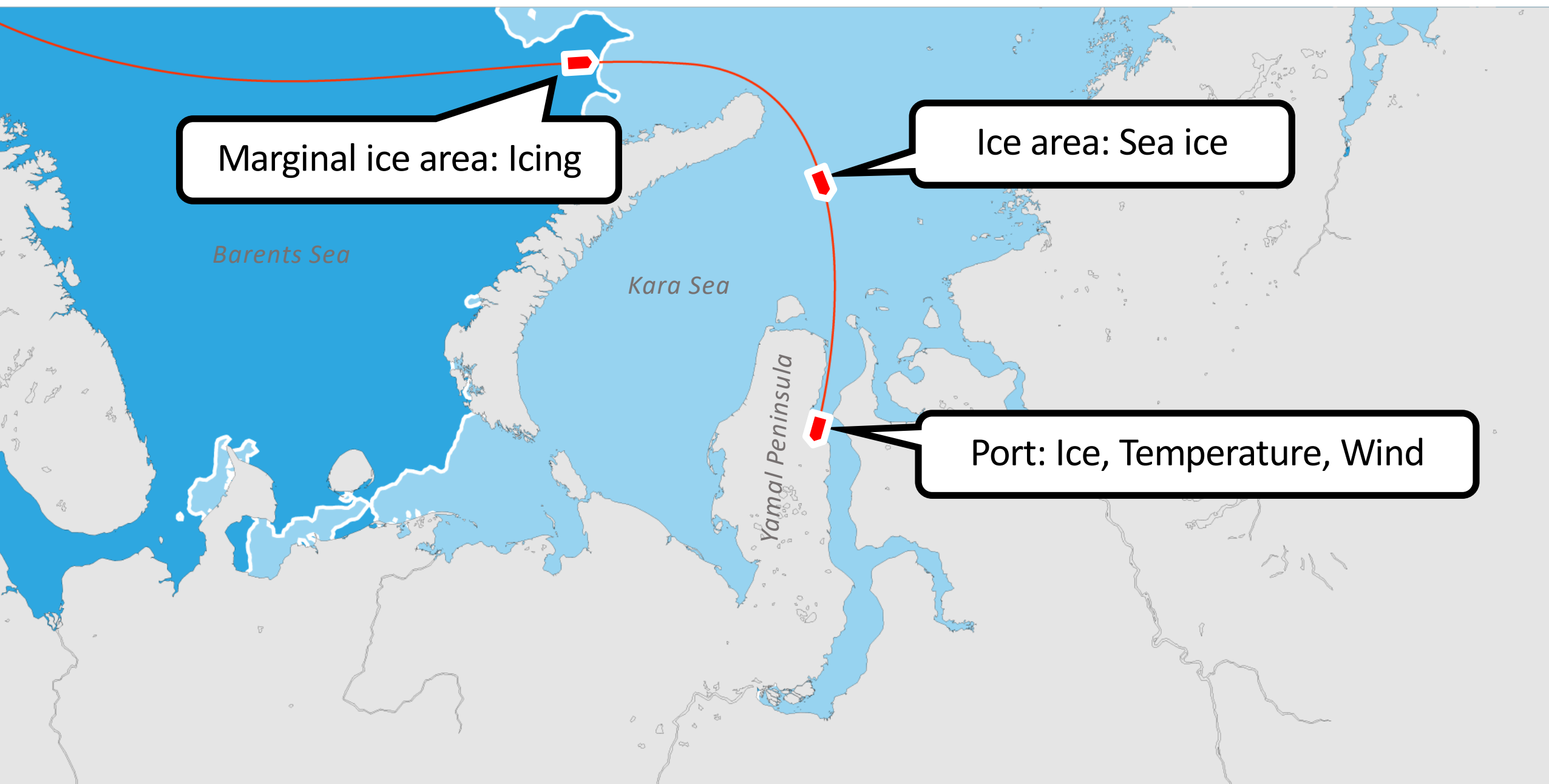
*Bolshevik
Island*

Laptev Sea

Vilkitsky Strait

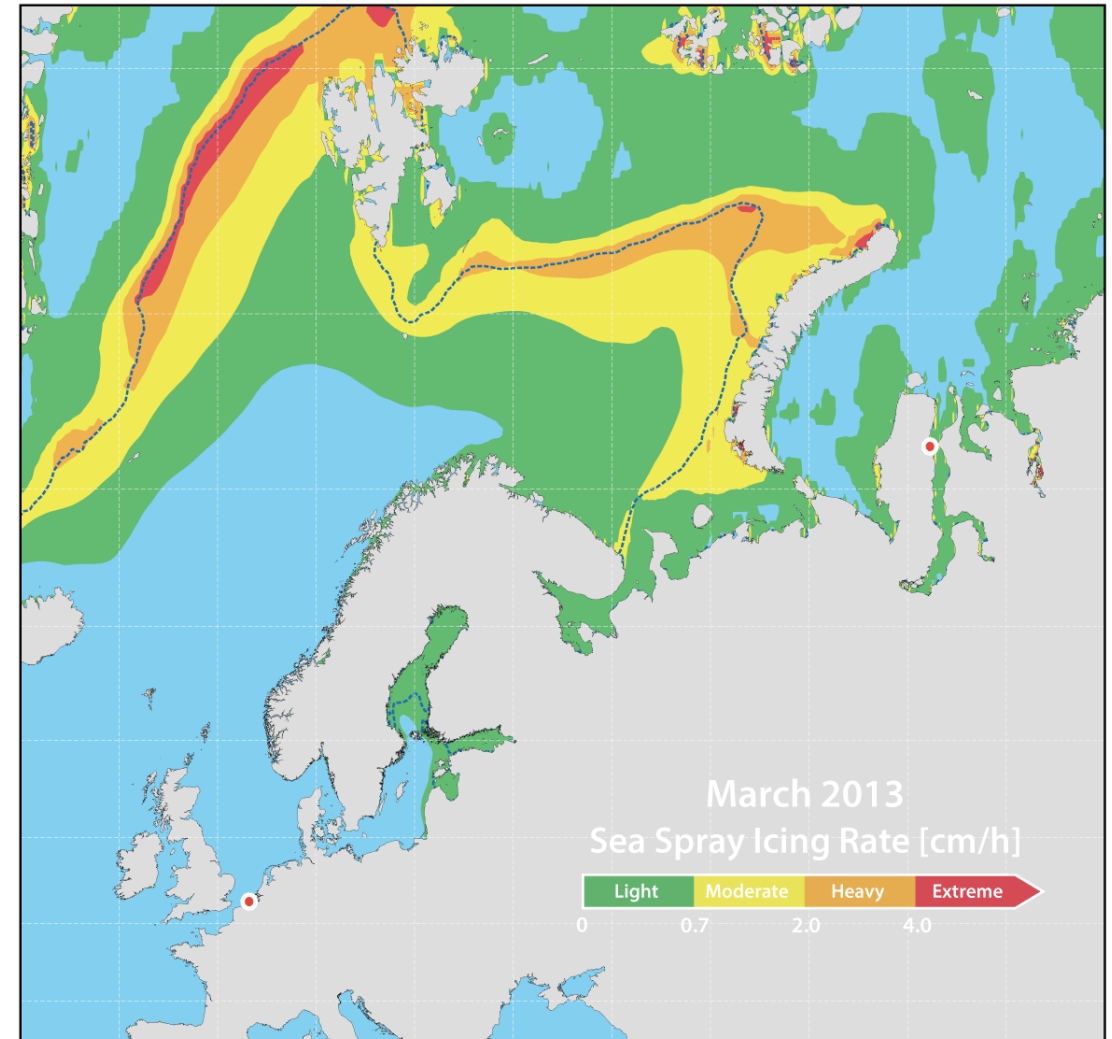
*Taymyr
Peninsula*

Weather risks in Arctic navigation



Sea spray icing

- Occurrence condition
 - Below-freezing air temperature
 - String wind over open sea → Sea spray
- Tends to happen while waiting for ice-breaker before entering ice



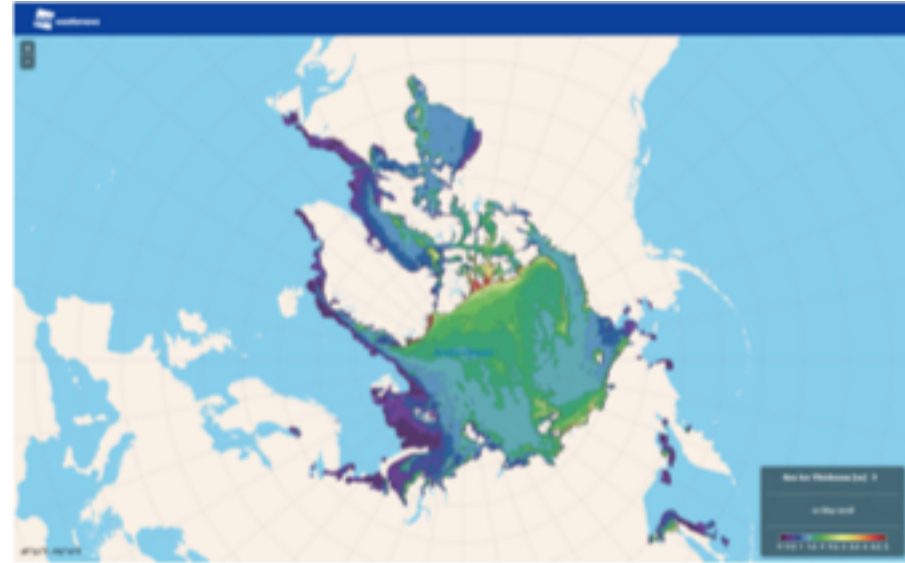
Icing rate (March 2013 monthly mean)

Ice

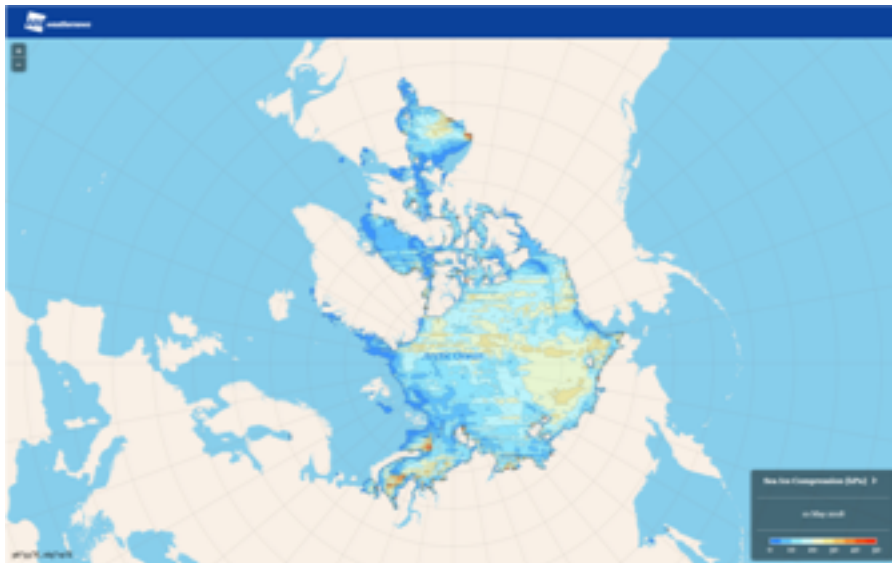
Concentration



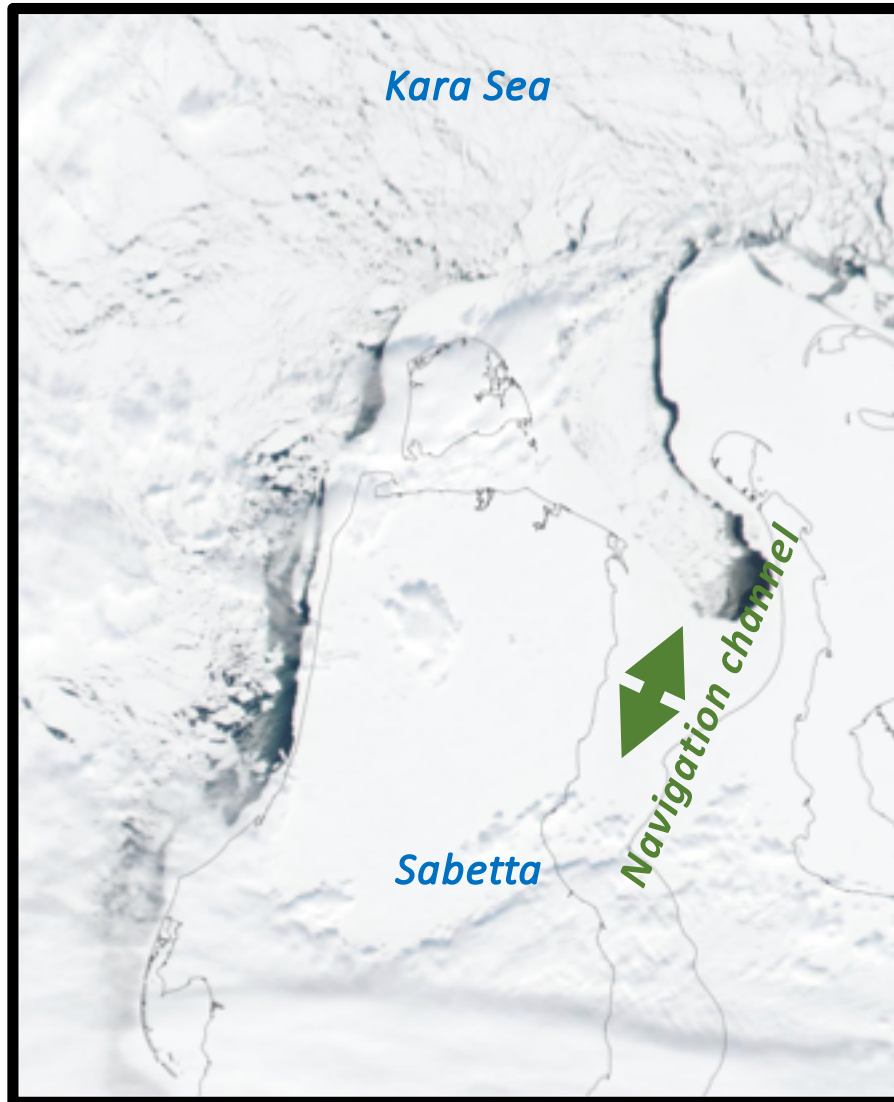
Thickness



Compression



Gulf of Ob navigability by ice



Satellite image on 12 April 2018

