

Improving Safety for Shipping in the Polar Seas

H2020 Arctic Passion Pilot Service for POLARIS Risk Management

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Objectives and approach

- Reduce the risk of a shipping incident by improving application of the International Maritime Organization's (IMO) POLARIS risk assessment system
- Co-designed and co-developed with PAME, national ice-services, ship owners and operators, insurers, marine safety organisations etc

1.
Historical
analysis of
shipping risk
in the Arctic.

2.
Current risk
information
to ships at
current
position.

3.
Forecast
POLARIS risk
assessments
based on sea
ice forecasts.

4.
Onboard
delivery,
visualisation
and
evaluation.

POLARIS

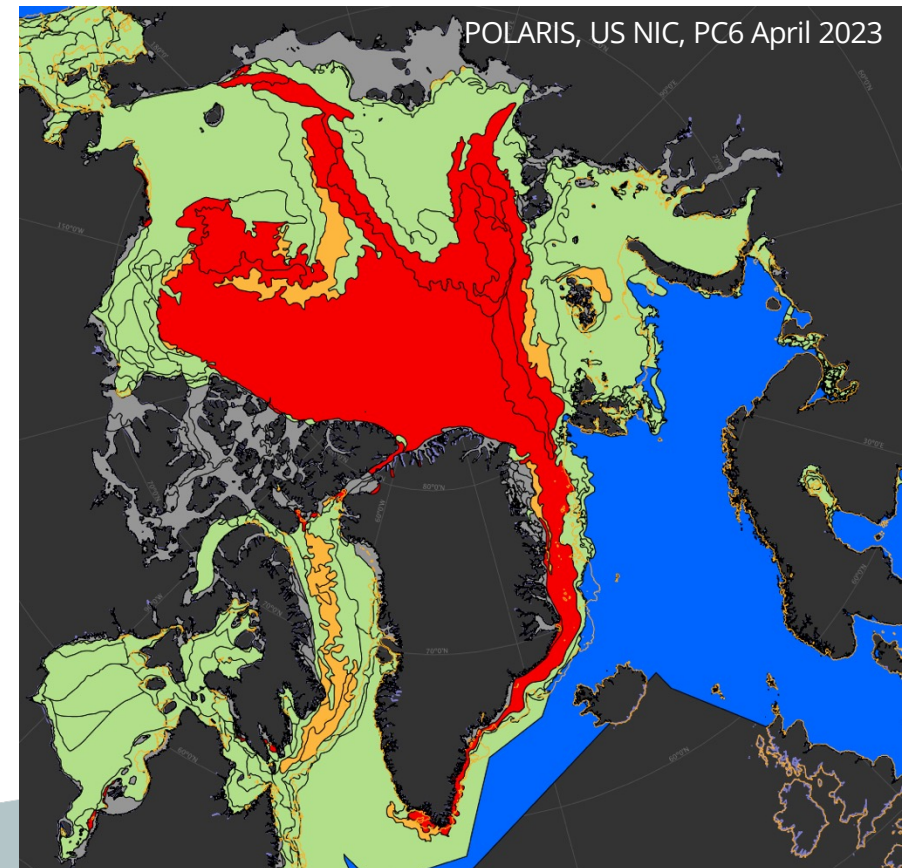
- Polar Operational Limit Assessment Risk Indexing System
- Calculation combines ice type concentrations with corresponding risk index values.
 - **RIO = 0 or positive: independent/normal operation**
 - **RIO = -10 to 0: elevated risk (escort, reduce speed, special considerations)**
 - **RIO less than 10: special considerations, operation not safe**
- RIO maps based on ice charts have significant limitations – timeliness, ice parameters, scale
- Use of POLARIS onboard is low.
- Changes to the POLARIS system and improvements in available sea ice information are required.
- Further information - Report from IICWG Task Team 2022 – 2 Mariner Use of POLARIS.

Increasing Ice Thickness (severity) →

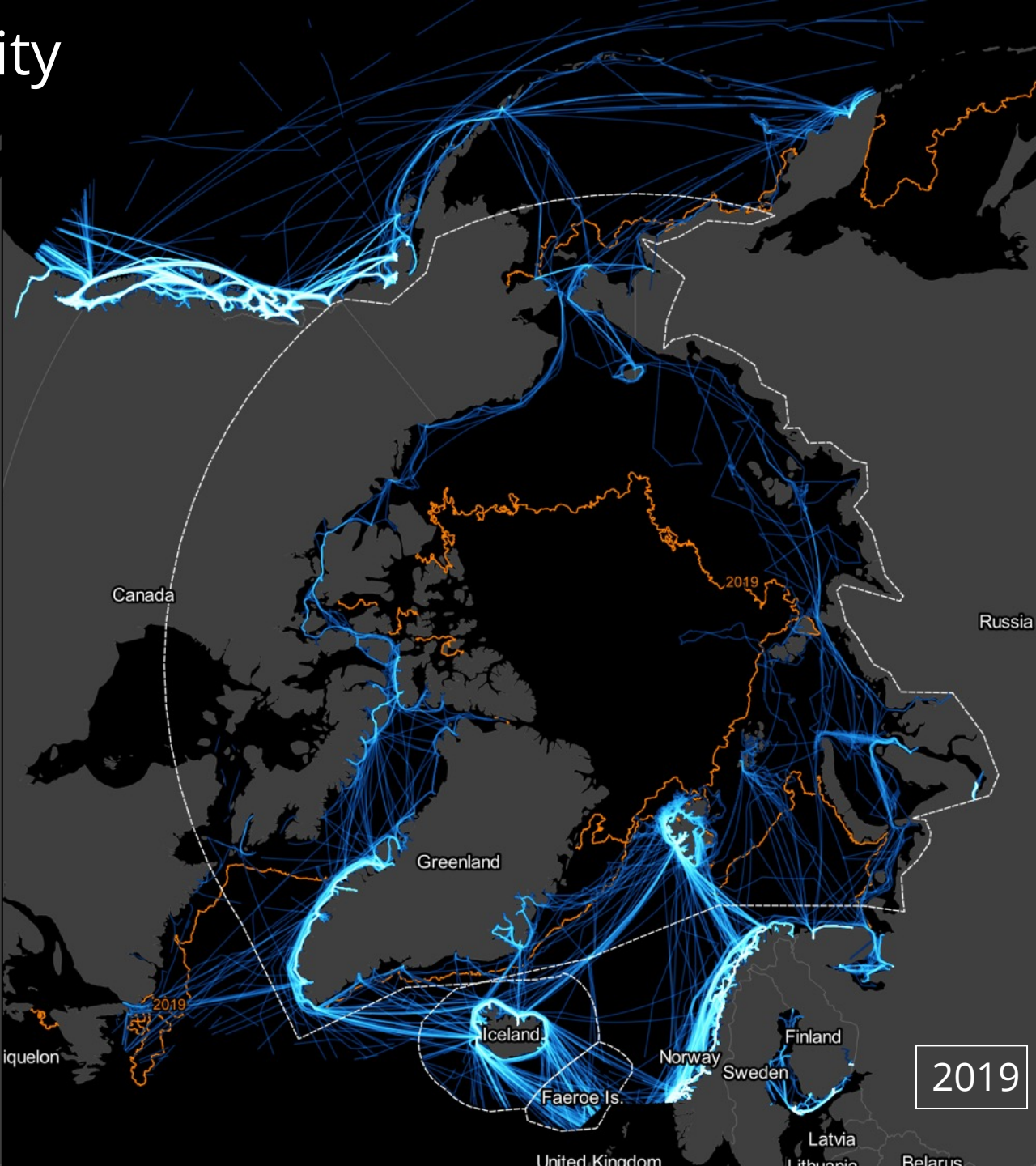
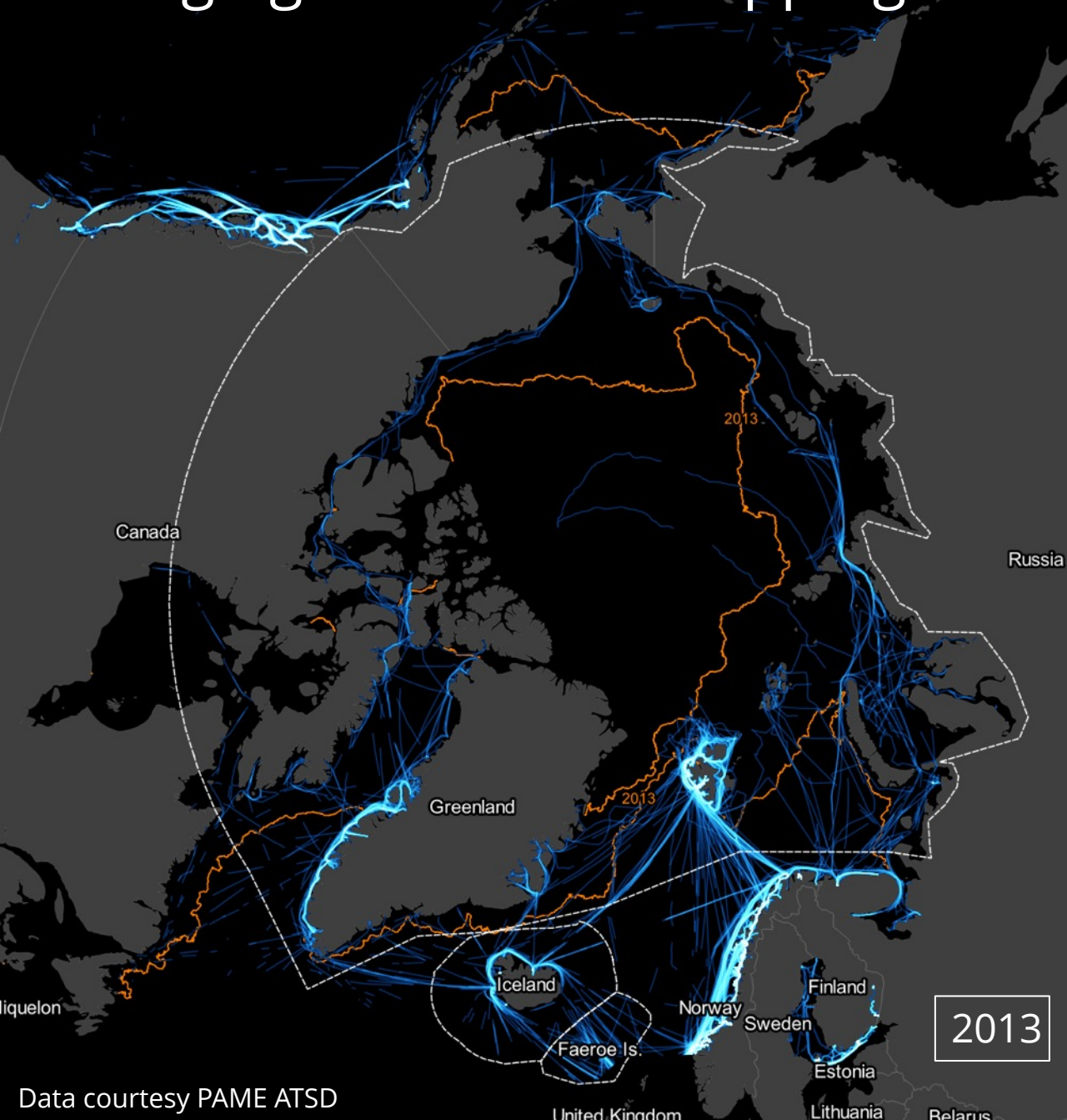
POLAR SHIP CATEGORY	ICE CLASS	WINTER RISK VALUES (RVs)											
		ICE FREE	NEW ICE	GREY ICE	GREY WHITE ICE	THIN FIRST YEAR 1ST STAGE	THIN FIRST YEAR 2ND STAGE	MEDIUM FIRST YEAR 1ST STAGE	MEDIUM FIRST YEAR 2ND STAGE	THICK FIRST YEAR	SECOND YEAR	LIGHT MULTI YEAR	HEAVY MULTI YEAR
		--	0-10 cm	10-15 cm	15-30 cm	30-50 cm	50-70 cm	70-95 cm	95-120 cm	120-200 cm	200-250 cm	250-300 cm	300+ cm
A	PC1	3	3	3	3	2	2	2	2	2	2	1	1
	PC2	3	3	3	3	2	2	2	2	2	1	1	0
	PC3	3	3	3	3	2	2	2	2	2	1	0	-1
	PC4	3	3	3	3	2	2	2	2	1	0	-1	-2
	PC5	3	3	3	3	2	2	1	1	0	-1	-2	-2
B	PC6	3	2	2	2	1	1	0	0	-1	-2	-3	-3
	PC7	3	2	2	2	1	0	-1	-1	-2	-3	-3	-3
C	IA Super	3	2	2	2	2	1	0	-1	-2	-3	-4	-4
	IA	3	2	2	2	1	0	-1	-2	-3	-4	-5	-5
	IB	3	2	2	1	0	-1	-2	-3	-4	-5	-6	-6
	IC	3	2	1	0	-1	-2	-3	-4	-5	-6	-7	-8

↓ Decreasing Ice Class

↘ Increased Risk



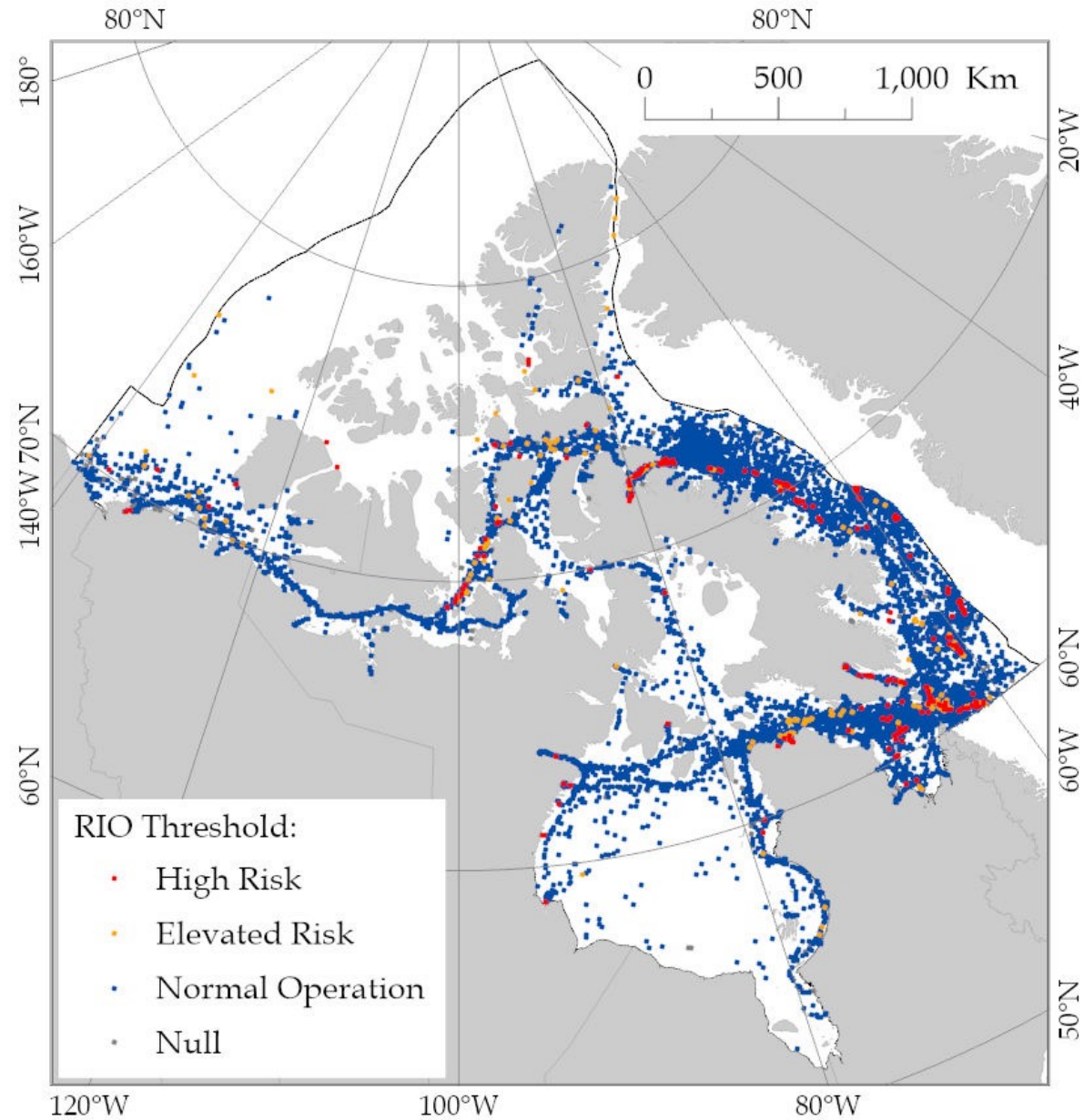
Changing Patterns of Shipping Activity



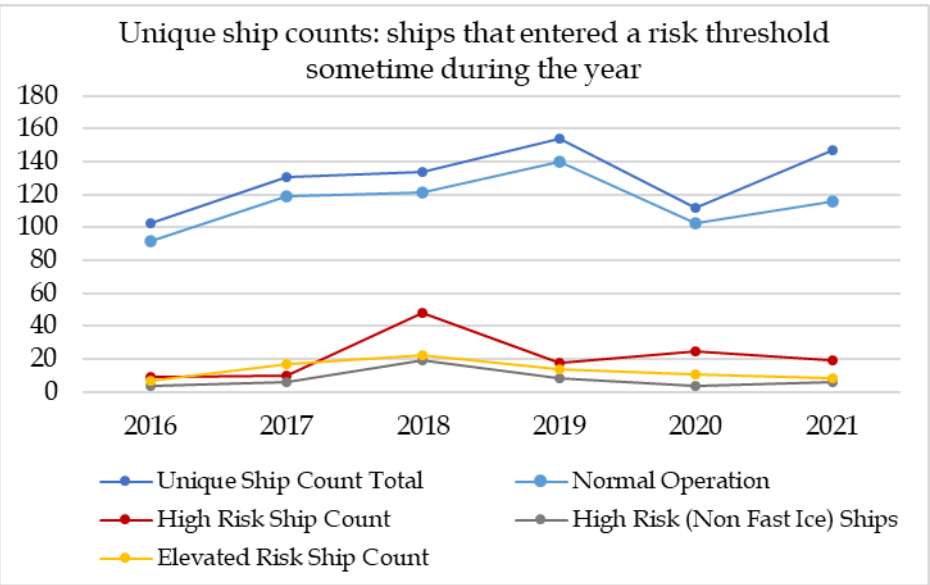
Data courtesy PAME ATSD

Historical POLARIS analysis

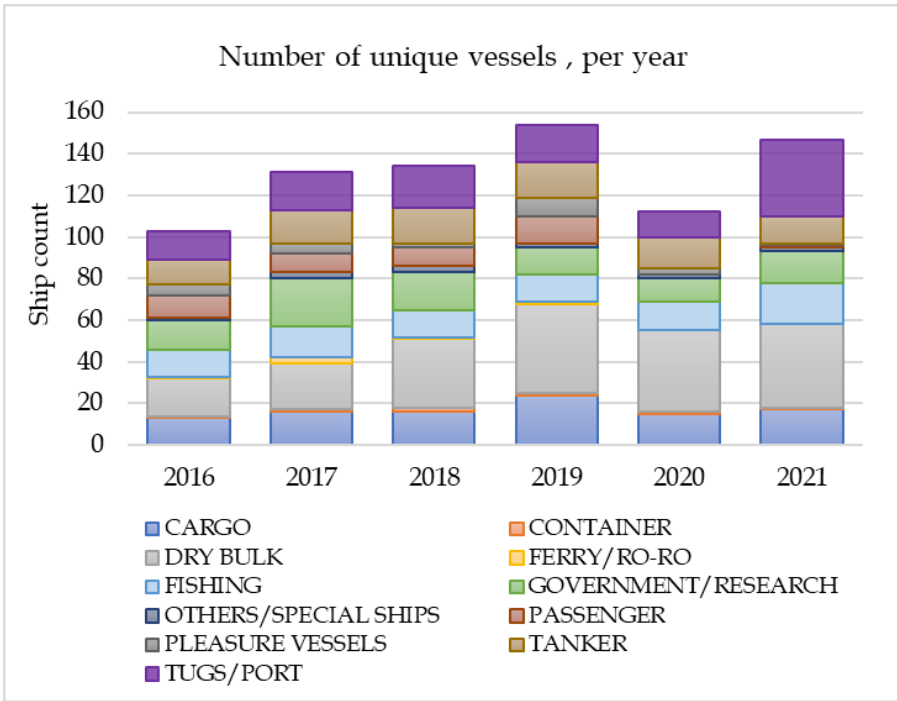
- ASTD: daily ship records
- NIC POLARIS charts: weekly
- NIC charts are weekly between 10th March 2016 to end March 2022. Bi-weekly for the remainder of year 2022.
- RIO values are assigned to records that are up to 4 days before the chart date. All other records are removed.
- The following analyses are based on years 2016-2021 (year 2022 has a reduced number of RIO points due to reduction in frequency of NIC charts, so this year is omitted).



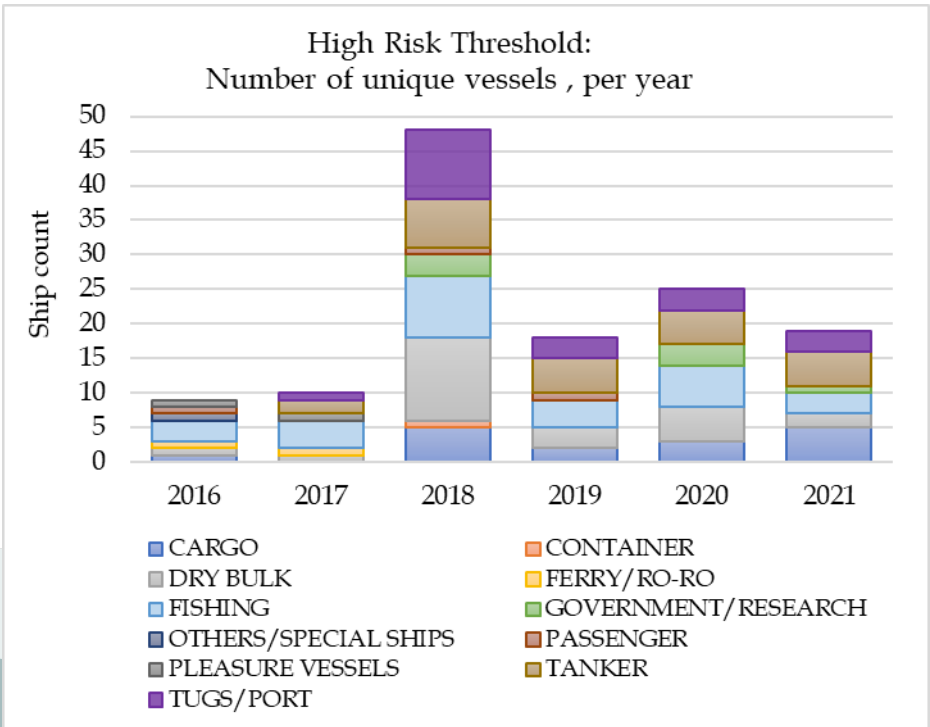
1



2



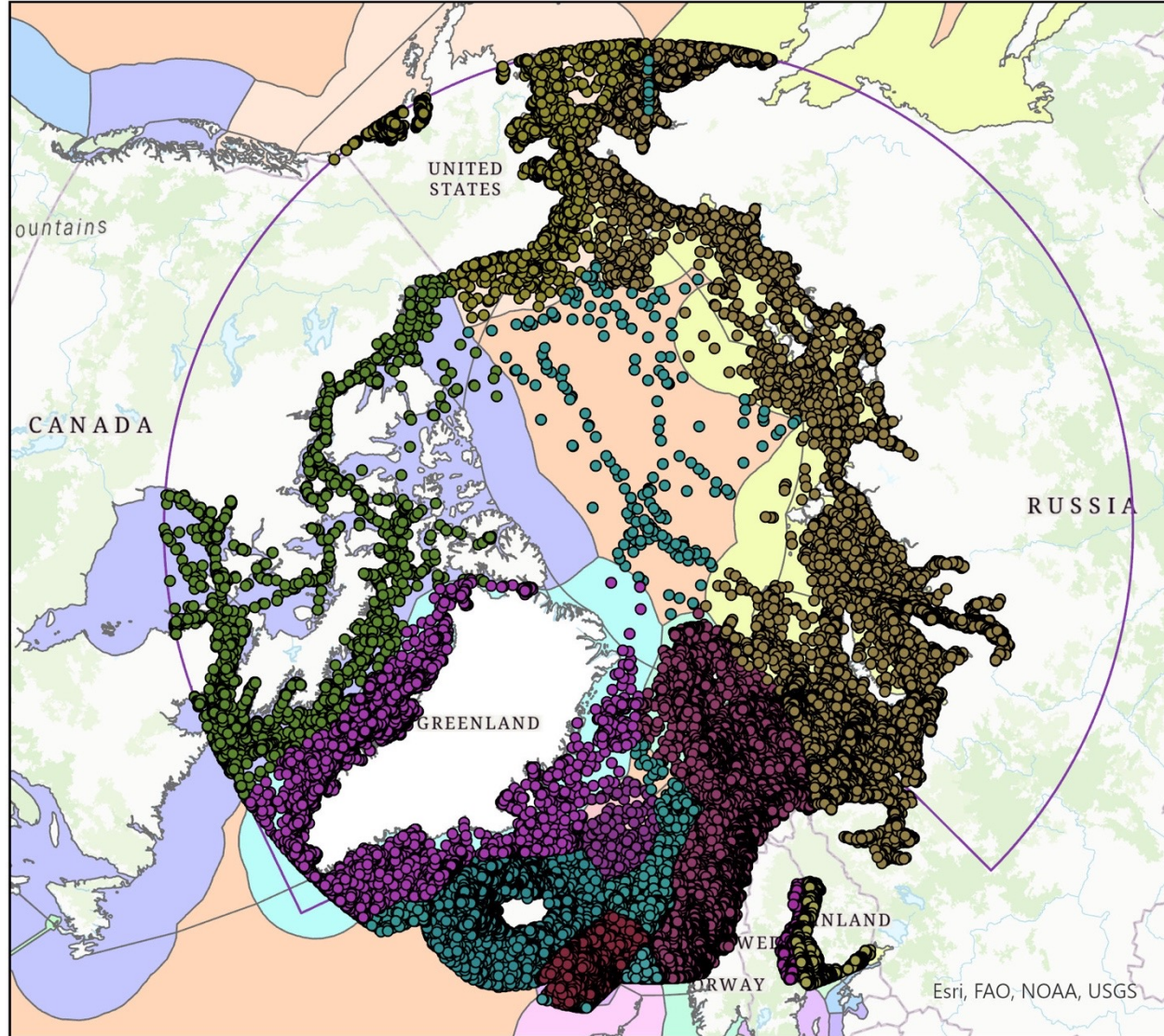
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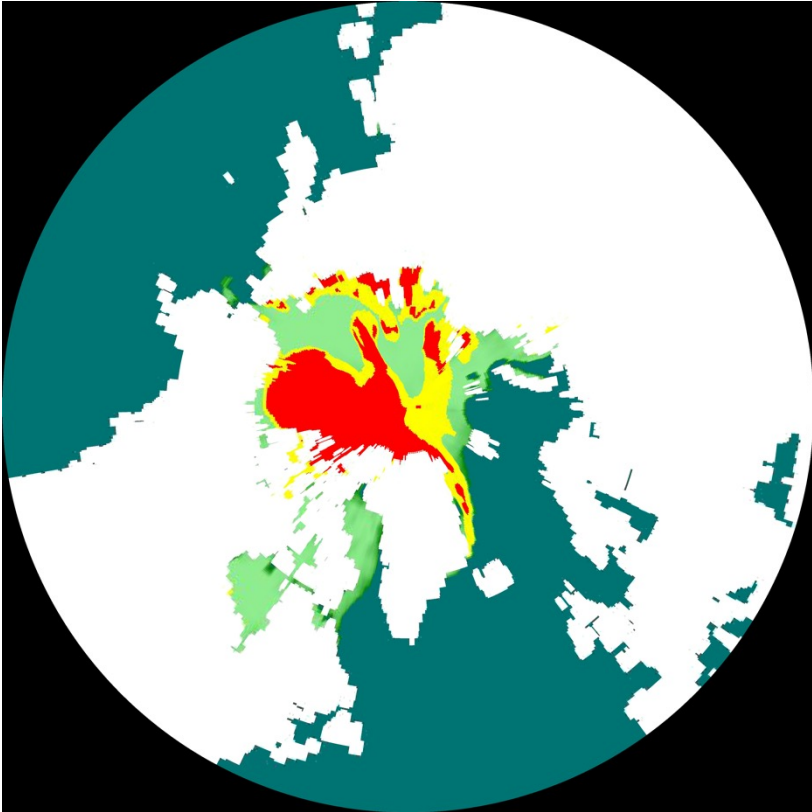
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Ship Type	Normal Operation	Elevated Risk	High Risk (Non Fast Ice)	High Risk (Fast Ice)
	Count			
CARGO	49	7	10	8
CONTAINER	2	0	1	1
DRY BULK	81	3	1	18
FERRY/RO-RO	4	1	1	0
FISHING	25	10	12	11
GOVERNMENT/RESEARCH	35	8	1	6
OTHERS/SPECIAL SHIPS	6	2	0	1
PASSENGER	28	7	3	0
PLEASURE VESSELS	7	3	1	1
TANKER	34	5	5	8
TUGS/PORT	34	5	3	11
Total	305	51	38	65

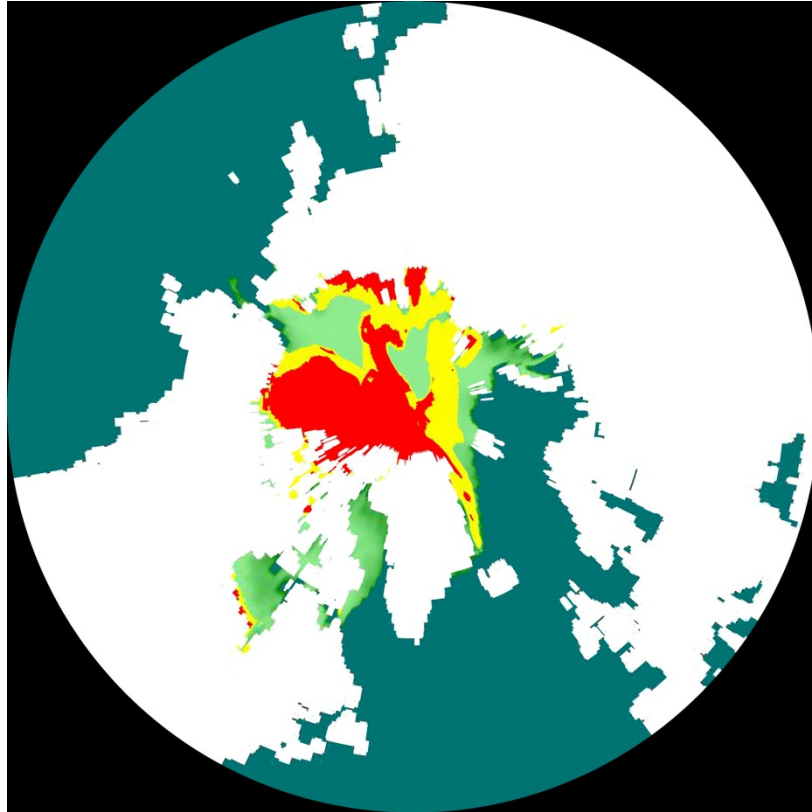
Arctic regional analysis



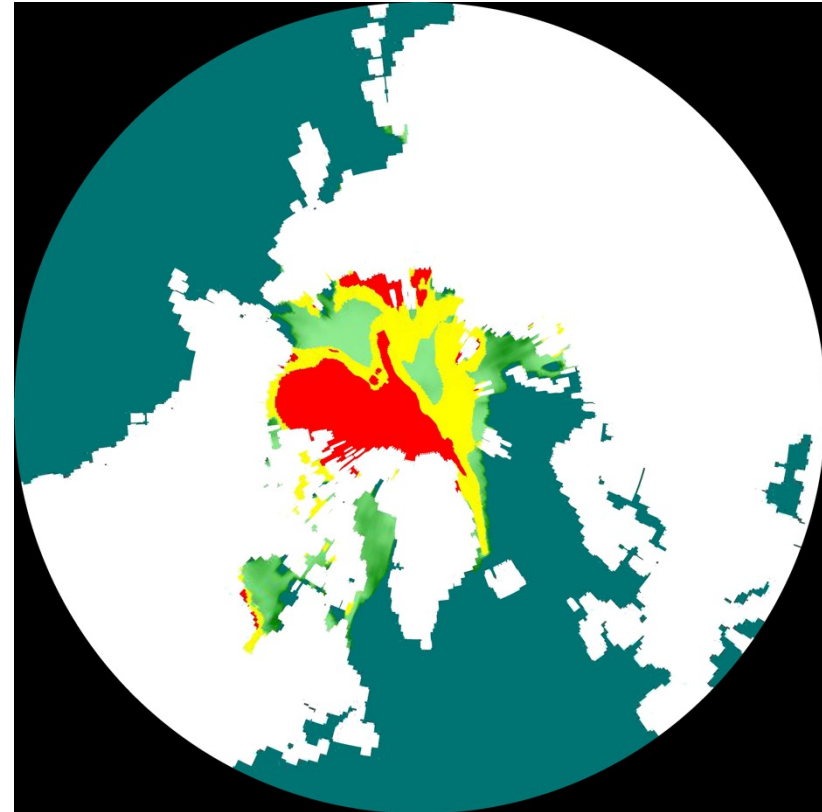
POLARIS forecasts



S2S_RIO_PC5_20230417-for-20230418



S2S_RIO_PC5_20230417-for-20230502



S2S_RIO_PC5_20230417-for-20230517

Demonstration partners



VIKING SUPPLY SHIPS



USCGC Healy



Royal Danish Navy



Svendborg International
Maritime Academy



Canadian Coast Guard



Memorial University,
Centre for Marine Simulation



<https://arcticpassion.eu>