

Building Digital Aids for Ice Navigators

Lasse Rabenstein

Session 15: Arctic Navigation



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Polar Services



Copyright: AWI Media, Esther Horvath

#1

Ice information is a good investment

Financial
Damage:
30 – 60 MEUR

Environmental
Damage
catastrophic



Photo: RosMorRechFlot

Chinese Bulk Carrier Damaged by Ice Sinks Off Russia

Mike Schuler

Total Views: 69375 🔥

March 1, 2023

#2

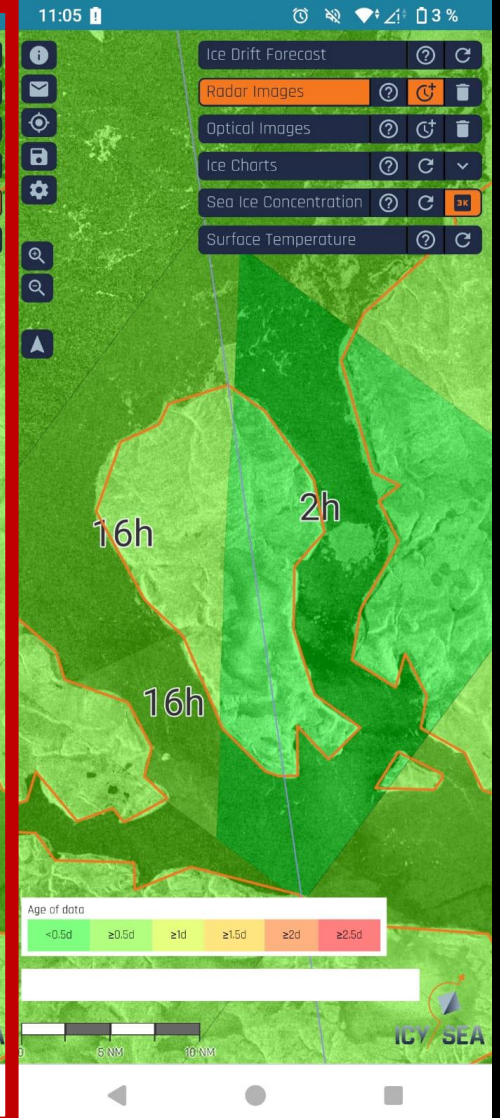
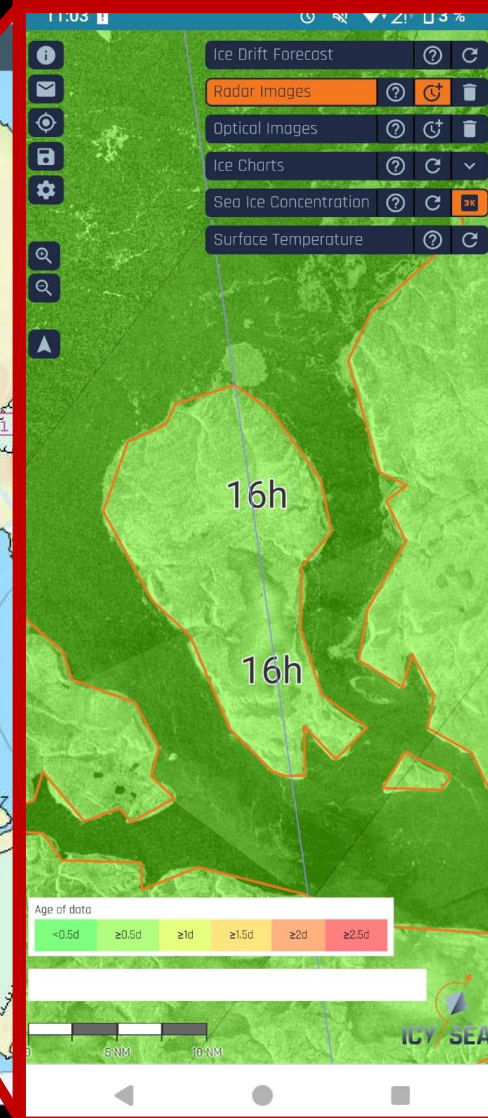
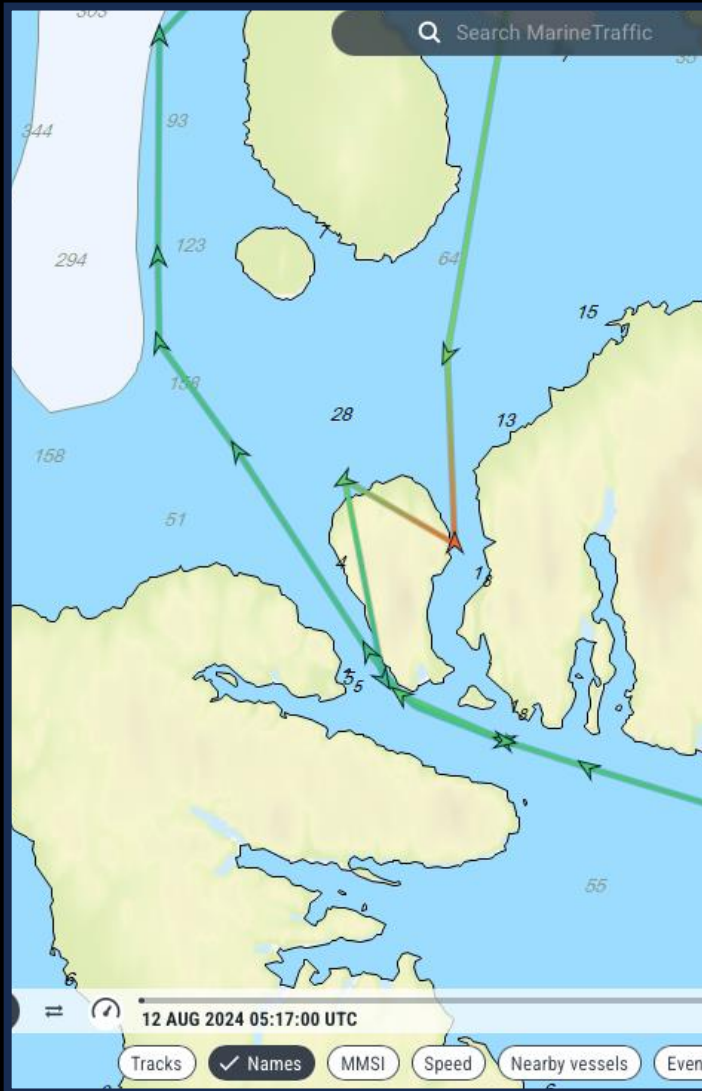
Vessel operators need to understand that
IcySea is an investment not a cost

An investment in knowledge pays the best interest.
(Benjamin Franklin)

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Management follows the slogan: 'avoid any costs, especially for things that are only nice to have'

Statement of a big cruise company to us



3

Integration in the decision making process on-board is crucial

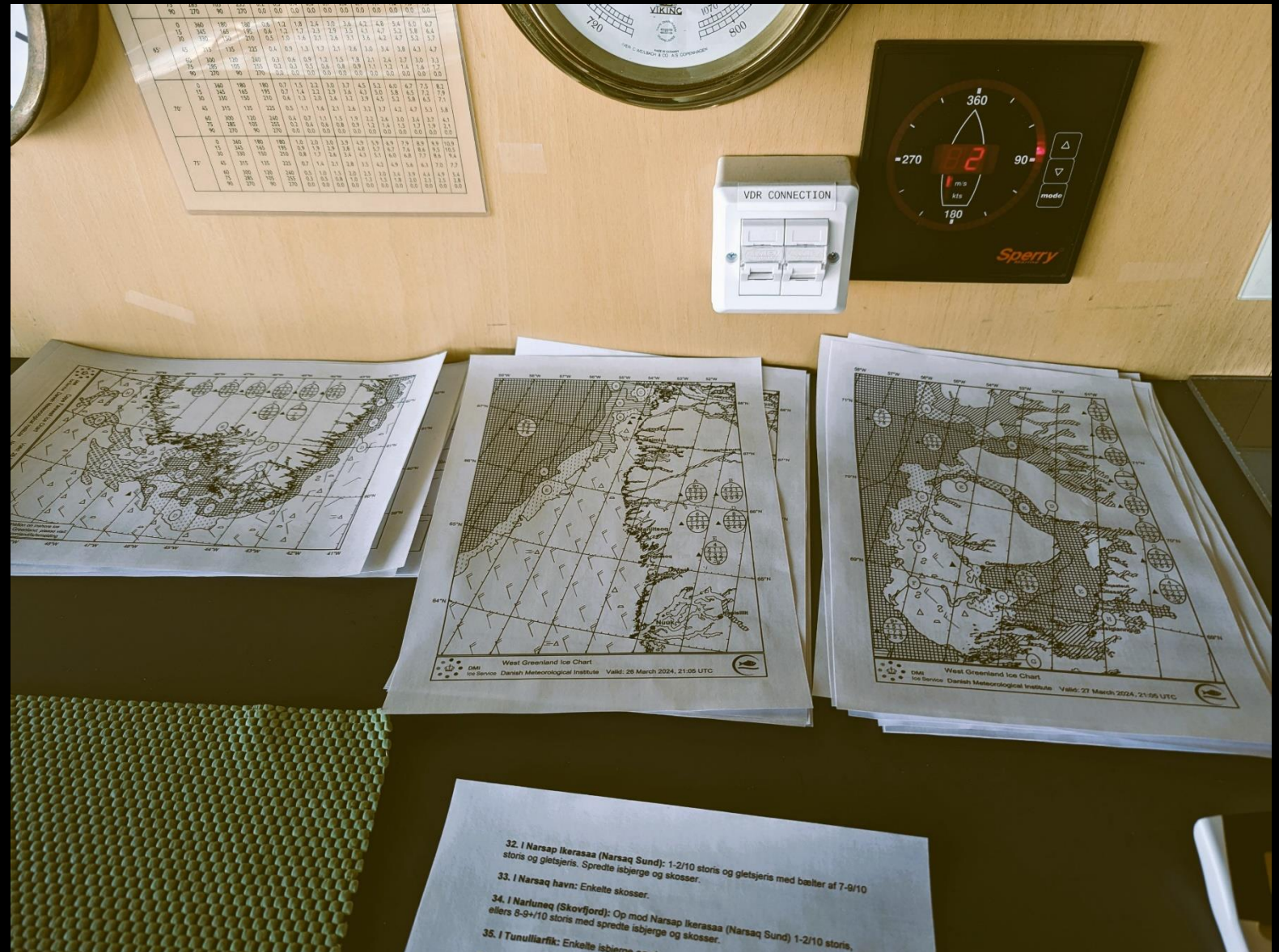
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2024



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2022



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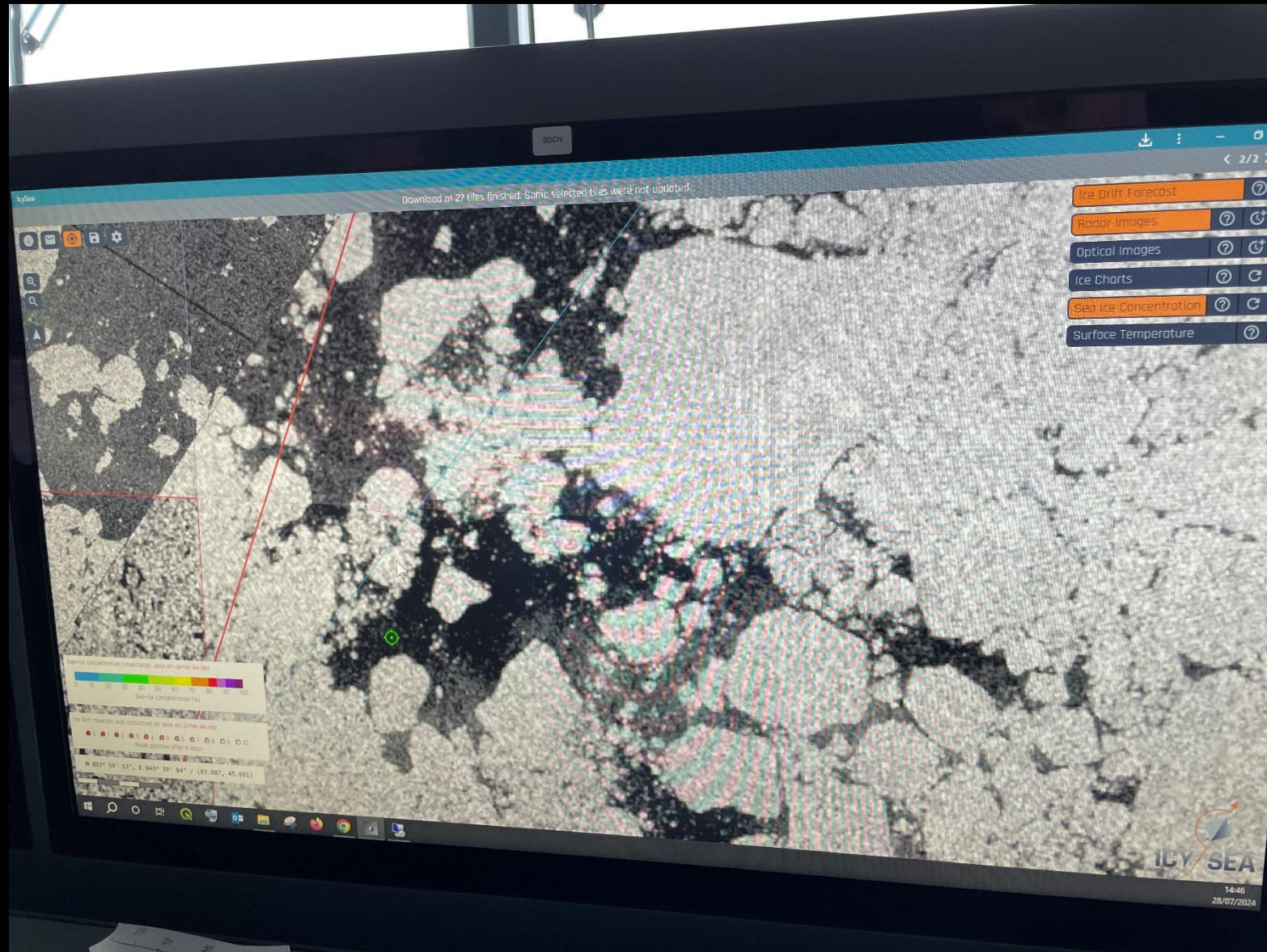
DESIDE



 **Polar View**

 Funded by the European Union **Destination Earth**

Implemented by   



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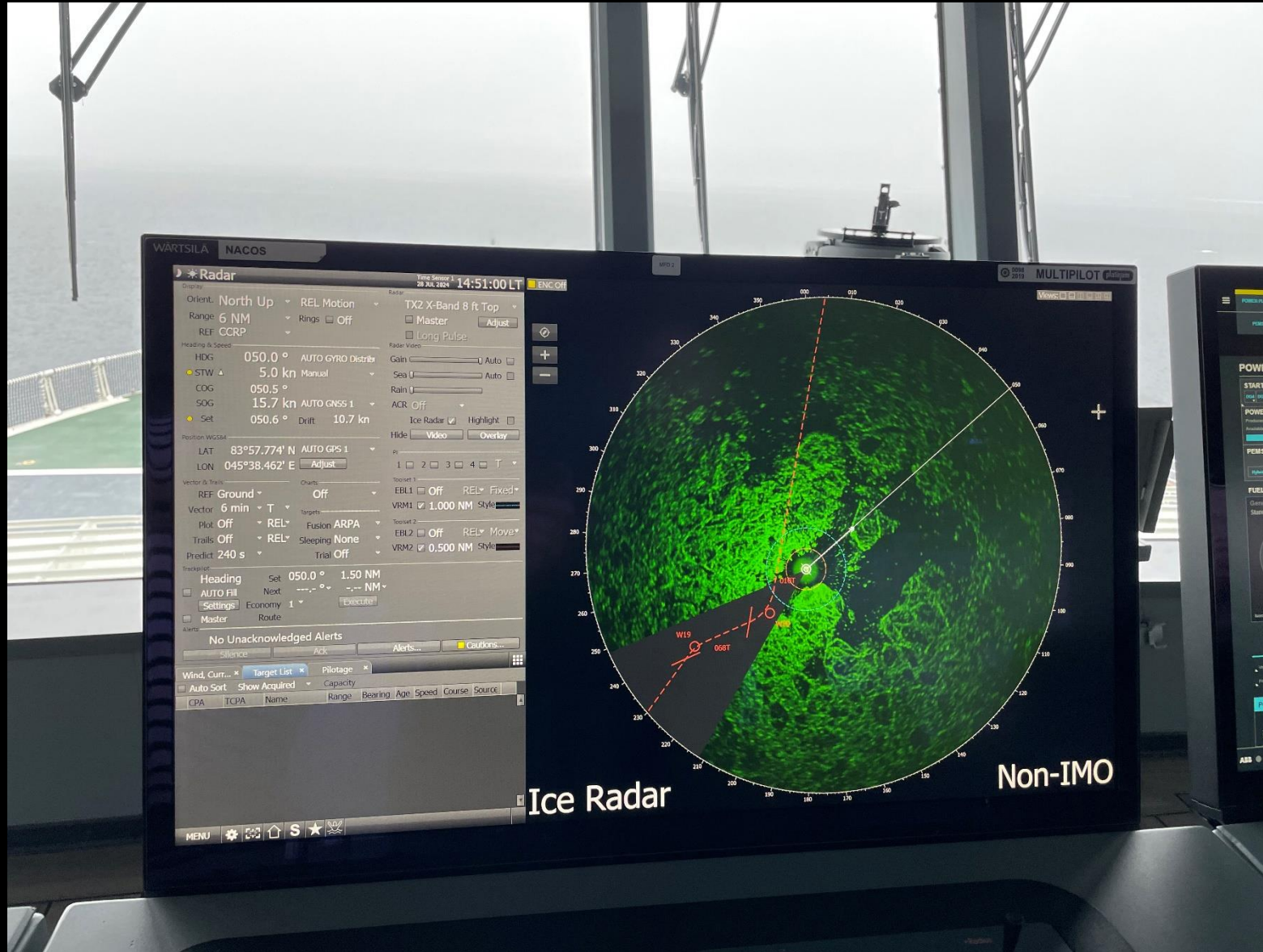
DESIDE



Polar View

Funded by the European Union **Destination Earth**

Implemented by



#4

IcySea is an explain product

- Continuous consulting and user support
- Education of the user is essential

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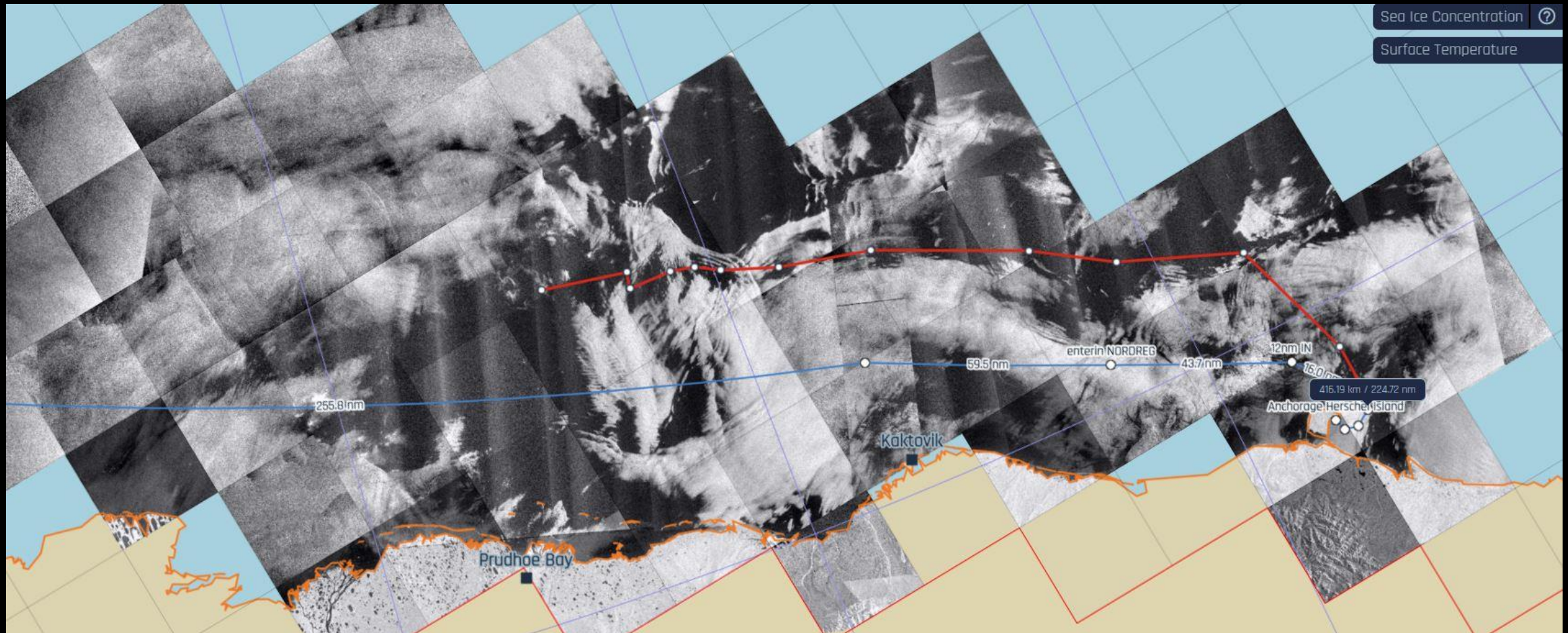
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Cooperation with nautical schools:



Usage of SAR satellite images can be difficult:



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YouTube DE

ICySea tutorials

Download of 29 files finished. Some selected files were not updated.

Ice Drift Forecast
Sea Ice Concentration
Surface Temperature

Ice ?
Ice ?

Pyramiden (abandoned)
Langyaerbyen
Sveagryna
Barentsøen
Hornøya Research Station
Svalbard Weather Station

Sea ice concentration (estimated) - 0% to 100%
Sea ice concentration (%)

N 87°51' 34" 24", E 08°51' 55" 52" / (75,248, 38,931)

7:40 / 9:48

IcySea Tutorials

Drift Noise - 5/6

- 1 IcySea Tutorial 1: How to install IcySea
Drift Noise
4:39
- 2 IcySea Tutorial 2: First Steps with IcySea
Drift Noise
6:11
- 3 IcySea Tutorial 3: Working with the Map
Drift Noise
6:30
- 4 IcySea Tutorial 4: Working with Ice Charts
Drift Noise
6:08
- 5 IcySea Tutorial 5: Working with satellite images
Drift Noise
9:49
- 6 IcySea Tutorial 6: Sea ice concentration, surface...
Drift Noise
8:05

All From the series From Drift Noise Pre >

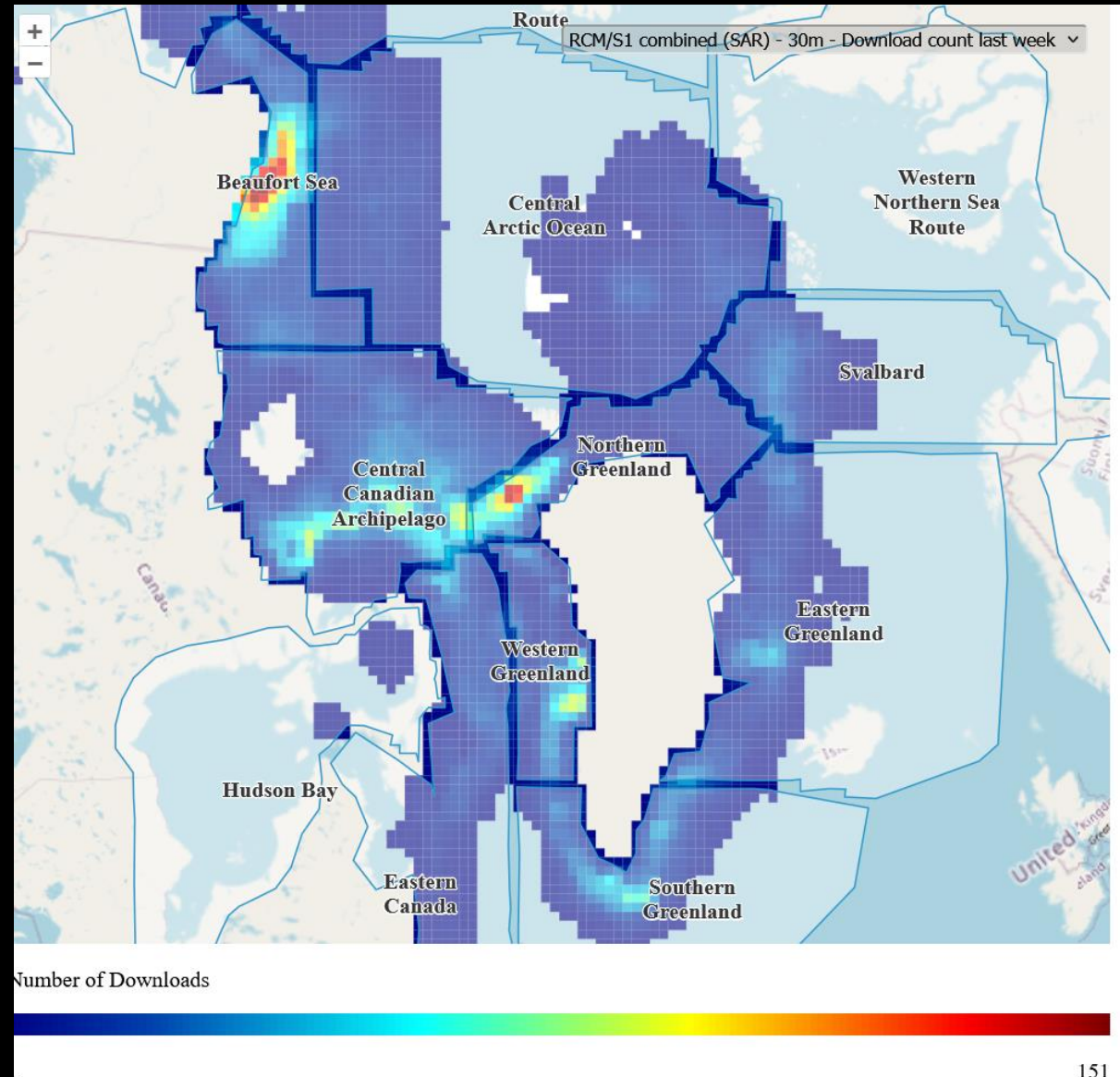
IcySea Tutorial 5: Working with satellite images

IcySea Tutorial 6: Sea ice

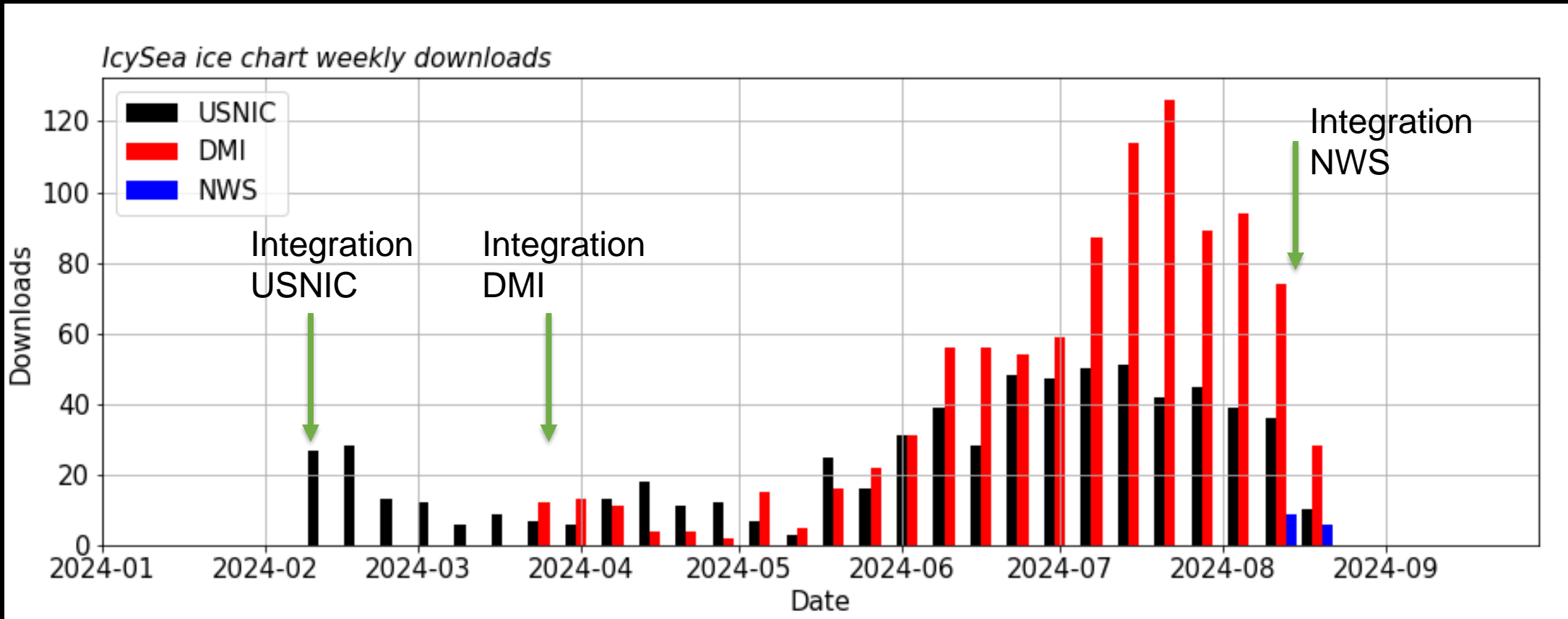
5

Digitization helps to understand the user needs

Areas where IcySea users
downloaded
Sentinel-1 and RCM images
within 1 week
(August 29 – September 4)



Weekly download count of the Ice Services Ice charts into IcySea



6

Crucial sea-ice parameters
are still missing on-board

In high resolution (SAR like resolution) and daily:

- Ice thickness and ice type
- Snow thickness and snow conditions
- Development of ridging and leads
- Improved forecasts of the shape of the ice margin
- Ice Pressure



Trafficability in space and time

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14:12

Your location

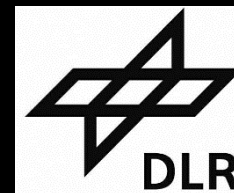
Murmansk

3 hr 46 3 hr 58 3 days 19 hr

76 hr 35 min (1003 nm)

Fastest route now due to ice conditions

Start Steps & more



7

A lot of known concepts and open data
are not yet utilized

Engineering work
rather than science

The Barents Observer

Fight Censorship!

Contribute

中文 РУССКИЙ

Search

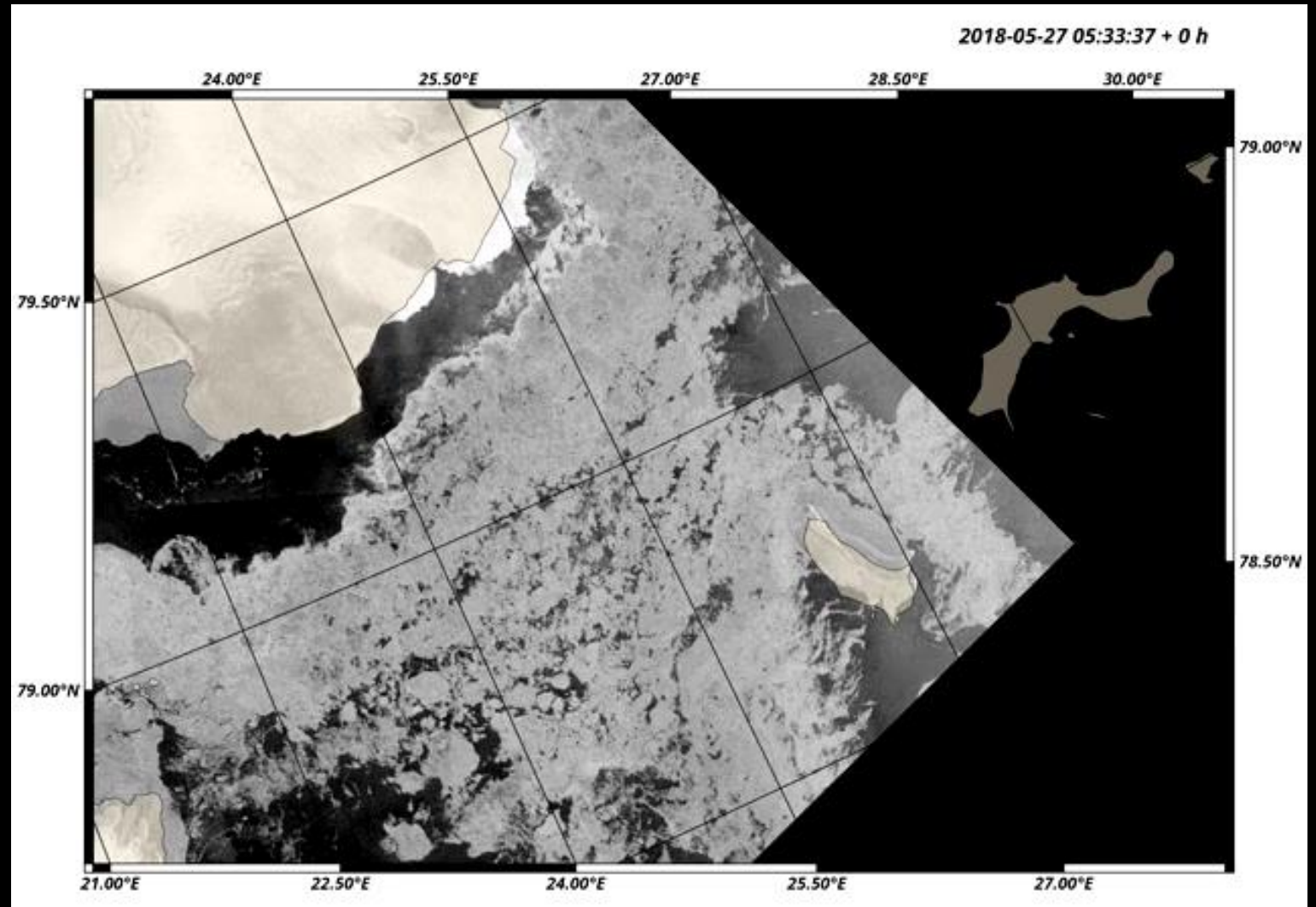


Illustration photo by Rosatom

Two icebreakers are on the way to rescue ice-locked ships on Northern Sea Route

- Thin ice thickness up to 30 cm
- Ice growth forecasts (simple thermodynamic model might suffice?)
- Seasonal Forecasts

Thinking out of the box
approaches:
Simulated high resolution
forecast

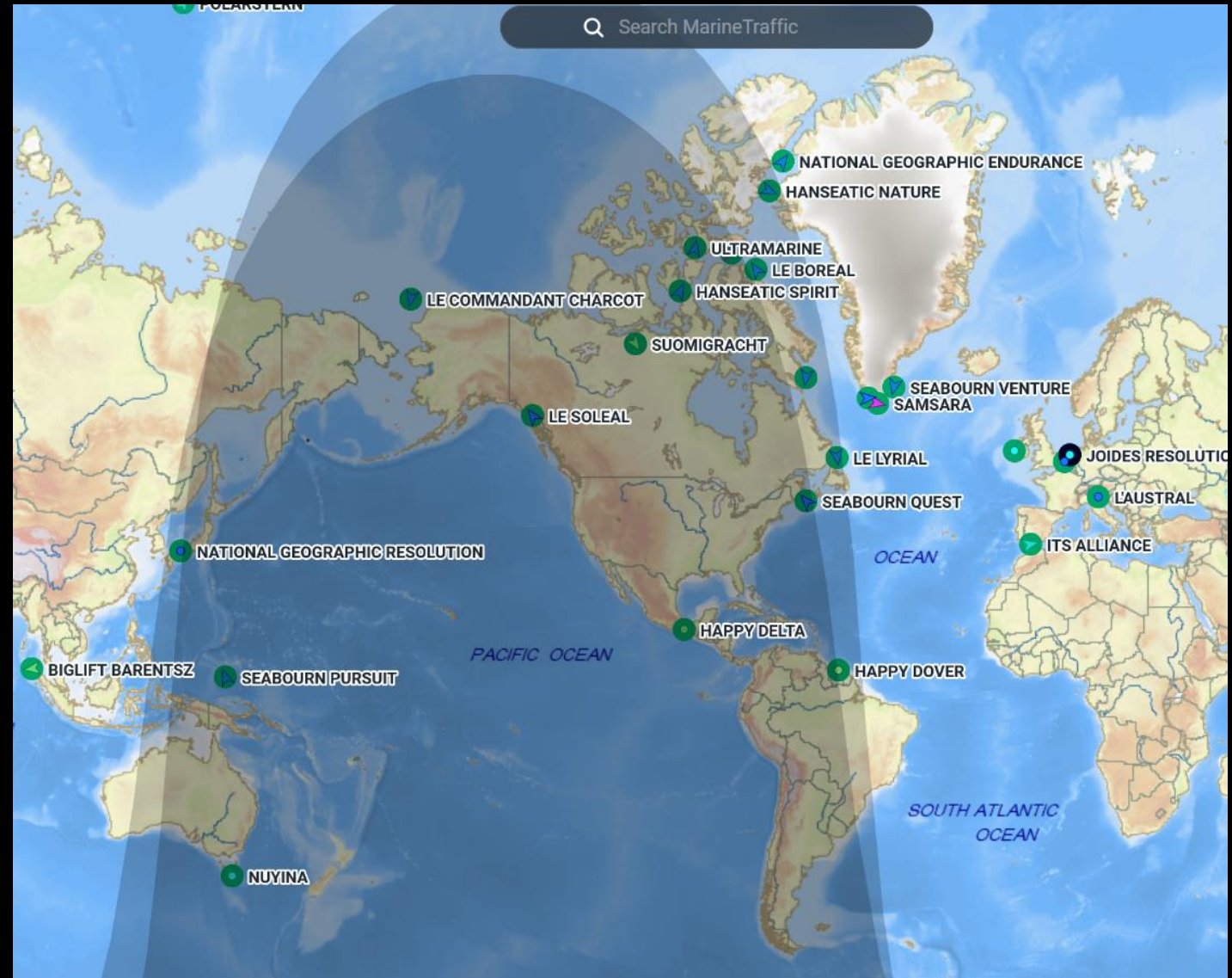


8

Small market size
slows down the innovation process

9

Endurance and Patience pays out eventually



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Jonathan
Bahlmann



Jakob
Bünger



Hannah
Jansen



Lasse
Rabenstein



Henning
Weidenhöfer



Bernhard
Schmitz



Taib
Hayat



Joshua
Dawson



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10

AI based satellite image interpretation
will be a paradigm change?