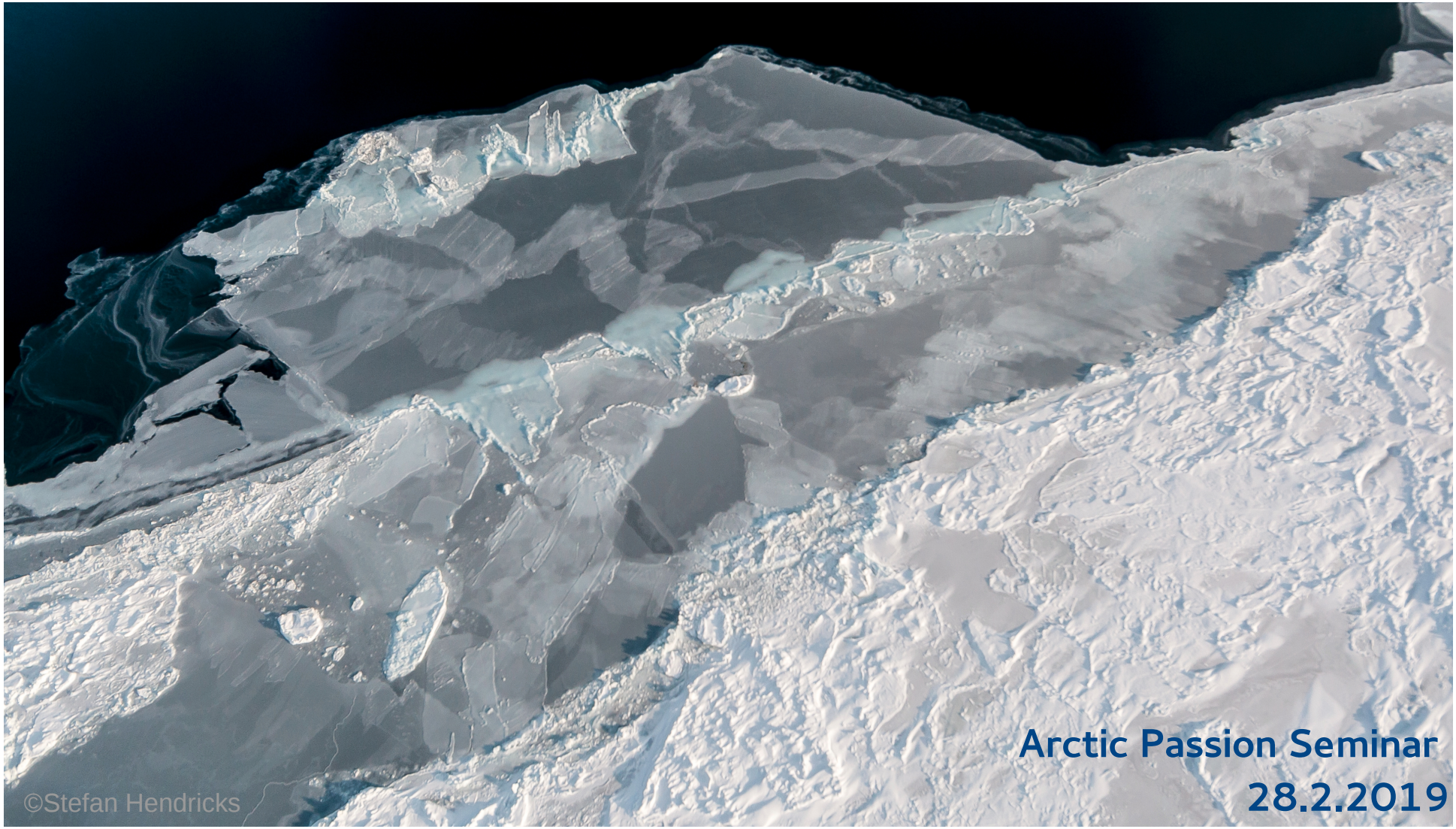
ARCTIC SEA ICE IN A CHANGING CLIMATE

Annu Oikkonen, Finnish Meteorological Institute



Arctic Passion Seminar
28.2.2019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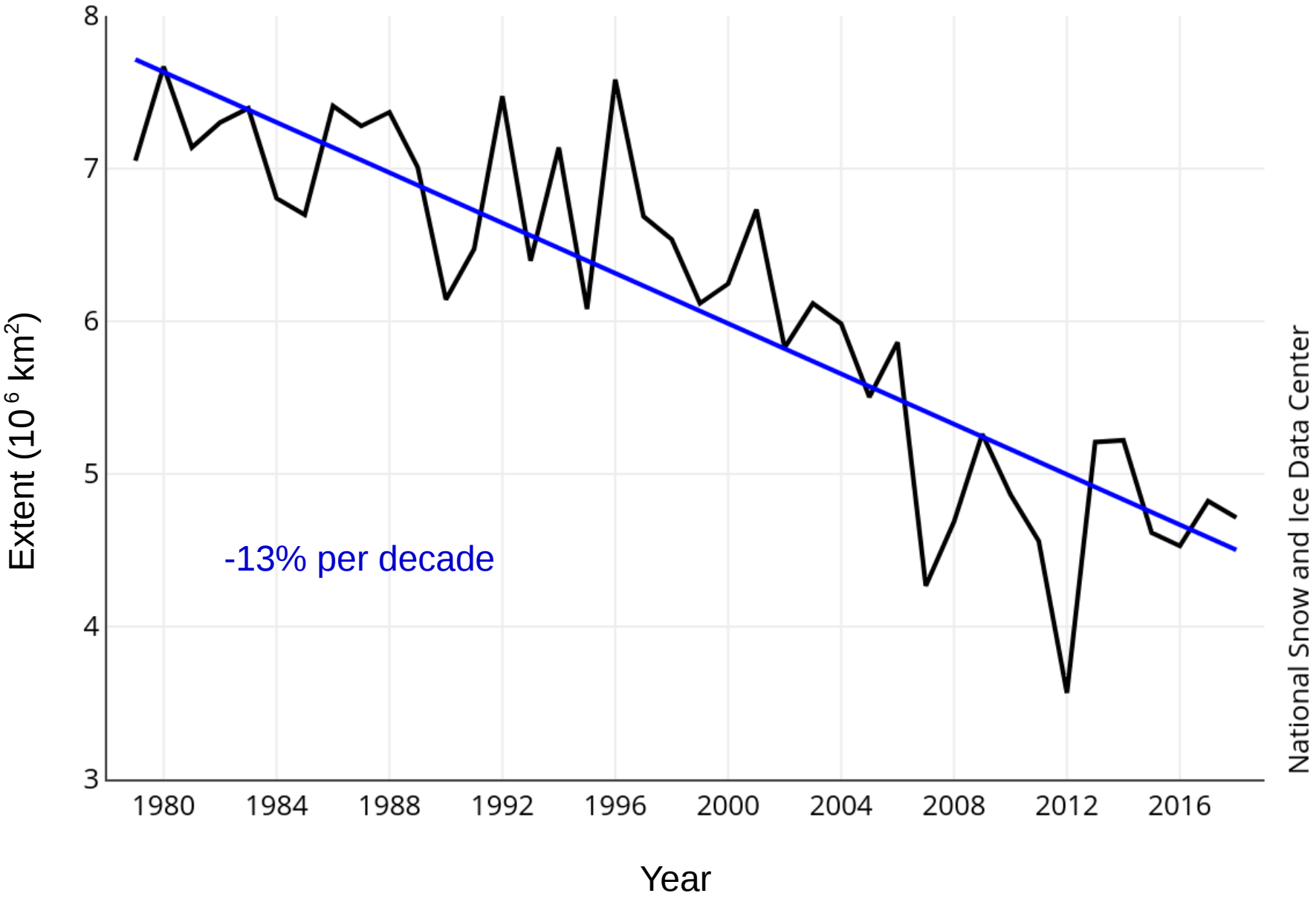
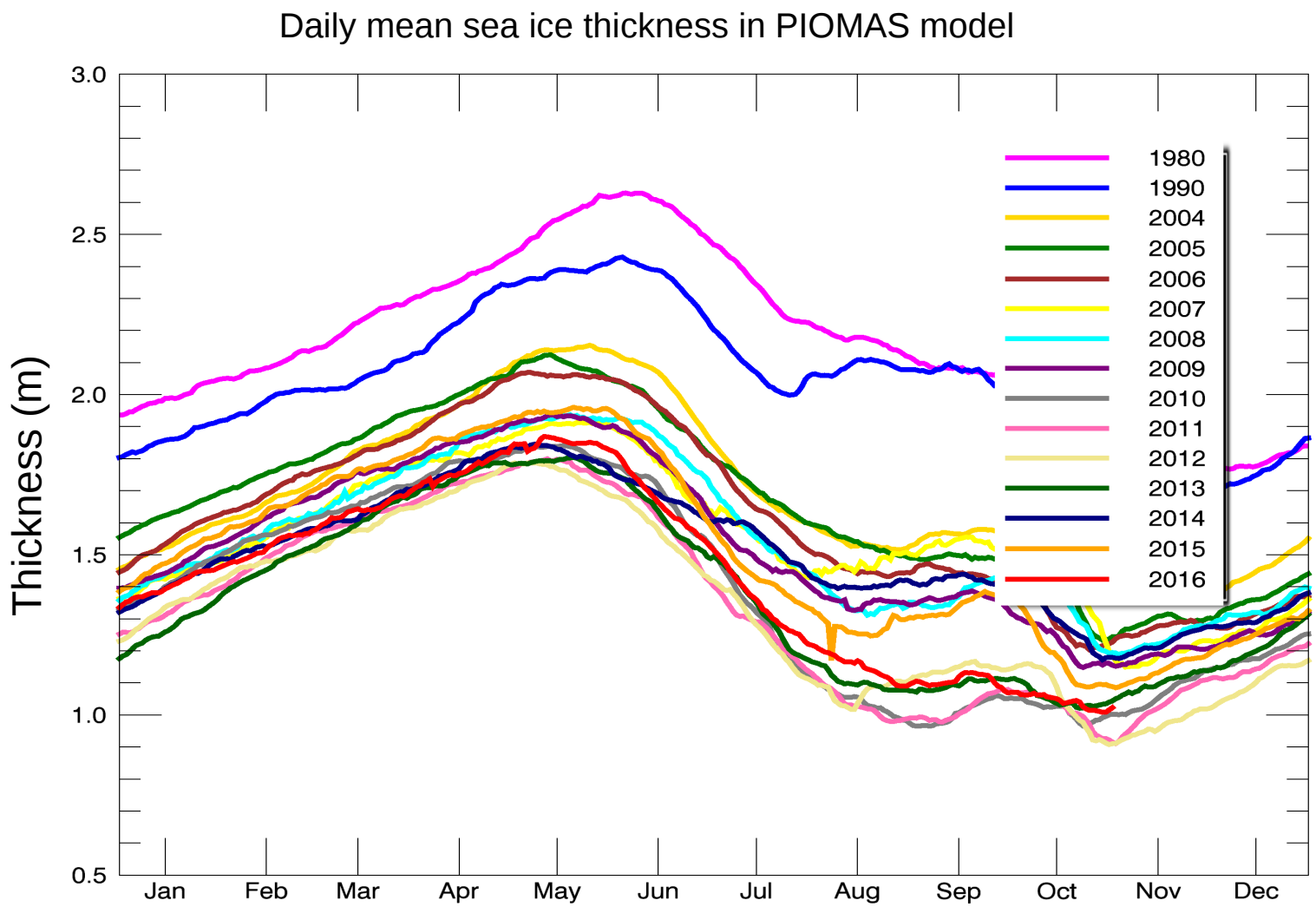
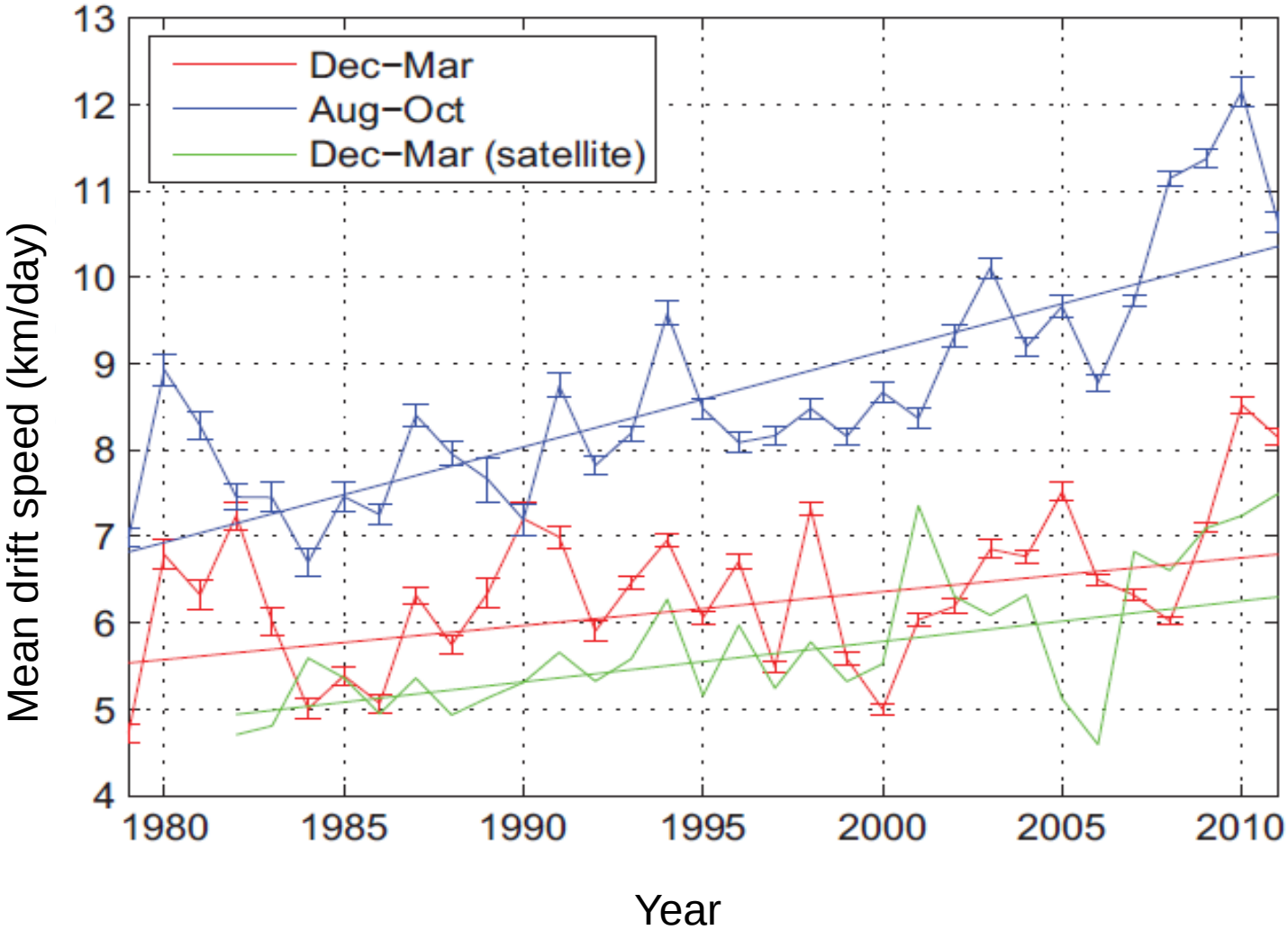
Arctic sea ice extent in September 1979-2018



Thickness of Arctic sea ice

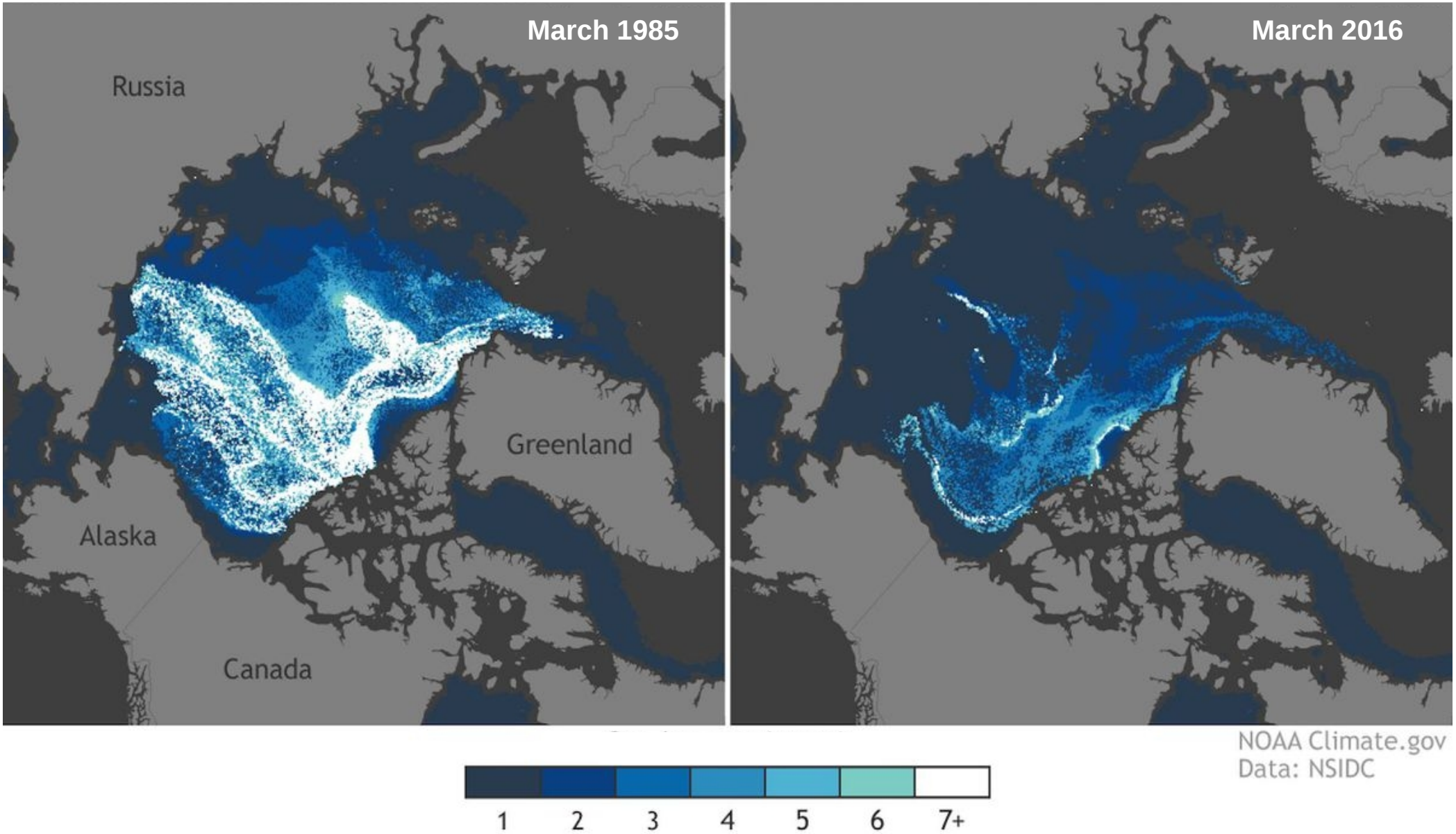


Drift speed of Arctic sea ice



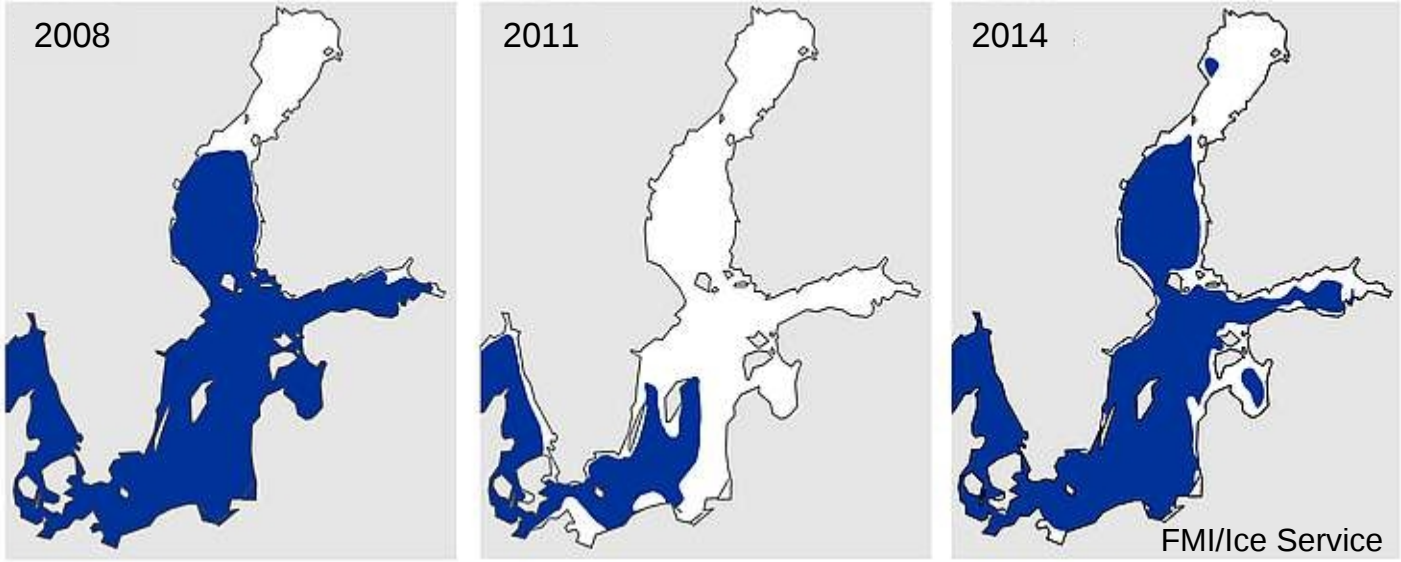
Olason ja Notz, 2014

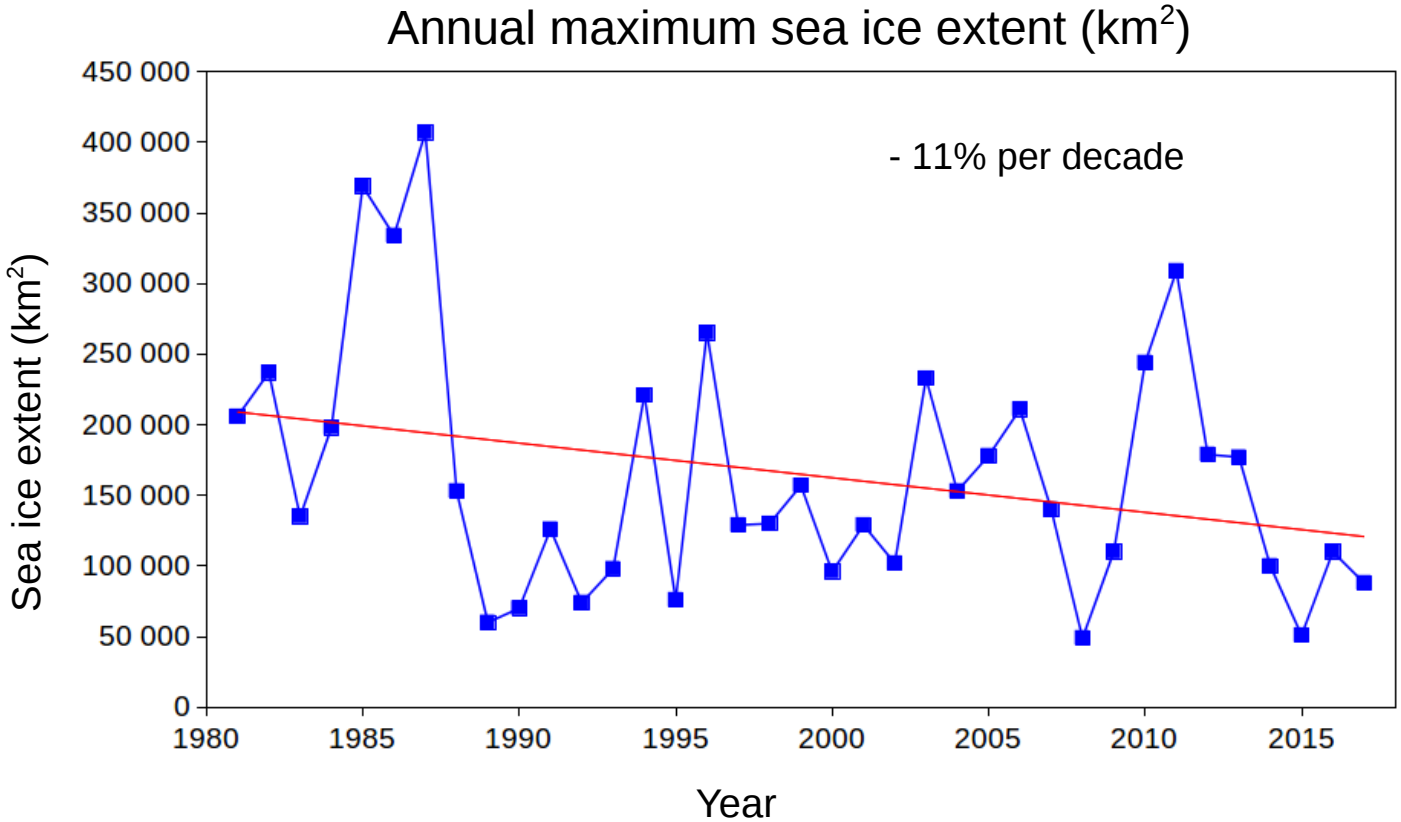
Age of Arctic sea ice



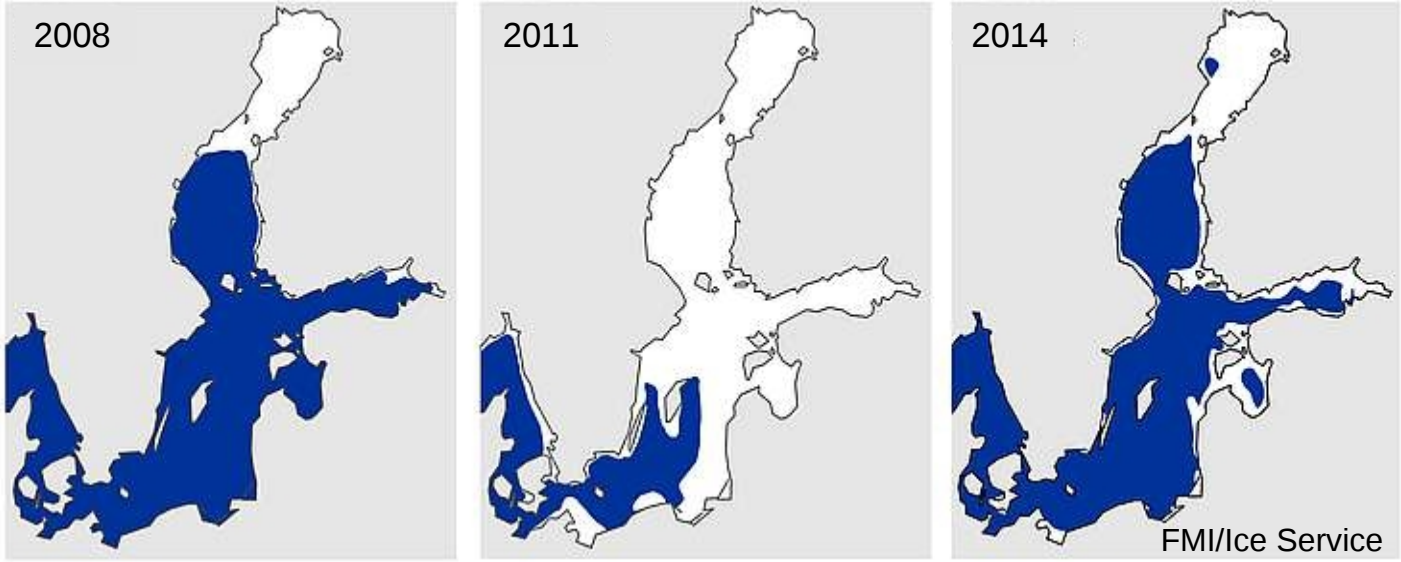
Sea ice age (years)

Ice cover in the Baltic Sea

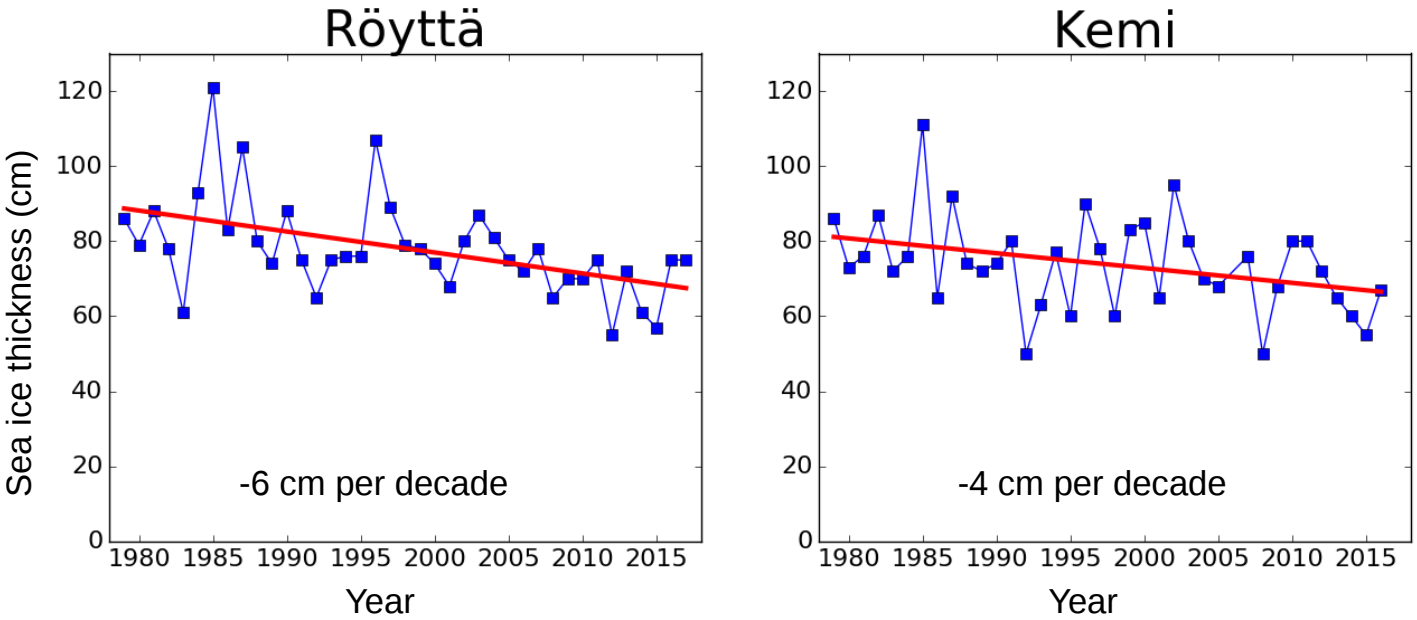




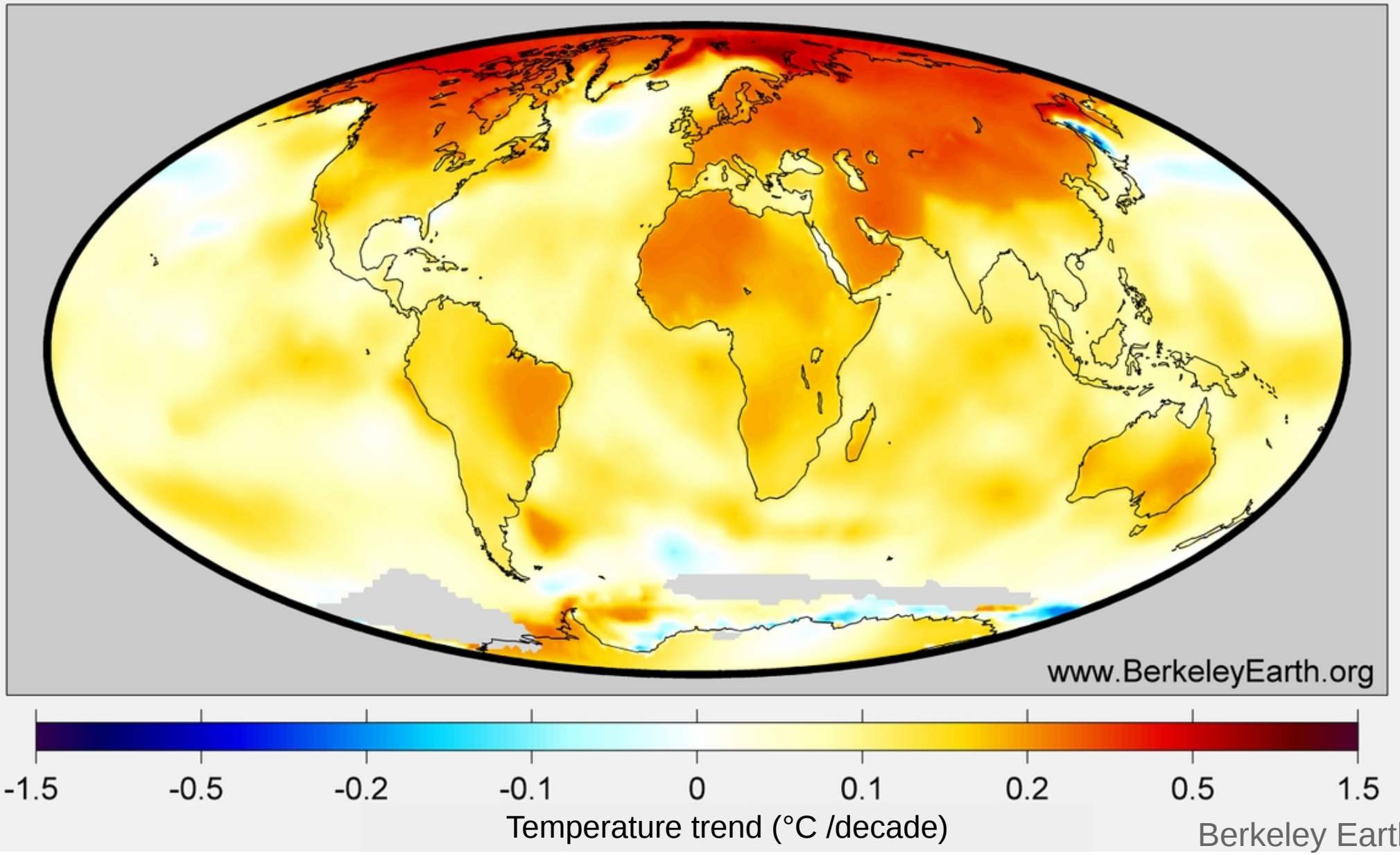
Ice cover in the Baltic Sea



Annual maximum thickness of fast ice (cm)

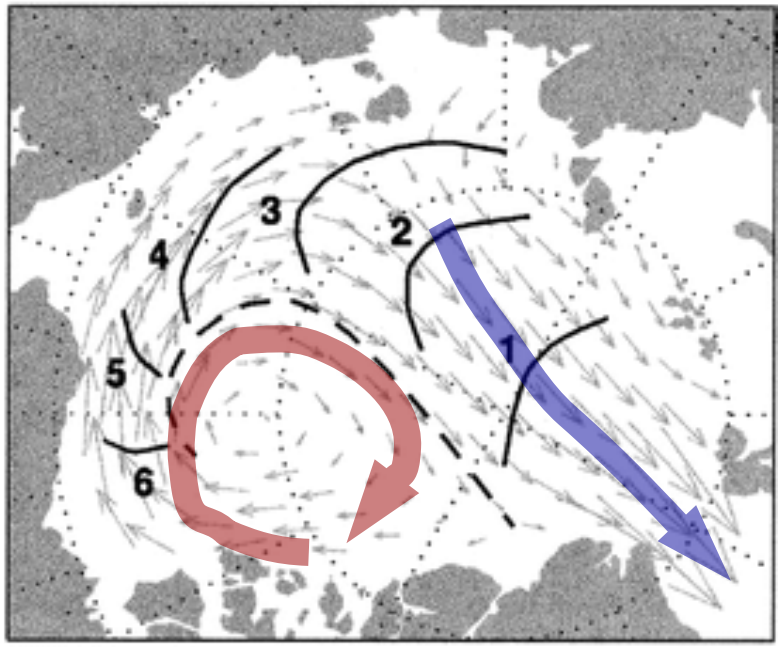


Change in surface air temperature since 1950

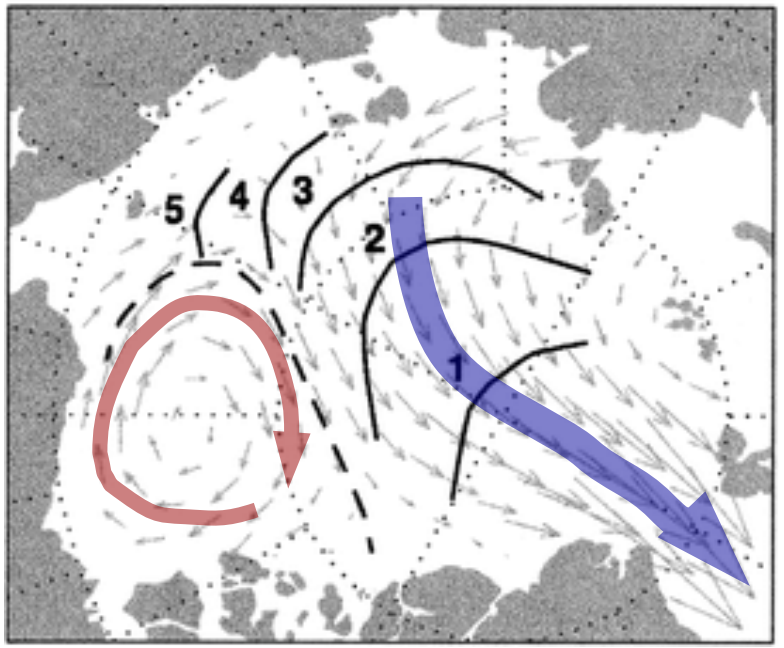


Berkeley Earth

Negative AO

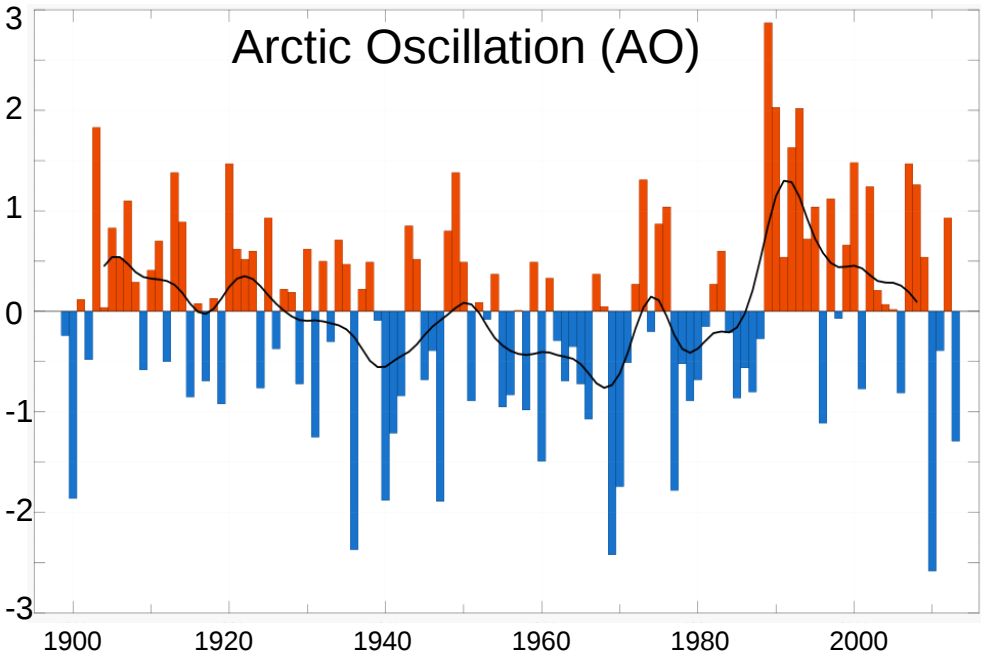


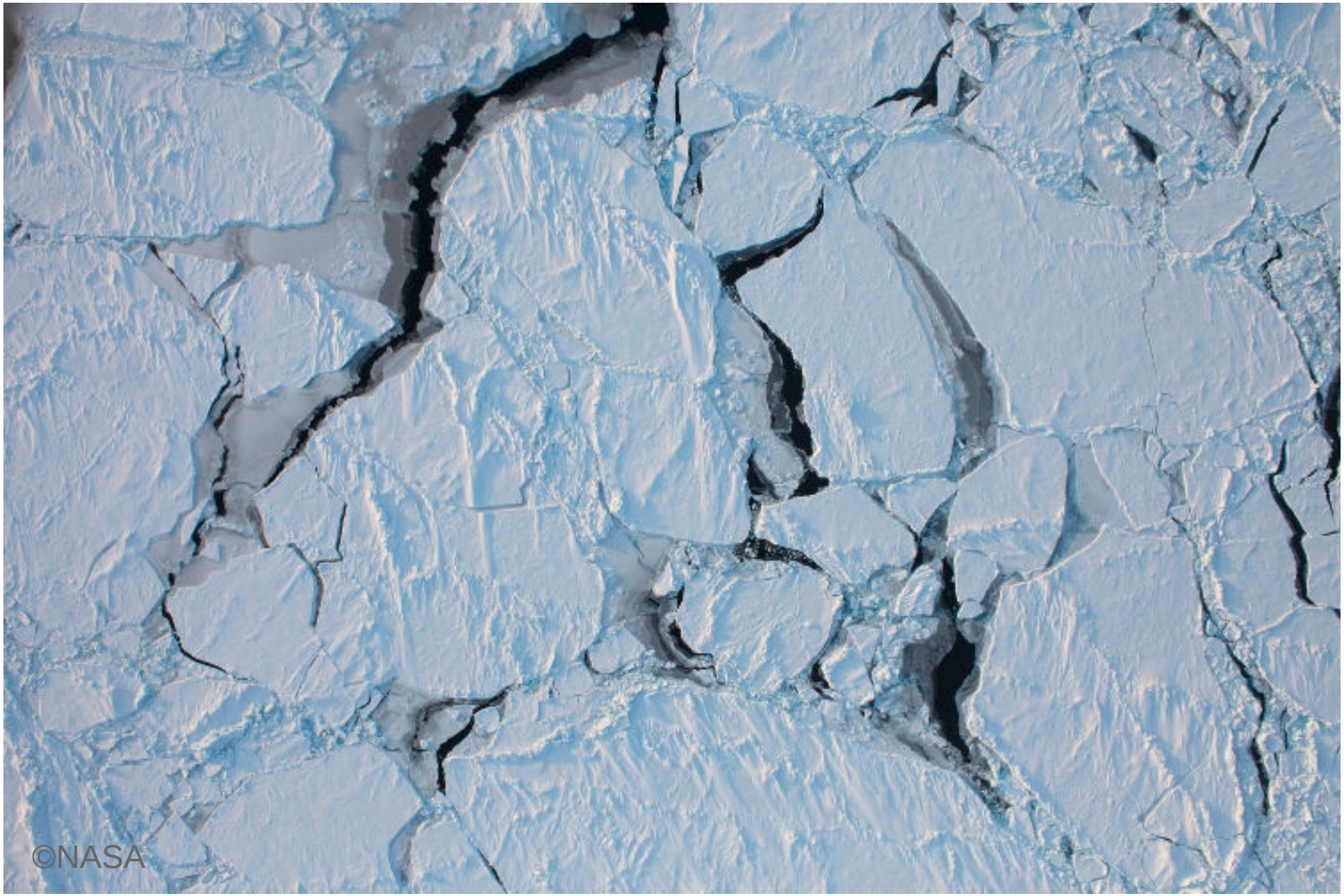
Positive AO



Beaufort Gyre

Transpolar Drift

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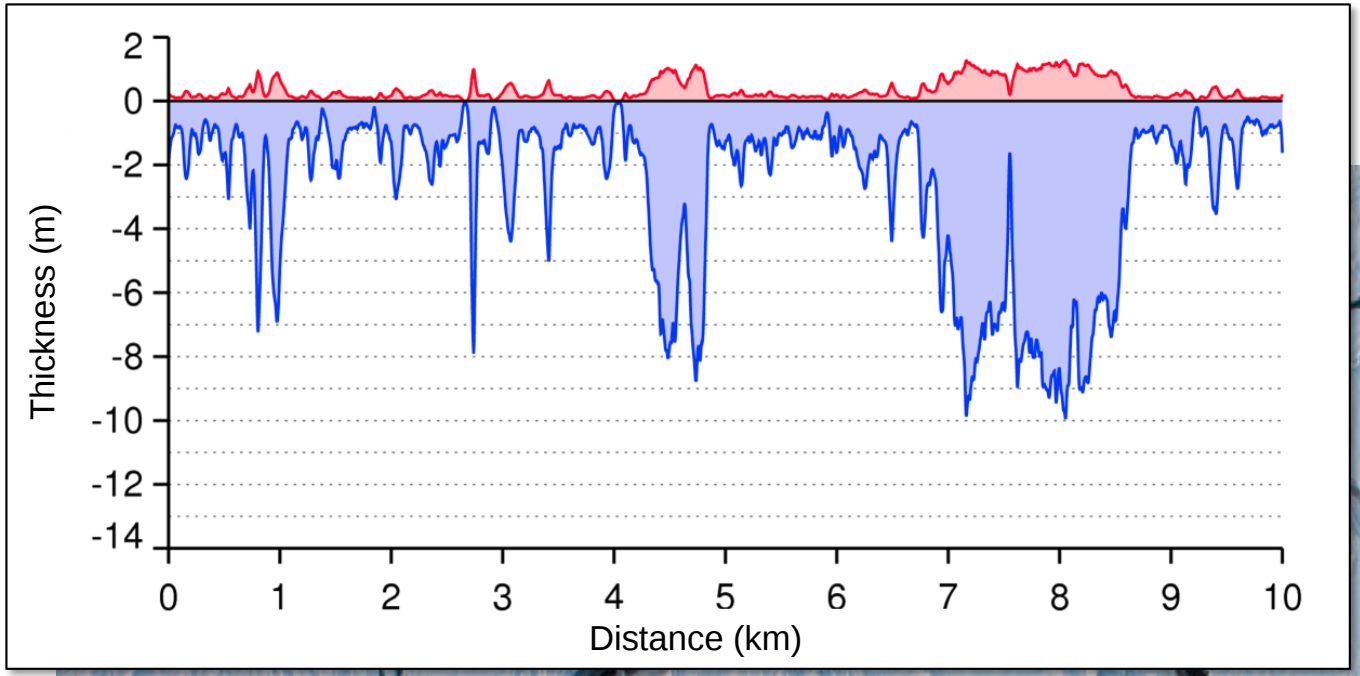
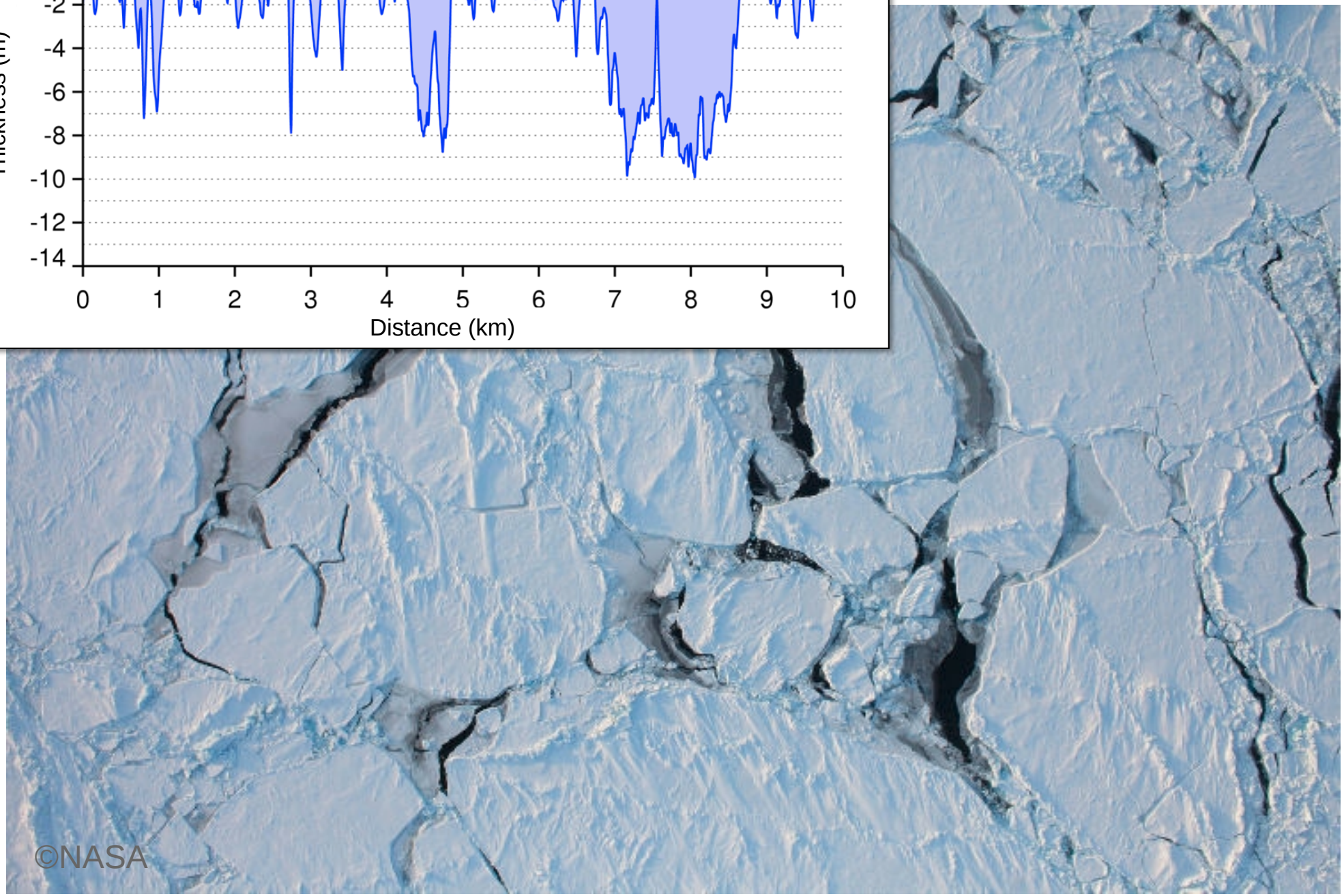
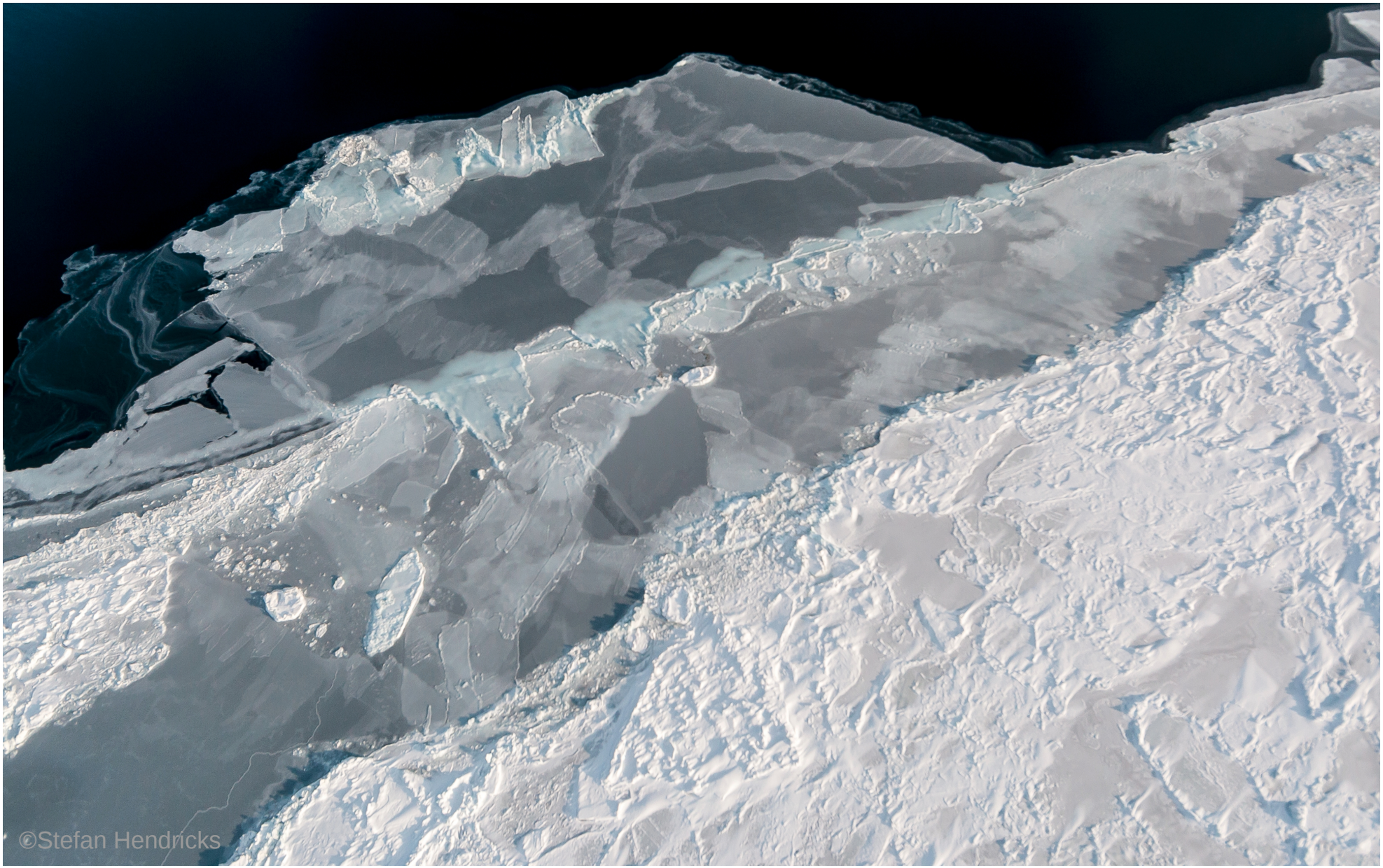


(profile: Stefan Hendricks,
Alfred Wegener Institute)

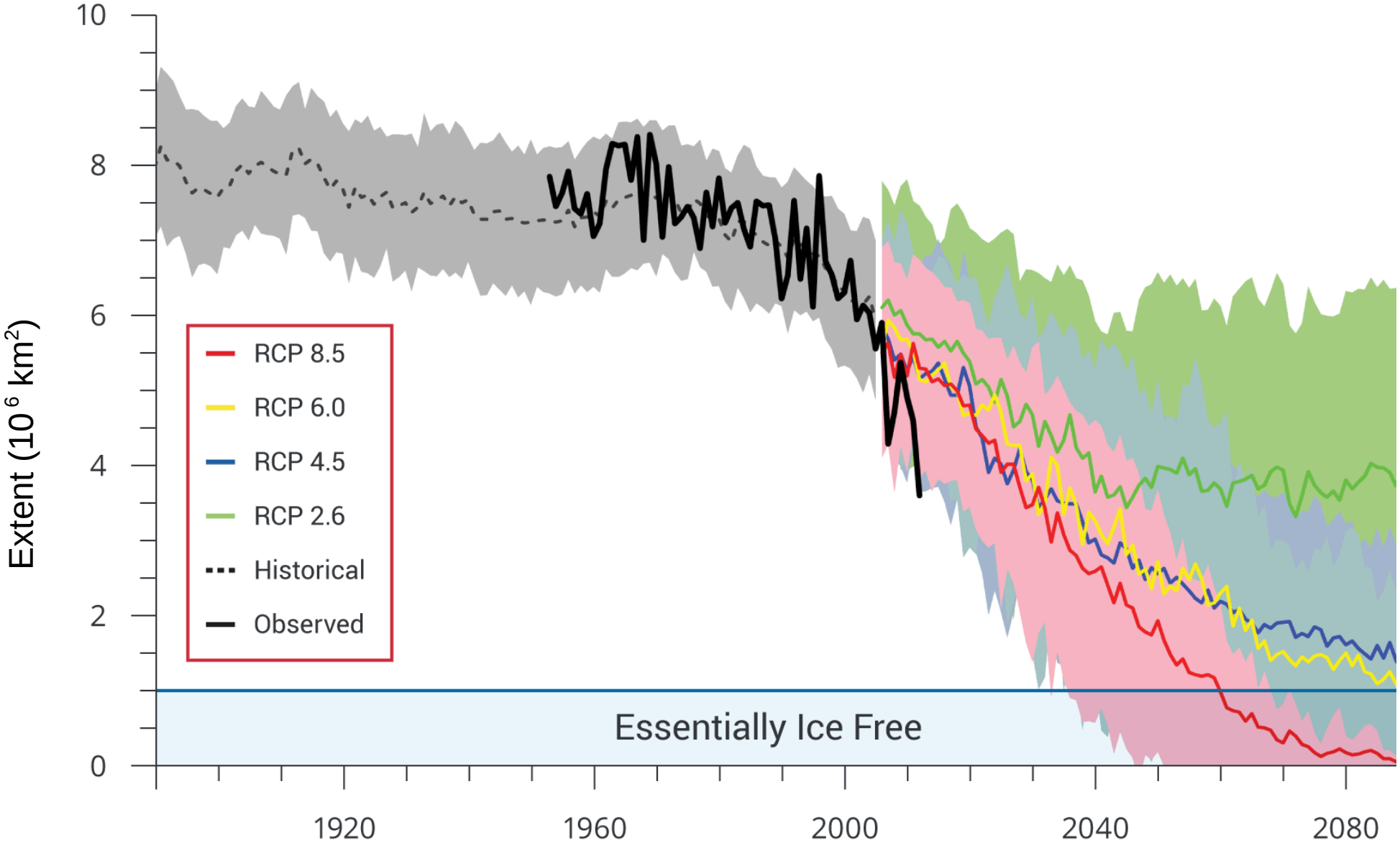


- **In winter**, quick ice growth in refreezing leads: accounts for over 25% of whole winter ice production



- **In summer**, dark open water areas enhance melting

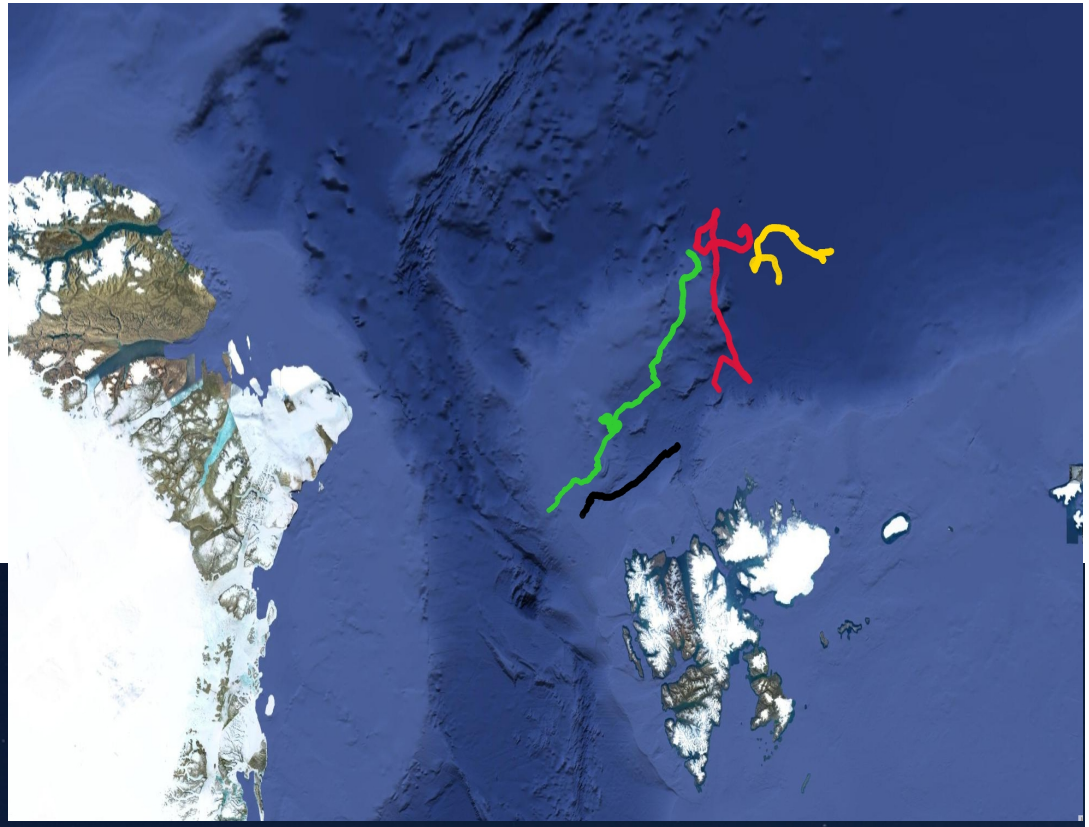
Arctic sea ice extent in September

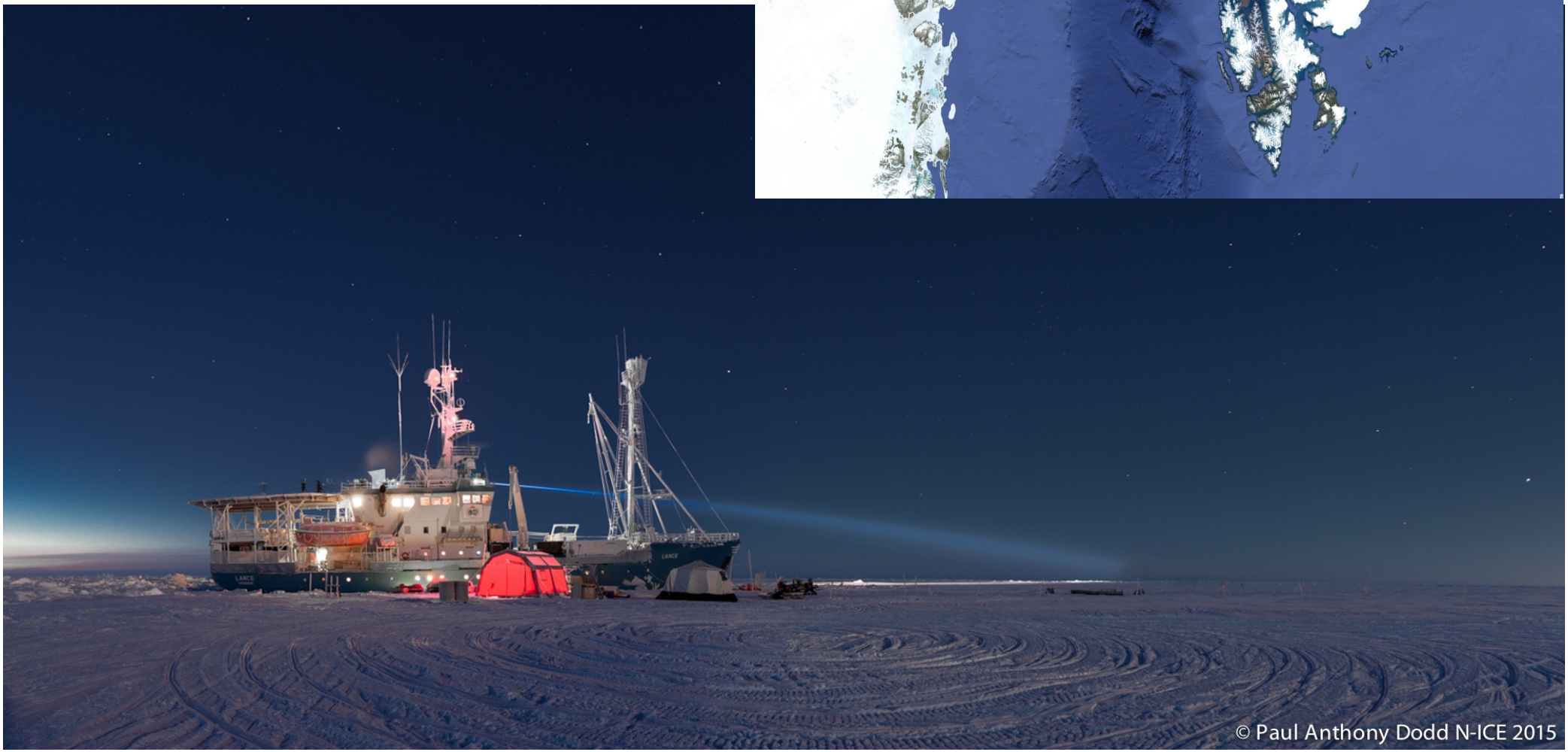


N-ICE 2015

NORWEGIAN YOUNG SEA ICE CRUISE

January-June 2015





N-ICE 2015
NORWEGIAN YOUNG SEA ICE CRUISE

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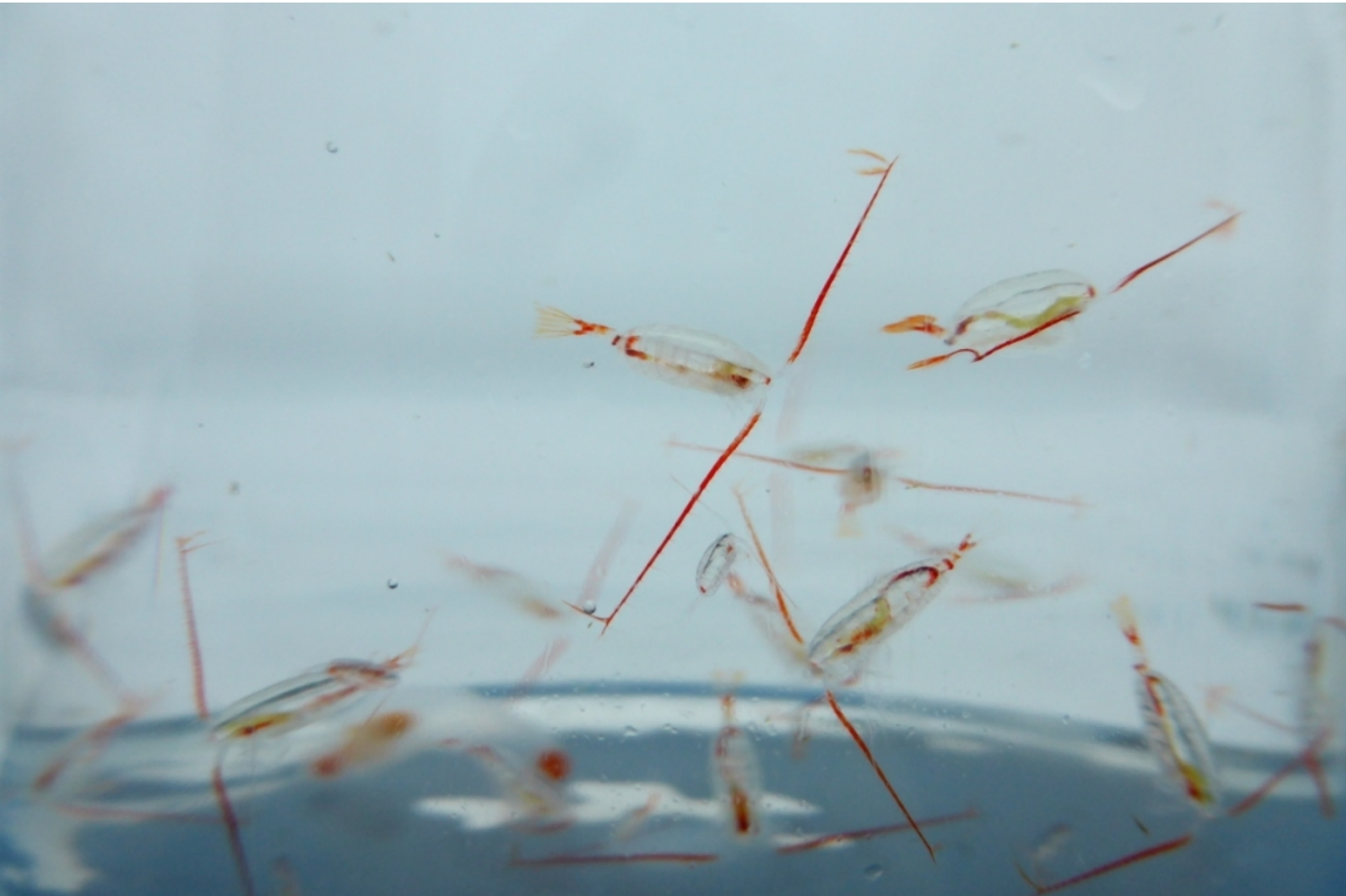
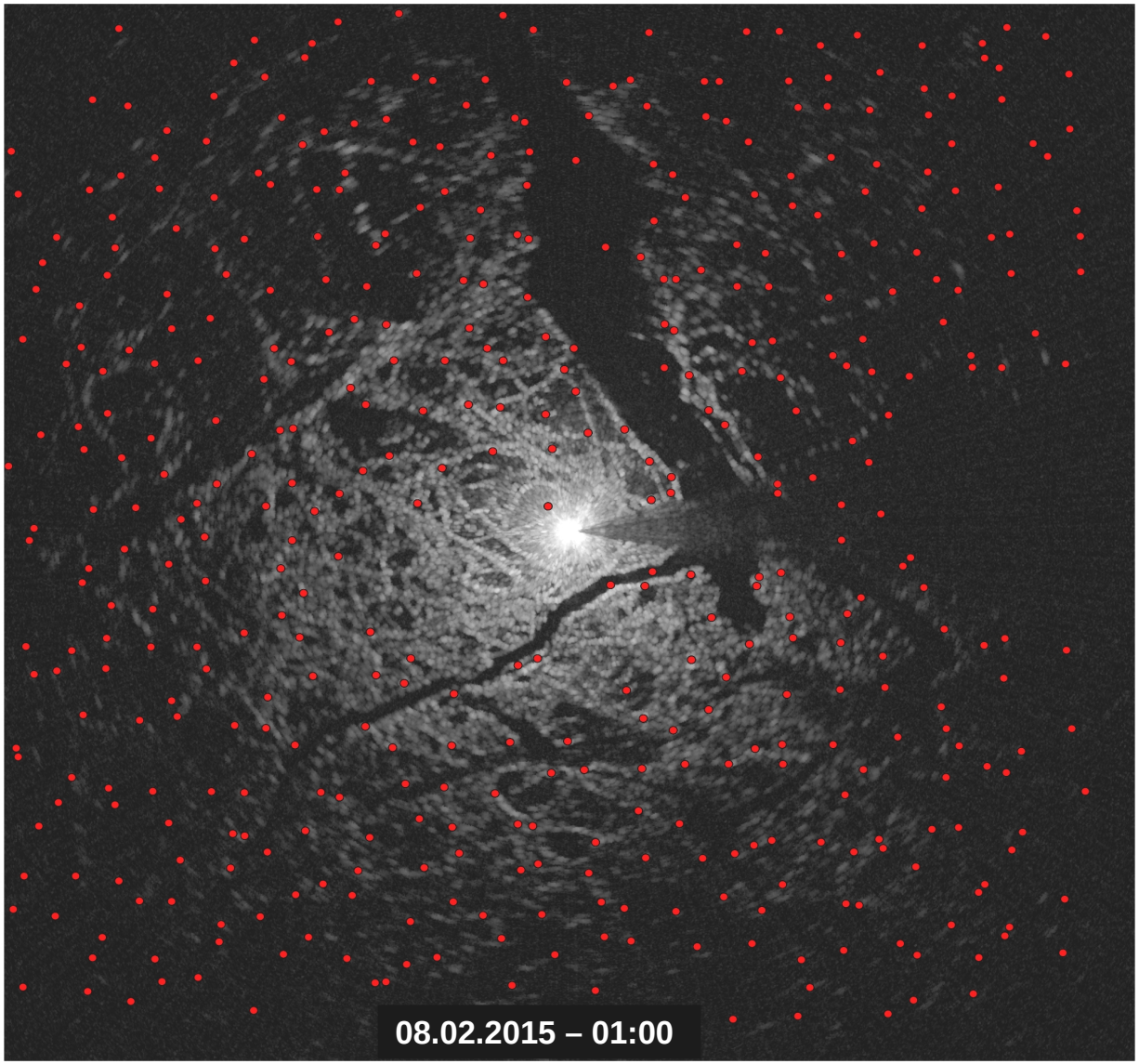
NORWEGIAN YOUNG SEA ICE CRUISE



15 km × 15 km
Resolution 12.5 m
Images every minute



15 km × 15 km
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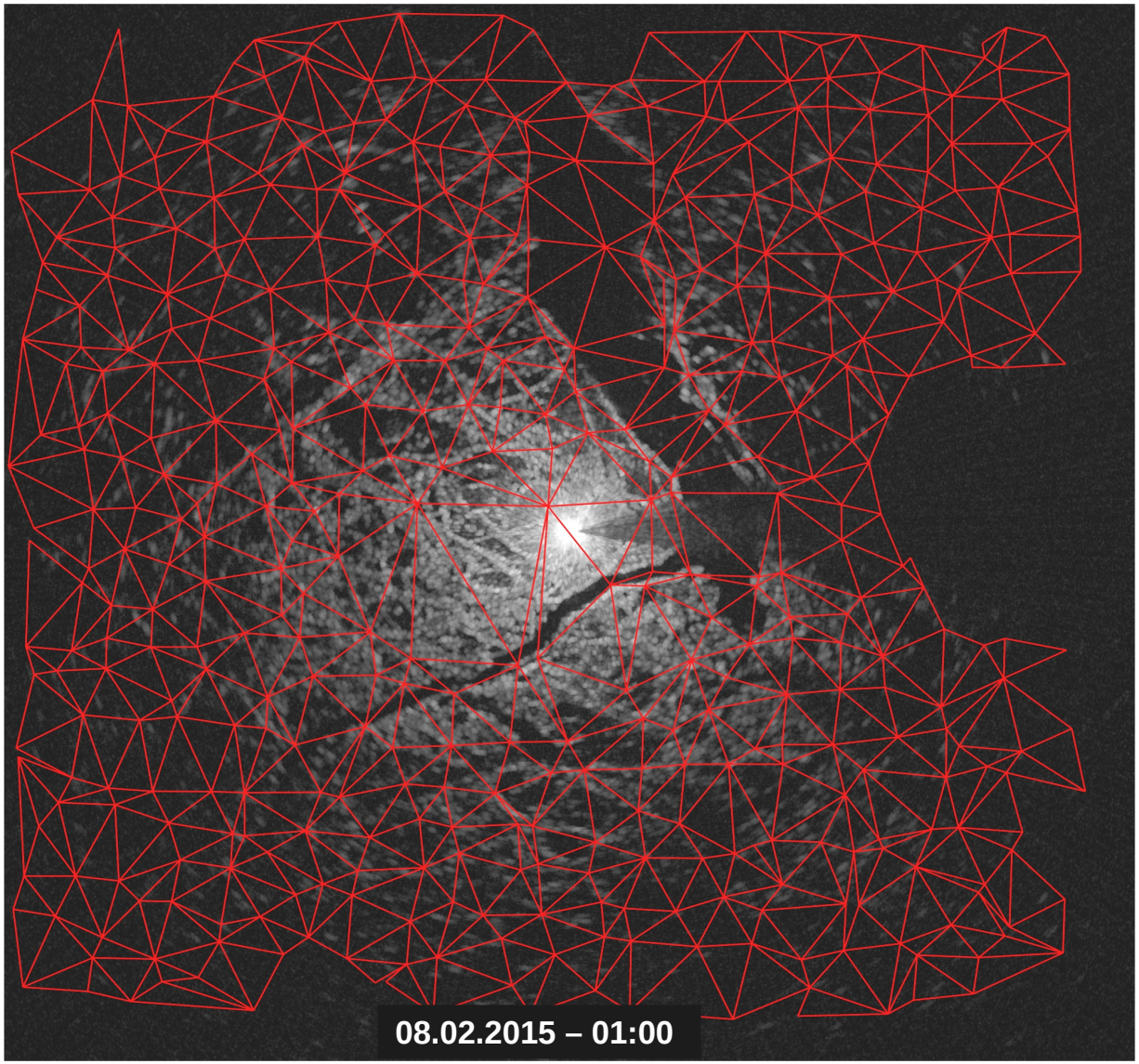
Images every minute



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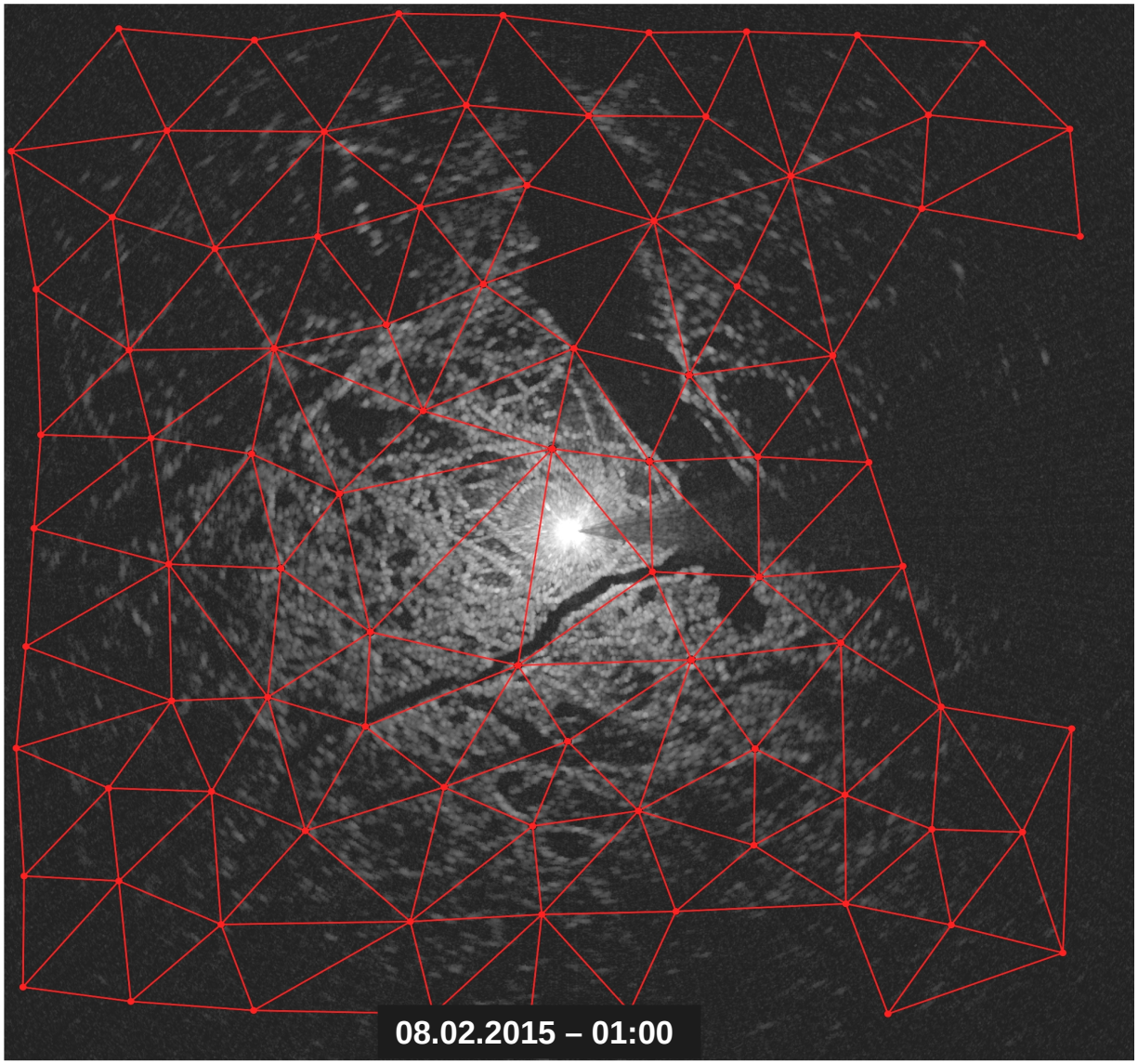
Images every minute



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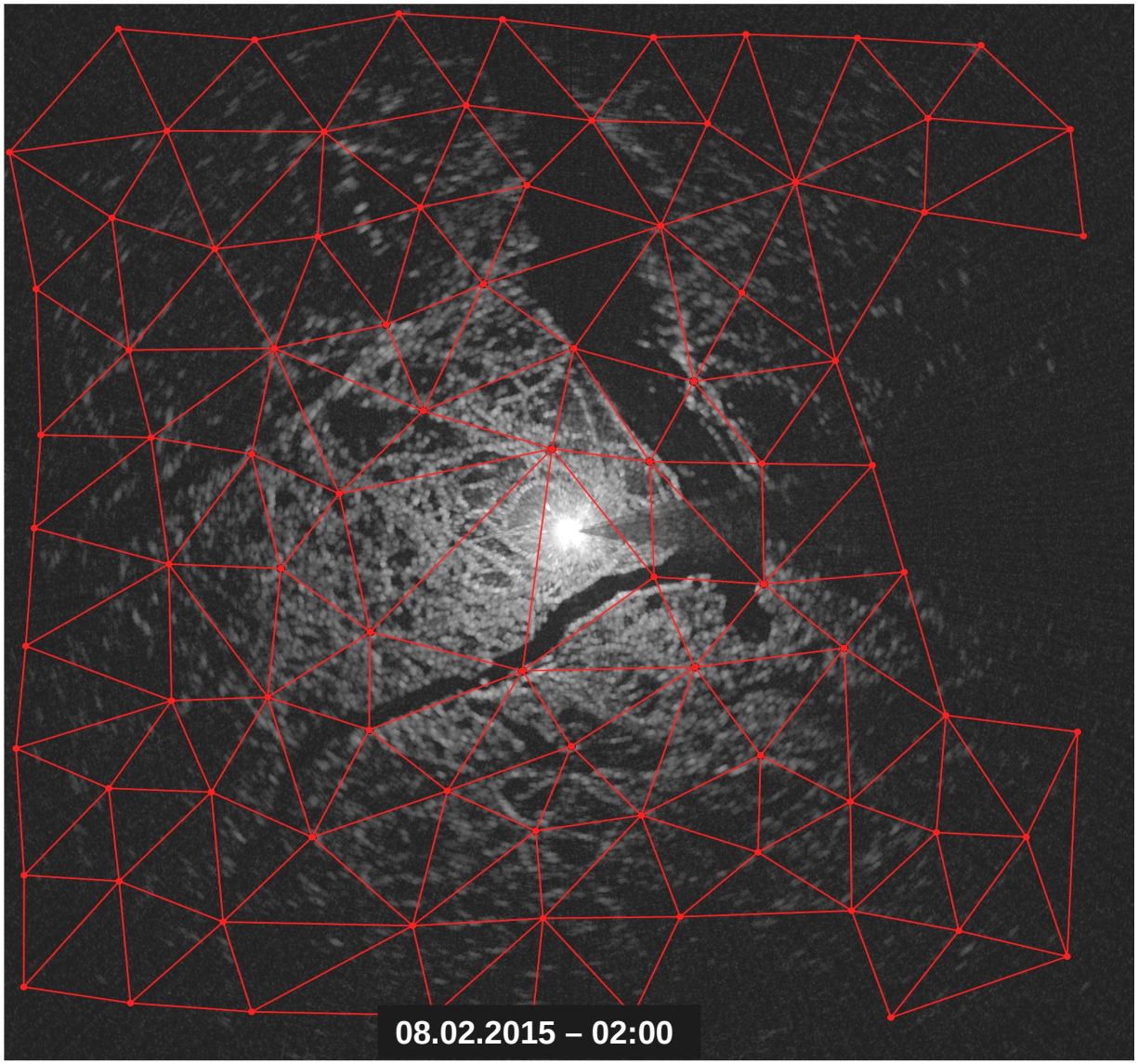
Images every minute



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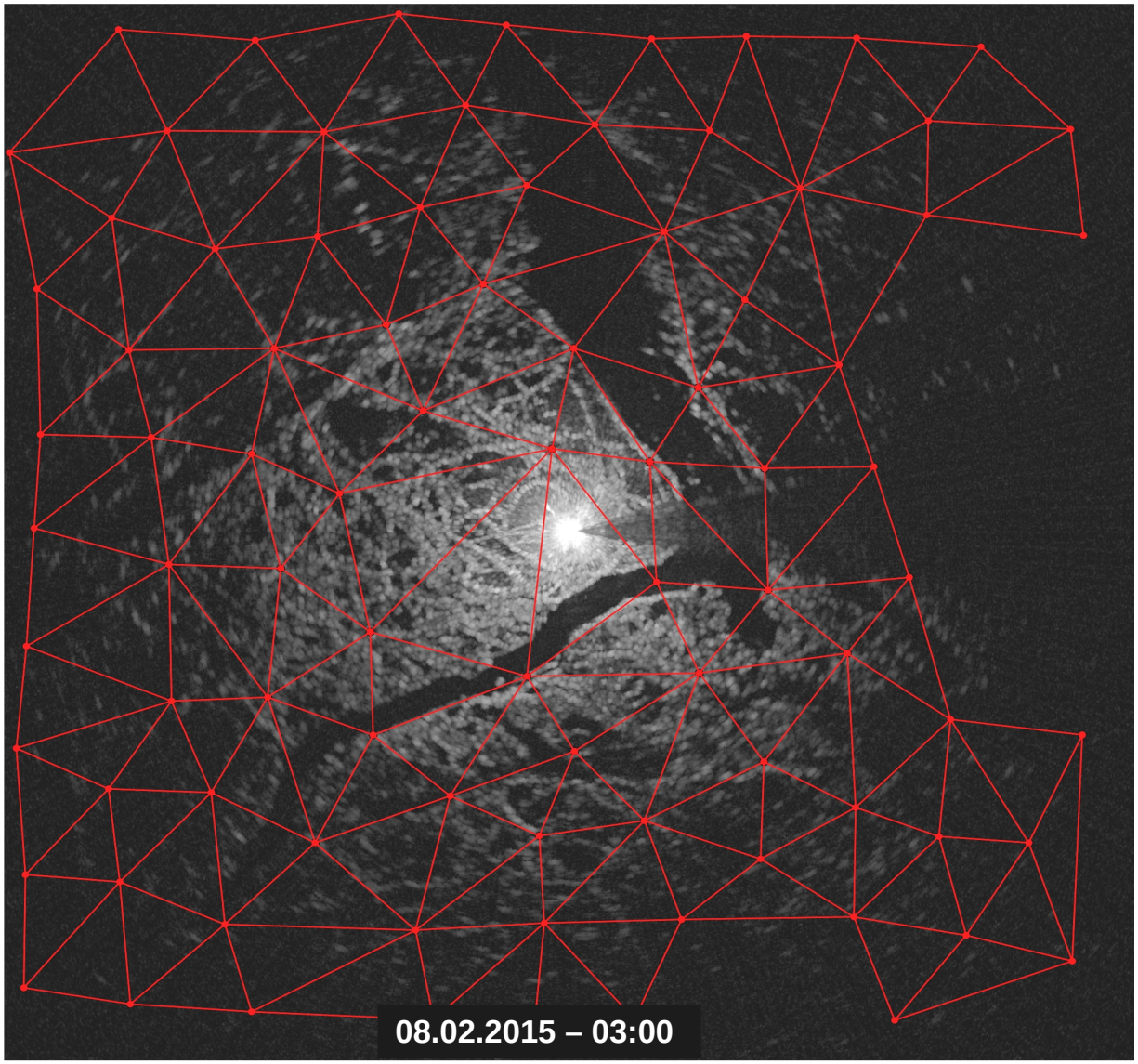

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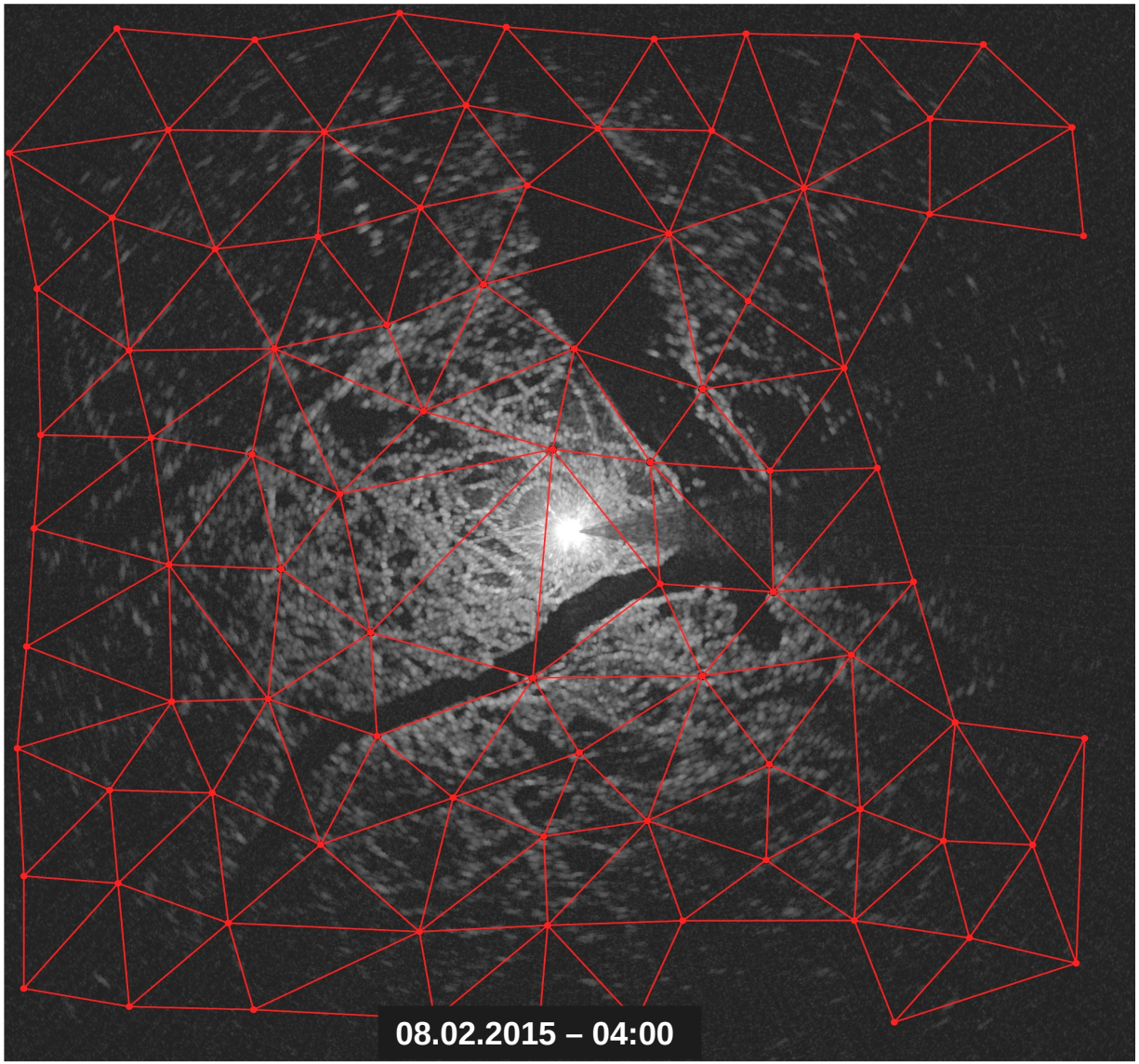
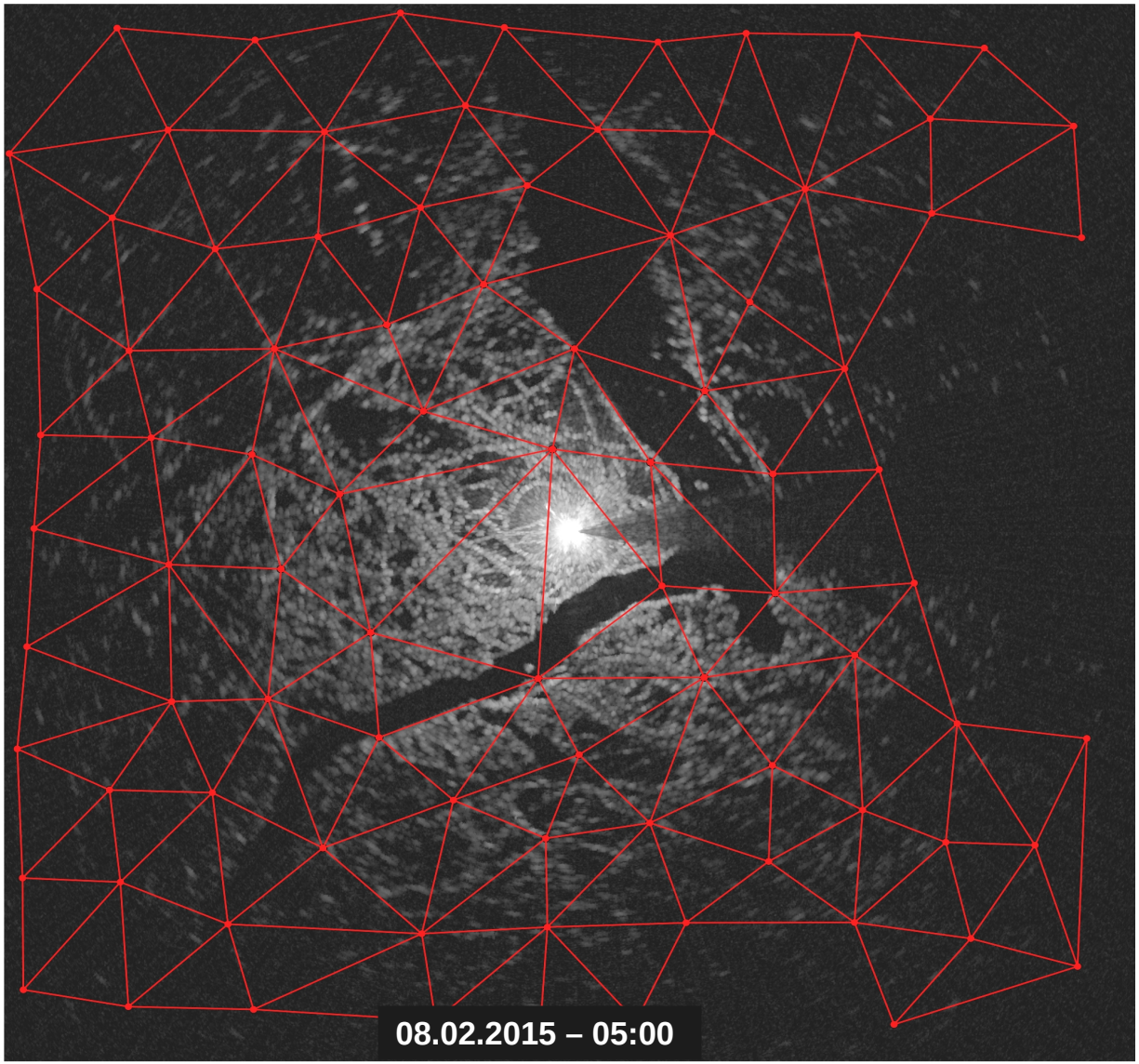


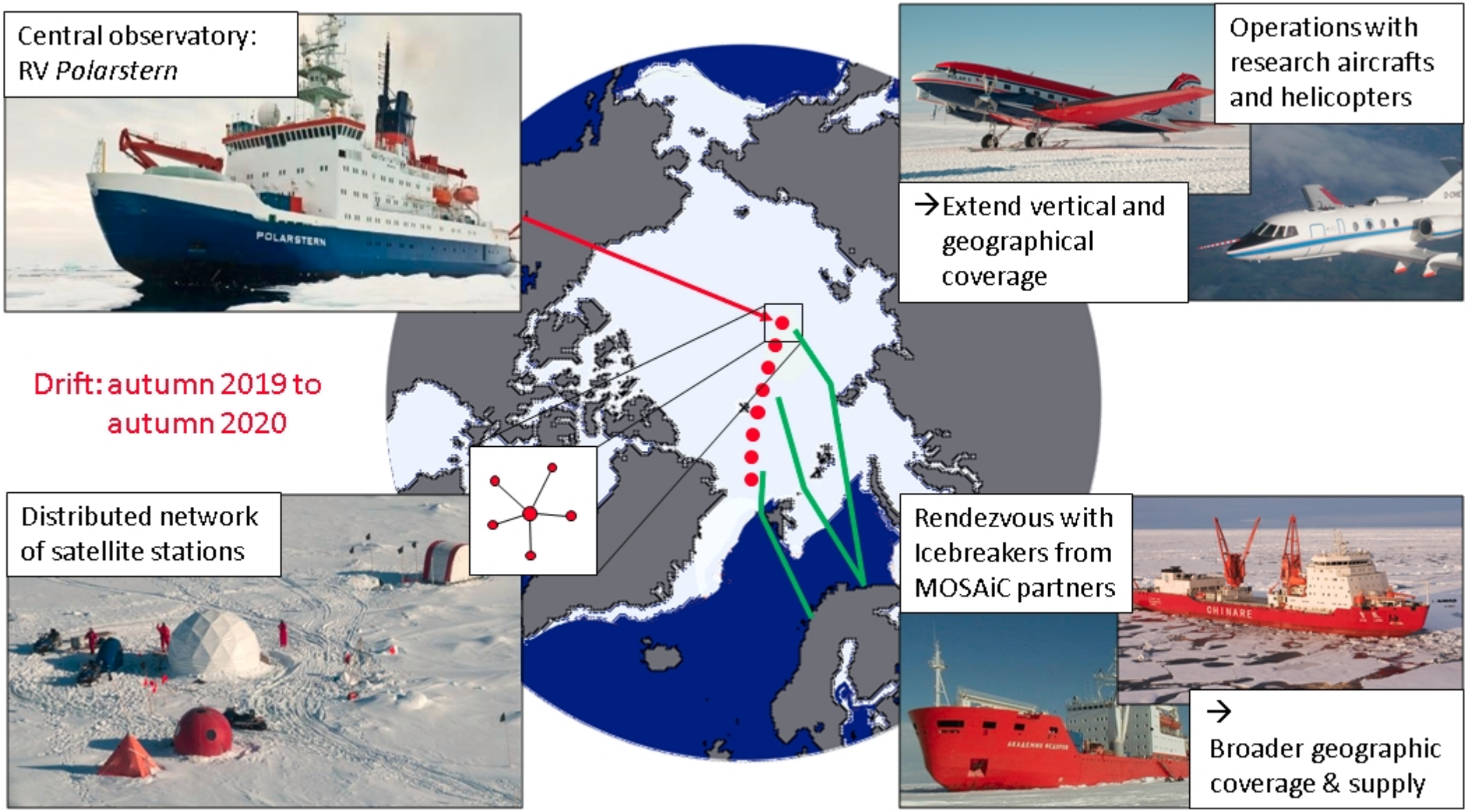
15 km × 15 km
Resolution 12.5 m
Images every minute

Deformation rate describes how fast some area in the ice pack is changing its shape.



15 km × 15 km
Resolution 12.5 m
Images every minute

MOSAiC - Multidisciplinary drifting observatory for the study of Arctic climate



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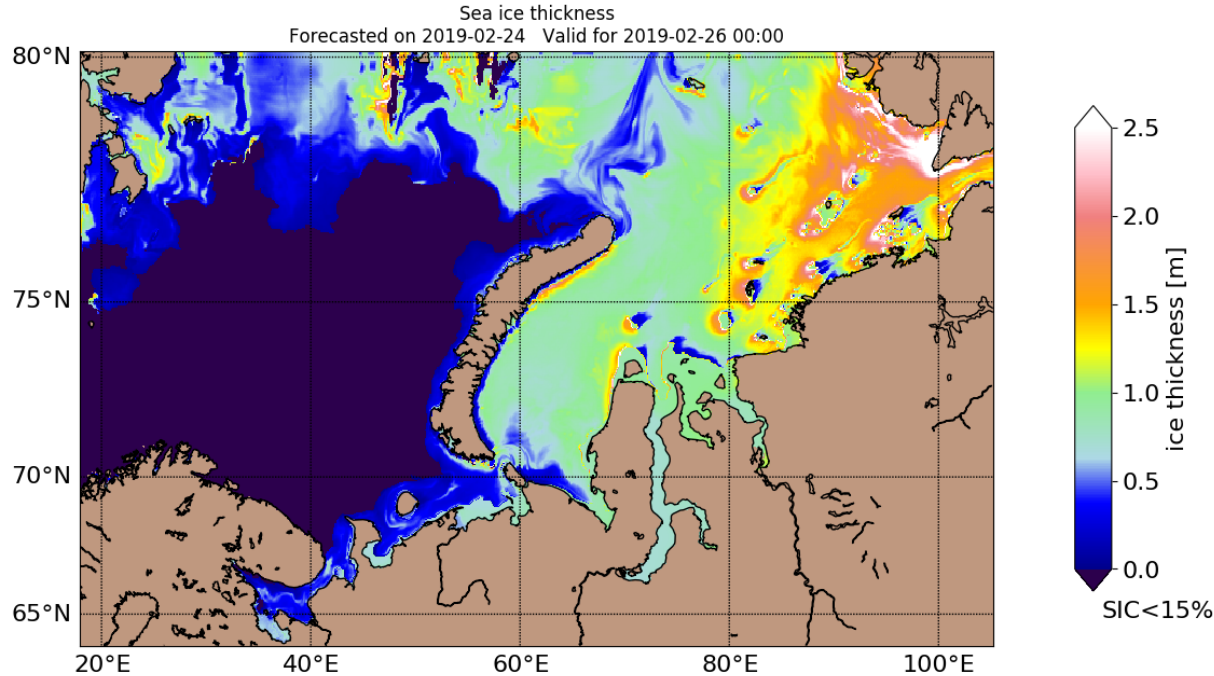
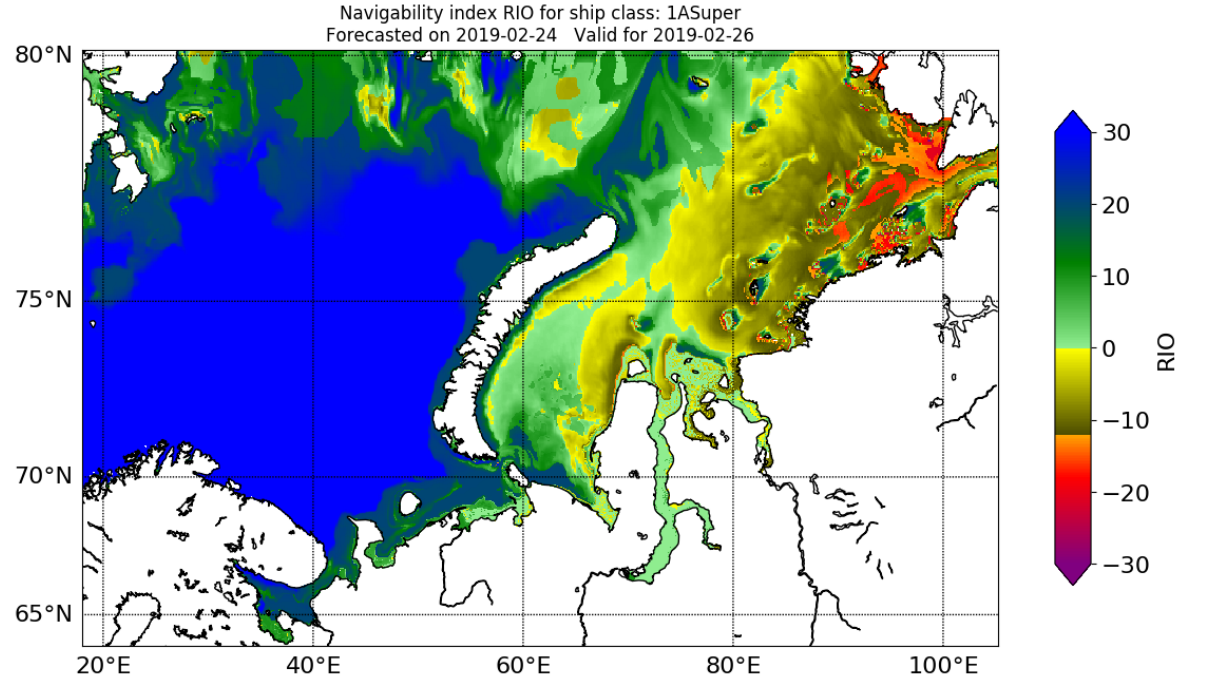
Kara Sea ice
BALTIC SEA
Baltic Sea ice

Model forecasts

- Sea ice - ocean model
  NEMO 3.6 LIM3
- 5 ice thickness categories
- Resolution: ~4 km, 45 vertical levels

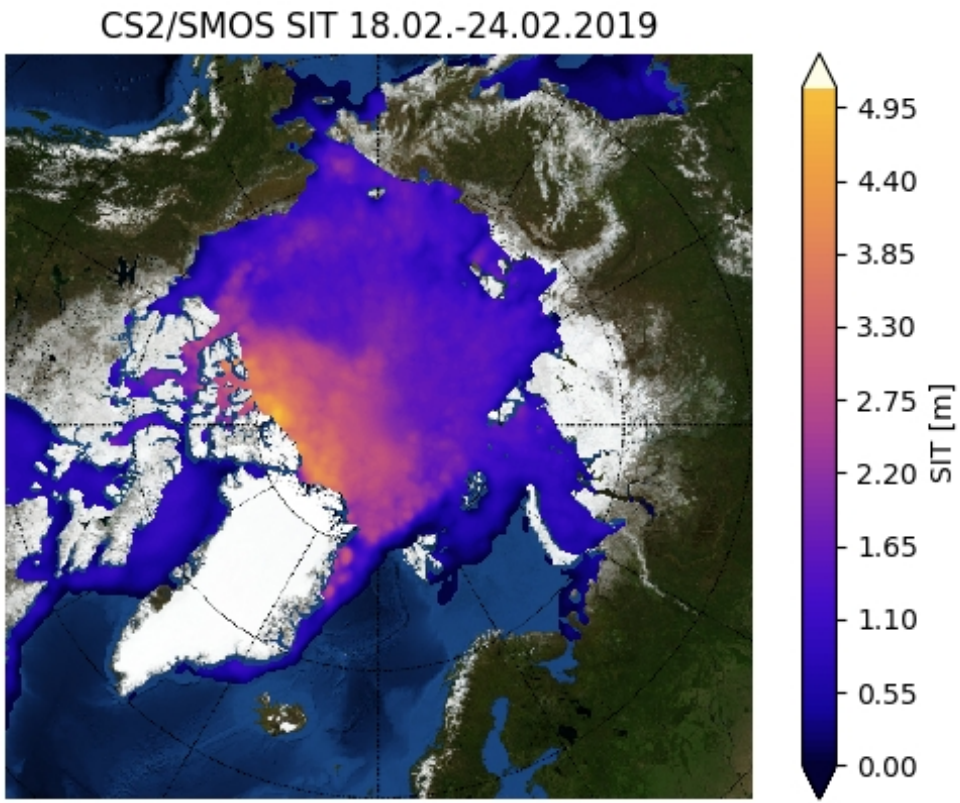
- **Daily forecasts for 12 days:**
  - **Sea ice thickness**
  - **Sea ice concentration and sea surface temperature**
  - **Navigability index RIO (Risk Index Outcome) for several ship classes**

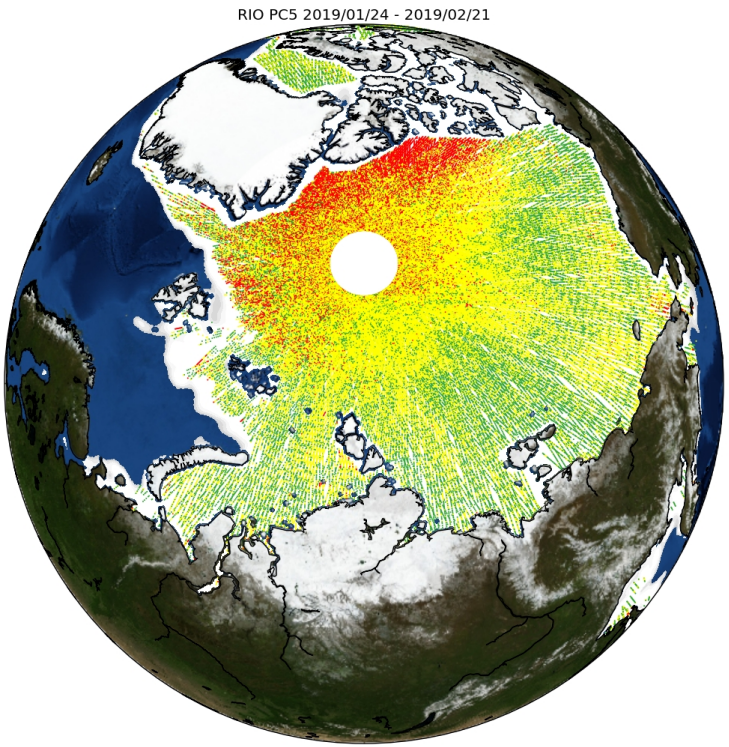




Satellite products

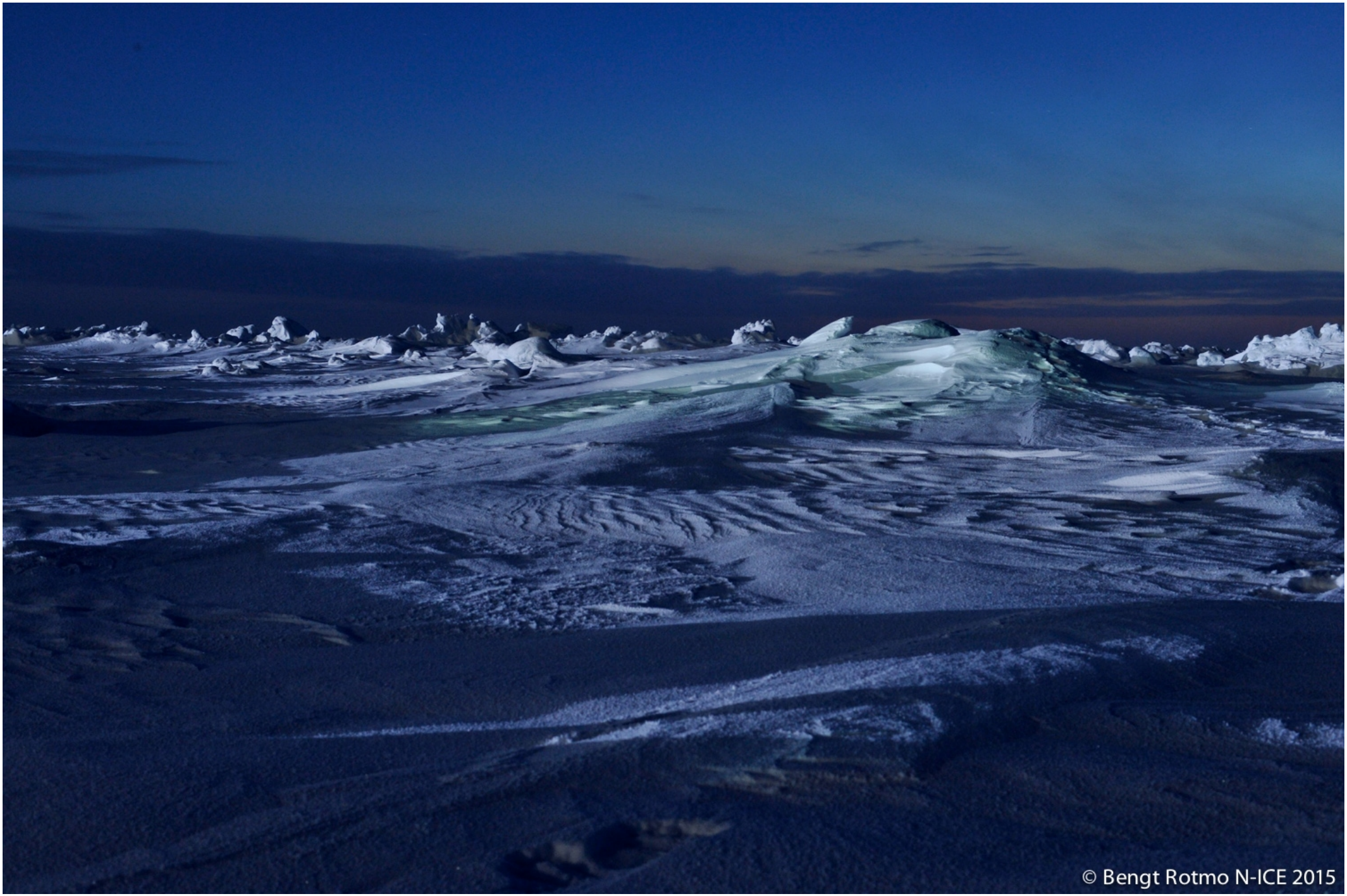
- Sea ice thickness calculated be merging Cryosat2 altimeter and SMOS radiometer measurements





- Near real time RIO, sea ice thickness and freeboard from Cryosat2

Longer time series available upon request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