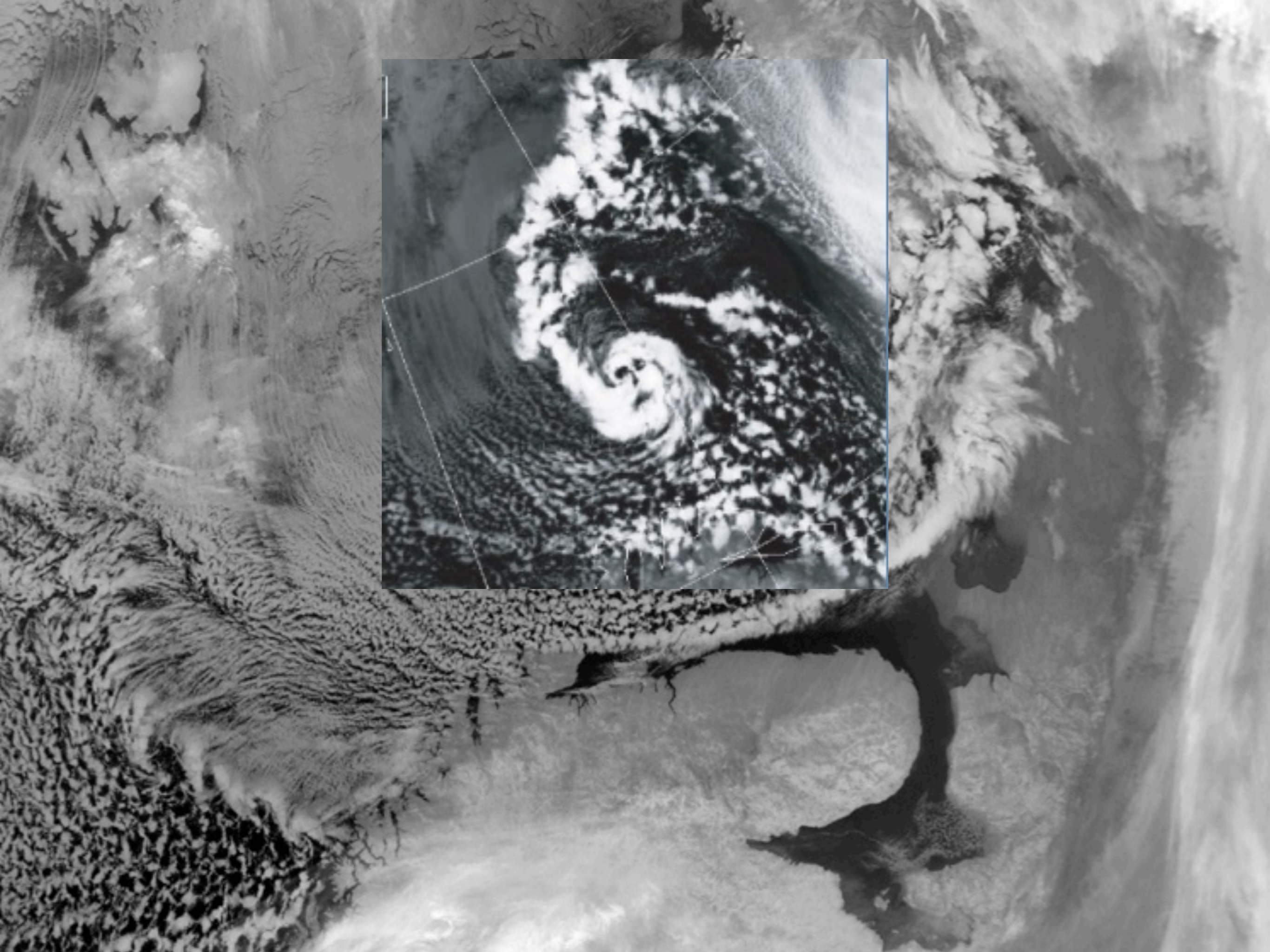


EXTREME ARCTIC MARINE WEATHER

ERIK KOLSTAD
BLUE ACTION KICKOFF

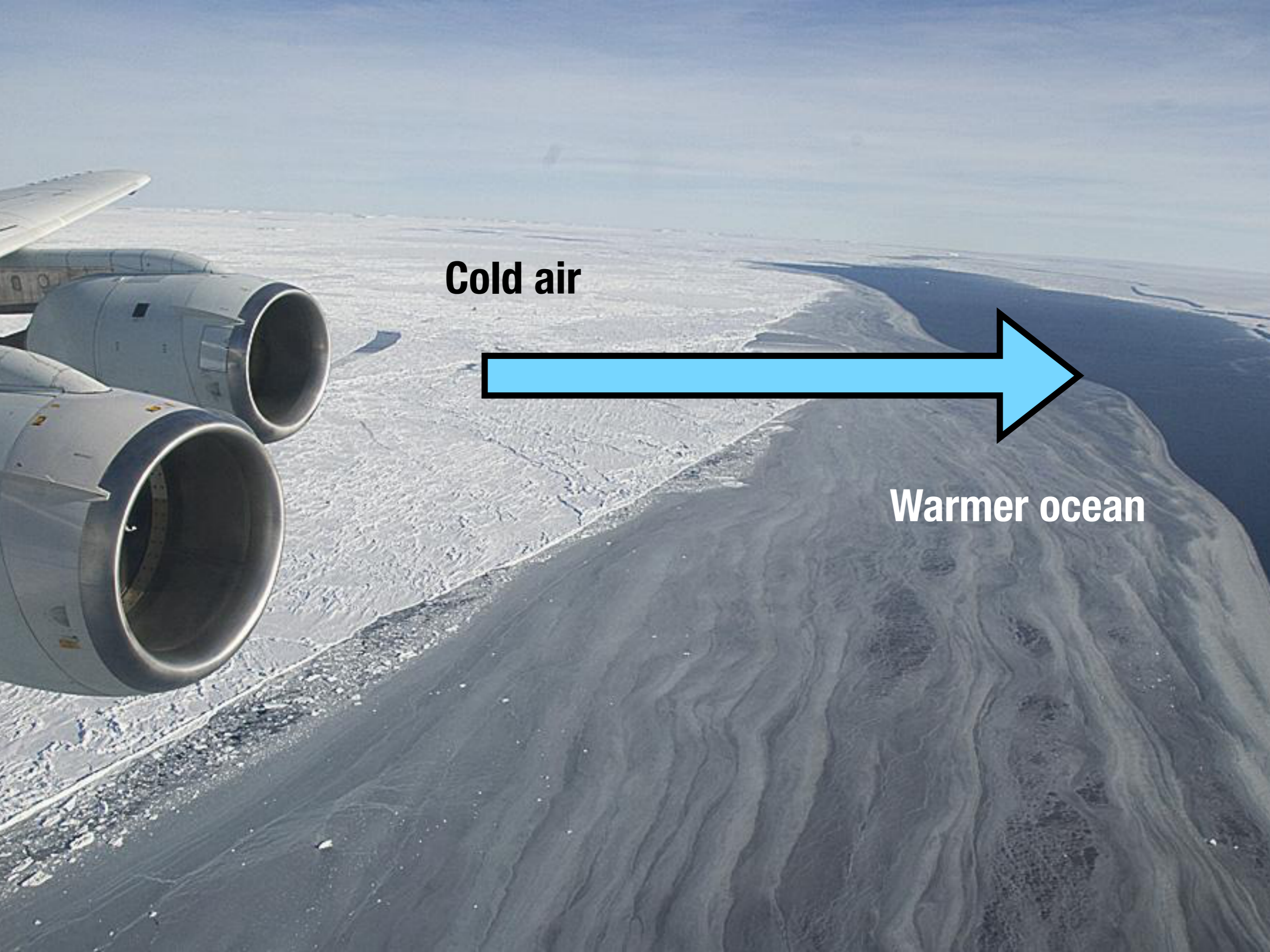


uni Research



The sea ice edge is a region with large temperature gradients





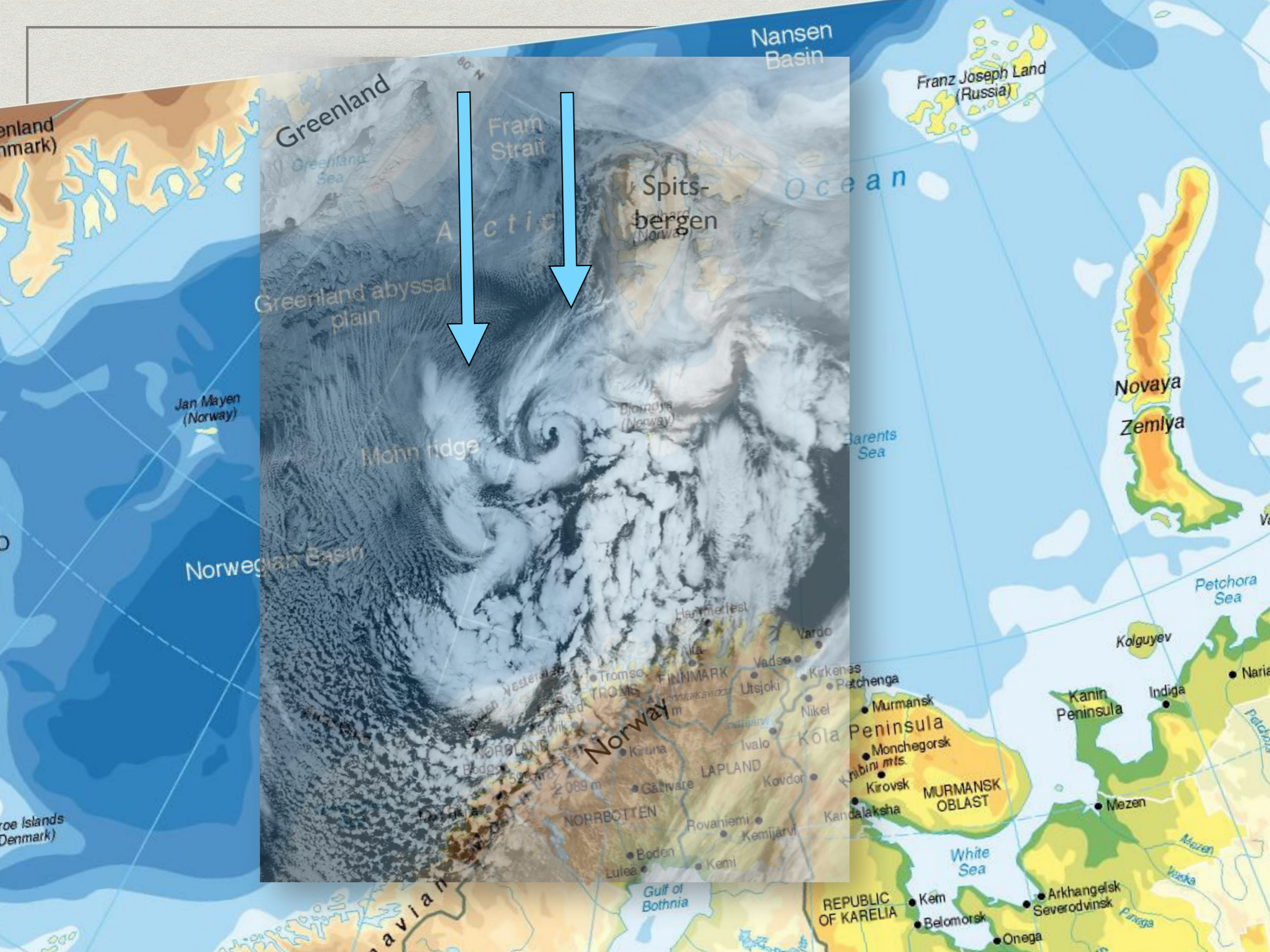
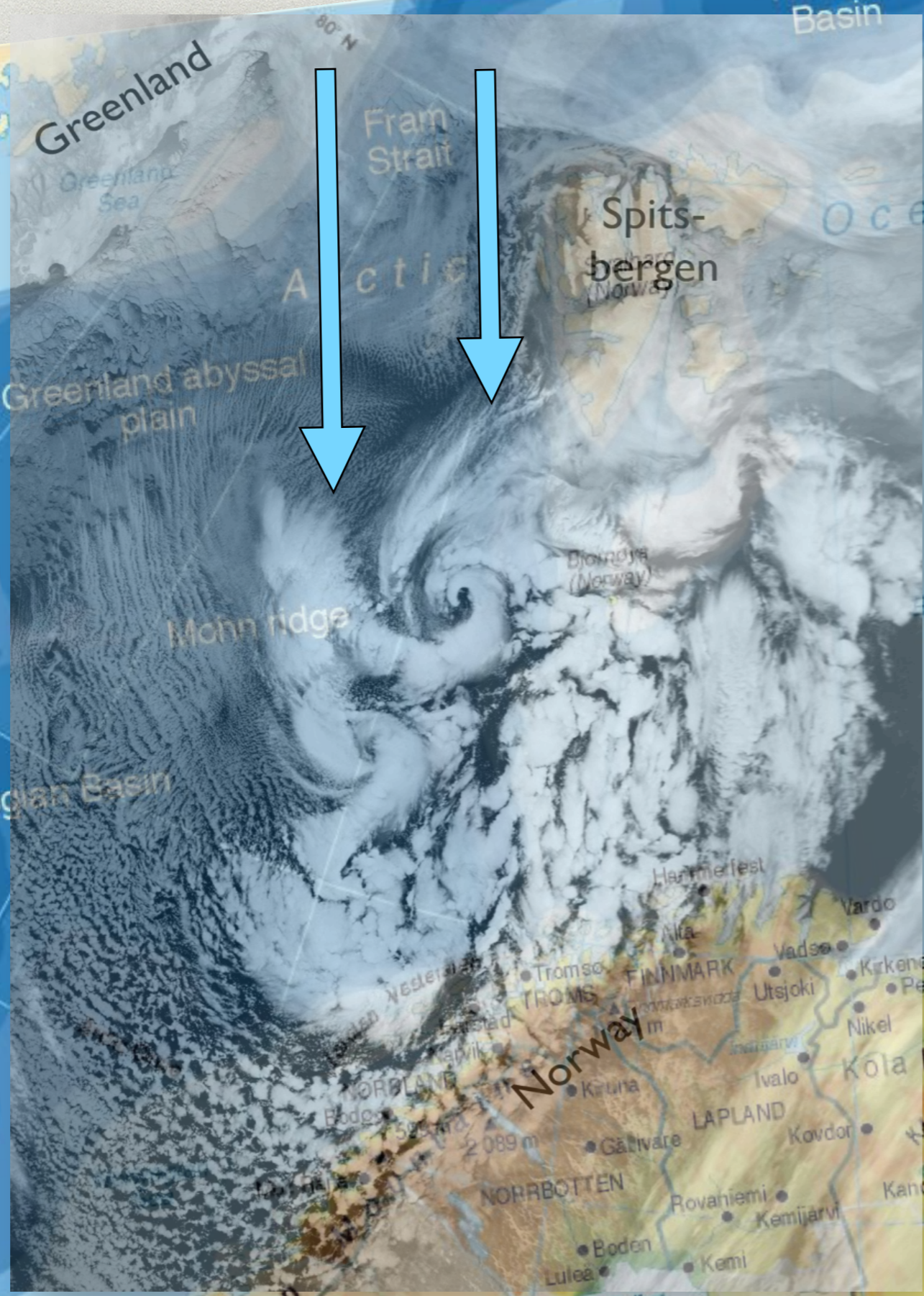
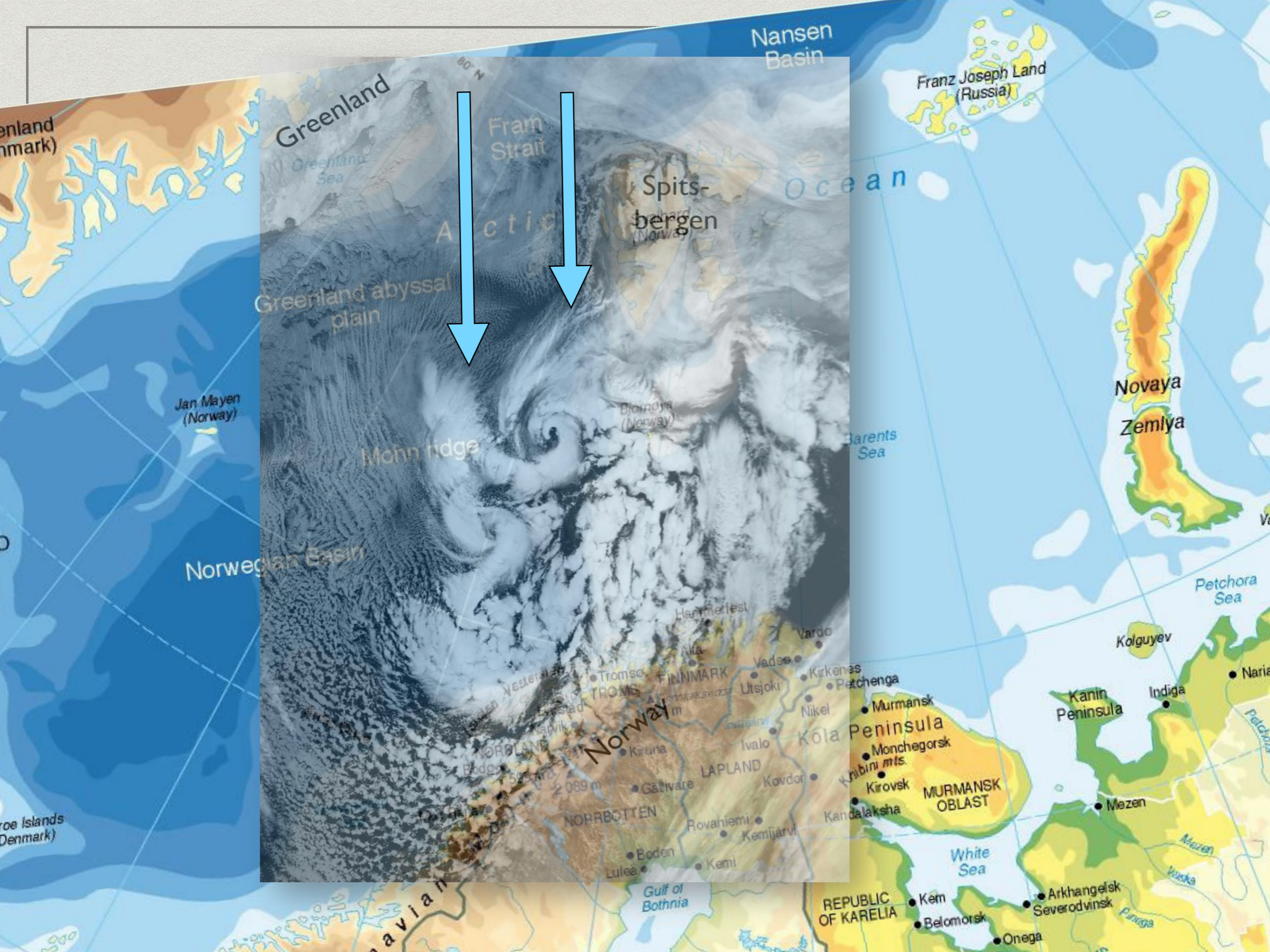
Cold air



Warmer ocean

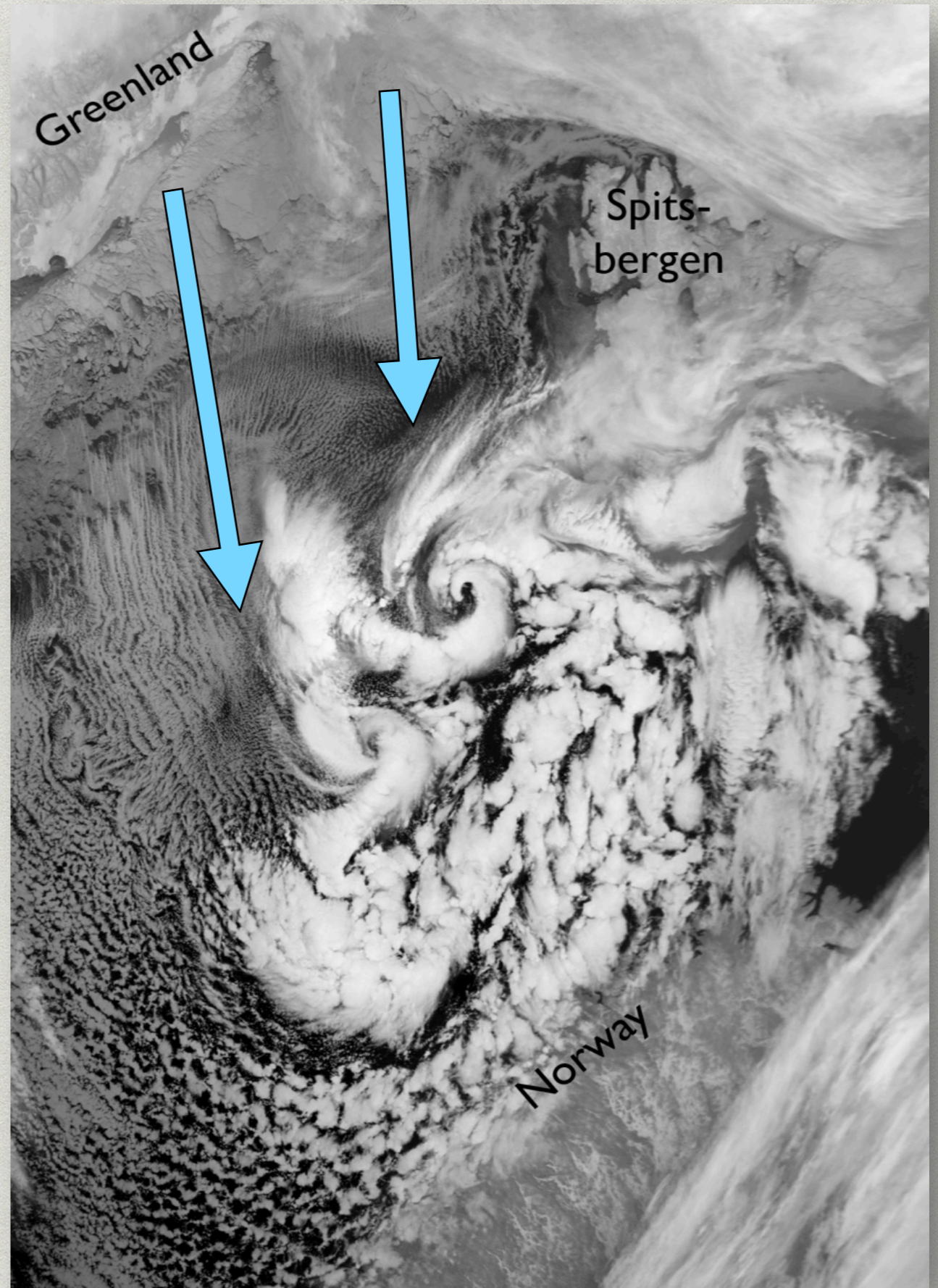




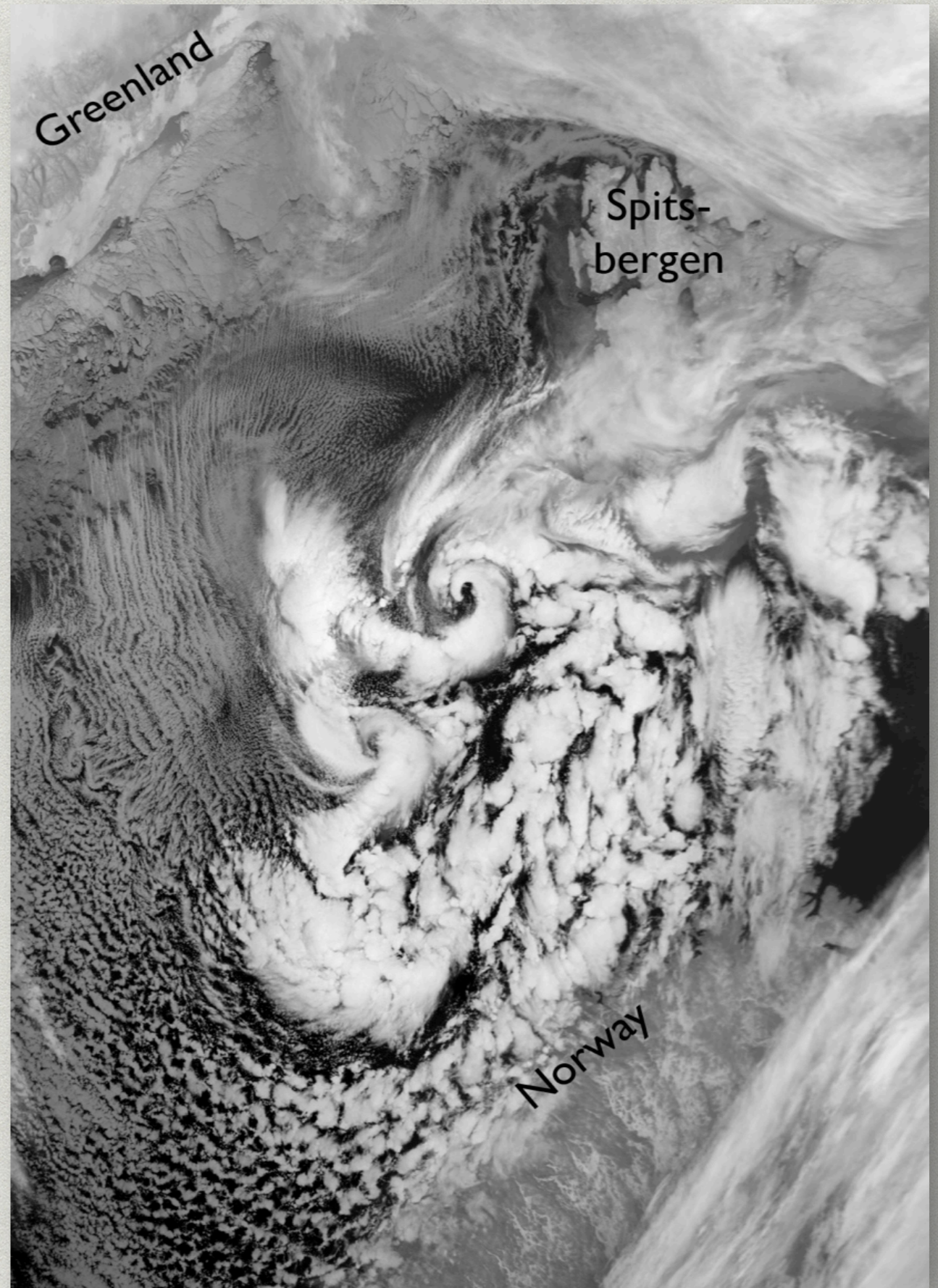
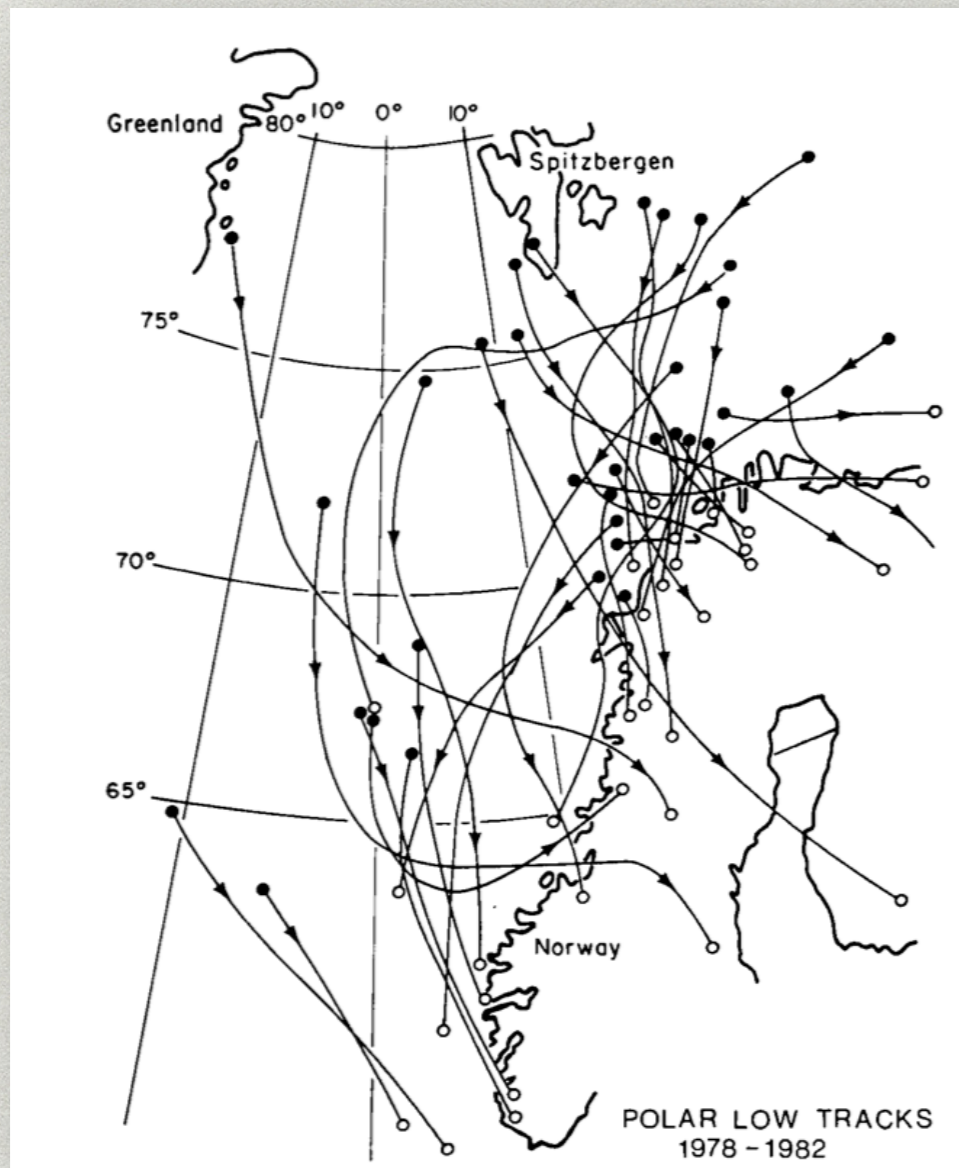




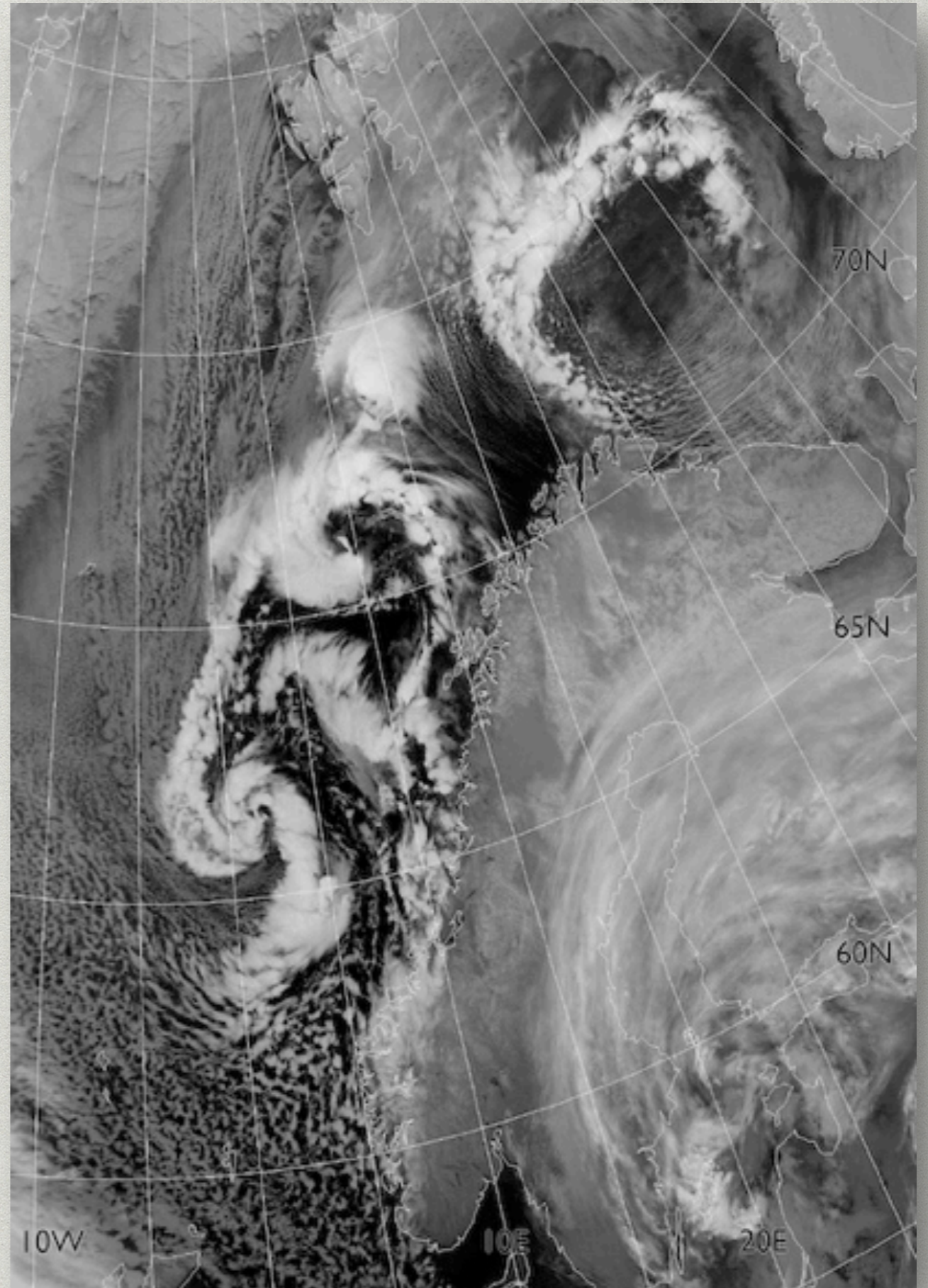
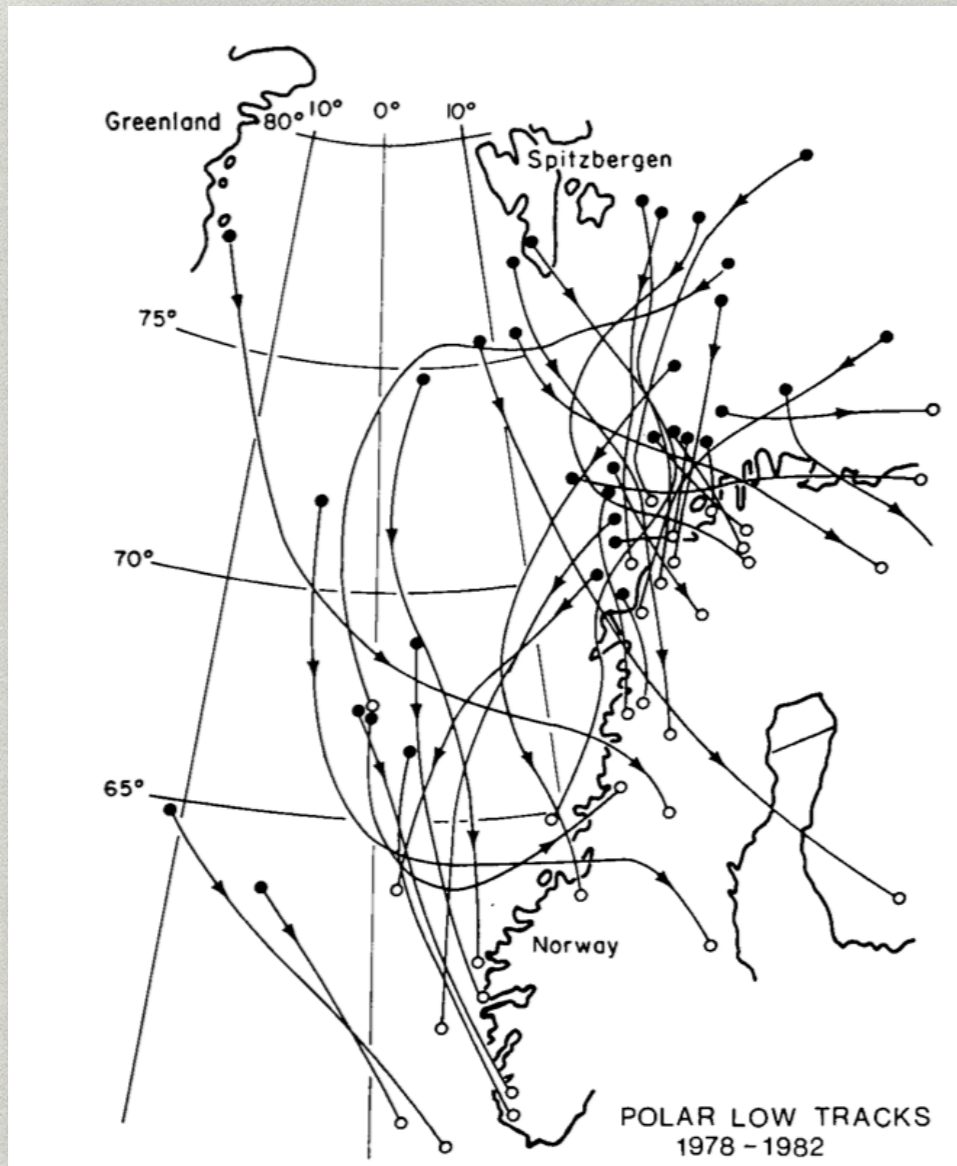
**One of the main reasons
are the large vertical
temperature differences
between the ocean and
the atmosphere**



This phenomenon has been known for a long time, along with typical tracks

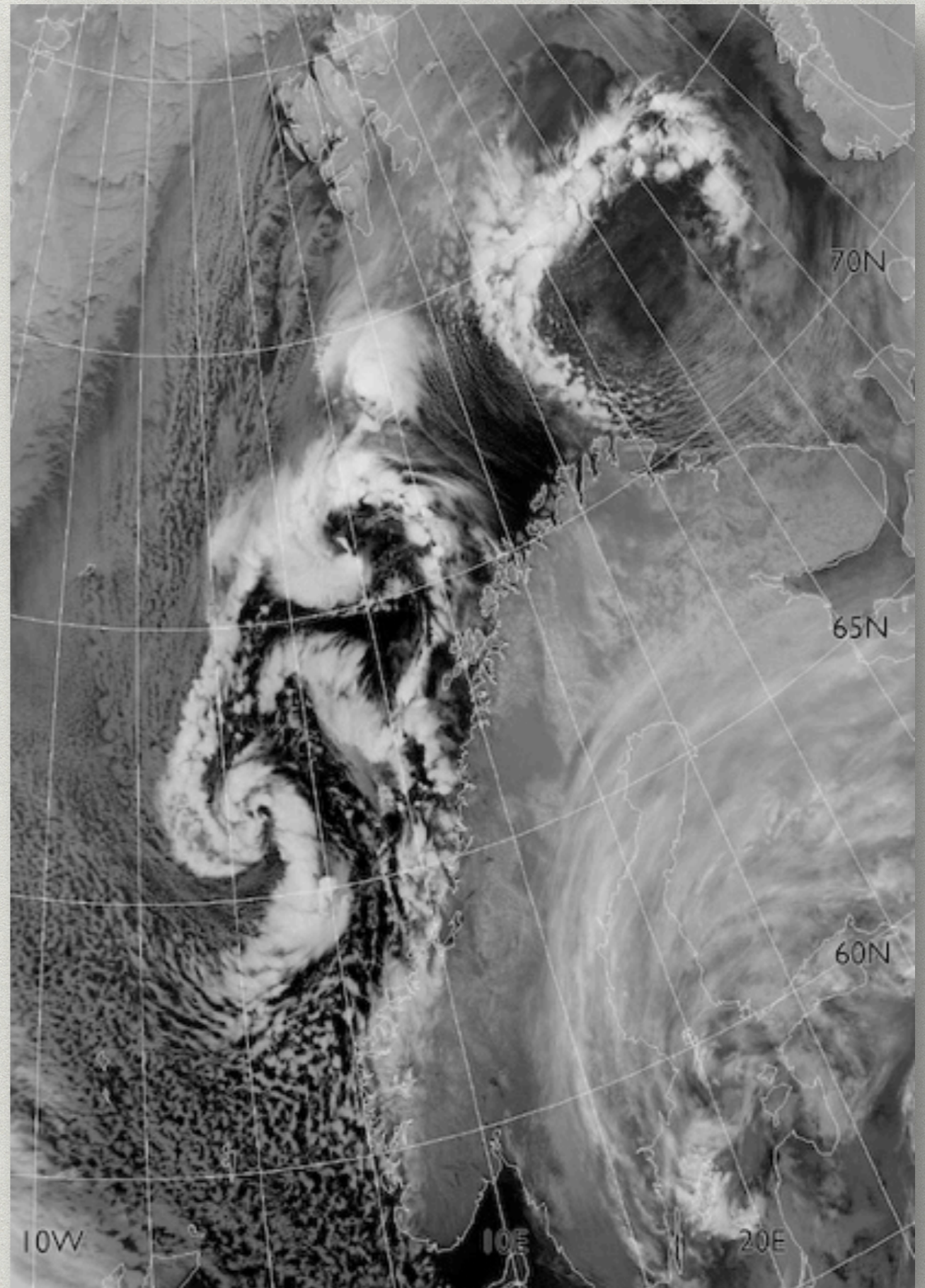


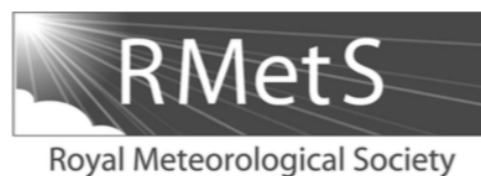
This phenomenon has been known for a long time, along with typical tracks



We cannot forecast individual polar lows more than a couple of days in advance

But maybe we can forecast the environment in which they form?





A global climatology of favourable conditions for polar lows

Erik W. Kolstad*

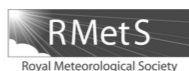
Bjerknes Centre for Climate Research, Bergen, Norway

*Correspondence to: E. W. Kolstad, StormGeo, Nordre Nøstekaien 1, 5011 Bergen, Norway.

E-mail: erik.kolstad@stormgeo.com

Two of the environment variables that are most favourable for polar low formation are:

- 1. Marine cold air outbreaks (warm ocean, cold air)**
- 2. Tropopause height (i.e. PV anomalies)**



A global climatology of favourable conditions for polar lows

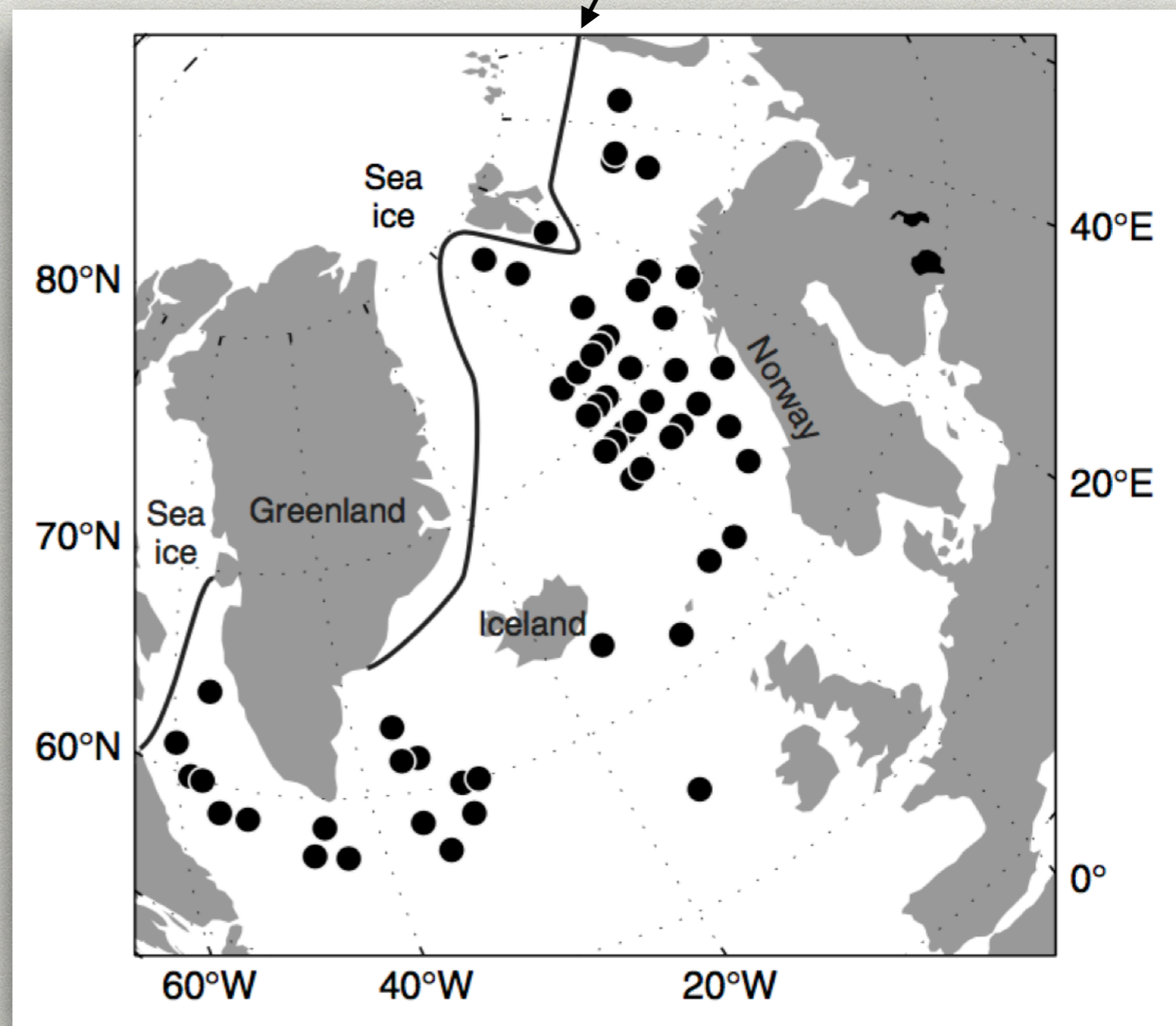
Erik W. Kolstad*

Bjerknes Centre for Climate Research, Bergen, Norway

*Correspondence to: E. W. Kolstad, StormGeo, Nordre Nøstekaien 1, 5011 Bergen, Norway.
E-mail: erik.kolstad@stormgeo.com

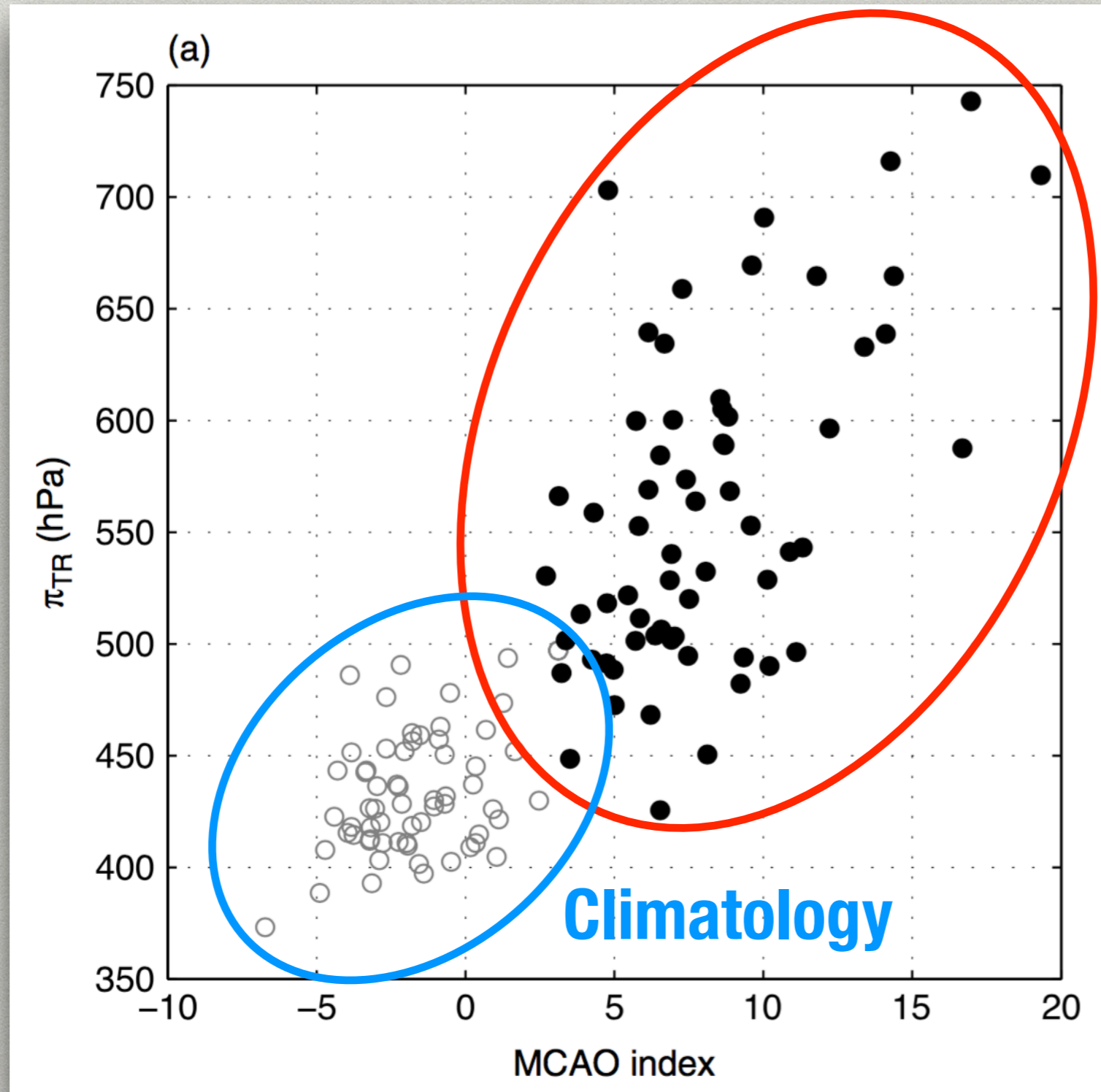
**63 polar lows
according to a
database compiled
by the Norwegian
met office in
Tromsø**

Approximate sea ice edge



Values for the 63 polar lows

Pressure at tropopause



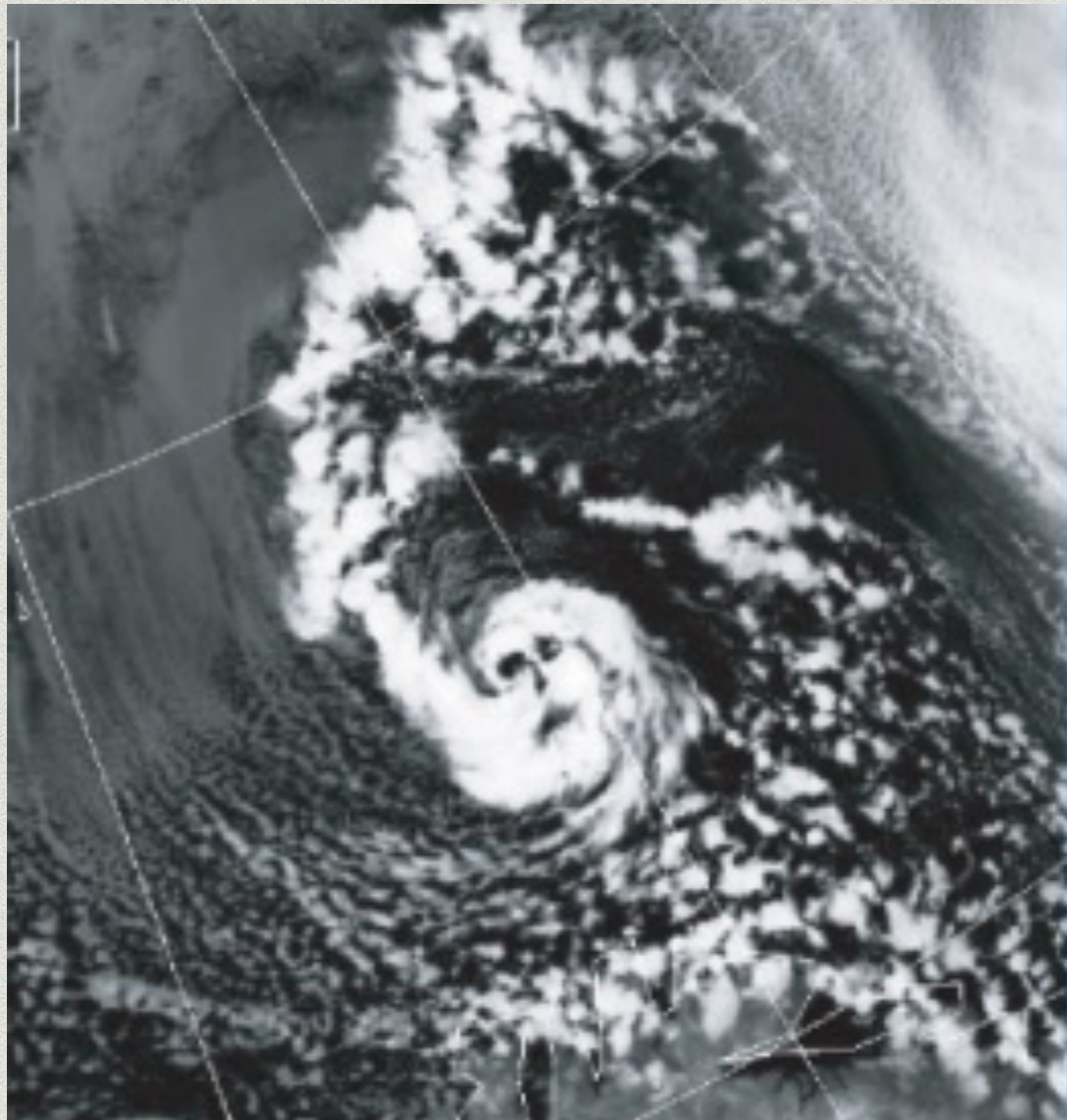
$$\text{MCAO index} = \text{SST} - \text{T700}$$

Work plan

Test dynamical models to see if marine cold air outbreaks can be forecast, and on what time scales (10–100 days)

Combine dynamical forecasts with empirical forecasts of northward-propagating SST anomalies and sea ice extent

With DNV GL, integrate these forecasts into a tool for risk management in the Arctic (WP5)



Thank you!

erik.kolstad@uni.no