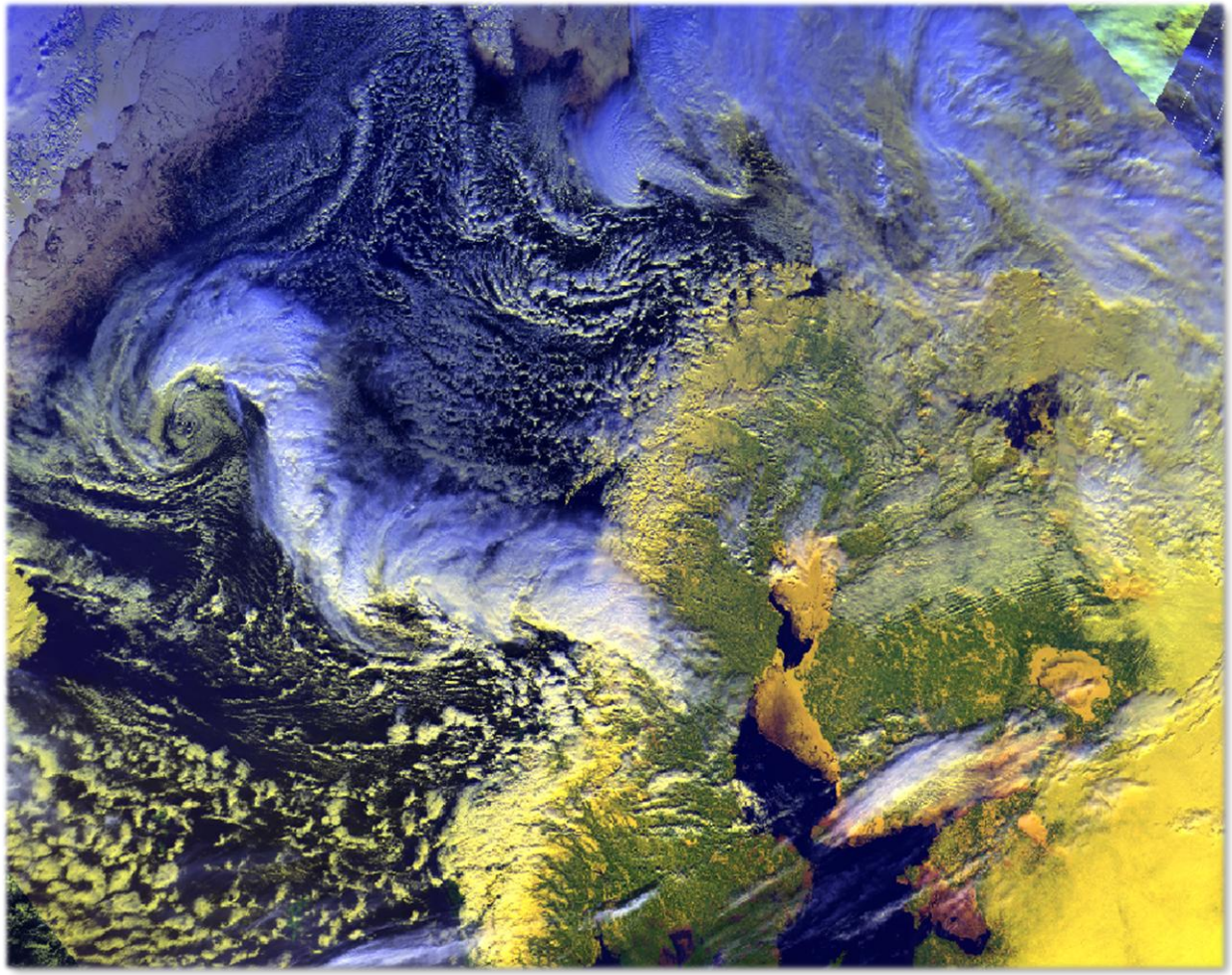
Tracking of Polar Lows using EPS



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Forecasting

- SST – T(500hPa) > 44 °C
- Potential Vorticity > 2 PVU
- Trough at 500 hPa

} Area with potential for PL development

- Satellite images
- Development in models

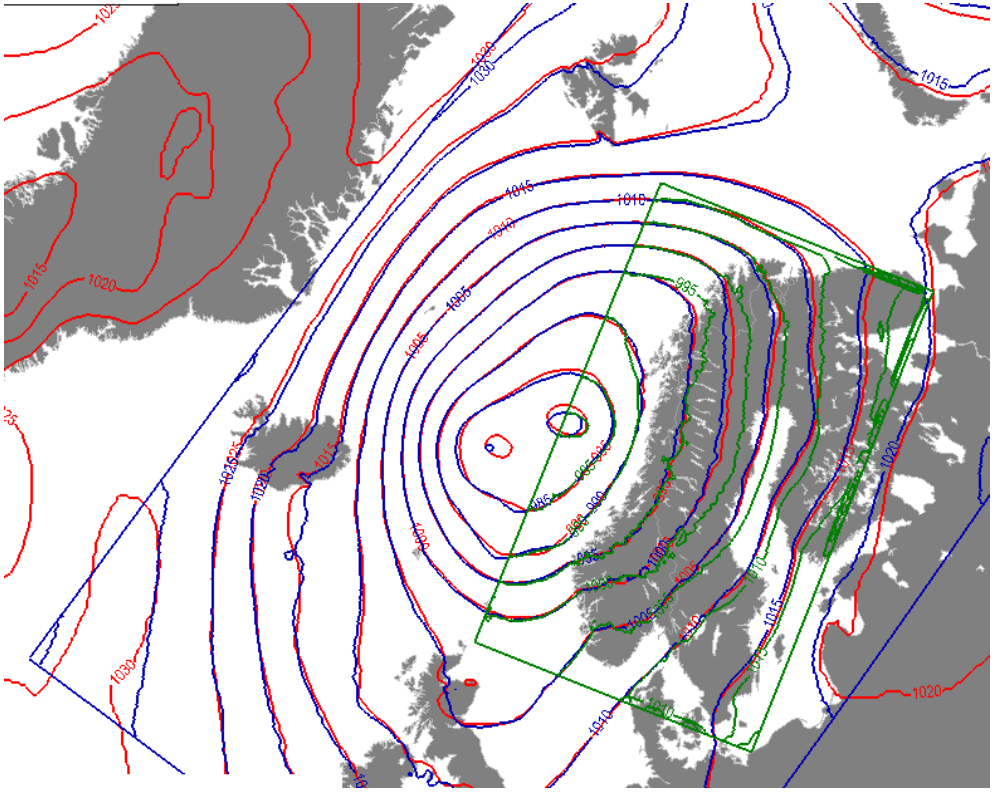
BUT:

- Difficult for model to forecast position (track) & wind speed

Models

- Hirlam (8 or 12 km), HARMONIE (5.5 km)
  - hydrostatic
- Unified Model (4 km), HARMONIE (2.5 km)
  - Non-hydrostatic

-> New approach: UMEPS

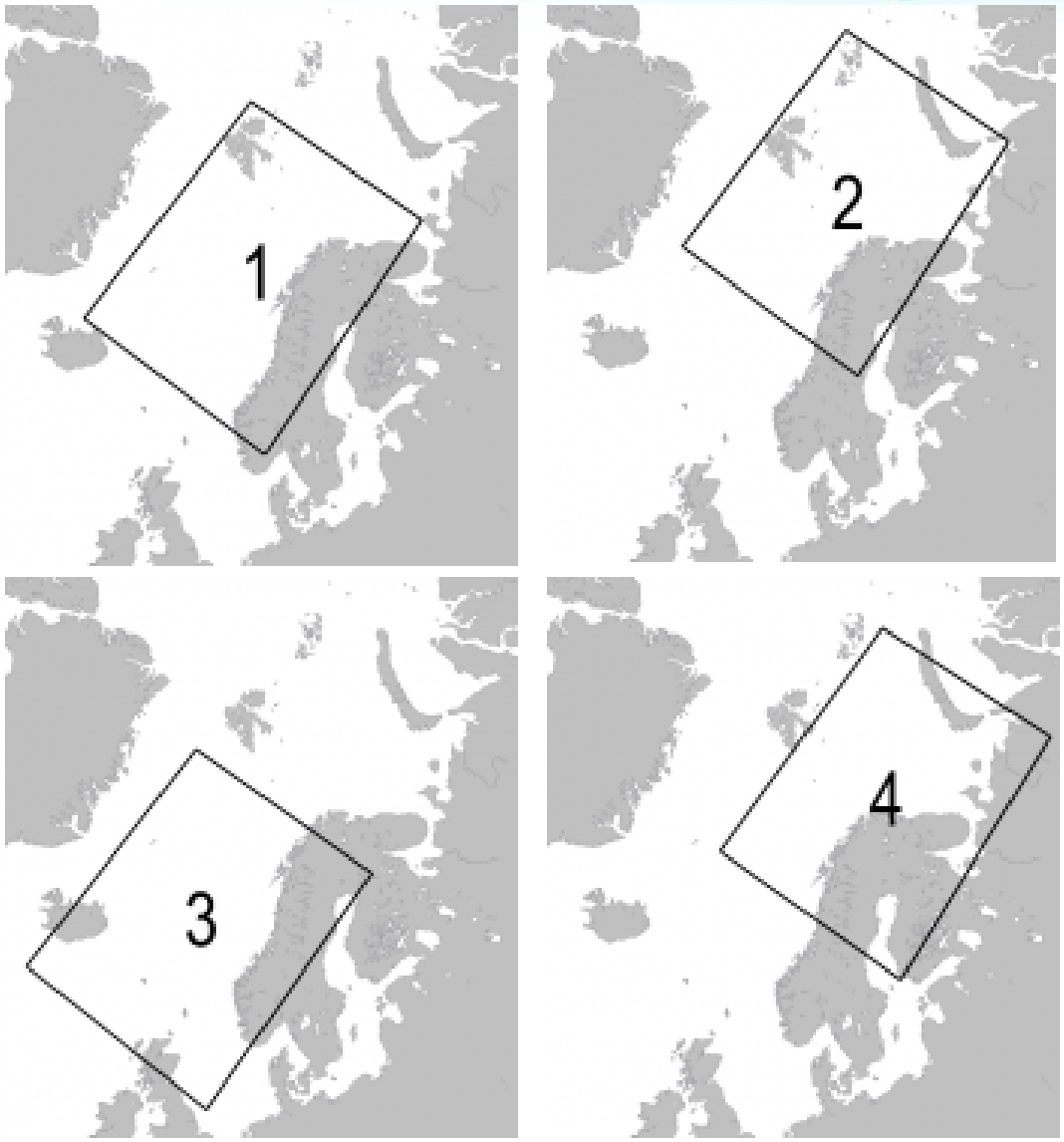


Domains

EC-EPS
Resolution: ~32 km
20 members + control run
00 + 12 UTC

LAMEPS (HIRLAM)
Resolution: 12 km
Initial + boundary conditions from EC-EPS
06 + 18 UTC

UMEPS
Resolution: 4 km, 400x500
«On-demand» downscaling of LAMEPS
06 + 18 UTC

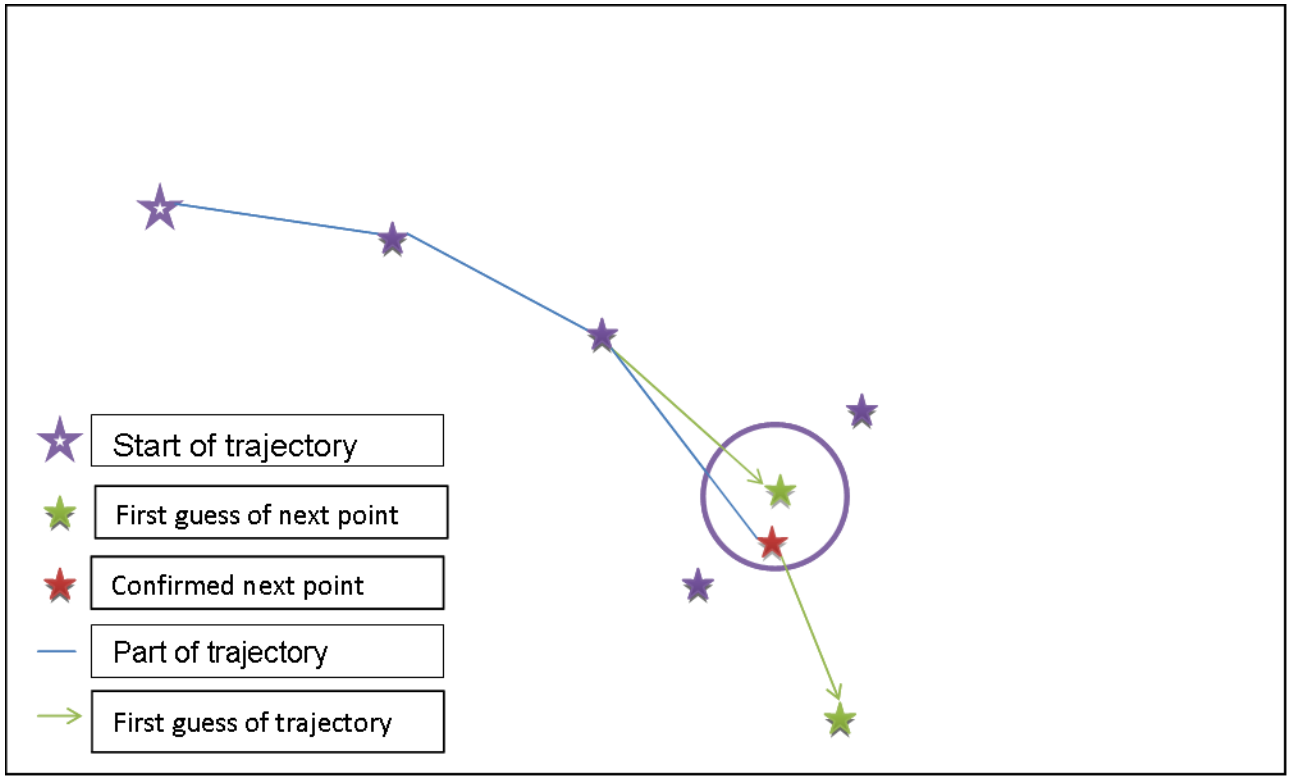


Tracking

1. Find vorticity maxima at 925 hPa

2. Find second vorticity maximum within given radius

Etc…



Tracking

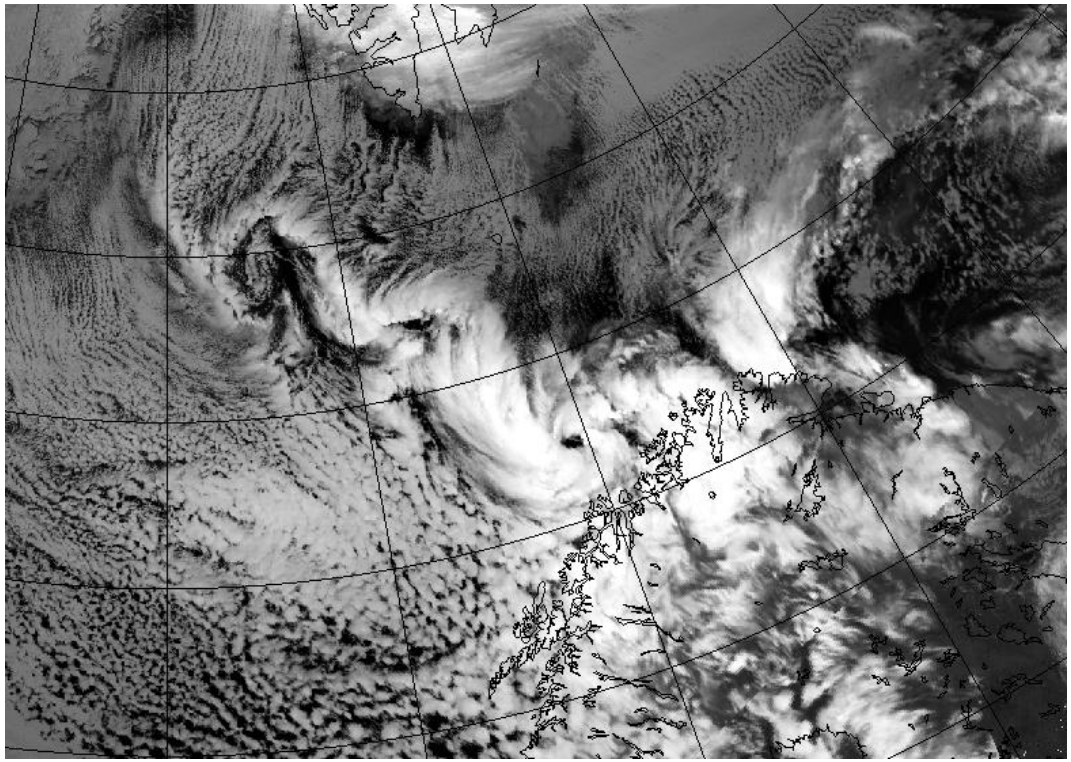
- Vorticity gradient > 7.e $^{-5}$ s^{-1}
- Tdiff > 43°C
- Surface wind > 15 or 20 m/s (BF 7 or 8)
- Radius > 45 km
- Duration > 9 hrs (3 time steps)
- Distance to other tracks > 50 km

Tracking

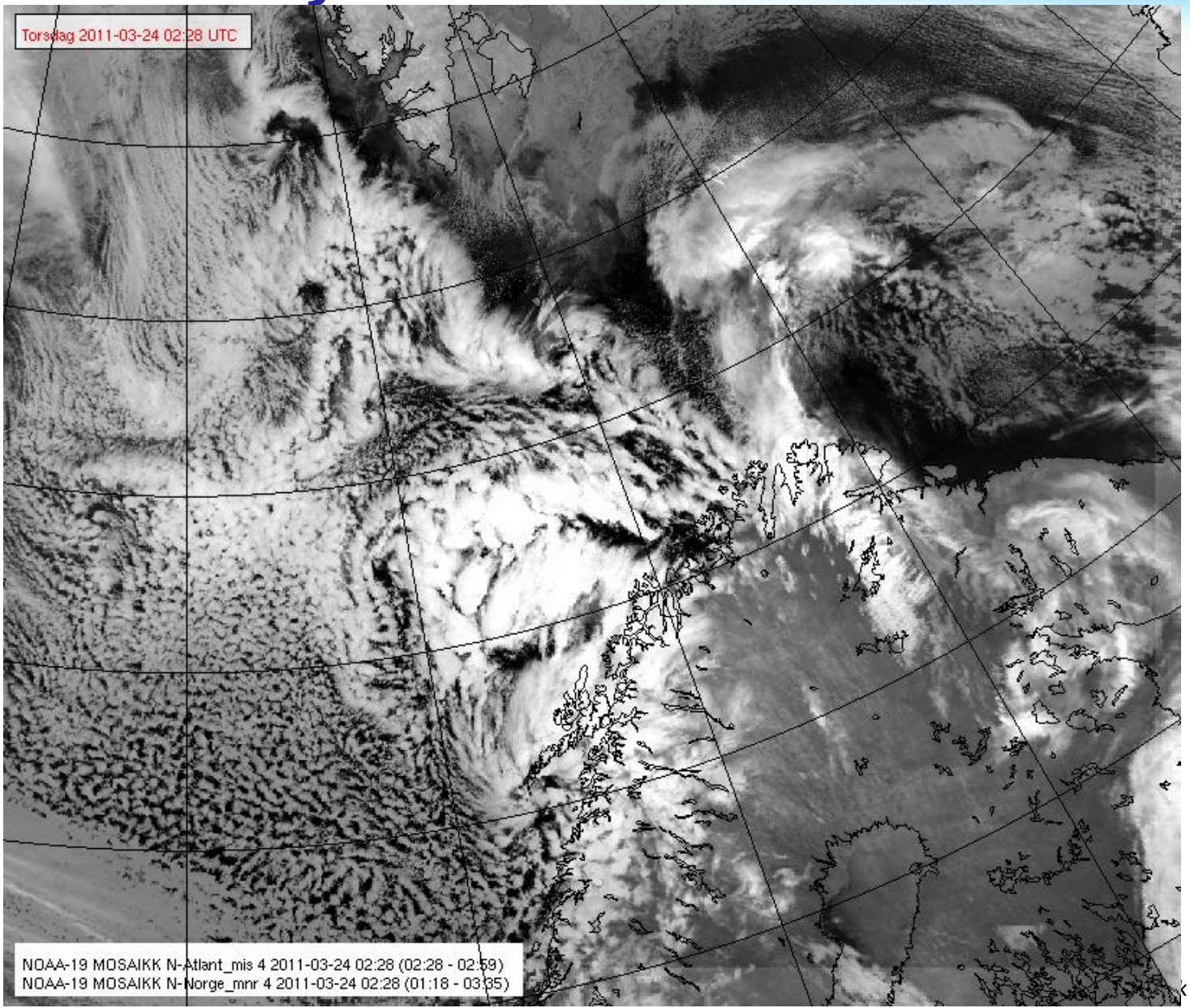
- Final result: List of tracks for all 20 + 1 UMEPS members
- Strike probabilities are calculated from tracks
- Probabilities for wind speed > 20 m/s and precipitation > 2.5mm/3hrs are calculated from UMEPS members
- Updated every 12 hours

Case study: 24 March 2011

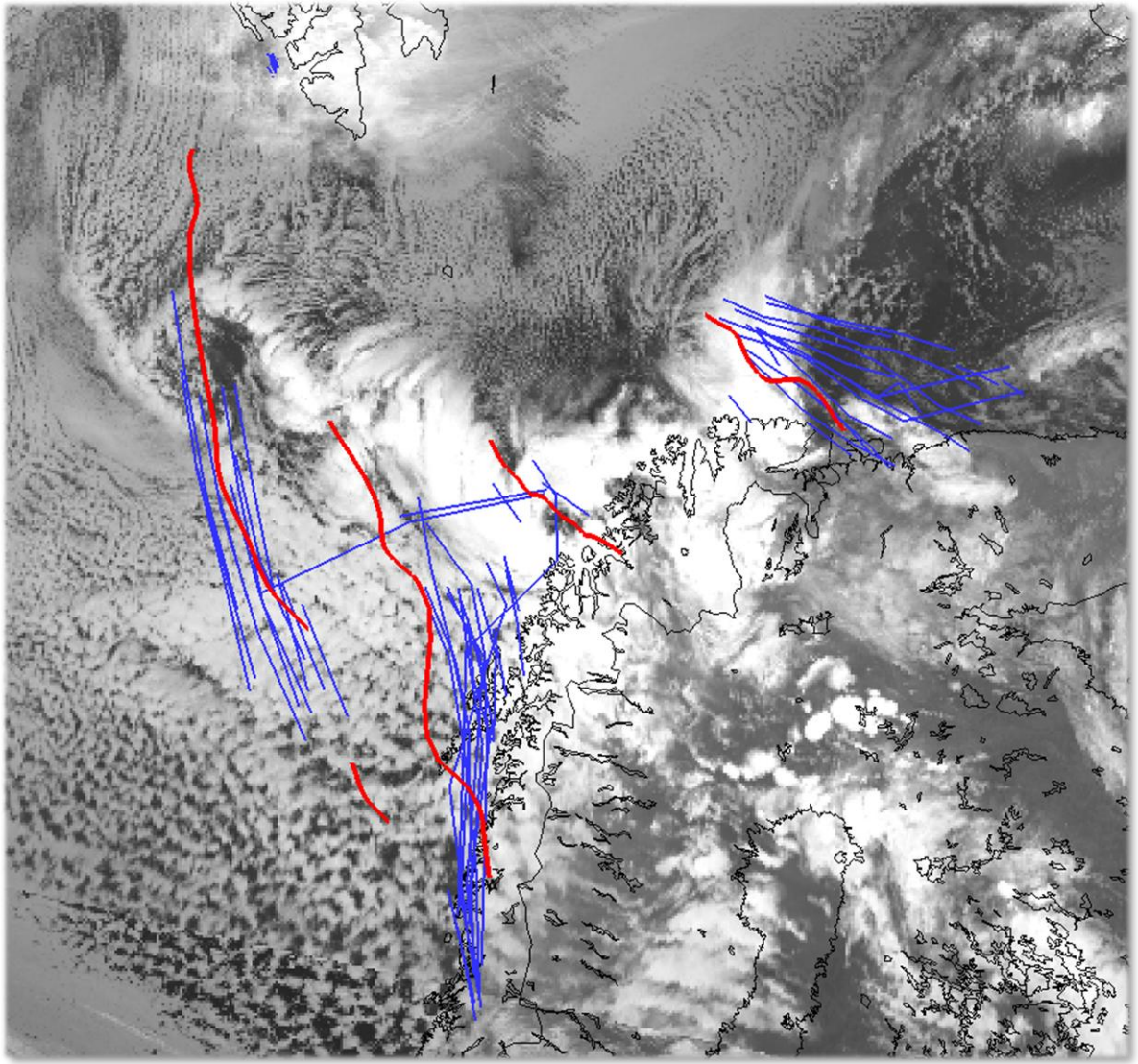
- Sequence of 4 polar lows
- Extremely cold mid tropospheric air:
  Tdiff 52-56°C
- Max observed wind:
  24 m/s, gusts 30 m/s



Case study: 24 March 2011



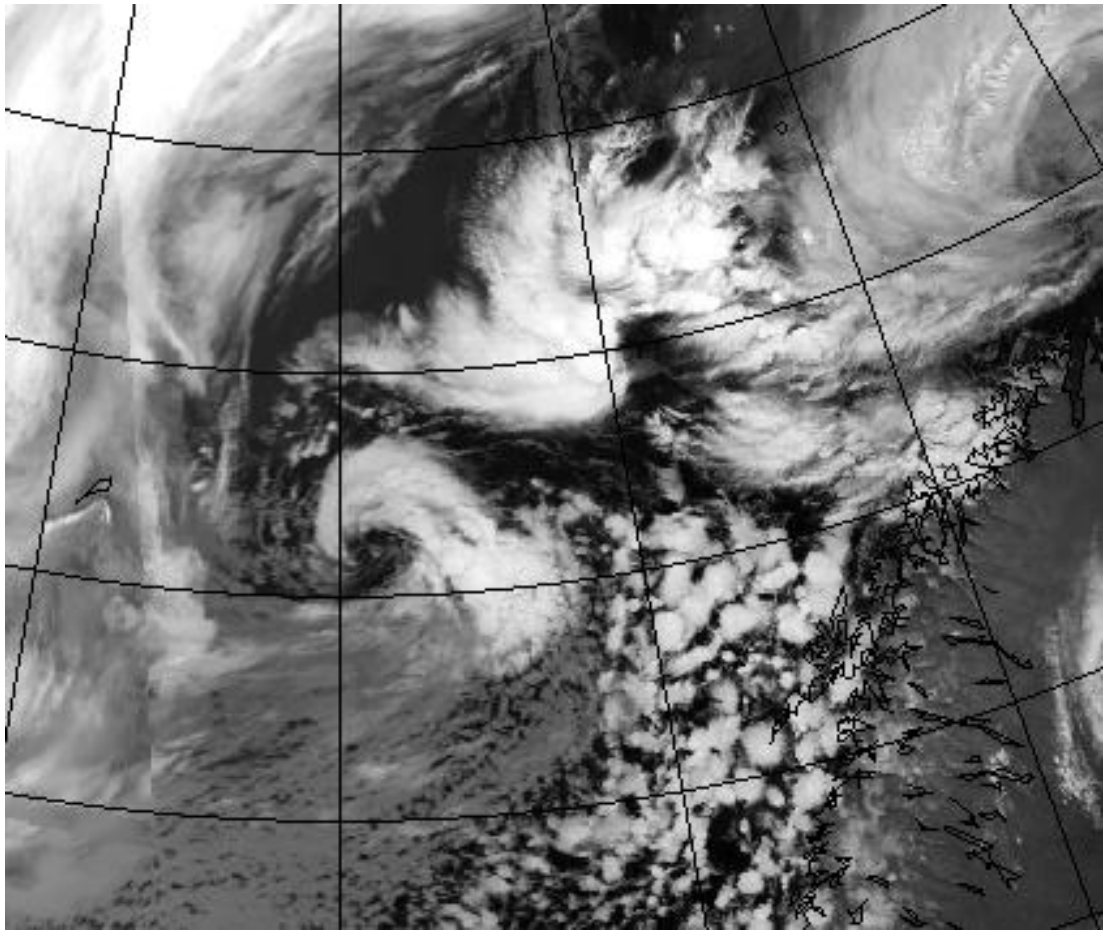
Case study: 24 March 2011



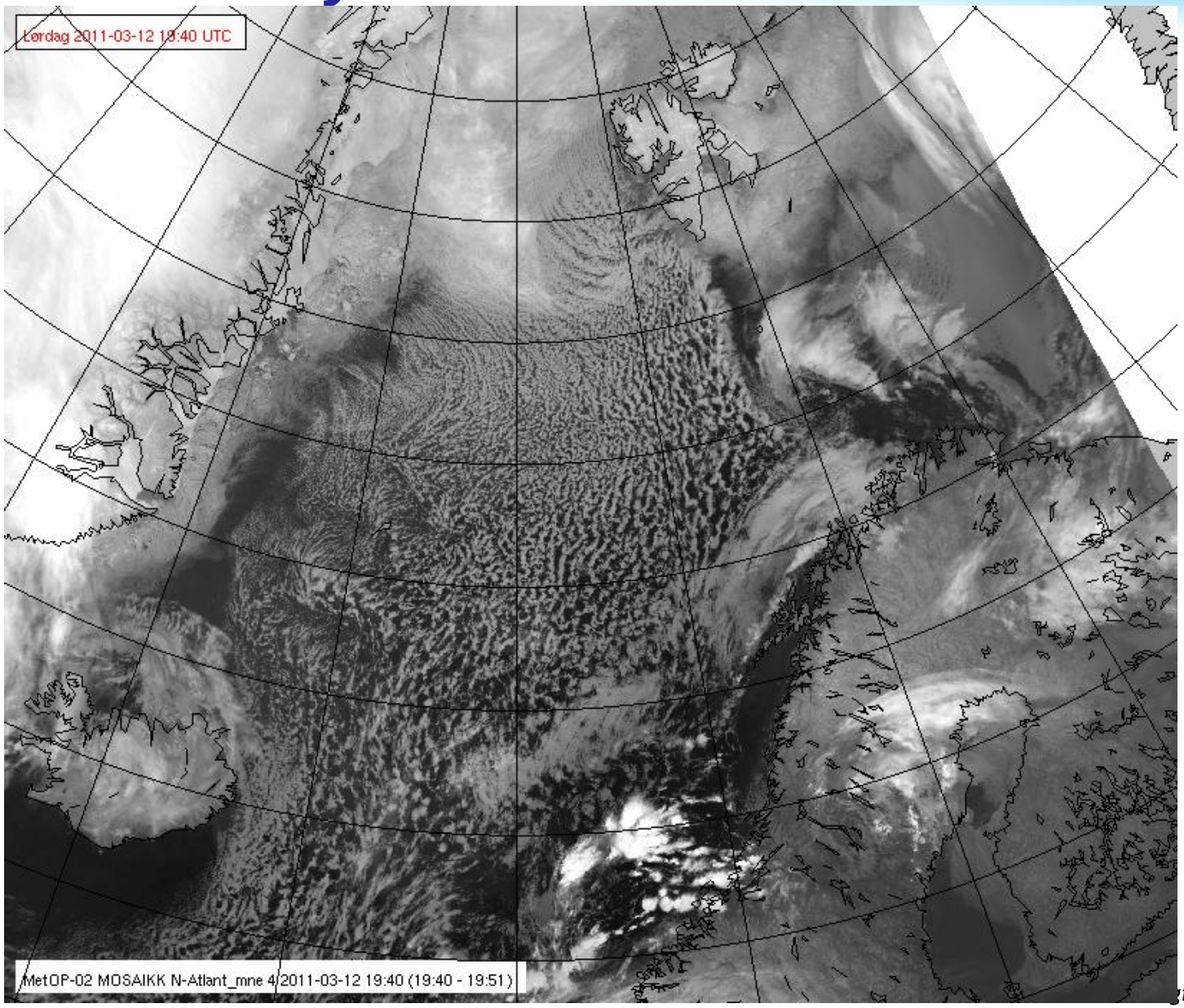
- Tracks from 24/03 06 UTC

Case study: 11 March 2011

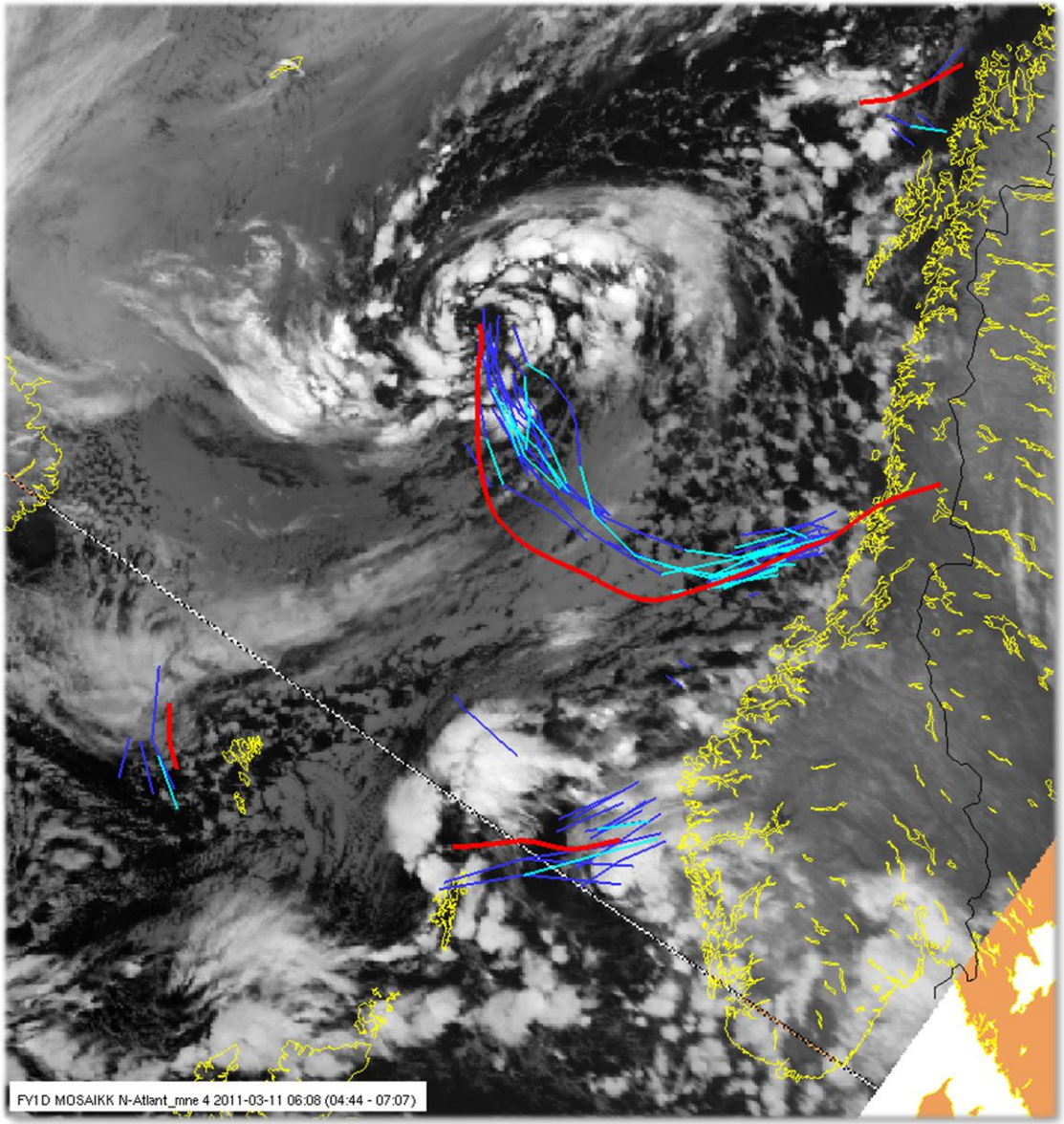
- Instability low
- Tdiff: 43-46°C
- Max observed wind: 24 m/s



Case study: 11 March 2011

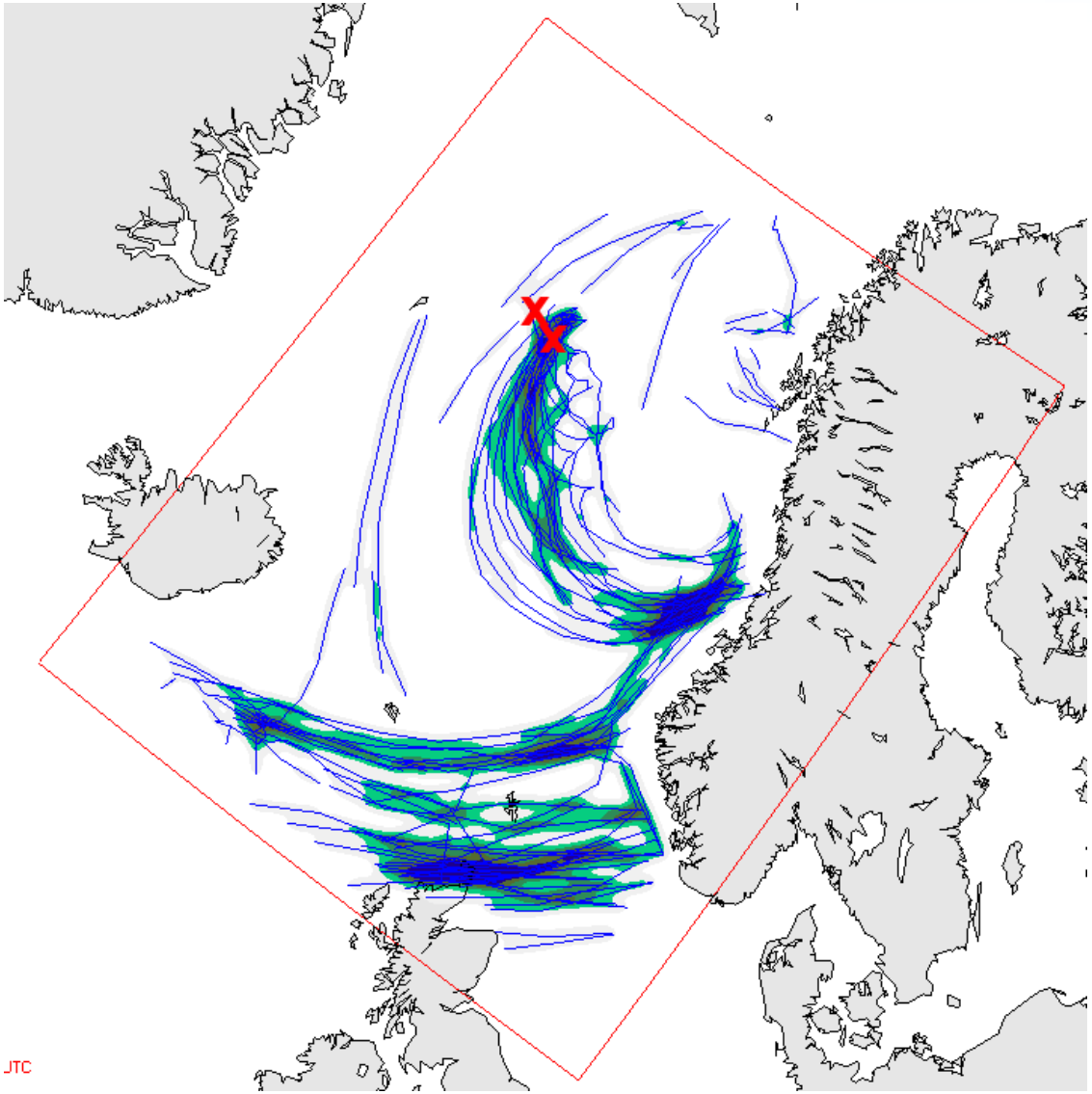


Case study: 11 March 2011



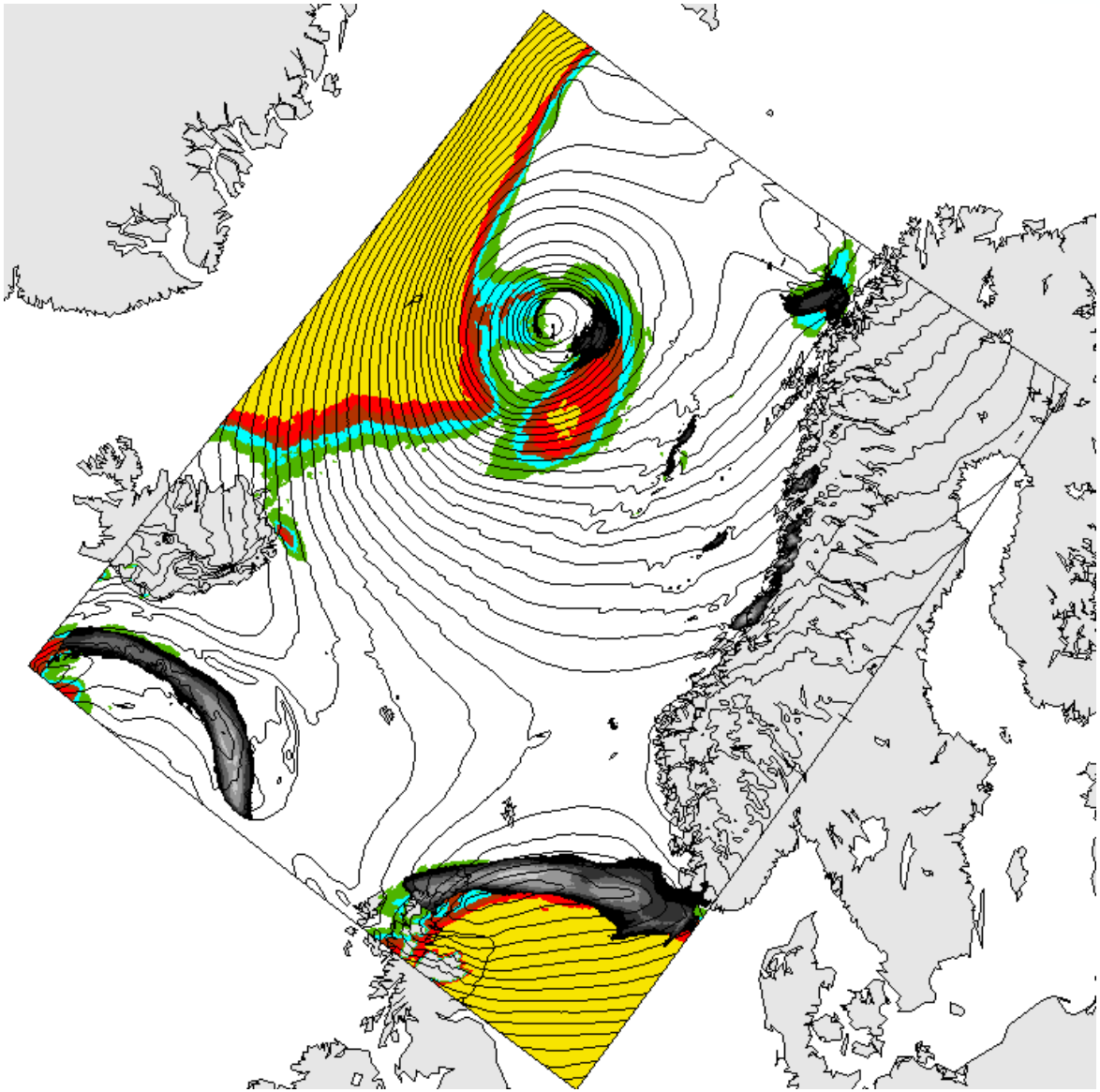
- Tracks from 11/03 06 UTC
- Minimum windspeed: 20 m/s (cyan) and 15 m/s (blue)

Case study: 11 March 2011



- Tracks from 10/03 06 UTC
- **X** = observed location

Case study: 11 March 2011



Colour:
925 hPa wind speed
> 20 m/s

Grey:
precipitation intensity
> 2.5 mm/3h

Contour:
Z1000 of the control run

The Future…

- On-demand system launch on web portal BarentsWatch next season
- First season = test season, UMEPS and tracking will run daily
- Minimum input from forecaster on duty: selection of domain
- Daily/twice daily updates with automated plots + short description by forecaster on duty
- Forecasts available via yr.no

The end ☺

… Questions??