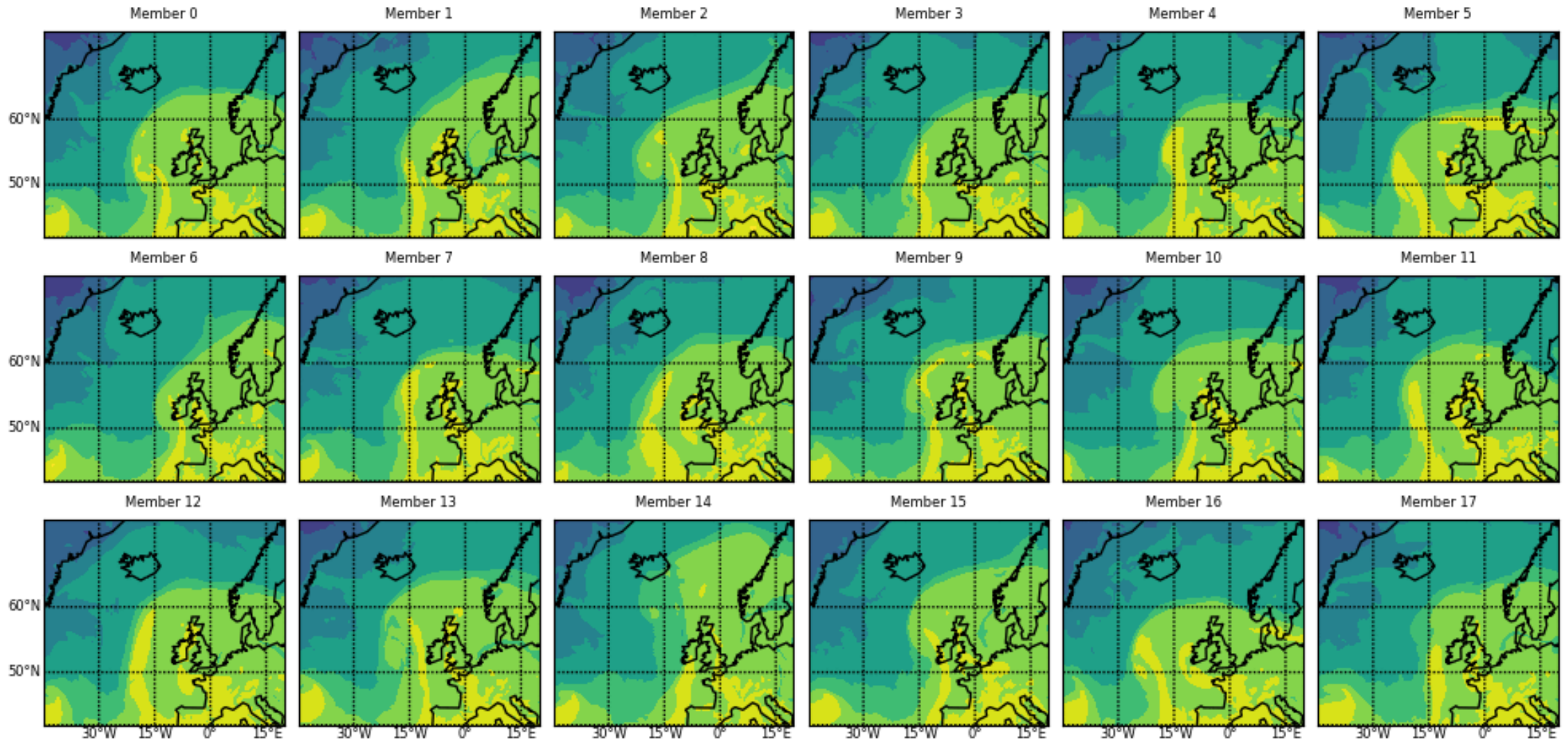# EXTRACTING LIKELY SCENARIOS FROM HIGH RESOLUTION FORECASTS IN REAL-TIME

By Kris Boykin

Supervised by John Methven and Tom Frame, University of Reading, Nigel Roberts and Stephen Moseley, Met Office

This presentation participates in OSPP

EGU

Outstanding Student & PhD candidate Presentation contest

Sharing not permitted

University of Reading

Scenario
DOCTORAL TRAINING PARTNERSHIP

NERC
SCIENCE OF THE ENVIRONMENT

Met Office

Ensemble members at t+117 hours

Is there a way to reduce the amount of ensemble data forecasters must digest while still retaining all the relevant information?

Motivation

- Ensemble forecasts output large amounts of complex data that is constantly being updated hourly/daily

- Forecasters have limited time to digest this data and output a forecast and any related impact warnings

- During high-impact events the need for speed and accuracy is great

The creation of a novel clustering method is used to reduce the ensemble into a few potential scenarios.

# MOGREPS-G 06 Oct 2018 00:00 UTC at t+117 hours
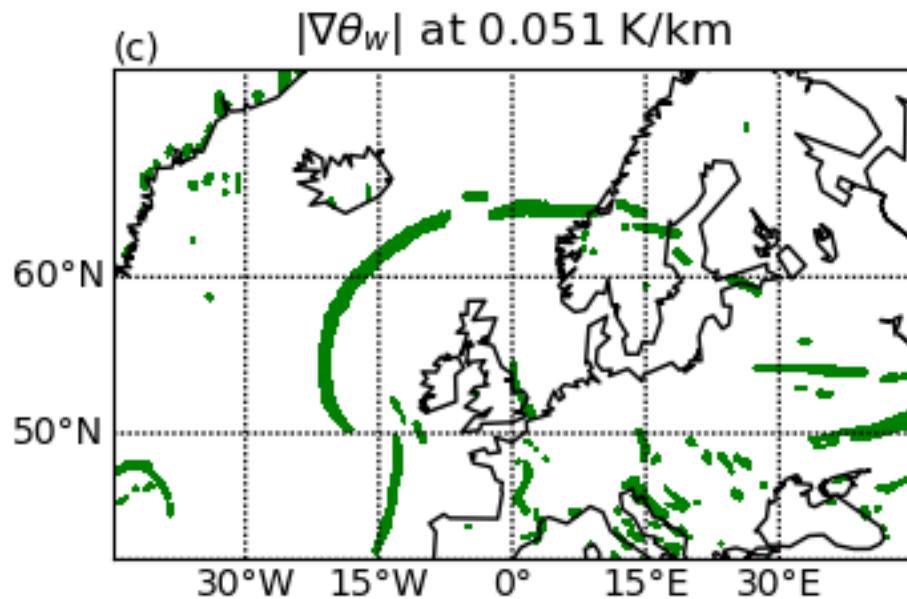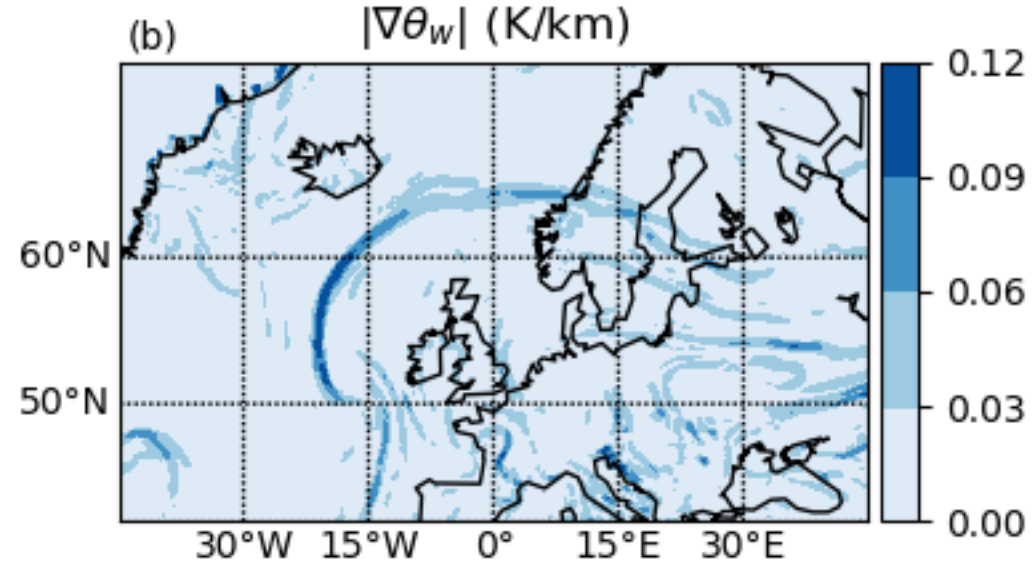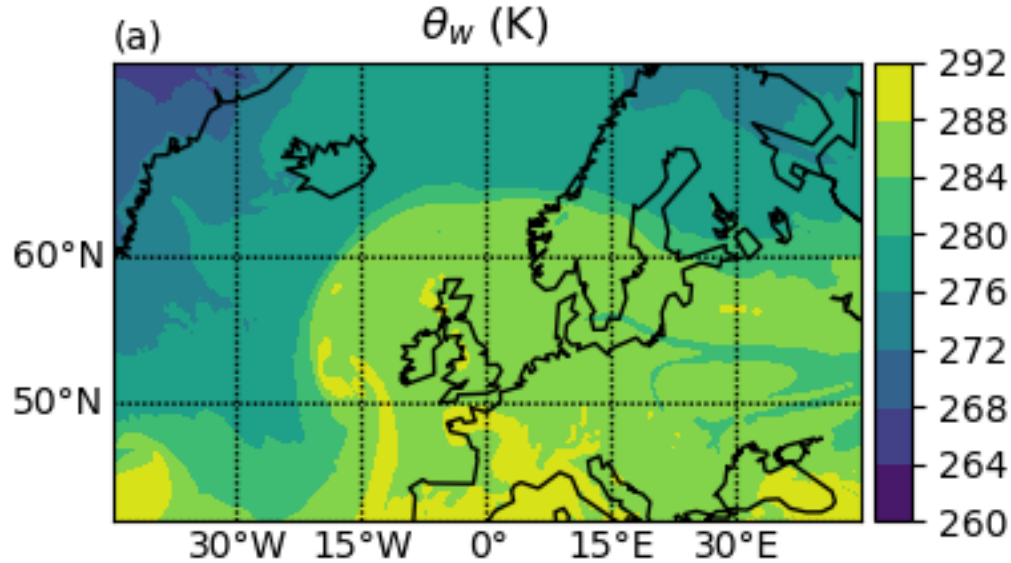
- (a): Wet bulb potential temperature at 850 hPa

- (b): Gradient of field to determine frontal regions

- (c): Threshold applied to create a binary field

Members 0 and 11

Distance matrix for 3.73% of domain as 1s at t+117
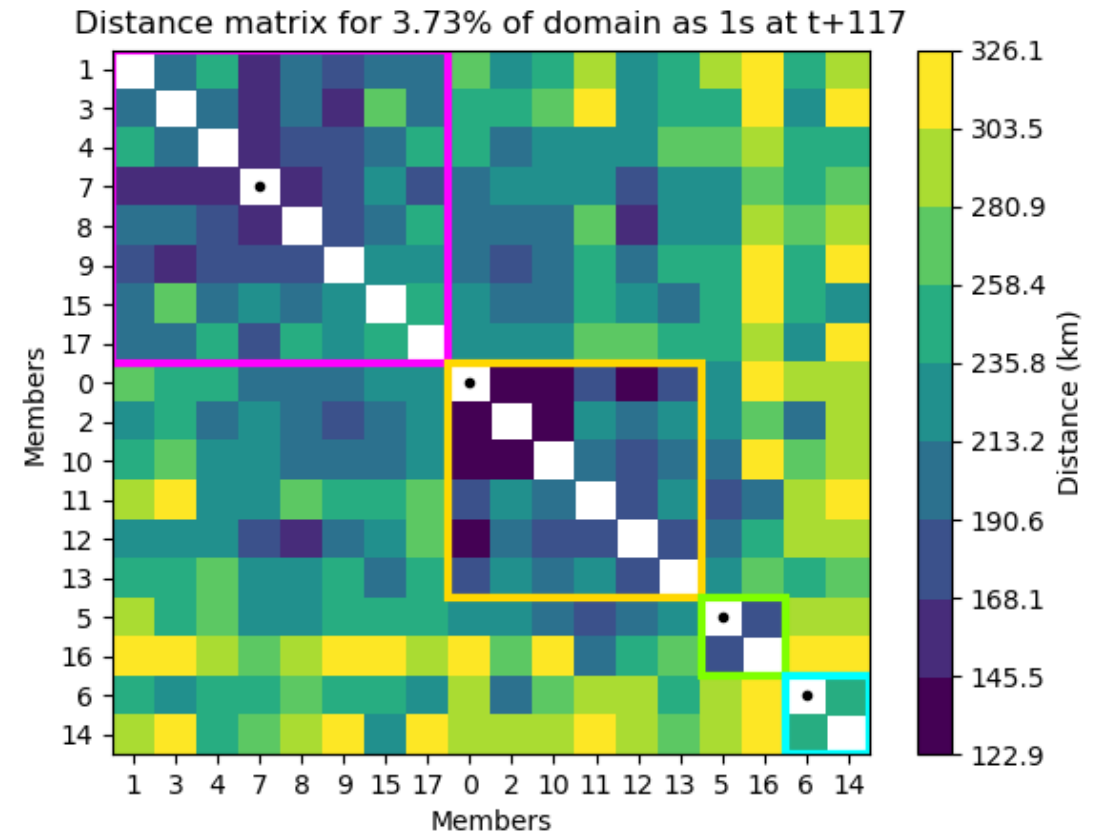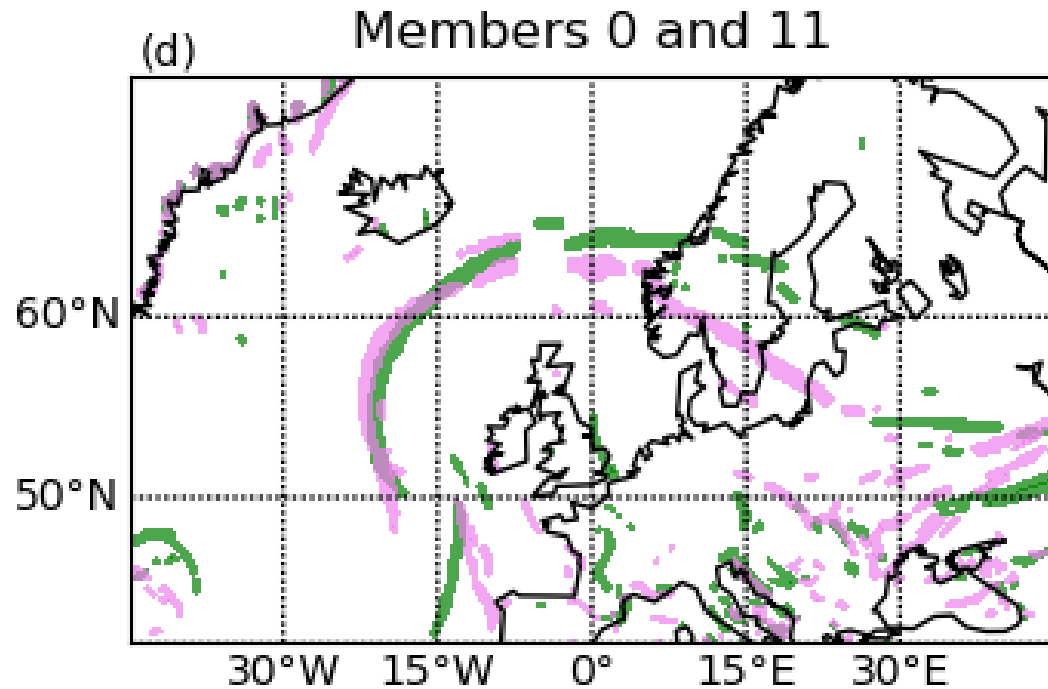
- (d): Members compared by spatial distance found with Fractions Skill Score (FSS), avoiding double penalty problem

- Right: Members are grouped together by distance with K-medoids clustering

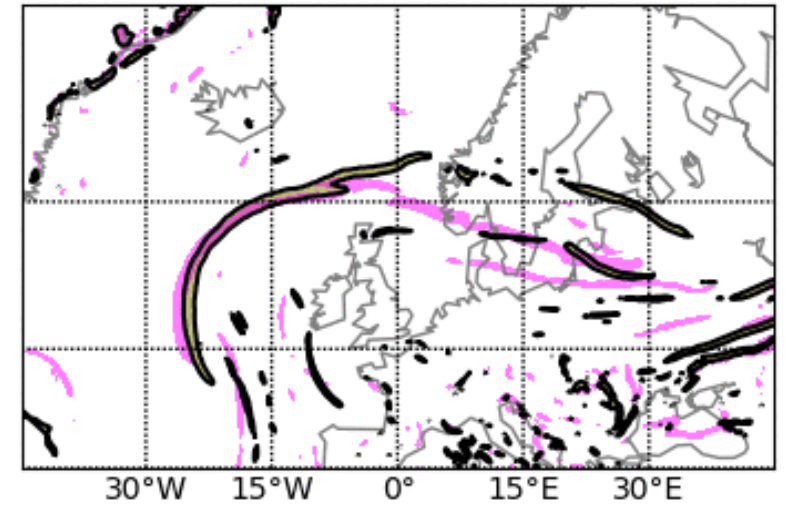Ensemble members at t+117 hours, colours representing cluster members
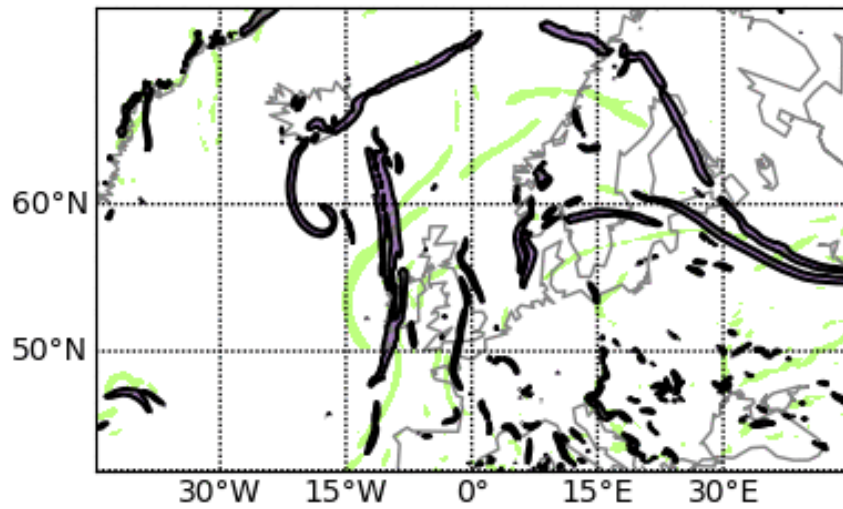

RM 7, cluster including [1 3 4 7 8 9 15 17]
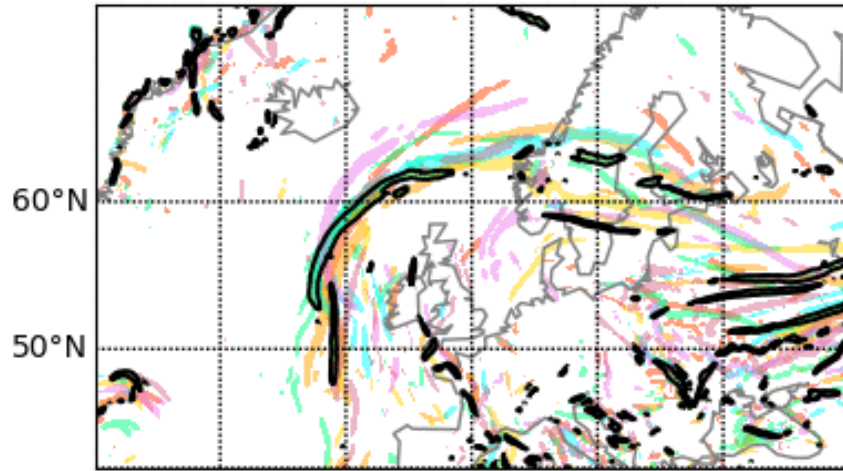
RM 0, cluster including [0 2 10 11 12 13]
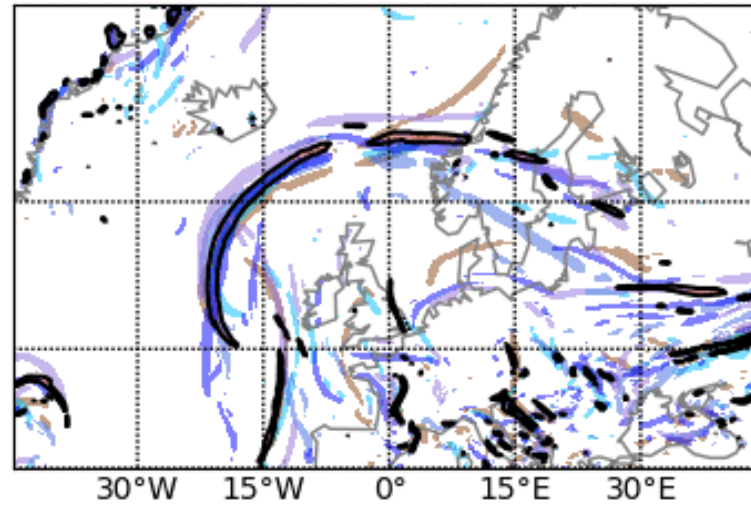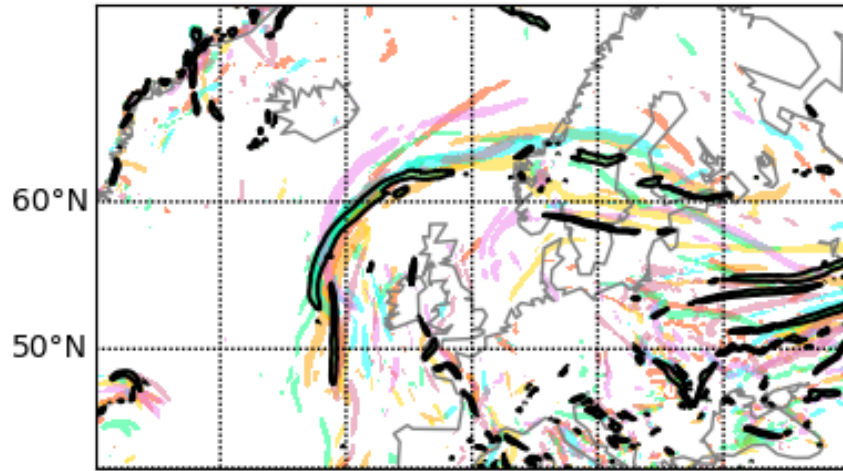

RM 5, cluster including [5 16]

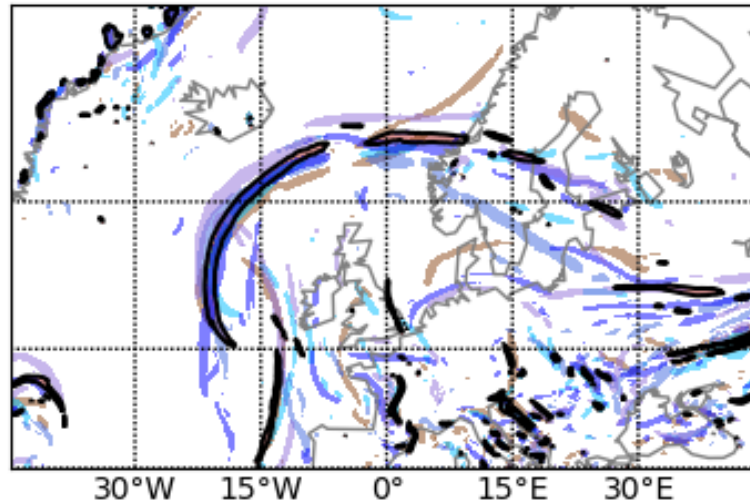RM 14, cluster including [6 14]

- When clustering is strong, a representative member is extracted from the clusters
- These representative members are then provided to forecasters as potential scenarios

Ensemble members at t+117 hours, colours representing cluster members
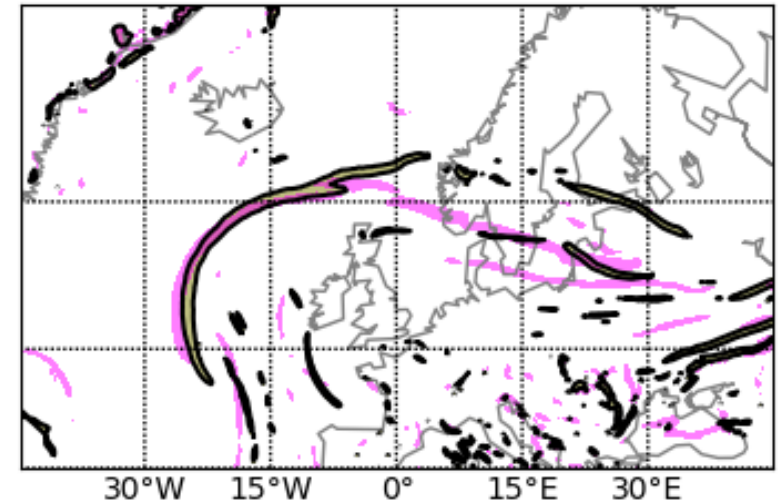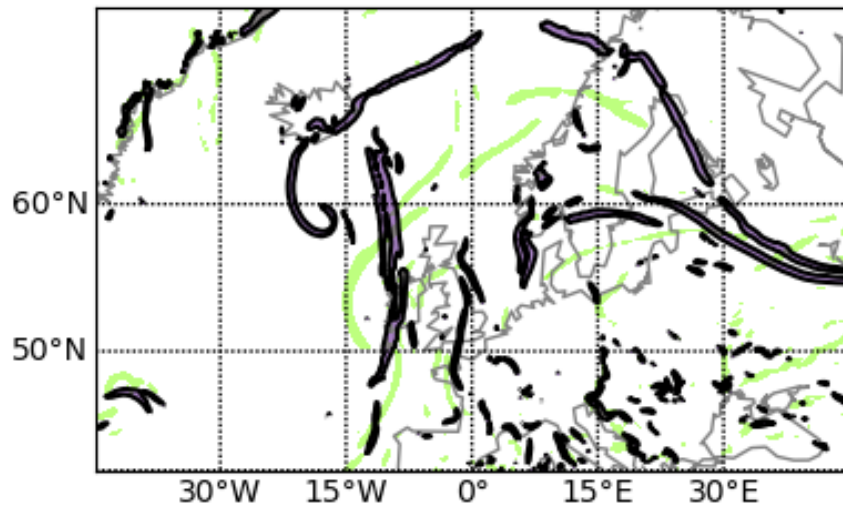

RM 7, cluster including [1 3 4 7 8 9 15 17]

RM 0, cluster including [0 2 10 11 12 13]

RM 5, cluster including [5 16]

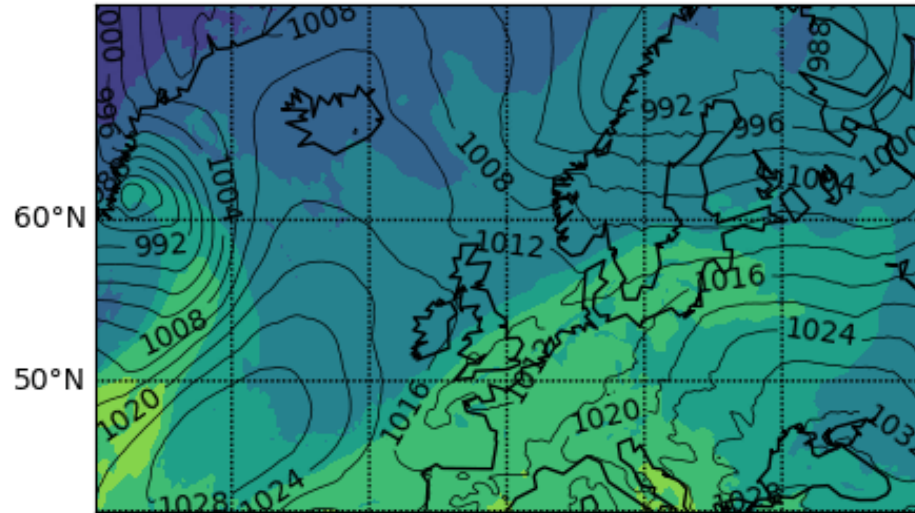RM 14, cluster including [6 14]

- When clustering is strong, a representative member is extracted from the clusters
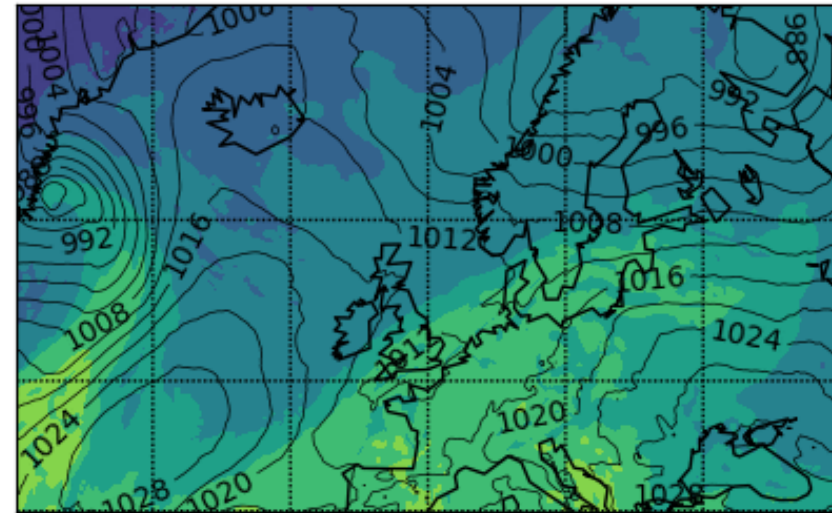- These representative members are then provided to forecasters as potential scenarios

Representative members for each of 4 clusters

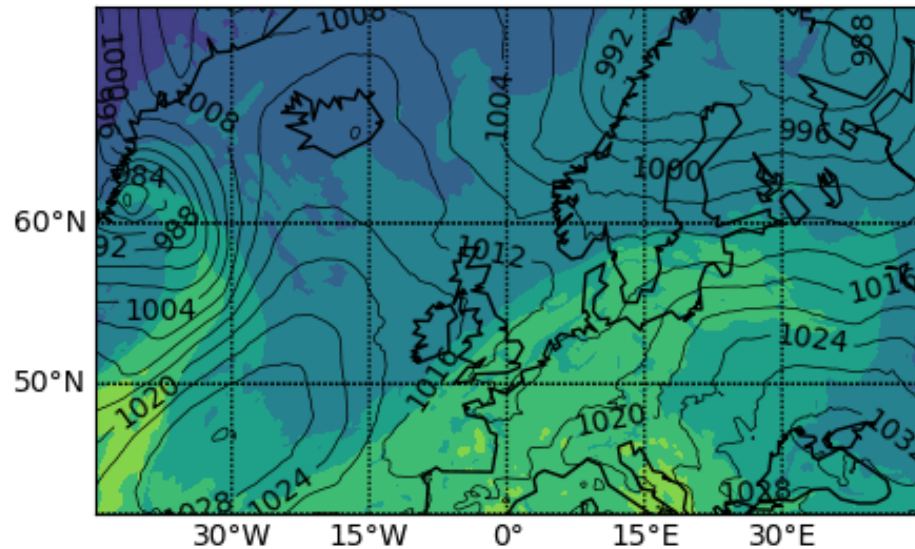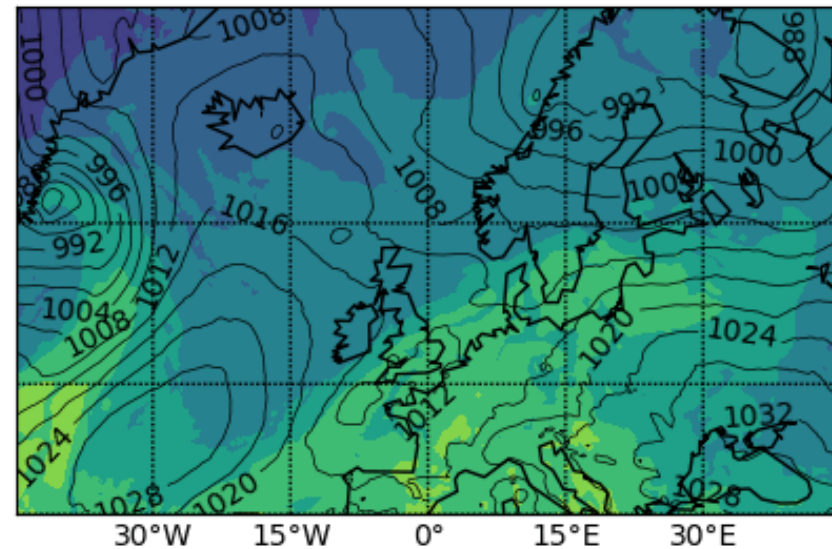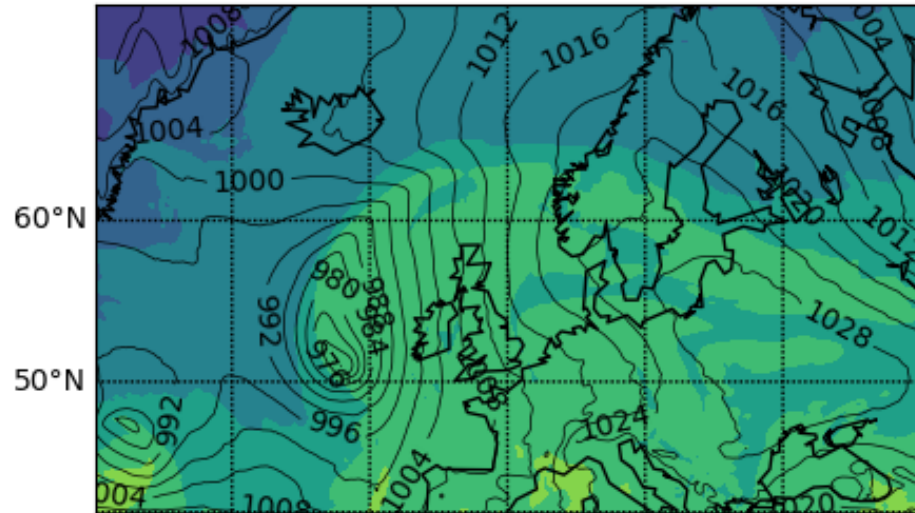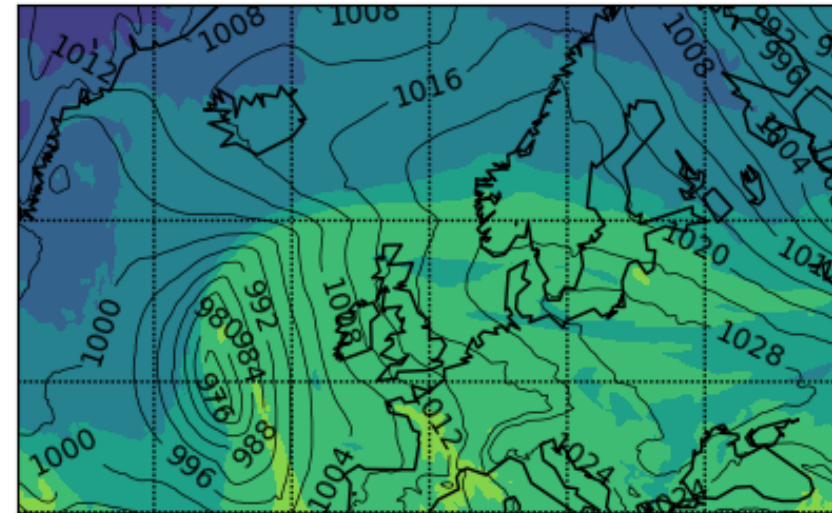MOGREPS-G θ_w (at 850 hPa) and MSLP (hPa) 00:00 06 Oct 2018 t+0 hours

Representative members for each of 4 clusters

MOGREPS-G θ_w (at 850 hPa) and MSLP (hPa) 00:00 06 Oct 2018 t+117 hours
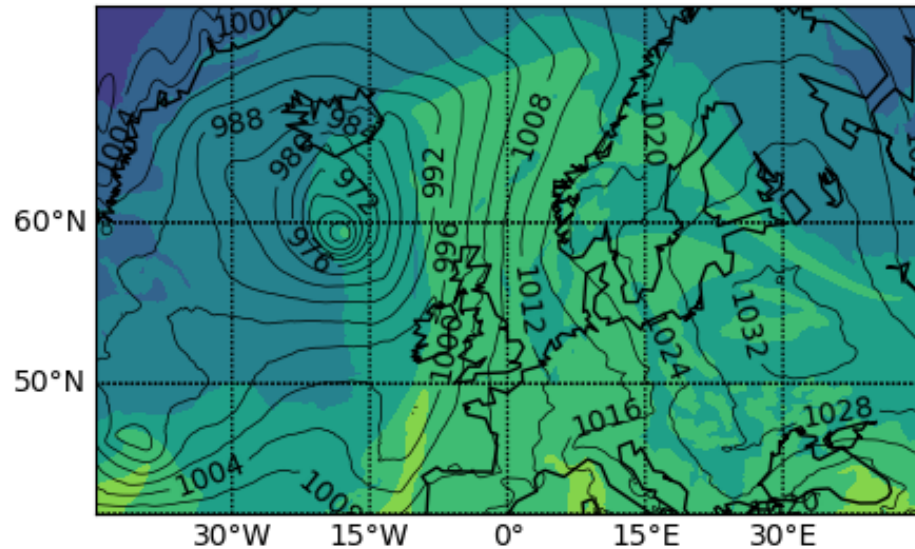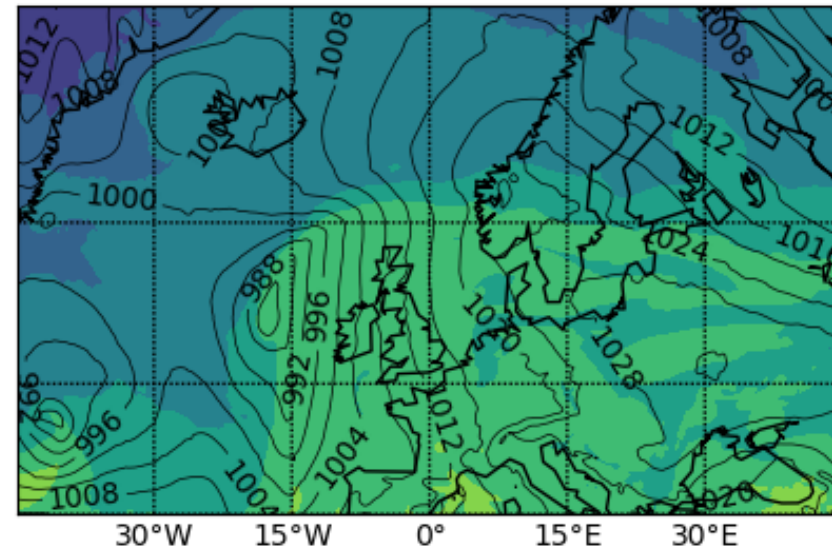
Summary and conclusion

- The gradient of the wet bulb potential temperature is used to define frontal regions

- The distance between ensemble members is calculated with the FSS

- Members are grouped together using K-medoids clustering

- Representative members are extracted and provided to forecasters as potential scenarios

- The method has been evaluated by scientists and operational meteorologists during the Met Office Winter Testbed

- Future implementation of method at Met Office

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