

# SUMMARY ASSESSMENT OF SEASONAL FORECASTS FOR EUROPE

## JANUARY, FEBRUARY, AND MARCH 2021

### Executive Summary

Seasonal forecast models and climate signals suggest January to March 2021 as a whole is most likely to be warmer than average across the whole of Europe. A north-south split for precipitation is indicated with Scandinavia most likely to be wetter than average and southern Europe drier than average.

#### Storms

The frequency of storms moving in from the North Atlantic is most likely to increase and be above average for northern Europe and Scandinavia and below average for southern Europe, especially towards the end of the period.

#### Precipitation

Precipitation is most likely to be above average across Scandinavia and below average across southern Europe. There is no clear consensus across the forecast models and climate signals for precipitation across northern Europe although above average precipitation is slightly more likely.

#### Temperature

Temperatures are most likely to be warmer than the long-term climatological average across Europe.

#### Analogue Years

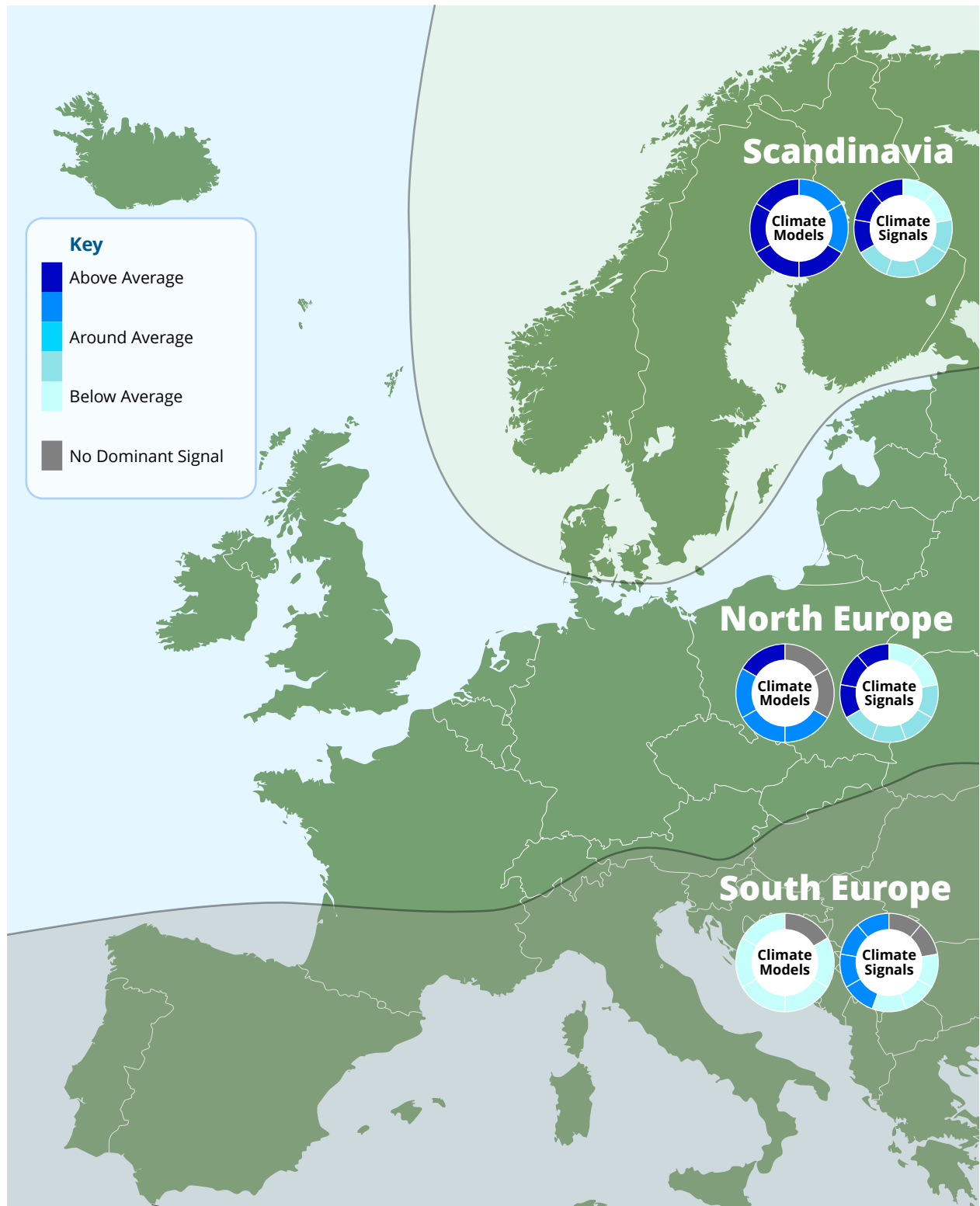
This analysis has looked at periods, termed analogue years, when climate signals have shown a similar pattern to those exhibited currently. Based on climate signals throughout December the most appropriate analogue for this winter is the winter of 2008/09. This, combined with the analogue years identified based on climate signals in October and November, suggests that both the number of windstorms and the maximum storm severity index for this winter is unlikely to be below average.

This is the final seasonal forecast assessment that will be issued for the current windstorm season.

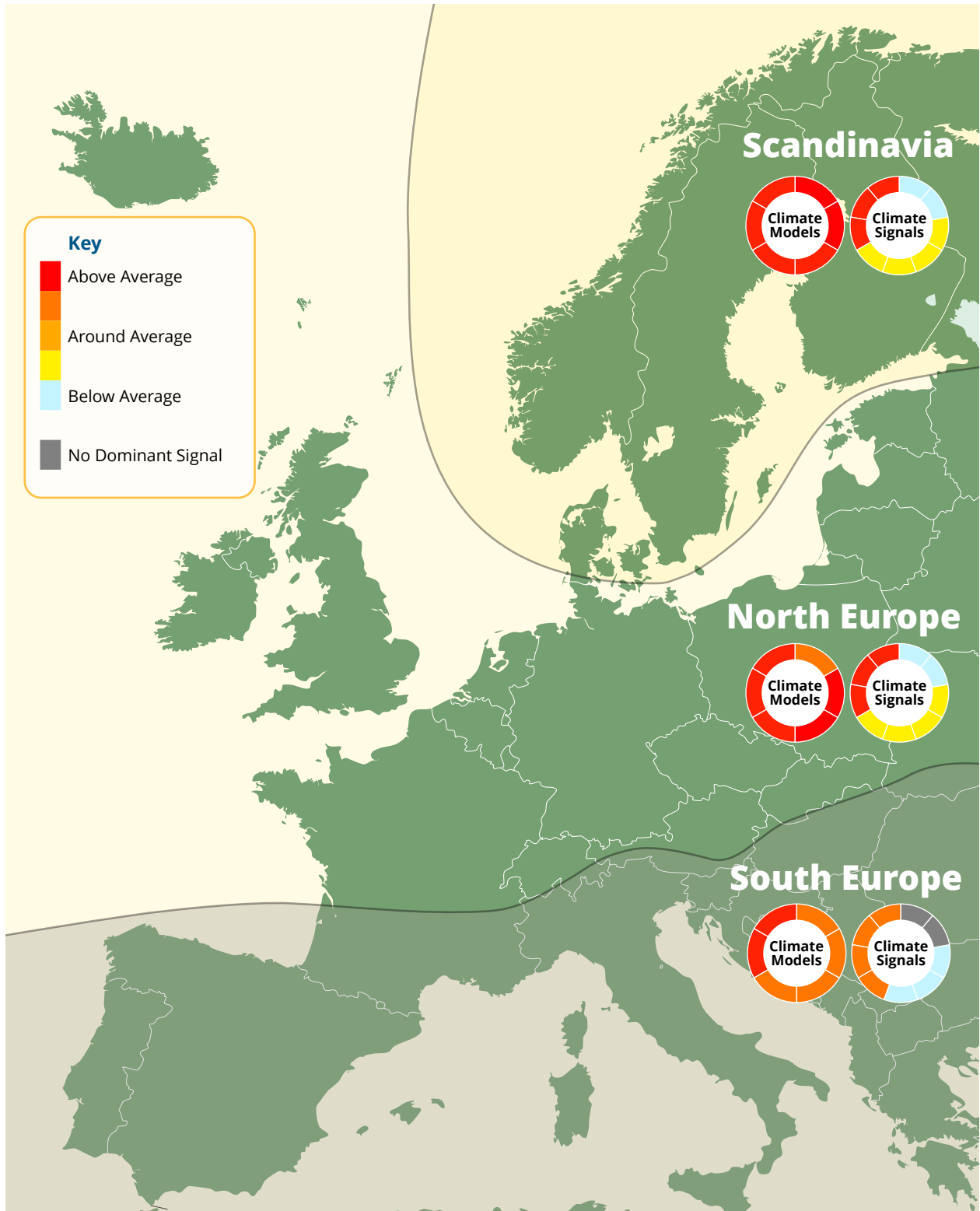
## Europe Climate Regions for January 2021 – March 2021

Our analysis of six climate models and nine climate signals suggest that conditions across Europe can be broadly grouped into three regions for January 2021 – March 2021: Northern Europe, Southern Europe and Scandinavia. The maps below summarise the conclusions of assessment of the forecasts for each of these regions.

### Assessment Summary – Precipitation January, February and March 2021



# Assessment Summary – Temperature January, February and March 2021

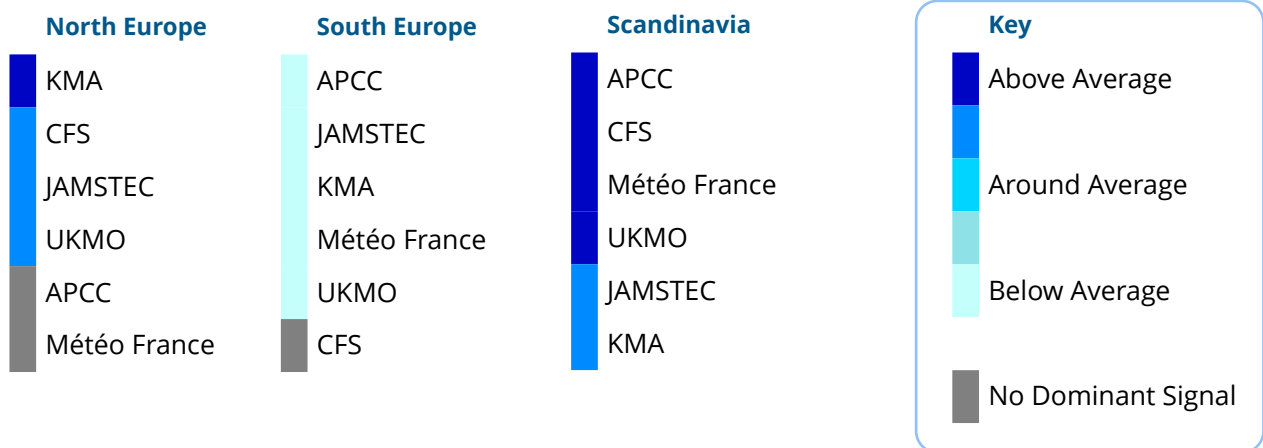


# Seasonal Forecast Assessment Summary

In order to produce this seasonal forecast assessment, the outputs of various seasonal forecast models have been analysed, along with some key climate indicators. In terms of the seasonal forecast models, EuroTempest has chosen to focus on precipitation and temperature as all agencies used in this report provide forecasts for both of these parameters, enabling a comparison across all agencies. Owing to the relationship between the occurrence of North Atlantic storms and mild and wet conditions, temperature and precipitation have been used as a proxy for storminess, as forecast models do not provide a direct measurement of storm occurrence. Similarly, despite the relationship between most climate signals and European weather being relatively weak, the status of these signals can often be suggestive of which weather types may be more likely to prevail, and so can be used to indicate trends in temperature, precipitation and storminess. As well as this, the use of analogue years identified by the phase of a number of climate signals has been used to forecast the possible characteristics of the upcoming winter storm season.

The seasonal forecasts and climate signals are summarised in the Seasonal Forecast Assessment section of this report. For more information on the characteristics of the signals please see the EuroTempest climate signals [factsheet](#). The implications of these models and signals on UK weather during JFM 2021 are shown in the diagram below.

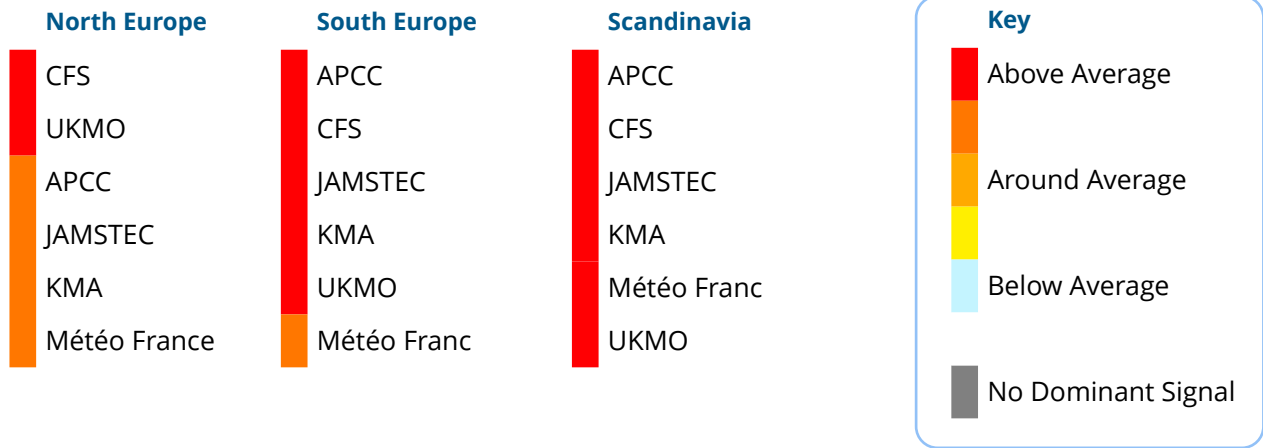
## Precipitation - Climate Models



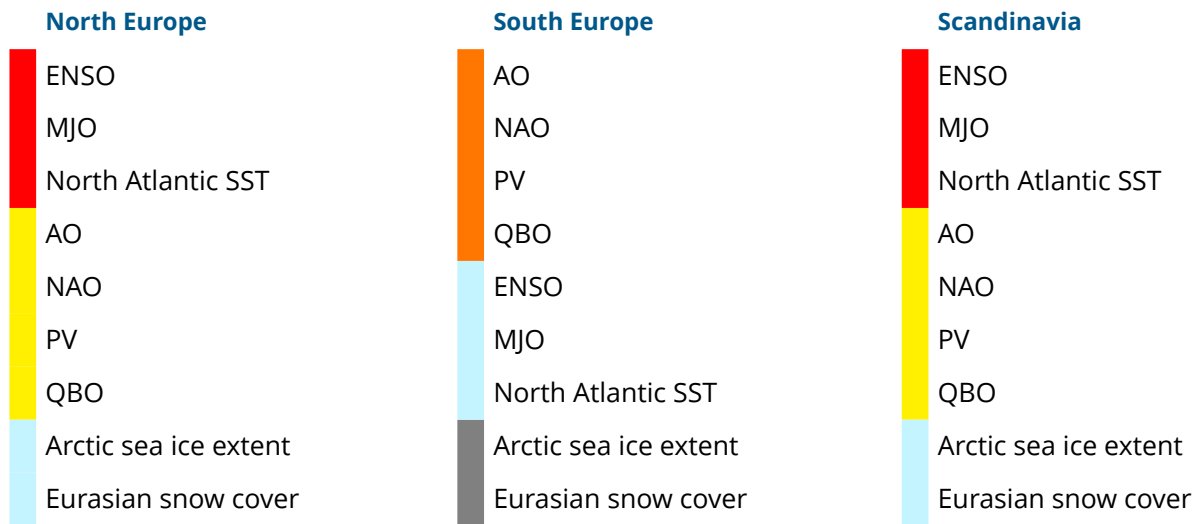
## Precipitation - Climate Signals



Temperature - Climate Models



Temperature - Climate Signals



## Extended Outlook

The following forecast is based on both the output of numerical weather prediction models and climate signals with a shorter-term impact.

There is currently little indication in the weather models and climate signals for any particular weather pattern to dominate during the next few weeks, especially across northern Europe. From late January into early February unsettled conditions are likely to become more favourable with milder and wetter conditions more likely across Scandinavia and much of northern Europe and drier and warmer conditions across southern Europe.

## Seasonal Forecast Assessment

### Climate Models Summary

#### Precipitation:

There is good consistency between the seasonal forecast models towards above average precipitation across Scandinavia and below average precipitation across southern Europe. There is no clear indication for northern Europe although around or above average precipitation is more likely, with:

- All of the NWP seasonal forecast models indicating either above average or around or above average precipitation for Scandinavia
- Five of the six models indicating below average precipitation for southern Europe
- Four of the six models indicating either around or above average or above average precipitation for northern Europe and two models suggesting each outcome (below, above or around average precipitation) is equally likely

#### Temperature:

There is very good consistency in the seasonal forecast models towards above average temperatures across Scandinavia and southern Europe and above or around average temperatures across northern Europe for the JFM period with:

- All six NWP seasonal forecasts indicating above average temperatures across Scandinavia
- Five of the six models suggesting above average temperature for southern Europe, with one model suggesting above or around average temperatures
- Four of the six models suggesting above or around average temperatures for northern Europe, with two models suggesting above average temperatures

For precipitation, the indication from the forecast models is that the chance of a wet JFM is much more likely than an average or dry JFM for Scandinavia, while for southern Europe the chance of a dry JFM outweighs that of an average or wet JFM. A warmer than average JFM is much more likely than an average or cold JFM across Scandinavia and southern Europe. The chance of a warmer than average JFM is more favourable than an average or cold JFM across northern Europe. However, there is consistency between the NWP seasonal forecast models to indicate that an average or colder than average JFM for north western Europe is possible. It should be noted however that "average" conditions are generally defined as the mean of the last 30 years or so. The generally increasing trend of warmer conditions associated with climate change makes it more likely that temperatures now will exceed these historical averages. Temperatures this DJF period that are colder than those that Europe has experienced within the last few years could still be above "average" by this definition

**Models used:****UKMO:** UK Met Office**CFS:** The US National Centers for Environmental Prediction Climate Forecast System**JAMSTEC:** Japan Agency for Marine-Earth Science and Technology**Météo-France:** National Met Agency of France**KMA:** Korea Meteorological Administration**APCC:** APEC Climate Center (South Korea)**Climate Signals**

There is currently no clear indication from the climate signals that any dominant weather pattern is likely for Europe, at least during the next few weeks, with many climate signals pointing to opposing or inconclusive outcomes. The current negative phases of the NAO and AO, the weakening of the polar vortex and the easterly phase of the QBO all indicate an increased potential for colder, drier and calmer periods across northern Europe and Scandinavia. However, from a more detailed assessment of medium-range weather models there are some signs of a particular jet stream set up developing (strengthening and reaching from the Gulf of Mexico across the north Atlantic) which could increase the potential for deep low pressures to affect areas of northern Europe and Scandinavia during the next few weeks while nevertheless leading to a continuation of a negative NAO index. Looking beyond the next few weeks, the combination of warm sea surface temperatures across the North Atlantic and the MJO moving into phase 3 further increase the likelihood of a positive NAO developing later this month and making warmer, wetter and more unsettled periods more likely across northern Europe and Scandinavia in late January and early February. Likewise, ENSO remains in a La Niña state and as mid-winter approaches the influence of a La Niña event begins to change to increase the potential for milder temperatures and wet and stormy weather in Scandinavia and northern Europe (and drier weather in southern Europe).

**Analogue Year****Comparison year:** [The winter of 2008/09.](#)

Analysis of the overall state of the climate during December 2020 and comparison with previous years has identified 2008/09 as an appropriate analogue year for this winter season. This is based on the similarity of the phases and magnitudes of several climate drivers, such as QBO, and ENSO, between December 2020 and the December of previous years. The winter of 2008/09 was characterised by:

- Above average number of severe storms
- Average maximum storm severity index

Previously 2013/14 and 1999/2000 were identified as analogue years based on the state of the climate during October and November respectively. Like both these years 2008/09 had an above average number of storms in its winter season however unlike the other two years the maximum storm severity index in 2008/09 was average rather than above average. Considering these three years as possible analogues for this winter indicates a diminished likelihood (compared to normal) that the number of storms will be below average and likewise that the maximum storm severity index for this winter is unlikely to be below average.

For more details on this method see the report entitled "Using Climate Signals to Forecast the UK Winter Storm Season" published [here](#).

**NAO: North Atlantic Oscillation****Current State:** Negative**Projected State:** Expected to be negative or slightly negative over the next month.**Implications for European weather:** Increased potential for colder, drier and calmer periods across northern Europe and Scandinavia.**AO: Arctic Oscillation****Current State:** Negative.**Projected State:** Expected to be negative or slightly negative over the next month.**Implications for European weather:** Increased potential for colder, drier and calmer periods across northern Europe and Scandinavia.

**PV: Polar Vortex**

**Current State:** Weak and displaced

**Projected State:** Expected to remain weak and displaced over the next month.

**Implications for European weather:** Increased potential for colder, drier and calmer periods across northern Europe and Scandinavia.

**QBO: Quasi-Biennial Oscillation**

**Current State:** Easterly phase

**Projected State:** Continued easterly phase

**Implications for European weather:** Increased potential for colder, drier and calmer periods across northern Europe and Scandinavia.

**ENSO: El Nino Southern Oscillation**

**Current State:** La Niña conditions

**Projected State:** ~95% chance of La Niña conditions continuing through the JFM period.

**Implications for European weather:** La Niña slightly increases the potential for mild, wet and stormy weather across northern Europe and Scandinavia later in the winter season.

**MJO: Madden Julian Oscillation**

**Current State:** Currently in phase 3.

**Projected State:** Expected to progress through phase 3 while strengthening and then into phase 4 and weakening again during the next few weeks.

**Implications for European weather:** An increased potential for a positive NAO and so mild temperatures and wet and stormy periods across northern Europe and Scandinavia lags stronger MJO phases 3 and 4 by around 10 days.

**North Atlantic SST**

**Current State:** Warmer than average in the North Atlantic.

**Projected State:** This pattern is expected to persist.

**Implications for European weather:** Increased potential for a positive NAO with increased potential for mild temperatures and wet and stormy periods across northern Europe and Scandinavia.

**Eurasian Snow Cover and Arctic Sea Ice Extent**

**Current State:** Eurasian snow cover is around average while Arctic sea ice extent is below normal.

**Projected State:** Arctic sea ice is expected to remain below normal.

**Implications for European weather:** Some potential for colder and drier periods, especially across northern regions.



## Appendices

### Seasonal Forecast Assessment - Notes

- This is not a EuroTempest forecast. This is a EuroTempest summary of a number of World Meteorological Organization (WMO) designated global producing centres for long-range forecasts. (<http://www.wmo.int/pages/prog/wcp/wcasp/gpc/gpc.php>)
- The brief summary of the possible climate signals gives some indications of possible weather patterns. However, these signals only give some suggestions and are not as detailed or refined as the WMO centres' forecasts.
- There is little tendency for one type of weather to prevail over any three month period and this assessment does not preclude the possible occurrence of other weather types over shorter time periods during the winter.
- Seasonal forecasts are for average conditions over a three month period, they are not forecasts for weather conditions persisting throughout the whole of the period.
- This report is produced for information only. Please contact us if you require further information or have any feedback. Contact details are provided in the "Contacts" section below.

### Seasonal Forecast Assessment - Method

In order to have any confidence in whether a season will likely turn out as forecast (by any agency) it is necessary to consider:

- a) whether there is a strong indication in any given forecast towards conditions for the coming season which are different from what might be expected from an average season based on the long-term historical record
- b) consistency across a range of available forecasts

In assessing the outlook for Europe, EuroTempest has taken account of forecasts produced by WMO designated global producing centres for long-range forecasts, these are either National Meteorological Agencies or other meteorological centres. These centres are listed in the "Seasonal Forecast Assessment – Sources" section below.

EuroTempest has chosen to focus on precipitation and temperature as all agencies used in this report provide forecasts for both of these parameters, enabling a comparison across all agencies. Owing to the relationship between the occurrence of North Atlantic storms and mild and wet conditions, temperature and precipitation have been used as a proxy for storminess, as forecast models do not provide a direct measurement of storm occurrence.

No two agencies present their forecasts in exactly the same way. Some present forecasts in terms of probabilities – e.g. the probabilities of the upcoming period being in the top third (above average), middle third (average) or bottom third (below average) of historical periods in terms of observed mean precipitation or temperature.

Other agencies present forecasts in terms of anomalies - i.e. the expected difference in the mean precipitation or temperature over the coming season from what would be expected from an average period based on the historical record. Forecasts using this method are generally either stated as being above or below the average.

For example, the probability of above average precipitation should be considered against the "climatological" chance of an above average period. This is 1 in 3, or around 33%, because any period will fall in either the top third (above average), middle third (average), or bottom third (below average).

It should be noted that these agencies generally define "average" conditions as the mean of the last 30 years or so. The generally increasing trend of warmer conditions as a result of climate change makes it more likely that temperatures will exceed these historical averages. Therefore, temperatures this season that are colder than those that Europe has experienced within the last few years could still be above "average" by this definition.

Also, the resolution of the forecasts (both spatial and in terms of the forecast parameter) differs between agencies. As such, absolute direct comparisons are not possible. EuroTempest has assessed each of the forecasts and summarised its conclusions in the summary tables. The entries in the table represent EuroTempest's standardised interpretation (applied to Europe) of the forecasts provided by each agency and do not necessarily represent a specific forecast for Europe by each agency.

It is also important to note that all agencies advise treating seasonal forecasts with caution – e.g. the UKMO seasonal forecast website states “Raw data are displayed for use by international meteorological centres. This does not constitute a seasonal forecast for a given location.”

#### Seasonal Forecast Assessment - Sources

In assessing the outlook for the European winter season EuroTempest has taken account of forecasts produced by six agencies. These are either National Meteorological Agencies or other meteorological organisations. All six of these agencies/organisations are World Meteorological Organization (WMO) designated global producing centres for long-range forecasts. (<http://www.wmo.int/pages/prog/wcp/wcasp/gpc/gpc.php>)

#### **UK Met Office (UKMO)**

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob>

#### **The US National Centers for Environmental Prediction Climate Forecast System (CFS)**

<http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/>

#### **Japan Agency for Marine-Earth Science and Technology (JAMSTEC)**

<http://www.jamstec.go.jp/frcgc/research/d1/iod/e/seasonal/outlook.html>

#### **Météo-France**

<http://www.meteofrance.com/accueil/previsions-saisonnieres>

#### **Korea Meteorological Administration (KMA)**

[http://www.wmolc.org/GPC\\_Seoul/](http://www.wmolc.org/GPC_Seoul/)

#### **APEC Climate Center (APCC) – South Korea**

<http://www.apcc21.net/ser/outlook.do?lang=en>