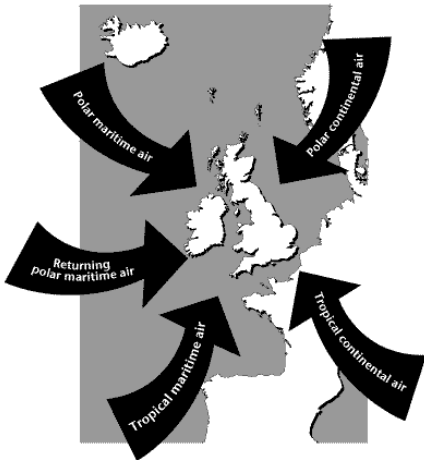


Air Masses



(‘continental’ or ‘maritime’).

Definition

An air mass is a large body of air with relatively uniform characteristics (temperature and humidity) in the horizontal.

Source

The characteristics of an air mass are determined by its source region. The source regions tend to be semi-permanent anticyclones (associated with the sinking regions of the global atmospheric circulation) in the sub-tropics and polar regions (‘tropical’ or ‘polar’ air). The air masses acquire the characteristics by contact with the underlying surface in the source region.

Track

As the position of anticyclones changes, there can be an outflow of air whose properties are modified as it migrates from its source. The modification depends partly on whether the track is over land or sea

Classification

Air masses are classified according to their source region and track.

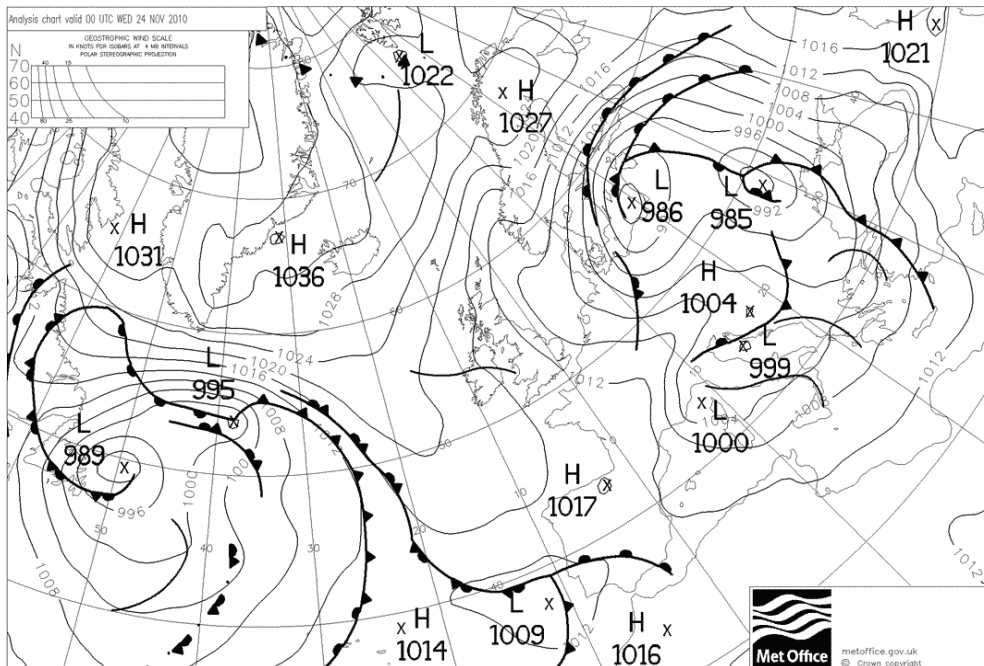
	Source Air temperature	Direction of Travel	Humidity increasing or not?	Temperature increasing or decreasing?	Convection?	Rainfall?
Polar Maritime	Cold	South or South East	Yes	Increasing	Yes	Yes – typically in showers.
Polar Continental	Cold	South or South West	No	Increasing	Yes	No – it depends on how much of the North Sea the air has crossed.
Tropical Maritime	Warm	North or North East	Yes	Decreasing	No	Maybe light drizzle – layer cloud can form as the air travels polewards and cools.
Tropical Continental	Warm	North or North West	No	Decreasing	Not generally	Sometimes there can be thunderstorms if localised convection begins over warm land surface.

Properties

The properties of an air mass depend upon:

- a) Source – air originating in tropical regions is warm, whereas air originating in polar regions is cold.
- b) Track – air travelling over the sea is moistened, whereas the moisture in air with a continental track is hardly changed.
- c) Stability - Southward moving air is warmed from below and becomes more unstable, whereas northward flowing air is cooled from below and becomes more stable.
- d) Development - The large scale vertical motion in a depression encourages the development of showers in southward moving air, whereas in the vicinity of an anticyclone the subsidising air tends to suppress showers.

November 2010



<http://www.wetter3.delfax>

24-11-10 00 UTC + 00

What is the wind direction over the UK?
North/ North-East

What is the air mass affecting the UK?
Polar continental

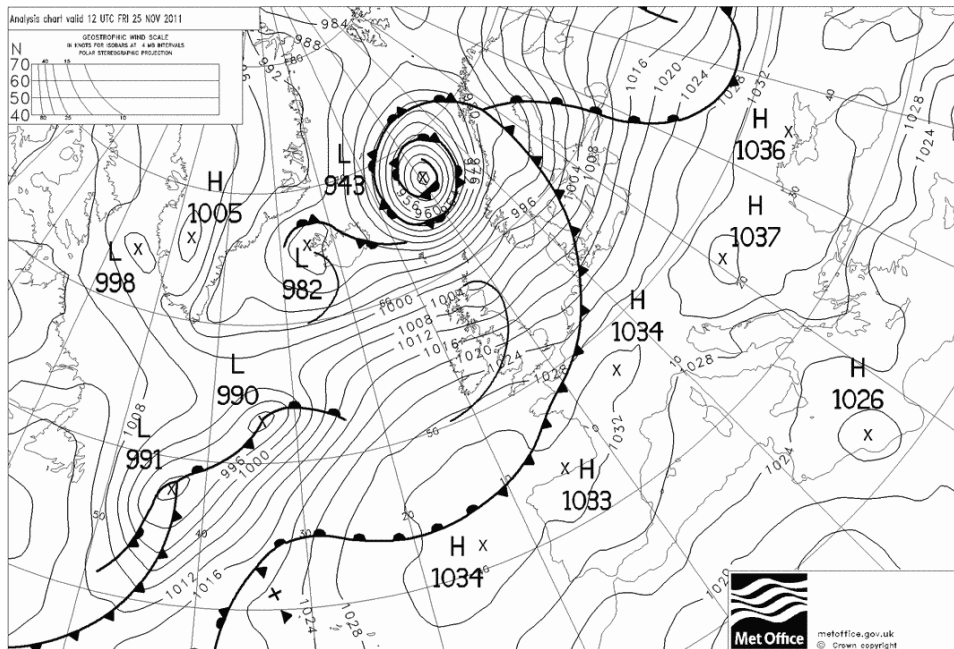
Would you expect convective activity?
Yes, the cold air is being warmed from below as it travels south over the sea.

Describe the weather, in terms of wind speed, direction, cloud and precipitation.
Light North/ Northeasterly winds (the pressure contours are well spaced out). The air has travelled a fair distance over the North Sea so there may be cloud and snow on the East coast. It will be very cold.

Would you expect any difference between day and night?
No, as the sea temperatures do not vary between day and night and inland the Sun will not heat the land much during the day at this time of year.

Would you expect any difference in the weather between the sea/ the windward coast and inland regions?
Yes, any showers (possibly of snow) will form over the sea and affect the coastal areas because at this time of year the sea is warmer than the land, and the air will be most humid over the sea. Inland there will be little convective cloud.

November 2011



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25-11-11 12 UTC

What is the wind direction over the UK?
Westerly/ west-northwesterly.

What is the air mass affecting the UK?
Polar maritime

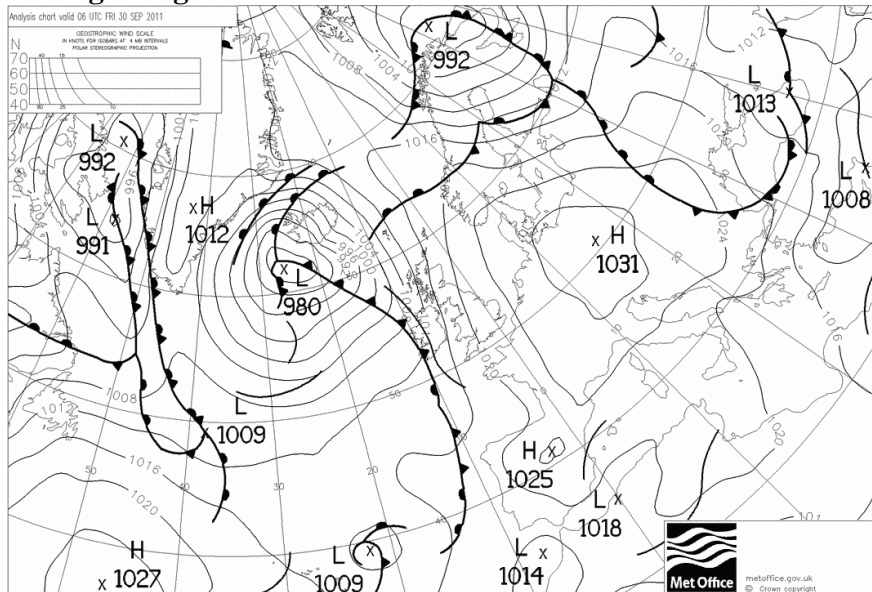
Would you expect convective activity?
Yes, the cold air is being warmed from below as it travels south and therefore becomes more unstable.

Describe the weather, in terms of wind speed, temperature, direction, cloud and precipitation.
Relatively strong winds (isobars close together) from the west or northwest. There will be some convective cloud. Temperatures will be about average for the time of year.

Would you expect any difference between day and night?
No, as the sea temperatures do not vary between day and night and inland the Sun will not heat the land much during the day at this time of year.

Would you expect any difference in the weather between the sea/ the windward coast and inland regions?
Most of the convection will be occurring over the sea (as the sea is warmer than the land in winter) and so showers will mainly affect the sea and the windward coast. However, as the wind is fairly strong, the shower clouds might travel well inland.

End of September/ Beginning of October 2011



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30-09-11 06 UTC

What is the wind direction over the UK?
South-westerly

What is the air mass affecting the UK?
Tropical maritime

Would you expect convective activity?
No, the warm air is being cooled from below as it travels north, and therefore becomes more stable,

Describe the weather, in terms of wind speed, direction, cloud and precipitation.
Light winds (the pressure contours are well spaced out) from the south/ south west. Warm weather for the time of year. There may be some low cloud.

Would you expect any difference between day and night?
During the day, the sun will still be strong enough to warm the land and burn off any stratus/ hill fog which formed over night when the ground (and therefore the air in contact with the ground) was colder.

Would you expect any difference in the weather between the sea/ the windward coast and inland regions?
Yes, there will be low cloud and/ or sea fog over the Atlantic which may affect the windward coast. This forms as the air moves polewards and cools, reaching the point where the rate of condensation is faster than the rate of evaporation. As the air is more humid over the sea, cloud forms more readily there.
Inland it will be sunny with little cloud.

You can find more air mass resources and activities in the teachers' KS4 section of MetLink.