WEEKLY WEATHER UPDATE
KEY NOTIONS AND ACRONYMS

New additions from previous updates are in red.

1. Pressure levels in the atmosphere

850 hPa pressure level: Approximately 1,500 metres (5,000 feet) above the surface. Level above the surface boundary layer, effects due to friction are considered negligible at this level and above.

700 hPa pressure level: Approximately 3,000 metres (10,000 feet) above the surface. Level considered ideal to check moisture in low pressure systems.

500 hPa pressure level: Approximately 5,000 metres (18,000 feet) above the surface. Level considered half way up in the troposphere.

200 / 300 hPa pressure level: Approximately 10 km (34,000 feet) above the surface. Level considered to be the top of the troposphere where the jet stream develops at our latitudes.

100 hPa pressure level: Approximately 15 km (50,000 feet) above the surface. Level considered to be the average bottom of the stratosphere.

10 hPa pressure level: Approximately 32 km (105,000 feet) above the surface. Level considered being half way up in the stratosphere.

2. Variability indices

Teleconnection: A teleconnection is a statistical association between the climate (temperature, precipitation, or other meteorological variables) at widely-separated locations. The significant association can be either positive or negative, and may be present for certain decades only to be absent in others; the locations influenced can be in the same or different latitude zones. A teleconnection manifests a recurring large-scale pattern in the atmosphere's pressure/height field, and the accompanying variations in winds influence the advection of temperature and moisture at locations within that pattern.

Arctic Oscillation (AO): Index measuring the atmospheric circulation over the Arctic. Like the NAO, it has a positive and a negative phase. In the negative phase, the polar low pressure system (polar vortex) over the Arctic is weaker, resulting in weaker westerly upper level winds, allowing cold Arctic air to push farther south into the UK. The opposite is true when the AO is positive: the polar circulation is stronger, locking the cold air over the Arctic. AO and NAO phases are often correlated.

Madden-Julian Oscillation (MJO): The MJO is the largest element of the intraseasonal (30-90 days) variability in the tropical atmosphere. It is a large scale coupling between atmospheric circulation and tropical deep convection. Rather than being a standing pattern (like ENSO), it is a traveling pattern, propagating eastwards at approximately 4 to 8 m/s, through the atmosphere above the warm parts of the Indian and Pacific oceans. This overall circulation pattern manifests itself in various ways but most clearly as anomalous rainfall: heavy rain from thunderstorms is enhanced in some parts and suppressed in others.

MJO progresses through different phases, which generally coincide with locations along the equator around the globe. Mathematical methods are used to combine cloud amount, winds at upper and lower levels of the atmosphere to provide a measure of the strength and location of the MJO.

There are 2 MJO phases per tropical region as follows:

1: Western Hemisphere and Africa
2: Indian Ocean
3: Indian Ocean
4: Continental Maritime
5: Continental Maritime
6: Western Pacific
7: Western Pacific
8: Western Hemisphere and Africa

North Atlantic Oscillation (NAO): Index measuring the pressure difference between the Azores and Greenland. Positive values mean west to east circulation of the low pressure systems; whereas negatives values mean a blocking high pressure system impedes their progression towards the UK. Depending on its location, cold conditions may result for the UK.

3. Physical notions

Advection: It refers to the transport mechanism of a substance or conserved property by a fluid due to the fluid's bulk motion. It is a horizontal movement. For example, temperature is advected by the wind.

Coriolis force: From an earth observer, it is an apparent curving of a wind flow due to Earth's rotation.

Downwelling: Transfer of a property to lower levels. For example, it can be the propagation of easterly winds or temperature anomaly from the stratosphere into the troposphere.

Equivalent potential temperature: Usually displayed at 850 hPa, it basically traces airmasses and allows comparison by taking out the effect of latent hea release responsible for temperature rise during condensation processes (cloud formation). Fronts are therefore very obvious on an equivalent potential temperature chart.

Geopotential height: It approximates the actual height of a pressure surface above mean sea-level.
Since cold air is denser than warm air, it causes pressure surfaces to be lower in colder air masses, while less dense, warmer air allows the pressure surfaces to be higher. Thus, heights are lower in cold air masses, and higher in warm air masses. Areas of low height tend to be associated with a relatively cold column of air between the surface and 500 hPa, while areas of high height are associated with relatively warm columns of air.

Geopotential height anomaly: It is a deviation in the geopotential height field from average values.
Geopotential heights below (resp. above) average mean colder (resp. warmer) than average temperatures across the region.

4. Numerical models

In **deterministic models**, outcomes are precisely determined through known relationships among states and events, without any room for random variation. In such models, a given input will always produce the same output.

On the contrary, **ensemble (stochastic) models** attempt to quantify the amount of uncertainty in a forecast by generating an ensemble of multiple forecasts, each minutely different, or perturbed, from the original observations.

ECMWF: European Centre for Medium-Range Weather Forecast, European weather model.

GEFS: Global Ensemble Forecast System, American weather Model.

GFS: Global Forecast System, American weather model.

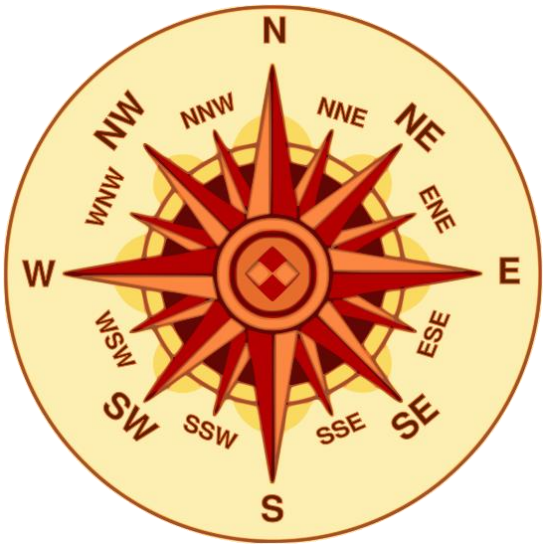
NAEFS: North American Ensemble Forecast System, American weather Model.

NCEP: National Centres for Environmental Prediction

UKMO: United Kingdom Met Office, British weather model

5. **Compass directions**

In meteorology, wind direction is reported by the direction **from which it originates**. For example, a *northerly* wind blows from the north to the south. Wind direction is usually reported in cardinal directions or in azimuth degrees. For example, a wind coming from the south is given as 180 degrees; one from the east is 090 degrees.



N'ly:	Northerly
NNE'ly:	North North Easterly
NE'ly:	North easterly
ENE'ly:	East North Easterly
E'ly:	Easterly
ESE'ly:	East South Easterly
SE'ly:	South Easterly
SSE'ly:	South South Easterly
S'ly:	Southerly
SSW'ly:	South South Westerly
SW'ly:	South Westerly
WSW'ly:	West South Westerly
W'ly:	Westerly
WNW'ly:	West North Westerly
NW'ly:	North Westerly
NNW'ly:	North North Westerly