



Gorge/Ghyll Leader Award (GGL)

Pre-Course Learning Document. Weather.

This Pre-Course Learning Document aims to provide you with a basic understanding of how the weather works and how to interpret weather charts. There are many fine mountain weather resources out there – websites, webcams, books and we would encourage anyone wanting to lead in the outdoors to further their knowledge by getting to know these. We would also encourage you to develop a healthy obsession with the weather in general.

For ease of use this is only a basic introduction with each subject heading worth mastering individually through experience.

Understanding the weather

Weather is essentially fuelled by pressure. Atmospheric pressure will vary in different places at different times and it is these differences reacting to each other that causes many of the weather systems that we know and love. For example, heavy descending air will flow outwards when it meets light ascending air, creating wind. This wind will then move weather systems around meeting areas of different pressure (or features such as mountains) creating yet more changes in weather!

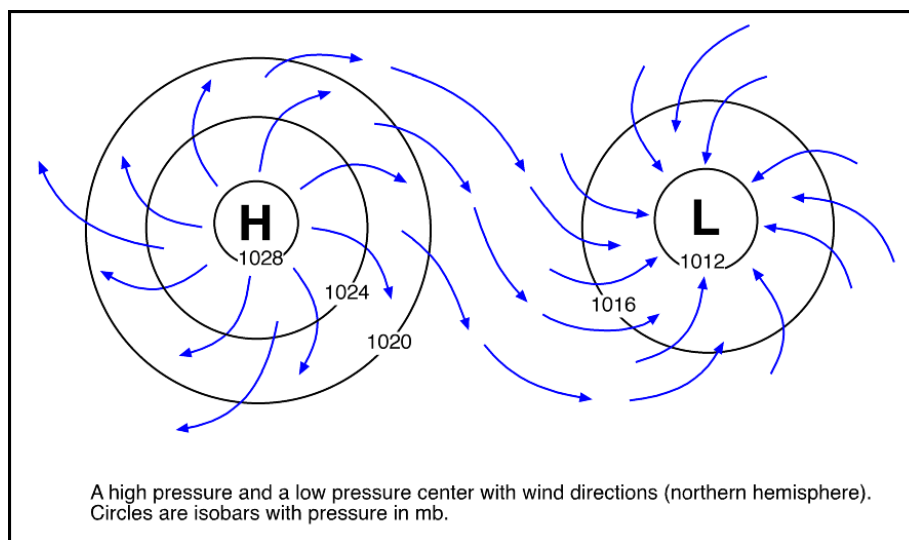


Image 1

We can see High and Low pressure on the weather map above. The closer the isobars, the stronger the wind (just like a land map – the closer the contours, the steeper the ground).

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We know that heat rises so it is easy to remember that cold air is heavier than warm air. We should also remember that warm air can hold a lot more moisture than the cooler air, but as it rises it will cool and lose this moisture.

A weather map will also show the position of Warm and Cold Fronts. These are the lines marking the boundaries between different air masses. As warm air circulates around the centre of a *Low*, it will rise over the cool air and develop into a Warm Front. As it rises it will begin to cool and lose its water vapour creating clouds and possibly precipitation. A Warm front is indicated by semicircles along a line.

The warm, wet and windy weather following a Warm Front will soon be caught up by cooler, heavier air which will undercut the warm air forcing it up. This is a Cold Front and is marked by triangles along a line.

The map below shows the fronts moving across the UK.

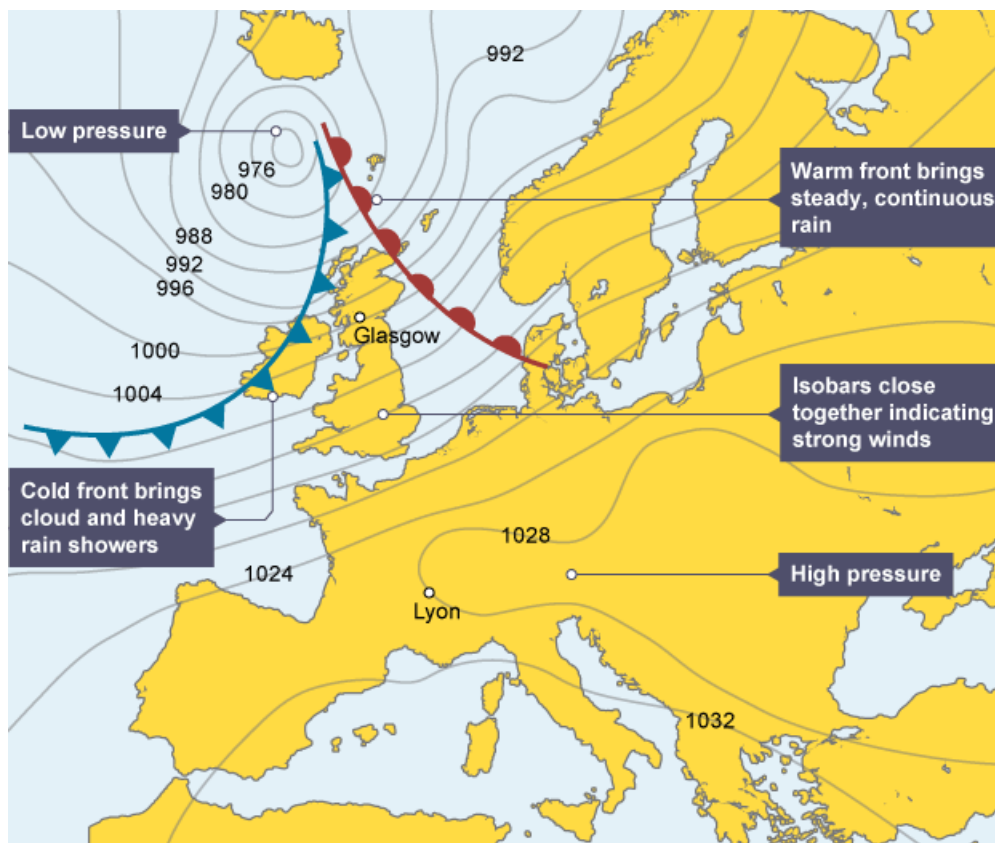


Image 2



Gorge/Ghyll Leader Award (GGL)

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The cross section below shows us what will be happening from the ground.

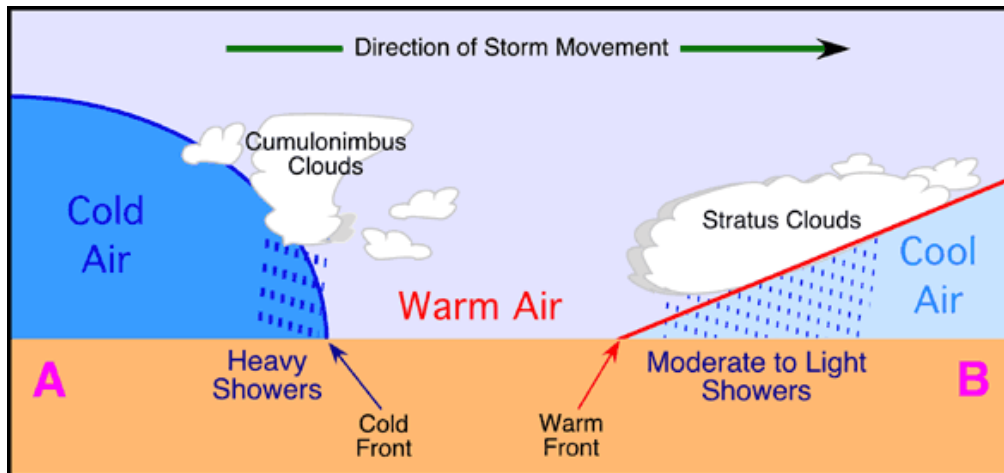


Image 3

Wind

So we can see on a weather map the tightly packed isobars indicating strong wind. It's also worth remembering that the higher up the hill we go, the less dense the air pressure meaning the wind can travel faster. If you have walked up high to access a gorge or canyon the wind could therefore be stronger than what has been predicted at ground level.

The channelling effect of a gorge or ghyll can also funnel the wind even more strongly right towards us. Up to around 40mph is tolerable to most appropriately dressed people. Up to 60mph should get most people considering getting out while over 60mph comes with a risk of being blown over!

Clouds

When out on the hill, by the gorge or ghyll, you might get a little head start by observing the clouds.

Here are some basics: A Warm Front can be seen advancing at first by the thin Cirrus clouds often known as 'Mares tails' and 'Mackerel Sky' clouds at the very highest level.

These can be the first signs of something beginning and will give us several hours warning of the approaching storm, *if* the clouds are increasing and spreading out. If they dissolve and clear then the weather should turn out fine.

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Image 4 – Cirrus

A Cold Front can be first spotted by the appearance of large Cumulus clouds. The weather will change quickly and dramatically with heavy rain as the cold air undercuts the warm air and makes it rise quickly.

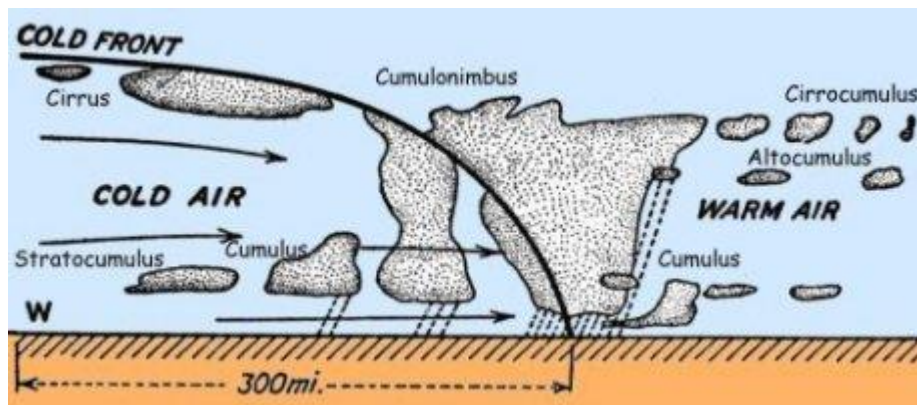


Image 5 – Cumulus Clouds leading the cold front

Precipitation

Is obviously very important when entering watercourses. We should look at recent rain or snowfall as well as that which may fall during the trip. There are a few websites that record recent rainfall levels so that you can do some research if you are travelling to an area. You should follow the rainfall closely leading up to a trip whether this is via websites or just being out on the hill if you live close by. Local knowledge can be gained by calling a colleague that lives in an area or popping into a café



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and chatting with the owners; the value of this knowledge cannot be underestimated, however, its integrity is down to your experience.

Topography

The Catchment area. Where the catchment area is large, on a windward slope with steep profiles and direct stream paths then the effects of even moderate rainfall can be considerable and rapid. All gorges and ghylls will be affected by heavy, prolonged rain and only experience will tell you when they are safe to use again (seeing a gorge in full flood is both sobering and a very useful piece of knowledge).

Low angled hills, leeward slopes (the 'rain shadow') and indirect or non-existent stream paths will slow the fallen rain down and dissipate it more widely. Experience of the area will help you master this but a good, informed look at a map of the area will give you a surprisingly good estimate.

Vegetation

Vegetation can have a considerable impact on reducing the speed of water runoff. Mature forest will have the greatest single impact, while newly planted areas will have least. The older woodland has well established undergrowth as well as a complex arrangement of trees all helping to soak up and delay water. Newly planted woods are sparser due to regular planting and straight-line drainage ditches. These straight lines (known as 'gripping') let water rush down them un-checked by corners or change of angle.

Peat bogs can be unpredictable as they can soak up large amounts of rain, delaying the expected runoff. Long periods of light rain can fill them up, appearing to have no effect on the gorge, before they overflow and release far more than expected.

Image 1

Image 2

Image 3

Image 4 <http://enclave.entropymag.org/wp-content/uploads/2015/07/boone-weather-cirrus.jpg>

Image 5 <http://www.weather-climate.org.uk/images/06d.jpg>