Mountain Weather

Mountain weather is very exciting and dramatic because the South Island is a narrow piece of land with ocean on either side and a high mountain range lying down the centre.

All aspects of life in Arthur's Pass are affected by the weather:

The general **climate** determines which plants, insects, and birds flourish in different places. Mountain processes such as **erosion** are largely caused by the weather.

Trampers and climbers who come to Arthur's Pass can find their plans drastically changed by the weather.

When you come to stay at the Centre you may have beautiful sunny days on which you can go swimming or snow may fall overnight, meaning a day of snowball fights and mittens. There could also be a huge rain storm with thunder and. lightning, resulting in flooding torrents where previously there was only a tiny stream.

Climate At Arthur's Pass

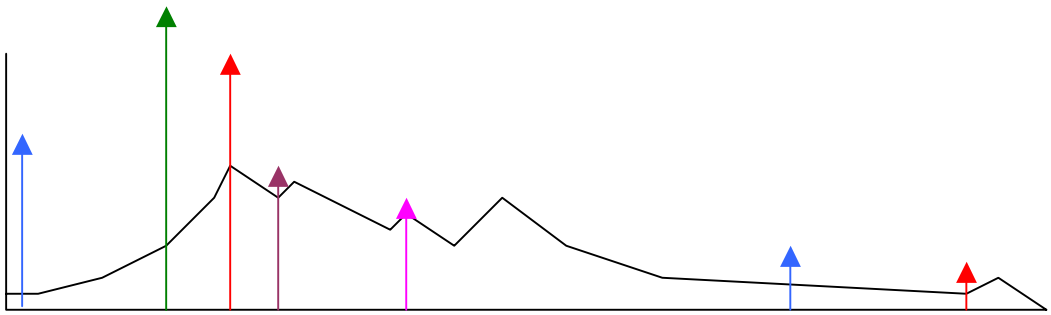
Arthur's Pass township is 740 **metres** above sea level, high in the mountains of the Southern Alps. Because of this altitude and because it is a long way from the sea, the climate is very different to that of Christchurch, which is only 7 metres above sea level.

Rainfall

Rain can drive you crazy when you live at Arthur's Pass. Rain falls on approximately 160 days per year. The **average yearly rainfall** is nearly 4,000 **mm,** which is over twice the rainfall at Bealey (1,600 mm) only 15 km east of Arthur's Pass, and six times the rainfall in Christchurch (650 mm).

A cross section of the Southern Alps from Greymouth to Christchurch, showing the rainfall gradient from west to east, is shown in the diagram below. Rainfall is highest on the Divide and to the west, but decreases with distance east from the Divide. The highest rainfall is at Otira, 10 km west of Arthur's Pass. It has a rainfall of 5,000 mm

Annual rain-fall (mm) West to East across the South Island.



Greymouth 2480mm
Otira 5074mm
Arthur's Pass 3970mm
Bealey 1674mm
Flock Hill 1307mm
Darfield 814mm
Christchurch 658mm

The Nor'-West Cycle

The main rain bearing wind is the **"Nor'-wester".** The north-west wind **evaporates** water as it blows across the Tasman Sea. The wind, carrying the water droplets evaporated from the sea, is forced to rise up by the mountains to higher **altitudes** where the temperature is colder. The moist air is cooled and the water droplets **condense** as clouds. As the clouds get colder larger droplets form, until their weight means they can no longer stay in the cloud, and the droplets fall as rain. If the air temperature is very cold, especially in winter, the water droplets freeze and fall as hail or snow. Most of the rain or snow is dropped over the mountains. The Nor'-wester continues east from the mountains across the plains as a hot, dry blustery wind. You can see the marked difference between rainfall in the mountains and in Christchurch on the graph. East of the mountains, across the plains, is a **rainshadow area.** Next time there is a hot blustery nor'-wester in Christchurch, and all you can think of is the swimming pool, have a look out towards the mountains. You may be able to see the storm clouds over the Southern Alps, or there may be a **"Nor'-west Arch",** which always means rain in the mountains.

North westerly conditions are often followed by a southerly change, which can bring a period of fine weather before the next nor'-wester.

Although the climate at Arthur's Pass seems to be rainy and unsettled, there can be long periods of fine weather. Much of the high annual rainfall is concentrated into a few relatively heavy falls. Snow falls are common in winter. Changes in weather take place very rapidly.

Temperature

Places at higher **altitudes,** such as Arthur's Pass, generally have a lower average **temperature** than places closer to the sea.

At Arthur's Pass the hottest time of year is usually January/February with an average maximum temperature around 18 C. What is the maximum temperature in your town? Frosts can still be recorded in summer if the temperature drops sharply at night.
The maximum recorded temperature at Arthur's Pass is 29.4 C. In winter the temperature has been recorded as low as -15.6 C. Winter has extremes of temperature with very cold frosty nights, followed by crisp, clear, sunny days with the temperature rising to as much as 12 C.

Sunshine Hours

Because Arthur's Pass is in a valley surrounded by high mountains, the village does not get much sunshine, even in summer. At mid winter the sun peeps over the mountain horizon at 11.00 am and has quickly scooted across the sky to disappear by 2.30 pm.

Clouds

A cloud is formed when rising air carrying moisture droplets **evaporated** from the sea, is cooled. The water droplets **condense** in the colder temperatures found at higher altitudes, and form clouds. Different cloud types are partly the result of the wind pushing the clouds around into **heaps (Cumulus)** or **layers (Stratus),** or strange exciting shapes (for example birds and dragons).

The wind is always stronger at higher altitudes. High altitude clouds are so cold that they are made of ice crystals. The are called **cirrus.** Often these high altitude clouds leave a trail of ice crystals which the wind twists and turns into strange wispy forms. These are called **Mare's Tails.** A halo round the sun is also made up of ice crystals high in the sky. When you see a lot of this high cirrus cloud it indicates strong winds high in the sky and often means a storm is on the way.

These clouds are often followed by waves **of hogsback** clouds **(spaceship clouds)** which are accompanied by strong winds, and usually soon after the rain will come. Why do you think they are called hogsbacks?

Rain occurs because the water droplets in the cloud have combined together to make a raindrop that is too heavy to stay suspended in the cloud. A raindrop is about 1 mm in diameter, and is made up of one million cloud droplets. If the air temperature is very cold the water droplets will freeze and fall as snow or hail. Rain and snow fills the rivers that flow to the sea- where winds will evaporate water to form clouds again.