

**U3A Port Fairy
Science...naturally!**

Clouds Part 3 – Low Clouds

Ross Knudsen, 23 June 2020



A lovely example of approaching Nimbostratus cloud (very dark cloud above horizon) looking south east from East Beach, Port Fairy. The Nimbostratus is flanked by Cumulus in the foreground. All these are 'low clouds'.

In Part 3 of the 'Clouds' presentation, we are now down to the 'low clouds'. These clouds produce most of our 'weather' in the lowest ten thousand feet (3,000 m) of the Earth's troposphere. The weather associated with these clouds, and that we experience, ranges from fog and mist, rain, showers, drizzle, snow, and thunderstorms and their associated effects to name a few.

Earth's low clouds are dominant clouds and are perhaps the most likely types of cloud we see in the skies around Port Fairy. Certain types develop before the passage of fronts, and once fronts have passed. It is all to do with the atmospheric temperature, barometric pressure and humidity of the air mass at the time.

These low clouds are quite easy to identify due to their density or thickness, shape and structure. Some develop with warmer air, and some with cooler air, yet like the middle and high clouds, we can still read them to determine what the weather is going to be like.

Low clouds

Form in the troposphere below 6500 feet or 2000 metres

Cloud types

Stratus, Stratocumulus, Cumulus, Cumulonimbus, Nimbostratus

Where they form

Worldwide, except for Cumulus in Antarctica (the ground is too cold for thermals)

<u>Composition</u>	Predominantly water droplets, however, ice crystals, snowflakes, and hail in Cumulonimbus
<u>Precipitation</u>	Yes – You can get wet from either rain, rain showers, snow, snow showers, drizzle, drizzle showers. Not all low clouds including Cumulus clouds produce precipitation.
<u>Formation</u>	Mainly by convection or thermals (rising air) and through condensation where water vapour is converted to liquid droplets.
<u>Visual effects</u>	Can be stunning and awesome when viewed as thunderstorms and their associated lightning displays. Cloud ‘streets’ when formed in parallel lines with wind direction. Roll clouds. Huge, puffy cotton wool-looking clouds.

STRATUS

Stratus are grey, flat, layers or patches of cloud, with very diffuse edges and similar to Altostratus clouds in that they are featureless in appearance and cast a drab, dreary light. They are the lowest forming of all clouds, sometimes appearing at ground level, when they are called fog or mist. They most commonly form around coastlines and mountains.

They are associated with areas of high atmospheric pressure when the air is calmer and given the right conditions, will fill valleys with fog. Stratus takes time to form and is slow to dissipate. The only precipitation produced by this cloud is light drizzle or gentle snow



Stratus opacus (being thick enough to mask the sun) cloud hangs around Port Fairy as viewed from South Beach on 26 May 2020. This a classic example of Stratus and an occasional visitor to Port Fairy. Forms particularly during the cooler months of the year after a front has passed and we have settled weather with a high-pressure system dominating.

On this morning, the fog had lifted to become Stratus. Once the stratus clears, it will turn out fine and sunny with light and variable winds.

STRATOCUMULUS

Stratocumulus are low layers or patches of cloud, with well-defined bases. They are usually composed of clumps or rolls, and often show strong variations in tone – from bright white to dark grey. Their cloud elements may be joined by a common base and be continuous, unbroken layers or have gaps between them.

They are a common cloud and any precipitation would be occasional light rain showers, drizzle or snow. The well-known 'roll cloud', the 'Morning Glory', that forms in the Gulf of Carpentaria is a particular formation of Stratocumulus. Its shape is an individual tube of cloud.

We are likely to see Stratocumulus after a front has passed, and they can also occur around periods of unsettled weather. Although they appear clumpy, they are more likely to have flatter tops than Cumulus clouds.

Can be a threatener of bad weather. If ahead of a cold front, gusty winds and/or heavy showers tend to follow.

Common cloud to see around Port Fairy.



Recognising Stratocumulus from beneath. Photo taken in Port Fairy on 17 June 2020. This shows the darker cumuloform cells joined by a common base. There are a couple of breaks in the cloud indicated by the patch of blue sky and the crepuscular rays behind the trees in the background. Quite usual for stratocumulus. The breaks are created when there is sinking of air and the cloud dissipates.

Acknowledgement: Some reference material courtesy 'The Wonders of the Weather'

By Bob Crowder – Publication of the Bureau of Meteorology



A classic example of Stratocumulus, looking towards Warrnambool from East Beach, Port Fairy. The weather is more settled now as indicated by the surface of the bay. There is nil chance of showers from this cloud. It is only a shallow layer of cloud and holds insufficient water droplets to fall as rain or drizzle. What may appear to be light showers is only shadows of the cloud in the atmosphere beneath the cloud. More crepuscular rays of sunlight to enhance the effect.



The 'Morning Glory' roll cloud crosses the coast at The Gulf of Carpentaria. We will never see a roll cloud here in Port Fairy mainly due to our topography and different weather systems compared to the tropics.

(Photo courtesy of the Bureau of Meteorology)

CUMULUS

Cumulus are low, detached, puffy clouds that develop vertically in rising mounds, domes or towers and have generally flat bases. Their upper parts often resemble cauliflowers and they appear brilliant white when reflecting high sunlight, however, can look dark when the sun is behind them. Cumulus tend to be randomly scattered across the sky and can form at any time throughout the year.

Precipitation: Showers of rain, hail or snow. You will get wet if under a passing shower!

Cumulus clouds are the clouds that bring Port Fairy its rain showers and hail showers throughout the year, generally after a front has passed.



Cumulus north of Bourke in northern New South Wales. With such vertical development, these clouds are indicating instability and something is brewing. Port Fairy encounters clouds similar to this throughout the year.

Did You Know (A)?

Water is the only substance to occur naturally in the atmosphere as a solid, liquid and gas, and the energy absorbed or released during its changes from one state to another, not only plays an important part in our local weather, but also in the general circulation of the atmosphere.

Did You Know (B)?

There are approximately 7 million cloud droplets required to fill a teaspoon.



Cumulus mediocris (of moderate vertical development) over Victoria's western plains during summer. Fair-weather cumulus.



Cumulus congestus (maximum vertical development) north of Bourke in northern New South Wales. This cloud event later passed directly over Bourke and brought very heavy rain and completely covered the ground in pea-sized hail. This photo was taken in May 2018 and it was the first major storm/rain event in more than three years for Bourke.

This is not a mature thunderstorm as an anvil top has not yet formed.

This stage of the cell was the final link to becoming a thunderstorm.

We experience similar events here in Port Fairy.

CUMULONIMBUS

Cumulonimbus is the biggest and when it comes to extreme and destructive weather, you can be sure it will be in the thick of the action. That action includes torrential downpours, hail storms, snowstorms, lightning, gales, tornadoes and hurricanes. With often devastating effect, they can be a threat to life and damage to property.

Although sometimes reaching as high as 60,000 feet (18.5 km), Cumulonimbus are still classified as a low cloud, as their base is below 6,500 feet (2,000 m). Cumulonimbus are power houses in the sky and the energy they create and contain, can exceed up to ten atomic bombs. These days you will hear the term 'supercell' when it comes to this level of destructive storm.

I shall limit the amount of information here as I am intending to present a written feature on thunderstorms. Here are a couple of photos in the meantime.



Cumulonimbus in its maturing stage of development.

(Photo courtesy of the Bureau of Meteorology)



Here is your typical Cumulonimbus as seen from Port Fairy one summer afternoon. This cloud is full of water and energy, and what is going on inside the cloud is violent.

NIMBOSTRATUS

The Latin for rain cloud is 'nimbus'. The word is used in the name Nimbostratus because the cloud is, by definition, rain-bearing. It is also dark, thick, and ragged in appearance.

Nimbostratus are thick, grey, featureless layers of cloud that cause prolonged, continuous, often heavy rain or snow. They are the deepest of all the layer clouds extending from 2,000 feet to 18,000 feet (600 m to 5,500 m) and may cover many thousands of square miles or kilometres.

You will get wet from precipitation falling from these clouds and you will stay wet as the rain can fall for hours, and at times, more than a day. They bring good rainfall to areas they impact. Port Fairy will be impacted by these events a few of times a year due to our latitude. Good, steady rain that people on the land enjoy, particularly if it occurs when agriculture relies on it.

Nimbostratus is generally a sign of widespread ascent of a moist air mass. Once the Nimbostratus have passed, we can usually expect a change in the weather, being a cool change.

Did you know?

The atmosphere contains only about one part in ten thousand of all global water. Atmospheric moisture is recycled, that is, it is rained out and replaced on average every ten days. At this rate, the total water content of the oceans would take over one million years to pass through the atmosphere.



Nimbostratus approaching from the southwest prior to a change about to reach Victoria. This scene is viewed from the fire tower at Mt Rouse in February 2018. Definitely rain-bearing!

Summary

The clouds we see, whether from Port Fairy or London is the incredible work of our atmosphere transporting water in its varying states from one area to another. Be astounded that due to its nature, we are able to witness amazing sights as it displays form and function, vital to our survival.

The low clouds are just as important as the middle and high clouds and reflect what is occurring above us at any point in time.

Clouds

*Clouds may come and clouds may go
Without them, bears no rain nor snow!
Between them brings sun's golden rays
With sights of splendour through the day.
The sunset's glow 'neath crimson cloud
Will surely taunt a wonderous crowd.*

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Special feature coming soon to U3A Port Fairy:

