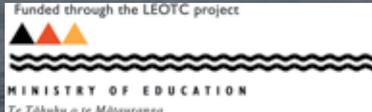


# Droplets

## The Kiwi Kids Cloud Identification Guide



Written by Paula McKean



# Droplets

## The Kiwi Kids Cloud Identification Guide

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# Cloud Classification

Since Luke Howard developed the first cloud classification system in 1802, clouds have been classified according to the altitude of the cloud base and the shape of the cloud.

There are three main categories:

Low level- Clouds that form below 2000 m:

Cumulus, Stratocumulus, Stratus (including Fog, Haze and Mist), Nimbostratus and Cumulonimbus.

Mid level - Clouds that form between 2000 m and 7000 m:

Alto cumulus and Altostratus.

High level - Clouds that form above 5000 m:

Cirrus, Cirrocumulus, Cirrostratus and Contrails.

In this guide cloud types have been organised by their characteristics so it is easier to distinguish between clouds that appear to be similar and to help determine the cloud type when the altitude can't be determined. Clouds have been grouped into four categories:

- Cumulus (heaped, puffy appearing clouds).
- Stratus (flat clouds that extend over large sections of sky).
- Precipitating (clouds that can produce rain, hail or snow).
- Cirrus (wispy high altitude clouds).

By using a combination of the altitude system and characteristic based system used in this guide, cloud identification will be easier and more accurate.

## Happy cloud spotting.

# How Clouds are formed ...

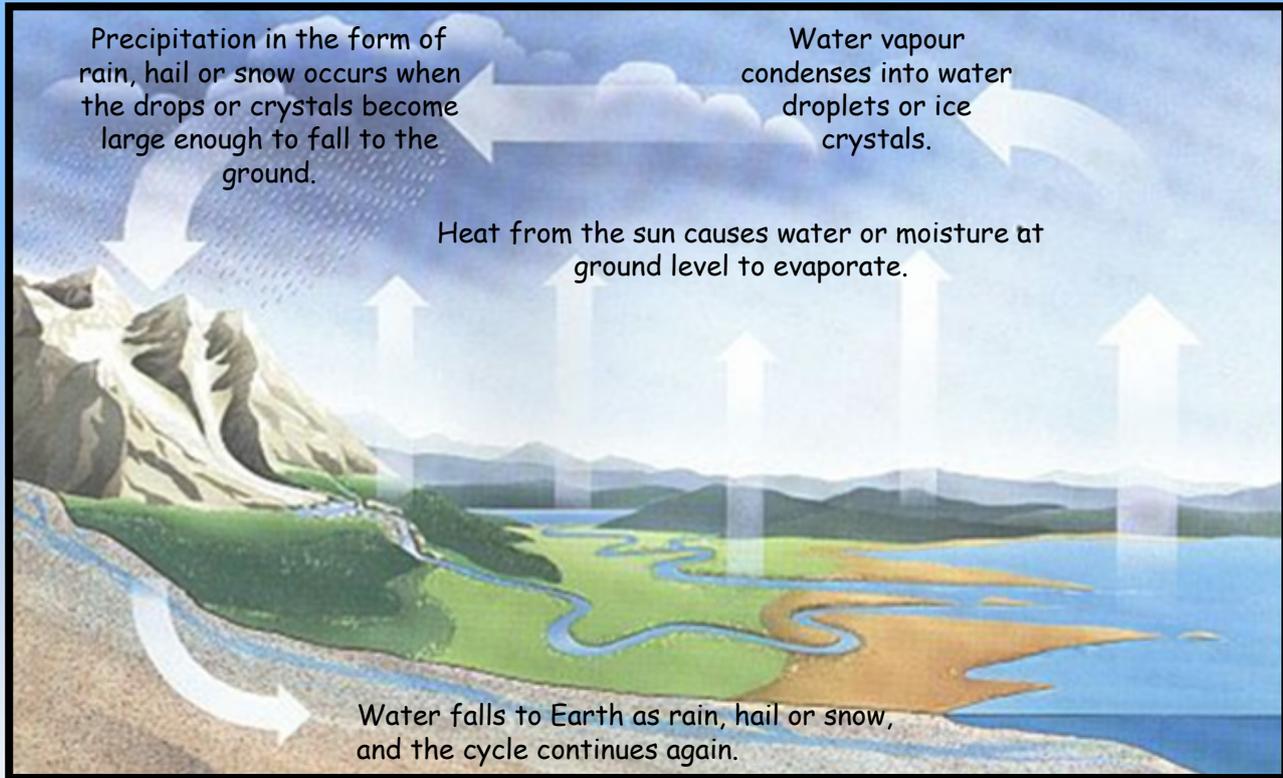
Clouds are an important part of the water cycle.

The heat from the sun evaporates water or moisture at ground level. The evaporated water, called water vapour, rises into the atmosphere. The water vapour will continue to rise, cooling as it goes, until it reaches a point in the atmosphere where the temperature is low enough for condensation (this is called dew point). The water vapour condenses around particulates in the atmosphere and turns into water droplets, or at high altitudes, ice crystals. These tiny droplets may become larger as two drops collide; a large collection of droplets forms a visible cloud.

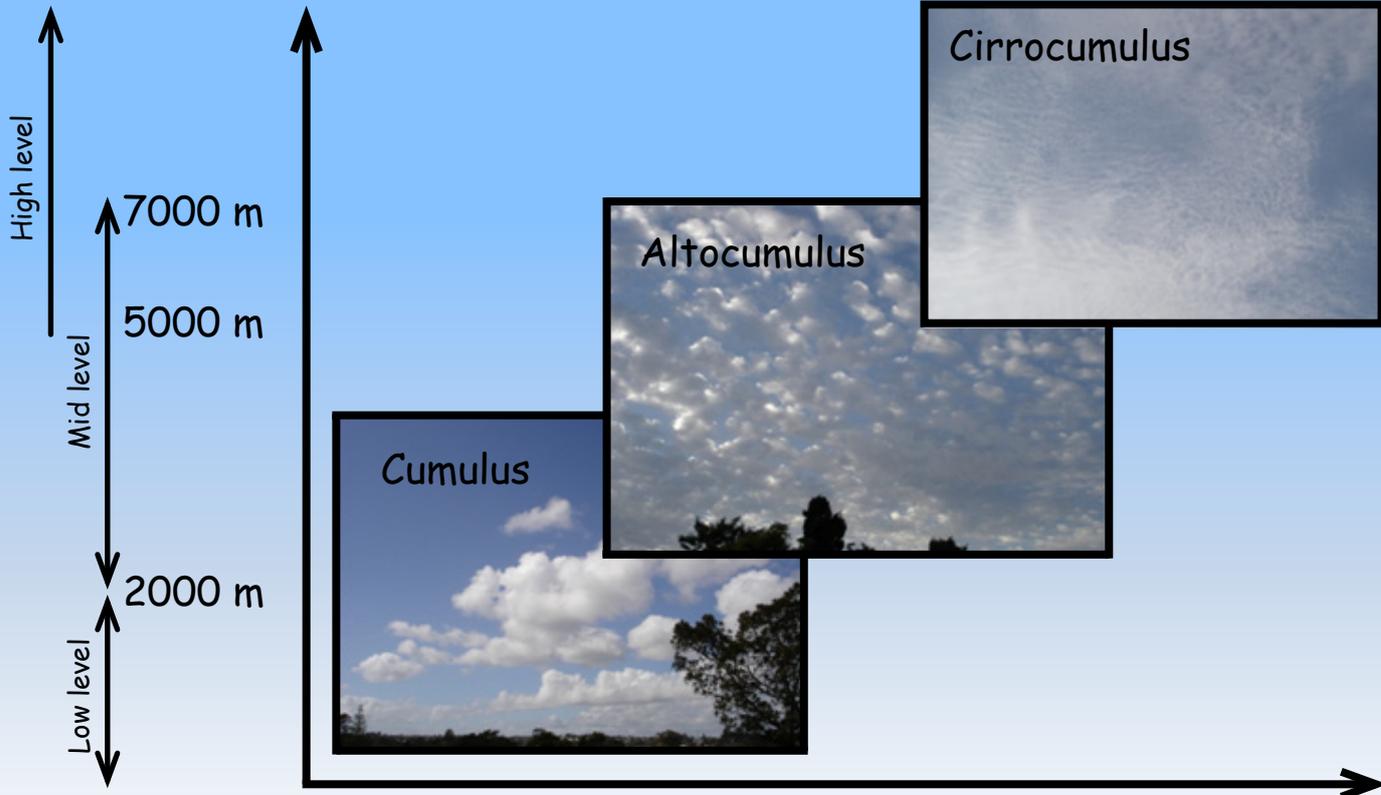
Precipitation in the form of rain, hail or snow occurs when the droplets or crystals become large enough to fall to the ground.

Water falls to Earth as rain, hail or snow, and the cycle continues again.

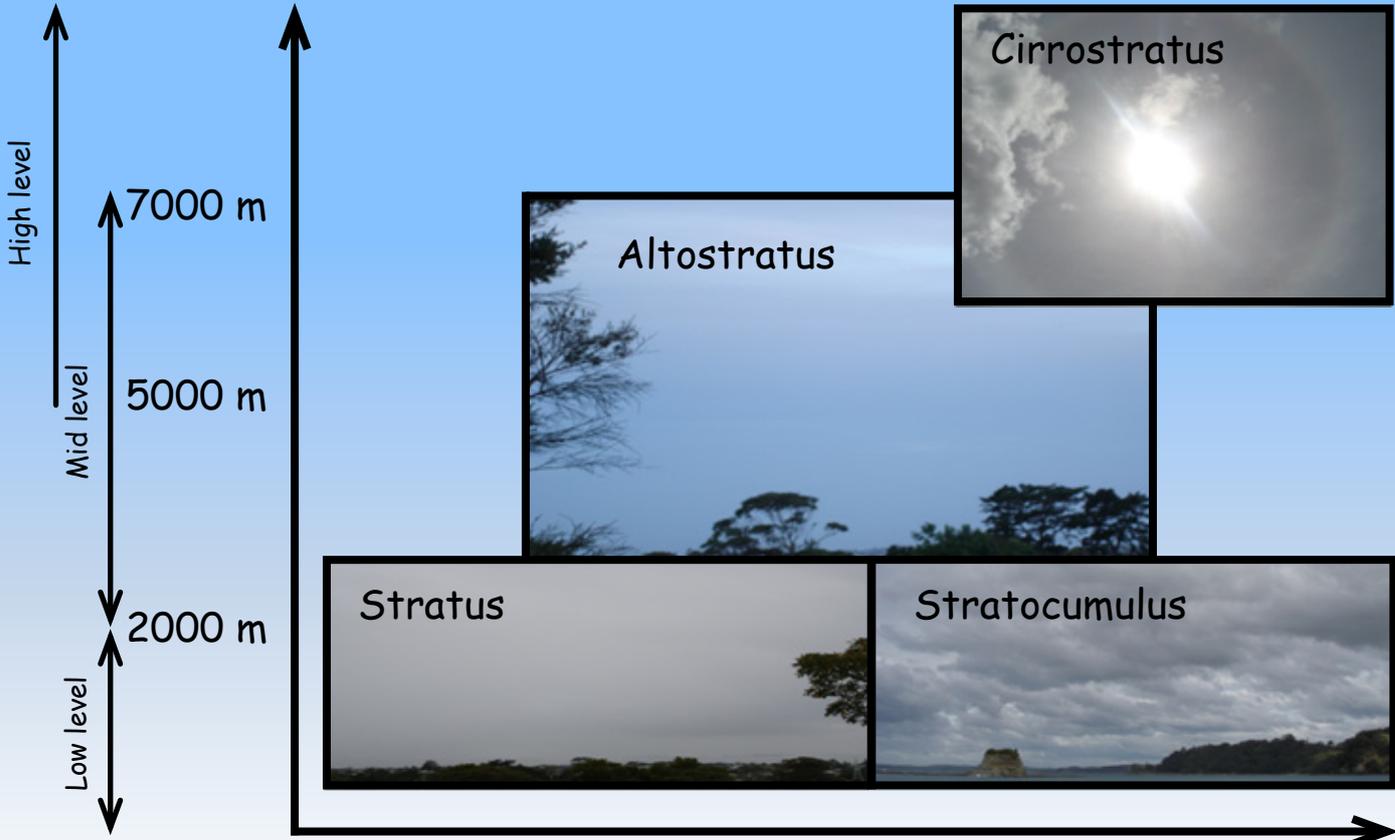
# The Water Cycle



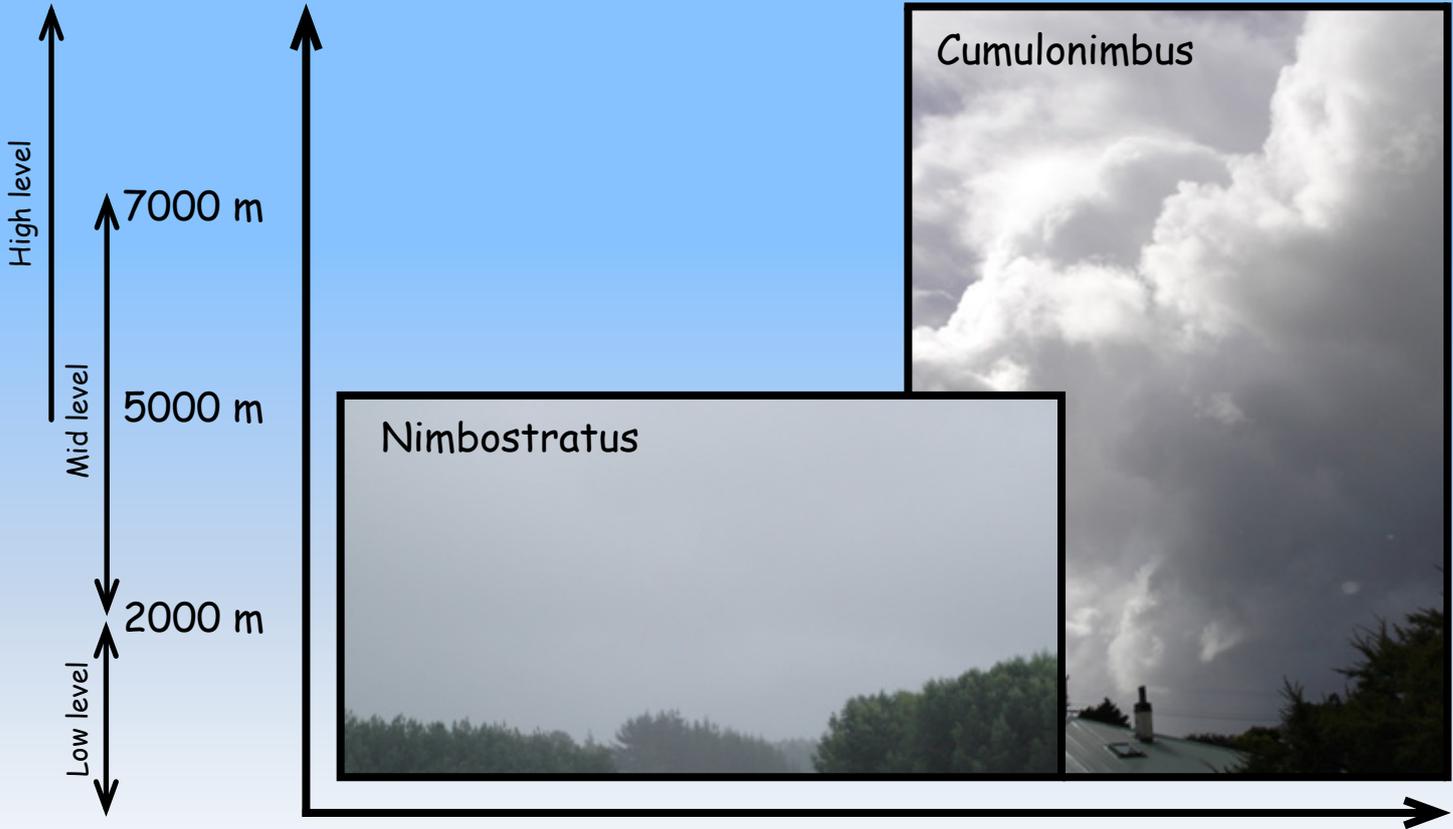
# Cumulus Altitudes



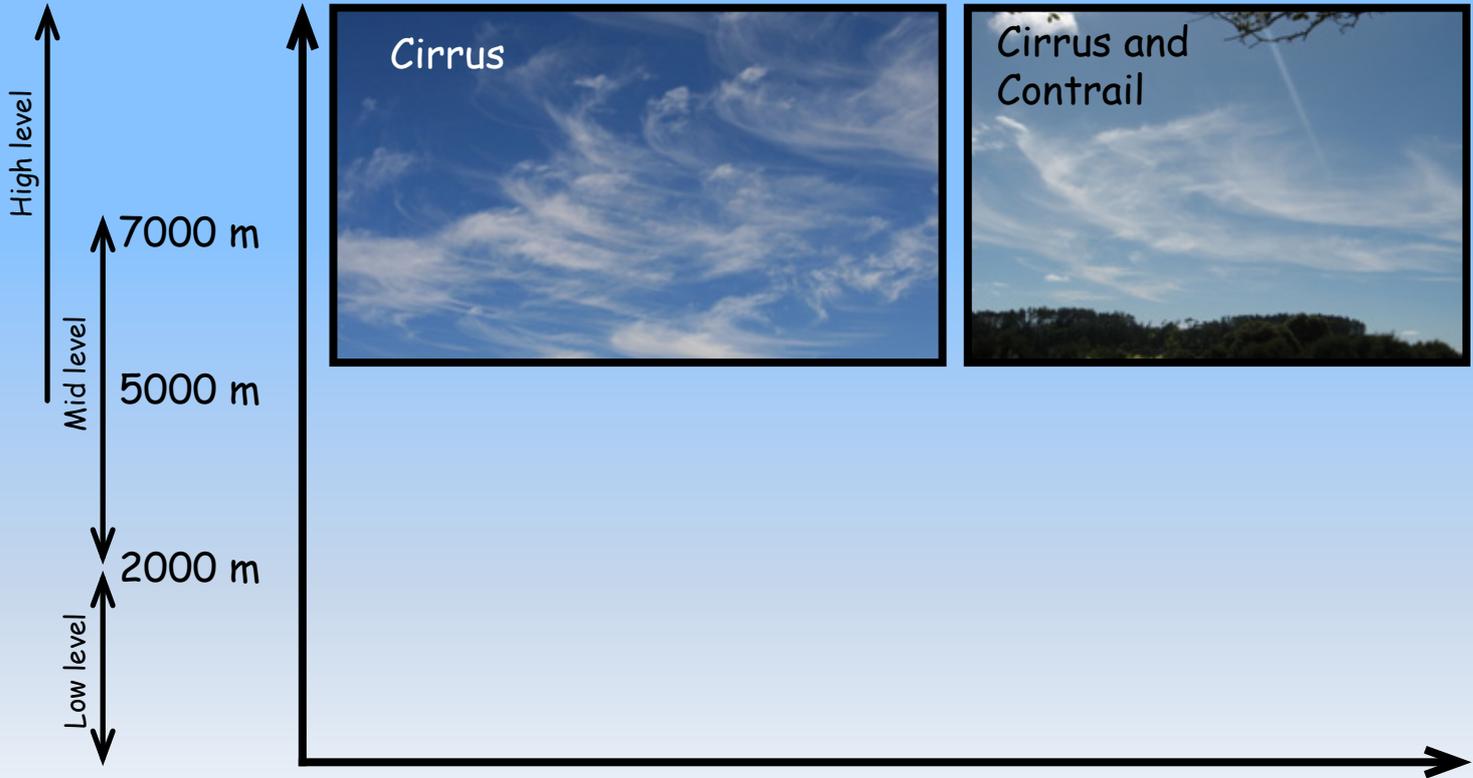
# Stratus Altitudes



# Precipitating Cloud Altitudes



# Cirrus Cloud Altitudes



# Cumulus Clouds

Te Kapua Whakapipi

## Cumulus Checklist:

- Is it a sunny day?
- Is the cloud low in the sky?
- Does it look like a big puffy cotton ball?
- Is it mostly white with a greyish bottom?
- When you hold up your hand at arm's length are the puffs about the size of your fist?

## Double Check:

- Is the spacing between clouds irregular?  
(Regular spacing could mean it is an *Alto*cumulus or *Cirro*cumulus.)
- Is the outline of the top of the clouds defined?  
(If not it is likely to be a *Cumulonimbus*.)
- Are the clouds detached?  
(If they are spread out and attached they are likely to be *Strato*cumulus.)



# Cumulus Facts

Latin:

Heap or pile.

Altitude Range:

Below 2000 m.

Composition:

Water droplets.

Formation:

Cumulus clouds are formed by thermal air currents. Cumulus clouds are constantly changing in shape and size. They will either keep growing or start evaporating.

Associated Weather:

Fine.

Did you know:

Glider pilots use Cumulus clouds to spot areas where they can get lift.  
You will never see a Cumulus cloud in Antarctica



# AltoCumulus

Te Kapua Whakapipi o Runga

## AltoCumulus Checklist:

- Do they look like small Cumulus clouds?
- Are they grouped or clustered together?
- Do they look like a flock of sheep or lots of cotton balls?
- When you hold up your hand at arm's length are the puffs about the size of your thumb?

## Double Check:

- What colour are the clouds?  
(If they are brilliant white and about the size of your fingernail when you hold your hand at arm's length then they are likely to be Cirrocumulus clouds.)
- Is it smooth or lens shaped?  
(Lenticularis clouds or wave clouds are types of altocumulus clouds.)



# AltoCumulus Facts



Latin:

Alto - High,  
Cumulus - Heap.

Altitude Range:

Between 2000 m and 7000 m.

Composition:

Mostly water droplets and some ice crystals.

Formation:

AltoCumulus clouds are formed in areas where the air is made unstable by rising currents.

Associated Weather:

AltoCumulus clouds can signal that wet weather is on the way. Alternatively, they may break up resulting in sunny periods.

Did you know:

Lenticularis or 'wave' clouds are AltoCumulus clouds and at times have been mistaken for flying saucers!

# Cirrocumulus

Te Kapua Whakapipi Pūrehurehu

## Cirrocumulus Checklist:

- Are the clouds white?
- Are they high in the sky?
- Do they have a ripple pattern, or are there lots of little puffs clustered together?
- When you hold your hand up at arm's length are the puffs about the size of your fingernail?

## Double Check:

- Do they have any shading?  
(If you see any shading then they are likely to be Altocumulus clouds.)



# Cirrocumulus Facts



Latin:

Cumulus - Heap.

Altitude Range:

Above 5000 m.

Composition:

Ice crystals.

Formation:

Cirrocumulus clouds are formed in areas where the air is unstable and fluctuates up and down. When the air fluctuates down the ice crystals in the clouds turn back into water vapour causing the spaces between the clouds.

Associated Weather:

Cirrocumulus clouds tend to form on fair but cold days. Combined with Cirrus clouds, they can be an indicator that bad weather is on the way.

Did you know:

Cirrocumulus cloud formations are often referred to as a "mackerel sky" because their patterns are similar in appearance to those on a mackerel fish.

# Stratus

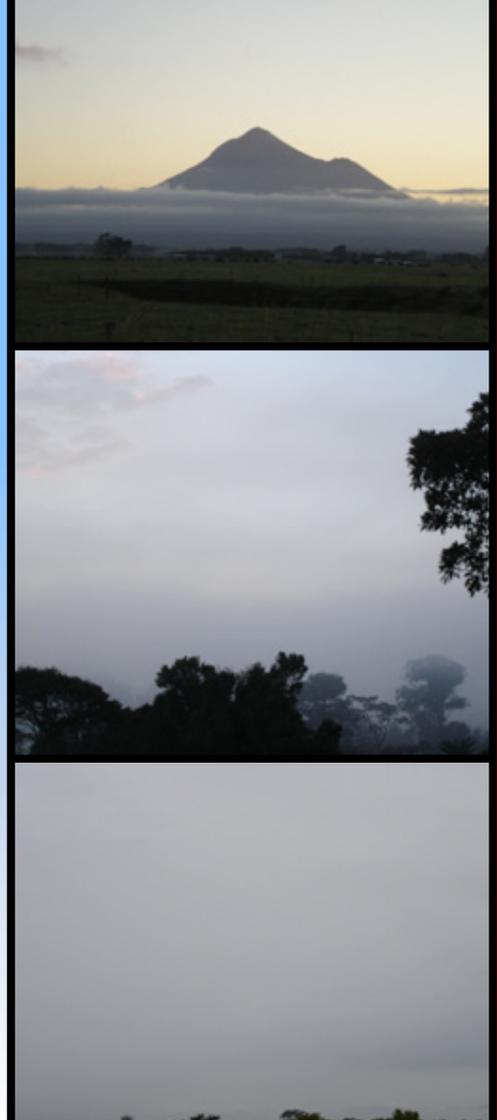
Te Kupenga a Tara-mai-nuku

## Stratus Checklist:

- Is the cloud greyish in colour?
- Is it low in the sky?
- Is it like a blanket covering the sky?
- Is the cloud featureless and uniform in appearance?

## Double Check:

- What does the base of the cloud look like?  
(If it has a puffy or textured bottom it could be Stratocumulus.)
- Is it Fog, Mist or a Haze?  
(These are types of Stratus clouds.)
- Is it drizzling?  
(Sometimes Stratus clouds can produce drizzle.)



# Stratus Facts



Latin:	Layer.
Altitude Range:	Anywhere between ground level and 2000 m.
Composition:	Water droplets.
Formation:	These clouds are formed in areas where the air layer is stable.
Associated Weather:	Overcast, sometimes drizzling. Stratus clouds have the potential to turn into the rain-producing Nimbostratus cloud.
Did you know:	Mist and Fog are also examples of Stratus cloud. In Fog visibility is less than 1 km. Where visibility is between 1 and 2 km in distance then it is a Mist.

# Stratocumulus

Te Kupenga a Tara-mai-nuku whakapipi

## Stratocumulus Checklist:

- Are the clouds grey and puffy?
- Are they low in the sky?
- Do they look like soft cotton candy or pillow stuffing?
- Do they cover most of the sky?
- When you hold up your hand at arm's length are the puffs about the size of your fist?

## Double Check:

- Are the clouds attached or close together?  
(If they are separate from one another then they will be Cumulus.)
- Is the base of the cloud puffy and varied in shading?  
(If the cloud is more uniform in appearance then it is likely to be Stratus.)



# Stratocumulus Facts

Latin:

Stratus - Layer,  
Cumulus - Heap or pile.

Altitude Range:

Below 2000 m.

Composition:

Water droplets.

Formation:

These clouds are formed either through the spreading and joining together of Cumulus clouds, or by the breaking up of Stratus clouds.

Associated Weather:

It is either becoming overcast or the weather is clearing.



# Altostratus

Te Kupenga a Tara-mai-nuku o Runga

## Altostratus Checklist:

- Are the clouds grey or blue-grey in colour?
- Are they in the mid level of the sky?
- Do they look smooth?
- Do they cover most of the sky?
- Has rain been forecast?

## Double Check:

- Can you see your shadow?  
(Altostratus clouds are too thick for a shadow to be cast. You will see your shadow if it is a layer of Cirrostratus.)
- Can you see a corona - a white or coloured disc of light around the sun?  
(If you see a halo around the sun, then it is likely to be Cirrostratus.)



# Altostratus Facts



Latin:

Alto - High,  
Stratus - Layer.

Altitude Range:

Between 2000 m - 7000 m.

Composition:

A mix of ice crystals and water droplets.

Formation:

These clouds are generally formed from the lowering and thickening of Cirrostratus clouds.

Associated Weather:

If the clouds continue to drop, Altostratus clouds can become the rain-producing Nimbostratus cloud.

# Cirrostratus

Te Kupenga Pūrehurehu a Tara-mai-nuku

## Cirrostratus Checklist:

- Are the clouds mostly transparent and / or milky in colour?
- Are they high in the sky?
- Are they like a veil covering parts of the sky?
- Can you see the sun through them?
- Can you see your shadow?

## Double Check:

- Can you see a halo?  
(If you see a corona then it is likely to be an Altostratus cloud.)
- What colour is the sky?  
(Cirrostratus can be so transparent that it is easily missed. If the sky isn't bright blue then it may in fact be overcast because of a thin layer of Cirrostratus cloud!)



# Cirrostratus Facts



Latin:

Stratus - Layer.

Altitude Range:

Above 5000 m.

Composition:

Ice crystals.

Formation:

Cirrostratus clouds are usually formed from the spreading and joining of cirrus clouds. Cirrostratus clouds will form in areas where air currents are stable.

Associated Weather:

Expect rain within the next 24 hours.

Did you know:

One way of telling the difference between a Cirrostratus and a Altostratus cloud is by looking for your shadow on the ground. If you can see your shadow, then the cloud above will be a Cirrostratus.

# Nimbostratus

Te Kupenga a Tara-mai-nuku Okewa

## Nimbostratus Checklist:

- Are the clouds dark grey?
- Are they either low or in the middle of the sky?
- Do they cover most of the sky?
- Is it difficult to see the base of the clouds?
- Is it raining steadily?

## Double Check:

- Can you see the sun?  
(Nimbostratus clouds are so thick that they block out the sun.)
- Is it showery?  
(Cumulus Congestus and Cumulonimbus are shower clouds.)
- Has there been thunder, lightning or hail?  
(These phenomena are only experienced with Cumulonimbus clouds.)



# Nimbostratus Facts

Latin:

Nimbus - Rain.

Stratus - Layer.

Altitude Range:

Anywhere below 6000 m.

Composition:

Water droplets.

Formation:

Nimbostratus clouds form in areas of stable air, and often originate from Altostratus or Stratus clouds.

Associated Weather:

Nimbostratus clouds bring prolonged and continuous rain or snow.

Did you know:

Nimbostratus clouds do not produce rainbows, hail, thunder or lightning.



# Cumulus Congestus

Te Kapua Whakapipi Okewa

## Cumulus Congestus Checklist:

- Is it a giant Cumulus cloud?
- Does it appear to be taller than it is wide?
- Is it showery?
- Does it still have a sharp outline at the top?

## Double Check:

- Can you see a rainbow?  
(Rainbows do not appear with Nimbostratus clouds.)
- Is it raining steadily?  
(Steady rain would indicate that the cloud is in fact a Nimbostratus.)
- Has there been thunder, lightning or hail?  
(These phenomena are only experienced with Cumulonimbus clouds.)



# Cumulus Congestus Facts



Latin:

Heap or pile.

Altitude Range:

Below 2000 m.

Composition:

Water droplets.

Formation:

Cumulus Congestus are a type of Cumulus cloud so are formed by rising thermal air currents. Conditions have allowed the cloud to continue to grow upwards.

Associated Weather:

Showers.

Did you know:

Cumulus Congestus clouds can continue to grow and develop into Cumulonimbus clouds.

# Cumulonimbus

He Kapua Whakapipi Okewa

## Cumulonimbus Checklist:

- Does the cloud have a dark base?
- Does it tower in the sky?
- Is it raining?
- Has there been a sudden shower, hail, thunder or lightning?

## Double Check:

- Can you see a rainbow?  
(Nimbostratus clouds do not produce rainbows.)
- Is it raining steadily?  
(Steady rain would indicate that the cloud is a Nimbostratus.)
- Is the outline of the top of the cloud defined?  
(If the edges are defined then it is likely to be a Cumulus Congestus cloud.)



# Cumulonimbus Facts

Latin:

Cumulus - Heap or pile.

Nimbus - Rain.

Altitude Range:

Can cover the entire altitude range and can tower up to 18 000 m.

Composition:

Water droplets and ice crystals.

Formation:

Cumulonimbus clouds form from Cumulus that have continued to grow vertically. In the upper regions of the cloud water droplets turn into ice crystals which make the edges of the cloud appear less defined.

Associated Weather:

Sudden and / or heavy showers, thunder, lightning and hail. These clouds can also produce tornadoes.

# Cirrus

Te Pūrehurehu

## Cirrus Checklist:

- Are the clouds bright white?
- Are they high in the sky?
- Do they appear wispy or like horse tails floating in the sky?

## Double Check:

- Do the wisps or streaks appear to be separate from one another?  
(If the cloud has a more veil-like appearance then it is likely to be Cirrostratus.)



# Cirrus Facts



Latin:

Cirrus - Curl of hair.

Altitude Range:

Form above 5000 m.

Composition:

Ice crystals.

Formation:

Cirrus clouds are made up of falling ice crystals. These falling ice crystals are whipped back up by the winds below giving a wispy effect.

Associated Weather:

Cirrus clouds generally indicate fair weather but are also the first sign of a warm front approaching, meaning a change in the weather.

Did you know:

Cirrus clouds are the fastest moving clouds. The precipitation from a Cirrus cloud evaporates before reaching the Earth. Contrails are man-made Cirrus clouds.

# Contrails

Short Lived:



## Contrails Checklist:

- Is the cloud bright white?
- Is it high in the sky?
- Is it in a straight line?
- Can you see, or have you seen a plane?
- Is it a nice day?

Persistent  
Non-spreading:



## Double Check:

There are three further classifications of Contrails:

*Short Lived, Persistent Non-spreading, or Persistent Spreading.*

- Short Lived Contrails do not stay in the sky very long.
- Persistent Non-spreading Contrails stay in the sky for a long time.
- Persistent Spreading Contrails also stay in the sky a long time, but will widen after the plane has passed. Any Contrail wider than your index finger when held at arm's length is likely to be Persistent spreading.

Persistent  
Spreading:



# Contrail Facts

Altitude Range:

Form above 8000 m.

Composition:

Ice crystals.

Formation:

Contrails are formed when particles from aircraft jet engines mix with the water vapour in the air. The water vapour condenses and freezes around the particles causing long white trails across the sky. For Contrails to form there needs to be a lot of moisture in the air at the altitude the plane is flying.

Associated Weather:

Contrails indicate the level of humidity at high altitudes.

Did you know:

A Contrail is a man-made Cirrus cloud. Persistent Contrails can remain in the sky long after the aircraft has gone.

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- Page 30: All Contrail photos are provided courtesy of NASA.
- The remaining photographs used in this resource were taken by Paula McKean

Water cycle diagram (Page 3), sourced from EMAP Newsletter September 2009.

