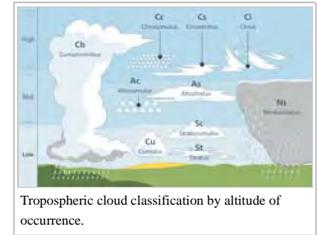


## List of cloud types

From Wikipedia, the free encyclopedia

- *High*: Cirrus, cirrocumulus, cirrostratus.
- *Middle*: Alto cumulus, altostratus.
- *Vertical*: Cumulonimbus, cumulus, nimbostratus.
- *Low*: Stratocumulus, small Cu, stratus.

The **list of cloud types** is a summarisation of the modern systems of cloud classification used in the troposphere, stratosphere, and mesosphere. The ten basic genus-types in the troposphere have Latin names derived from five physical *forms*. These are, in approximate ascending order of instability or convective activity, *stratiform* sheets, *cirriform* wisps and patches, *stratocumuliform* patches, rolls, and ripples, *cumuliform* heaps and tufts, and *cumulonimbiform* towers that often have complex structure. The forms are cross-classified by altitude range or *étage* into *high-level*, *middle*, *low*, and *multi-level*. Some of the resultant genus types are common to more than one form or more than one level, as illustrated in the stratocumuliform and cumuliform columns of the classification table below. Most genera are divided into *species*, some of which are common to more than one genus. Most genera and species can be subdivided into *varieties*, also with Latin names, some of which are common to more than one genus or species. The essentials of the modern nomenclature system for tropospheric clouds were proposed by Luke Howard, a British manufacturing chemist and an amateur meteorologist with broad interests in science, in an 1802 presentation to the Askesian Society. Since 1890, clouds have been classified and illustrated in cloud atlases. Mesospheric and stratospheric clouds have their own classifications with common names for the major types and alpha-numeric nomenclature for the subtypes.



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### Cloud classification: Order of listed types

In section two of this page (Classification of major types), height ranges are sorted in approximate descending order of altitude expressed in general terms. Within the troposphere, forms and genus types (including some genus sub-types) are shown from left to right in approximate ascending order of instability.

In sections three to five, terrestrial clouds are listed in descending order of the altitude range of each atmospheric layer in which clouds can form:

- mesospheric layer;
- stratospheric layer;
- tropospheric layer.
  - Within the troposphere, the levels or *étages* are listed in descending order of altitude range.
    - Non-vertical genus types (including some genus sub-types) are sorted into approximate descending order of altitude of the cloud bases.
    - Vertical or multi-*étage* genera and genus sub-types can be based in the low or middle *étages* and are therefore placed between the non-vertical low and mid-level genus types and sub-types. These thick clouds are listed in approximate descending order of altitude of the cloud tops.
      - The species associated with each genus type are listed in approximate ascending order of instability where applicable.
      - The constituent varieties and associated supplementary features and mother clouds for each genus or species are arranged in approximate order of frequency of occurrence.
      - A count of basic tropospheric variants that result from the division and subdivision of genus types into species and varieties is shown as a number in parentheses from V-1 (variant 1) through V-88 after each variety, after nimbostratus that has no sub-types, and after certain species that are not always dividable into varieties.

In section six, the cloud types in the general lists and the mother clouds in the applicable classification table are sorted in alphabetical order. The species table shows these types sorted from left to right in approximate ascending order of the convective instability of each species. The table for supplementary features has them arranged in approximate descending order of frequency of occurrence.

In section seven, extraterrestrial clouds can be found in the atmospheres of other planets in our solar system and beyond. The planets with clouds are listed (not numbered) in order of their distance from the sun, and the clouds on each planet are in approximate descending order of altitude.

### Classification of major types

Level/Form	(1) Stratiform	(2) Cirriform	(3) Stratocumuliform	(4) Cumuliform	(5) Cumulonimbiform
Extreme level		Noctilucent			
Very high level		Nacreous			
High-level	Cirrostratus	Cirrus	Layered Cirrocumulus	Tufted Cirrocumulus	
Mid-level	Altostratus		Layered Altocumulus	Tufted Altocumulus	
Towering vertical				Towering Cumulus	Cumulonimbus
Vertical/multi-level	Nimbostratus			Moderate Cumulus	
Low-level	Stratus		Stratocumulus	Small Cumulus	

### Polar mesospheric classification

Clouds that form above the mesosphere have a generally cirriform structure, but are not given Latin names based on that characteristic. Polar mesospheric clouds are the highest in the atmosphere and are given the Latin name noctilucent which refers to their illumination during deep twilight. They are sub-classified alpha-numerically according to specific details of their cirriform physical structure.

## Extremely high cirriform

Noctilucent clouds are thin, mostly cirriform-looking clouds, based from about 264,000 to 280,000 feet (80–85 km) and occasionally seen in deep twilight after sunset and before sunrise.<sup>[1][2]</sup>

### Type 1

Very tenuous; resembles cirrus.

### Type 2

Bands. Long streaks, often in parallel groups or interwoven at small angles.

#### Subtypes

##### 2A

Streaks with diffuse, blurred edges.

##### 2B

Streaks with sharply defined edges.

### Type 3

Billows. Clearly spaced, roughly parallel short streaks.

#### Subtypes

##### 3A

Short, straight, narrow streaks.

##### 3B

Wave-like structures with undulations.

### Type 4

Whirls. Partial (or, more rarely, complete) rings with dark centers.

#### Subtypes

##### 4A

Whirls possessing a small angular radius of curvature, sometimes resembling light ripples on a water surface.

##### 4B

Simple curve of medium angular radius with one or more bands.

##### 4C

Whirls with large-scale ring structures.



Noctilucent cloud over Estonia

## Polar stratospheric classification

Polar stratospheric clouds form at very high altitudes in polar regions of the stratosphere. Those that show mother-of-pearl colors are given the name *nacreous*.<sup>[3]</sup> Both these and non-nacreous types are classified alpha-numerically according to their physical state and chemical makeup.

### Very high cirriform

#### Nacreous (mother of pearl) and non-nacreous

A thin usually cirriform-looking cloud based from about 60,000 to 100,000 feet (18–30 km) and seen most often between sunset and sunrise.<sup>[3]</sup>

#### Type 1 (non-nacreous)

Contains supercooled nitric acid and water droplets.

##### Subtypes

##### 1A

Crystals of nitric acid and water.

##### 1B

Additionally contains supercooled sulfuric acid in ternary solution.

#### Type 2 (nacreous)

Consists of ice crystals only.

Columnar clouds – rare, column-shaped.



Stratospheric nacreous clouds over Antarctica

## Tropospheric classification

Tropospheric clouds are divided into physical forms defined by structure, and étages defined by altitude range. These divisions are cross-classified to produce ten basic genus-types. They have Latin names as authorized by the World Meteorological Organization (WMO) that indicate physical structure, altitude or étage, and process of formation

### High étage cirriform, stratocumuliform, cumuliform, and stratiform

High clouds form in the highest and coldest region of the troposphere from about 16,500 to 40,000 ft (5 to 12 km) in temperate latitudes.<sup>[4][5]</sup> At this altitude water almost always freezes so high clouds are generally composed of ice crystals or supercooled water droplets.

#### Genus cirrus

Abbreviation: Ci

Cirriform clouds tend to be wispy and are mostly transparent or translucent. Isolated cirrus do not bring rain; however, large amounts of cirrus can indicate an approaching storm system eventually followed by fair weather.

There are several variations of clouds of the cirrus genus based on species and varieties:

#### Species

- Cirrus fibratus (V-1)  
High clouds having the traditional "mare's tail" appearance. These clouds are long, fibrous, and curved, with no tufts or curls at the ends.
- Cirrus uncinus (V-2)  
Filaments with up-turned hooks or curls.
- Cirrus spissatus (V-3)  
Dense and opaque or mostly opaque patches.
- Cirrus castellanus (V-4)  
A series of dense lumps, or "towers", connected by a thinner base.
- Cirrus floccus (V-5)  
Elements which take on a rounded appearance on the top, with the lower part appearing ragged.<sup>[6]</sup>

#### Opacity-based varieties

- None; always translucent except species spissatus which is inherently opaque.<sup>[7]</sup>

#### Fibratus pattern-based varieties

- Cirrus fibratus intortus (V-6)  
Irregularly curved or tangled filaments.
- Cirrus fibratus vertebratus (V-7)  
Elements arranged in the manner of a vertebrate or fish skeleton.



Cirrus uncinus clouds (2)



Cirrus spissatus (3) clouds

**Pattern-based variety radiatus**

Large horizontal bands that appear to converge at the horizon; normally associated with fibratus and uncinus species.

- Cirrus fibratus radiatus (V-8)
- Cirrus uncinus radiatus (V-9)

**Pattern-based variety duplicatus**

Sheets at different layers of the upper troposphere, which may be connected at one or more points; normally associated with fibratus and uncinus species.

- Cirrus fibratus duplicatus (V-10)
- Cirrus uncinus duplicatus (V-11)

- *Varieties are not commonly associated with Ci species spissatus, castellanus, or floccus.*<sup>[6][7]</sup>

**Precipitation-based supplementary features**

- Not associated with cirrus.

**Cloud-based supplementary feature**

- Mamma
  - Bubble-like downward protuberances; mostly seen with species castellanus.<sup>[8]</sup>

**Genitus mother clouds**

- Cirrus cirrocumulogenitus
- Cirrus altocumulogenitus
- Cirrus cumulonimbogenitus

**Mutatus mother cloud**

- Cirrus cirrostratmutatus

**Genus cirrocumulus**

Abbreviation: Cc.<sup>[4]</sup>

High stratocumuliform and cumuliform clouds of the genus cirrocumulus form when moist air at high tropospheric altitude reaches saturation, creating ice crystals or supercooled water droplets. Limited convective instability at the cloud level gives the cloud a rolled or rippled appearance. Despite the lack of a *strato-* prefix, layered cirrocumulus is physically a high stratocumuliform genus. However, tufted cirrocumulus with its detached heaps fall more within the cumuliform category.<sup>[9]</sup>

**High stratocumuliform species**

- Cirrocumulus stratiformis<sup>[10]</sup> (V-12)
  - Sheets or relatively flat patches of cirrocumulus.
- Cirrocumulus lenticularis<sup>[10]</sup> (V-13)
  - Lenticular, or lens-shaped high cloud.
- Cirrocumulus castellanus<sup>[10]</sup> (V-14)
  - Cirrocumulus layer with "towers", or turrets joined at the bases.

**Opacity-based varieties**

- None (always translucent)

**Stratocumuliform pattern-based variety undulatus**

Cirrocumulus with an undulating base; normally associated with stratiformis and lenticularis species.

- Cirrocumulus stratiformis undulatus (V-15)
- Cirrocumulus lenticularis undulatus<sup>[7]</sup> (V-16)

**Pattern-based variety lacunosus**

Cirrocumulus with large clear holes; normally associated with stratiformis and castellanus species (also with cumuliform floccus species).

**Stratocumuliform lacunosus**

- Cirrocumulus stratiformis lacunosus (V-17)
- Cirrocumulus castellanus lacunosus (V-18)

**High cumuliform species**

- Cirrocumulus floccus<sup>[10]</sup> (V-19)
  - Very small white heaps with ragged bases and rounded tops.<sup>[6]</sup>

**Opacity-based varieties**

- None (always translucent)<sup>[7]</sup>

**Cumuliform lacunosus**

- Cirrocumulus floccus lacunosus<sup>[7]</sup> (V-20)

**Precipitation-based supplementary feature**

- Virga
  - Light precipitation that evaporates well above ground level; mostly seen with species stratiformis, castellanus, and floccus.<sup>[8]</sup>

**Cloud-based supplementary feature**

- Mamma
  - Bubble-like downward protuberances; mostly seen with species castellanus.

**Genitus mother clouds**

- None associated with cirrocumulus.

**Mutatus mother clouds**

- Cirrocumulus cirrostratmutatus
- Cirrocumulus cirrostratmutatus
- Cirrocumulus altocumulomutatus

**Genus cirrostratus**

Abbreviation: Cs<sup>[4]</sup>

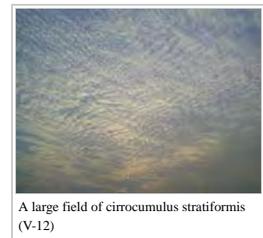
Clouds of the genus cirrostratus consist of mostly continuous, wide sheets of cloud that covers a large area of the sky. It is formed when convectively stable moist air cools to saturation at high altitude, forming ice crystals.<sup>[11]</sup> Frontal cirrostratus is a precursor to rain or snow if it thickens into mid-level altostratus and eventually nimbostratus as the weather front moves closer to the observer.

**Species**

- Cirrostratus fibratus<sup>[10]</sup> (V-21)
  - Cirrostratus sheet with a fibrous appearance, but not as detached as cirrus.
- Cirrostratus nebulosus<sup>[10]</sup> (V-22)
  - Featureless, uniform sheet.<sup>[6]</sup>



Cirrus fibratus radiatus (8)



A large field of cirrocumulus stratiformis (V-12)



Cirrostratus nebulosus (V-22) merging into darker altostratus transluclidus (V-47)

**Opacity-based varieties**

- None (always translucent)<sup>[7]</sup>

**Fibratus pattern-based varieties**

- Cirrostratus fibratus duplicatus<sup>[7]</sup> (V-23)  
Separate or semi-merged sheets with one layer slightly above the other.
- Cirrostratus fibratus undulatus<sup>[7]</sup> (V-24)  
Undulating waves.

Varieties are not commonly associated with *Cs* species *nebulosus*.<sup>[7]</sup>

**Supplementary features/accessory clouds**

- Not associated with cirrostratus.<sup>[8]</sup>

**Genitus mother clouds**

- Cirrostratus cirrocumulogenitus
- Cirrostratus cumulonimbogenitus

**Mutatus mother clouds**

- Cirrostratus cirromutatus
- Cirrostratus cirrocumulomutatus
- Cirrostratus altostratomutatus.

**Middle étage stratocumuliform, cumuliform, and stratiform**

Middle cloud forms from 6,500 to about 23,000 ft (2 to 7 km) in temperate latitudes, and may be composed of water droplets or ice crystals depending on the temperature profile at that altitude range.<sup>[5]</sup>

**Genus altocumulus**

Abbreviation: **Ac**<sup>[4]</sup>

Mid-level stratocumuliform and cumuliform clouds of the genus altocumulus are not always associated with a weather front but can still bring precipitation, usually in the form of virga which does not reach the ground. Layered forms of altocumulus are generally an indicator of limited convective instability, and are therefore mainly stratocumuliform in structure. Tufted altocumulus has a little more instability, and its detached heaps have a distinct cumuliform structure.

**Mid-level stratocumuliform species**

- Altocumulus stratiformis (always dividable into opacity-based varieties)  
Sheets or relatively flat patches of altocumulus.
- Altocumulus lenticularis (V-25)  
Lens-shaped middle cloud. Includes informal variant altocumulus Kelvin–Helmholtz cloud, lenticular spiral indicative of severe turbulence.
- Altocumulus castellanus (V-26)  
Turreted layer cloud.

**Stratocumuliform opacity-based varieties**

- Altocumulus stratiformis translucidus (V-27)  
Translucent altocumulus through which the sun or moon can be seen.
- Altocumulus stratiformis perlucidus (V-28)  
Opaque middle clouds with translucent breaks.
- Altocumulus stratiformis opacus (V-29)  
Opaque altocumulus that obscures the sun or moon.<sup>[7]</sup>

**Stratocumuliform pattern-based variety radiatus**

Rows of altocumulus that appear to converge at the horizon; normally associated with stratiformis species.

- Altocumulus stratiformis translucidus radiatus (V-30)
- Altocumulus stratiformis perlucidus radiatus (V-31)
- Altocumulus stratiformis opacus radiatus (V-32)

**Stratocumuliform pattern-based variety duplicatus**

Altocumulus in closely spaced layers, one above the other; normally associated with stratiformis and lenticularis species.

- Altocumulus stratiformis translucidus duplicatus (V-33)
- Altocumulus stratiformis perlucidus duplicatus (V-34)
- Altocumulus stratiformis opacus duplicatus (V-35)
- Altocumulus lenticularis duplicatus (V-36)

**Stratocumuliform pattern-based variety undulatus**

Altocumulus with wavy undulating base; normally associated with stratiformis and lenticularis species.<sup>[7]</sup>

- Altocumulus stratiformis translucidus undulatus (V-37)
- Altocumulus stratiformis perlucidus undulatus (V-38)
- Altocumulus stratiformis opacus undulatus (V-39)
- Altocumulus lenticularis undulatus (V-40)

**Pattern-based variety lacunosus**

Altocumulus with circular holes caused by localized downdrafts; normally associated with stratiformis and castellanus species (also with cumuliform floccus species).<sup>[7]</sup>

**Stratocumuliform lacunosus**

- Altocumulus stratiformis translucidus lacunosus (V-41)
- Altocumulus stratiformis perlucidus lacunosus (V-42)
- Altocumulus stratiformis opacus lacunosus (V-43)
- Altocumulus castellanus lacunosus (V-44)

**Mid-level cumuliform species**

- Altocumulus floccus (V-45)  
Tufted cumuliform clouds with ragged bases.<sup>[6]</sup>

**Cumuliform lacunosus**

- Altocumulus floccus lacunosus <sup>[6]</sup> (V-46)

**Precipitation-based supplementary feature**

- Virga  
Altocumulus producing precipitation that evaporates before reaching the ground; usually associated with species stratiformis, castellanus, and floccus.

**Cloud-based supplementary feature**

- Mamma  
Altocumulus (usually species castellanus) with downward facing bubble-like protuberances caused by localized downdrafts within the cloud.<sup>[8]</sup>

**Genitus mother clouds**

Altocumulus castellanus (V-26)



Altocumulus floccus (V-27)



Altocumulus lenticularis duplicatus (V-37)



Altocumulus stratiformis translucidus undulatus (V-39)



Altocumulus stratiformis perlucidus undulatus (V-39) clouds merging into altostratus opacus (48), with higher layer of cirrus fibratus (V-1)

- *Alto cumulus cumulogenitus*
- *Alto cumulus cumulonimbogenitus*

#### Mutatus mother clouds

- *Alto cumulus cirro cumulo mutatus*
- *Alto cumulus altostratomo mutatus*
- *Alto cumulus nimbostratomo mutatus*
- *Alto cumulus stratocumulo mutatus*

#### Genus altostratus

Abbreviation: **As**<sup>[4]</sup>

Stratiform clouds of the genus *altostratus* form when a large convectively stable airmass is lifted to condensation in the middle étage of the troposphere, usually along a frontal system. *Altostratus* can bring light rain or snow. If the precipitation becomes continuous, it may thicken into *nimbostratus* which can bring precipitation of moderate to heavy intensity.

#### Species

- No differentiated species (always nebulous).<sup>[6]</sup>

#### Opacity-based varieties

- *Altostratus translucidus* (V-47)  
Altostratus through which the sun can be seen.
- *Altostratus opacus* (V-48)  
Altostratus that completely blocks out the sun.<sup>[7]</sup>

#### Pattern-based variety radiatus

Bands that appear to converge at the horizon.

- *Altostratus translucidus radiatus* (V-49)
- *Altostratus opacus radiatus* (V-50)

#### Pattern-based variety duplicatus

*Altostratus* in closely spaced layers, one above the other.

- *Altostratus translucidus duplicatus* (V-51)
- *Altostratus opacus duplicatus* (V-52)

#### Pattern-based variety undulatus

*Altostratus* with wavy undulating base.

- *Altostratus translucidus undulatus* (V-53)
- *Altostratus opacus undulatus* <sup>[6]</sup> (V-54)

#### Precipitation-based supplementary features

- *Virga*  
Accompanied by precipitation that evaporates before reaching the ground. Seen mostly with *opacus* varieties.
- *Praecipitatio*  
Produces precipitation that reaches the ground; associated with *opacus* varieties.<sup>[8]</sup>

#### Cloud-based supplementary feature

- *Mamma*  
Altostratus with downward facing bubble-like protuberances caused by localized downdrafts within the cloud.

#### Accessory cloud

Seen mostly with *opacus* varieties

- *Pannus*  
Accompanied by ragged lower layer of *fractus* species clouds forming in precipitation.<sup>[8]</sup>

#### Genitus mother clouds

- *Altostratus alto cumulo genitus*
- *Altostratus cumulonimbogenitus*

#### Mutatus mother clouds

- *Altostratus cirrostratomo mutatus*
- *Altostratus nimbostratomo mutatus*

### Vertical or multi-étage cumulonimbiform, cumuliform, and stratiform (low to middle cloud base)

Clouds with upward-growing vertical development usually form below 6,500 feet (2.0 km),<sup>[5]</sup> but can be based as high as 8,000 feet (2.4 km) in temperate climates, and often much higher in arid regions. Downward-growing cloud forms mostly above 6,500 feet (2.0 km) and achieves vertical extent as the base subsides into the low altitude range during precipitation.

#### Genus cumulonimbus: Towering vertical

Abbreviation: **Cb**<sup>[4]</sup>

Clouds of the genus *cumulonimbus* have very dark gray to nearly black flat bases and very high tops that can penetrate the tropopause. They develop from *cumulus* when the airmass is convectively highly unstable. They generally produce thunderstorms, rain or showers, and sometimes hail, strong outflow winds, and/or tornadoes at ground level.

#### Species

- *Cumulonimbus calvus* (V-55)  
Cumulonimbus with high domed top.
- *Cumulonimbus capillatus* (V-56)  
Towering vertical cloud with high cirriform top.<sup>[6]</sup>

#### Varieties

- No varieties (always opaque and does not form in patterns visible from surface level).<sup>[6][7]</sup>

#### Precipitation-based supplementary features

Associated with *calvus* and *capillatus* species.

- *Virga*  
Precipitation that evaporates before reaching the ground.
- *Praecipitatio*  
Precipitation that reaches the ground.<sup>[8]</sup>

#### Cloud-based supplementary features

- *Incus* (species *capillatus* only)  
Cumulonimbus with flat anvil-like cirriform top caused by wind shear where the rising air currents hit the inversion layer at the tropopause.<sup>[8][12]</sup>
- *Mamma*  
Also sometimes called *Mammatus*, consisting of bubble-like protrusions on the underside caused by localized downdrafts.
- *Arcus* (including roll and shelf clouds)  
Low, horizontal cloud formation associated with the leading edge of thunderstorm outflow.



Fallstreak hole -alto cumulus stratiformis translucidus lacunosus (V-42)



Altostratus translucidus (V-47) near top of photo merging into altostratus opacus (48) near bottom



Cumulonimbus calvus (V-55)

- Tuba
            - Column hanging from the cloud base which can develop into a funnel cloud or tornado.<sup>[8]</sup>

#### Accessory clouds

Seen with species and capillatus except where noted.

- Pannus
  - Accompanied by a lower layer of fractus species cloud forming in precipitation.
  - Pileus (species calvus only)
  - Small cap-like cloud over parent cumulonimbus.
  - Velum
  - A thin horizontal sheet that forms around the middle of a cumulonimbus.<sup>[8]</sup>

#### Genitus mother clouds

- Cumulonimbus altocumulogenitus
  - Cumulonimbus altostratogenitus
  - Cumulonimbus nimbostratogenitus
  - Cumulonimbus stratocumulogenitus
  - Cumulonimbus cumulogenitus

#### Mutatus mother cloud

- Cumulonimbus cumulomutatus

### Genus cumulus: Towering vertical

Abbreviations: **Cu con** (*cumulus congestus*) or **Tcu** (*towering cumulus*)<sup>[13]</sup>

#### Species

- Cumulus congestus<sup>[6]</sup> (V-57)

These large cumulus clouds have flat dark grey bases and very tall tower-like formations with tops mostly in the high level of the troposphere. The International Civil Aviation Organization (ICAO) designates this species as towering cumulus (Tcu).

#### Opacity-based varieties

- None (always opaque).

#### Pattern-based variety

- None (not generally discerned with highly unstable cumulus congestus).

#### Precipitation-based supplementary features

- Virga
  - Accompanied by precipitation that evaporates before reaching the ground.
  - Praecipitatio
  - Produces precipitation that reaches the ground.<sup>[8]</sup>

#### Cloud-based supplementary features

- Mamma
  - Downward facing bubble-like protuberances caused by localized downdrafts within the cloud.
  - Arcus (including roll and shelf clouds)
  - Low horizontal cloud formation associated with the leading edge of a thunderstorm outflow.
  - Tuba
  - Column hanging from the cloud base which can develop into a small funnel cloud.<sup>[8]</sup>

#### Accessory clouds

- Pannus
  - Accompanied by a lower layer of fractus species cloud forming in precipitation.
  - Pileus
  - Small cap-like cloud over parent cumulus cloud.
  - Velum
  - A thin horizontal sheet that forms around the middle of a cumulus cloud.<sup>[8]</sup>

#### Mother clouds

- Genitus and mutatus types are the same as for small and moderate cumulus.

### Genus nimbostratus: Moderate or deep vertical

Abbreviation: **Ns**<sup>[4]</sup> (V-58)

Clouds of the genus nimbostratus tend to bring constant precipitation and low visibility. This cloud type normally forms above 6,500 feet (2.0 km)<sup>[5]</sup> from altostratus cloud but tends to thicken into the lower levels during the occurrence of precipitation. The top of a nimbostratus deck is usually in the middle level of the troposphere.

#### Species

- No differentiated species (always nebulous).<sup>[6]</sup>

#### Varieties

- No varieties (always opaque and never forms in patterns).<sup>[6][7]</sup>

#### Precipitation-based supplementary features

- Virga
  - Accompanied by precipitation that evaporates before reaching the ground.
  - Praecipitatio
  - Produces precipitation that reaches the ground.<sup>[8]</sup>

#### Accessory cloud

- Pannus
  - Nimbostratus with lower layer of fractus species cloud forming in precipitation.<sup>[8]</sup>

#### Genitus mother clouds

- Nimbostratus cumulogenitus
  - Nimbostratus cumulonimbogenitus

#### Mutatus mother clouds

- Nimbostratus altostratomutatus
  - Nimbostratus altocumulomutatus
  - Nimbostratus stratocumulomutatus

### Genus cumulus: Moderate vertical



Single-cell Cumulonimbus capillatus (V-56) incus



Cumulus congestus (V-57)



Nimbostratus virga

Abbreviation: **Cu**<sup>[4]</sup>

Moderate vertical cumulus is the product of free convective airmass instability. Continued upward growth suggests showers later in the day.

#### Species

- *Cumulus mediocris* (V-59)

Moderate vertical clouds with flat medium grey bases and higher tops than *cumulus humilis*.<sup>[6]</sup>

##### Opacity-based varieties

- None (always opaque)

##### Pattern-based variety

- *Cumulus mediocris radiatus* <sup>[14]</sup>(V-60)

Moderate cumulus clouds arranged in parallel lines that appear to converge at the horizon.<sup>[6][7]</sup>

##### Precipitation-based supplementary features

- *Virga*  
Accompanied by precipitation that evaporates before reaching the ground.
- *Praecipitatio*  
Produces precipitation that reaches the ground.<sup>[8]</sup>

##### Cloud-based supplementary feature

- *Mamma*  
Downward facing bubble-like protuberances caused by localized downdrafts within the cloud.<sup>[8]</sup>

##### Accessory clouds

- *Pileus*  
Small cap-like cloud over parent cumulus cloud.<sup>[8]</sup>
- *Velum*  
A thin horizontal sheet that forms around the middle of a cumulus cloud.

##### Mother clouds

- *Genitus* and *mutatus* types are the same as for cumulus of little vertical extent.

### Low étage stratocumuliform, cumuliform, and stratiform

Low cloud forms from near surface to ca. 6,500 feet (2.0 km) and are generally composed of water droplets.<sup>[5]</sup>

#### Genus stratocumulus

Abbreviation: **Sc**<sup>[4]</sup>

Clouds of the genus stratocumulus are lumpy, often forming in slightly unstable air, and they can produce very light rain or drizzle.

#### Species

- *Stratocumulus stratiformis* (always dividable into opacity-based varieties)

Sheets or relatively flat patches of stratocumulus

- *Stratocumulus lenticularis* (V-61)

Lens-shaped low cloud.

- *Stratocumulus castellanus* (V-62)

Layer of turreted stratocumulus cloud with tower-like formations protruding upwards.<sup>[6]</sup>

##### Stratocumuliform opacity-based varieties

- *Stratocumulus stratiformis translucidus* (V-63)  
Thin translucent stratocumulus through which the sun or moon can be seen.
- *Stratocumulus stratiformis perlucidus* (V-64)  
Opaque low clouds with translucent breaks.
- *Stratocumulus stratiformis opacus* (V-65)  
Opaque stratocumulus clouds.<sup>[7]</sup>

##### Pattern-based variety radiatus

Stratocumulus arranged in parallel bands that appear to converge on the horizon; normally associated with stratiformis species..

- *Stratocumulus stratiformis translucidus radiatus* (V-66)
- *Stratocumulus stratiformis perlucidus radiatus* (V-67)
- *Stratocumulus stratiformis opacus radiatus* (V-68)

##### Pattern-based variety duplicatus

Closely spaced layers of stratocumulus, one above the other; normally associated with stratiformis and lenticularis species.

- *Stratocumulus stratiformis translucidus duplicatus* (V-69)
- *Stratocumulus stratiformis perlucidus duplicatus* (V-70)
- *Stratocumulus stratiformis opacus duplicatus* (V-71)
- *Stratocumulus lenticularis duplicatus* (V-72)

##### Pattern-based variety undulatus

Stratocumulus with wavy undulating base; normally associated with stratiformis and lenticularis species.<sup>[7]</sup>

- *Stratocumulus stratiformis translucidus undulatus* (V-73)
- *Stratocumulus stratiformis perlucidus undulatus* (V-74)
- *Stratocumulus stratiformis opacus undulatus* (V-75)
- *Stratocumulus lenticularis undulatus* (V-76)

##### Pattern-based variety lacunosus

Sc with circular holes caused by localized downdrafts; normally associated with stratiformis and castellanus species.

- *Stratocumulus stratiformis translucidus lacunosus* (V-77)
- *Stratocumulus stratiformis perlucidus lacunosus* (V-78)
- *Stratocumulus stratiformis opacus lacunosus* (V-79)
- *Stratocumulus castellanus lacunosus*<sup>[6]</sup> (V-80)

##### Precipitation-based supplementary features

Usually associated with species stratiformis and castellanus:

- *Virga*  
Low cloud producing precipitation that evaporates before reaching the ground.
- *Praecipitatio*  
Stratocumulus clouds producing precipitation that reaches the ground.<sup>[8]</sup>

##### Cloud-based supplementary feature

- *Mamma*



Cumulus mediocris (V-56) from above



Cumulus mediocris (V-56) pileus



Cumulus mediocris (V-56) arcus



Stratocumulus castellanus (V-62)

Stratocumulus with bubble-like protrusions on the underside; usually associated with species *castellanus*.<sup>[8]</sup>

#### Genitus mother clouds

- *Stratocumulus cumulogenitus*
- *Stratocumulus nimbostratogenitus*
- *Stratocumulus cumulonimbogenitus*
- *Stratocumulus altostratogenitus*

#### Mutatus mother clouds

- *Stratocumulus nimbostratmutatus*
- *Stratocumulus altocumulomutatus*
- *Stratocumulus stratomutatus*

### Genus cumulus (little vertical extent)

Abbreviation: **Cu**

These are fair weather cumuliform clouds of limited convection that do not grow vertically. The vertical height from base to top is generally less than the width of the cloud base. They appear similar to stratocumulus but the elements are generally more detached and less wide at the base.

#### Species

- *Cumulus fractus* (V-81)  
Ragged shreds of cumulus clouds.
- *Cumulus humilis* (V-82)  
"Fair weather clouds" with flat light grey bases and small white domed tops.<sup>[6]</sup>

#### Opacity-based varieties

- None (always opaque except species *fractus* which is always translucent).<sup>[7]</sup>

#### Humilis pattern-based variety

- *Cumulus humilis radiatus* (V-83)  
Small cumulus clouds arranged in parallel lines that appear to converge at the horizon.<sup>[15]</sup>

#### Supplementary features/accessory clouds

- Not commonly seen with *cumulus fractus* or *humilis*.<sup>[8]</sup>

#### Genitus mother clouds

- *Cumulus stratocumulogenitus*

#### Mutatus mother clouds

- *Cumulus stratocumulomutatus*
- *Cumulus stratomutatus*

### Genus stratus

Abbreviation: **St**<sup>[4]</sup>

Clouds of the genus *stratus* form in low horizontal layers having a ragged or uniform base. Ragged *stratus* often forms in precipitation while more uniform *stratus* forms in maritime or other moist stable air mass conditions. The latter often produces drizzle.

#### Species

- *Stratus nebulosus*  
Uniform fog-like low cloud.
- *Stratus fractus* (V-84)  
Ragged shreds of *stratus* clouds usually under base of precipitation clouds.<sup>[6]</sup>

#### Nebulosus opacity-based varieties

- *Stratus nebulosus translucidus* (V-85)  
Thin translucent *stratus*.
- *Stratus nebulosus opacus* (V-86)  
Opaque *stratus* that obscures the sun or moon.<sup>[7]</sup>

#### Pattern-based variety undulatus

Wavy undulating base.

- *Stratus nebulosus translucidus undulatus* (V-87)
- *Stratus nebulosus opacus undulatus* (V-88)
- *Varieties are not commonly associated with St species fractus*.<sup>[6][7]</sup>

#### Precipitation-based supplementary feature

- *Praecipitatio*  
*Stratus* (usually species *nebulosus*) producing precipitation.<sup>[8]</sup>

#### Accessory clouds

- Not usually seen with *stratus*.<sup>[8]</sup>

#### Genitus mother clouds

- *Stratus nimbostratogenitus*
- *Stratus cumulogenitus*
- *Stratus cumulonimbogenitus*

#### Mutatus mother cloud

- *Stratus stratocumulomutatus*



Stratocumulus cumulogenitus with higher layer of altocumulus stratiformis



Cumulus humilis (V-82)



At level with stratus nebulosus (V-81) clouds



Stratus fractus (V-84) cloud

## Alphabetical lists of tropospheric cloud types with Latin etymologies where applicable

### WMO genera

- *Alto*cumulus (*altus* and *cumulus*) high heap; now applied to middle-étage stratocumuliform and cumuliform.
- *Alto*stratus (*altus* and *stratus*) high sheet; now applied to middle-étage stratiform.
- *Cirrocumulus* (*cirrus* and *cumulus*) thin, wispy heap; applied to high-étage stratocumuliform and cumuliform.
- *Cirrostratus* (*cirrus* and *stratus*) thin, wispy sheet; applied to high-étage stratiform.
- *Cirrus* ("thin and wispy") applied to high-étage cirriform.
- *Cumulonimbus* (*cumulus* and *nimbus*) precipitation-bearing heap; applied to vertical/multi-étage cumulonimbiform.
- *Cumulus* ("heap") applied to low-étage and vertical/multi-étage cumuliform.
- *Nimbostratus* (*nimbus* and *stratus*) precipitation-bearing sheet; applied to multi-étage stratiform with vertical extent.
- *Stratocumulus* (*stratus* and *cumulus*) heap partly spread into a sheet; applied to low-étage stratocumuliform.

- Stratus ("sheet") applied to low mostly shallow stratiform.

*Nimbus* and *Altus*, not genera but used in combination, are Latin for "raincloud" and "high" respectively.

### WMO species

- Castellanus (Cas) – castle-like stratocumuliform (Sc cas, Ac cas, Cc cas) and dense cirriform (Ci cas) with a series of turret shapes – indicates air mass instability.
- Congestus (Con) – cumuliform (Cu con/Tcu) with great vertical development and heaped into cauliflower shapes – indicates considerable airmass instability and strong upcurrents.
- Fibratus (Fib) – cirriform (Ci fib) or high stratiform (Cs fib) in the form of filaments, can be straight or slightly curved.
- Floccus (Flo) – tufted middle and high stratiform (Ac flo, Cc flo) and high cirriform (Ci flo) – indicates some mid and/or high level instability.
- Fractus (Fra) – low stratiform (St fra) or cumuliform (Cu fra) with an irregular shredded appearance – forms in precipitation and/or gusty winds.
- Humilis (Hum) – small, low, flattened cumuliform (Cu hum) – indicates relatively slight airmass instability.
- Lenticularis (Len) – stratocumuliform (Sc len, Ac len, Cc len) having a lens-like appearance – formed by standing waves of wind passing over mountains or hills.
- Mediocris (Med) – medium size cumuliform (Cu med) with bulges at the top – indicates moderate instability and upcurrents.
- Nebulosus (Neb) – indistinct low and high stratiform (St neb, Cs neb) without features – indicates light wind if any and stable air mass.
- Spissatus (Spi) – thick cirriform (Ci spi) with a grey appearance – indicates some upward movement of air in the upper troposphere.
- Stratiformis (Str) – horizontal cloud sheet of flattened stratocumuliform (Sc str, Ac str, Cc str) – indicates very slight airmass instability.
- Uncinus (Unc) – cirriform (Ci unc) with a hook shape at the top – indicates a nearby backside of a weather system.

The division of genus types into species is as shown in the following table. The species are sorted from left to right in approximate ascending order of instability or vertical extent. The genus types are arranged from top to bottom in the same ascending order for each étage. (1)=Stratiform types, (2)=Cirriform types, (3)=Stratocumuliform types, (4)=Cumuliform types, (5)=Cumulonimbiform types.

Etage	Species (L-R)	Abbrev.	(1)	Neb (1)	Fib (1,2)	Unc (2)	Spi (2)	Str (3)	Len (3)	Cas (2,3)	Flo (2,4)	Fra (1,4)	Hum (4)	Med (4)	Con (4)	Cal (5)	Cap (5)
	Genus name	Species name L-R	(no species)	Nebulosus	Fibratus	Uncinus	Spissatus	Stratiformis	Lenticularis	Castellanus	Floccus	Fractus	Humilis	Mediocris	Congestus	Calvus	Capillatus
High	Cirrostratus (1)	Cs		+ (1)	+ (1)												
	Cirrus (2)	Ci			+ (2)	+ (2)	+ (2)			+ (2)	+ (2)						
	Cirrocumulus (3,4)	Cc						+ (3)	+ (3)	+ (3)	+ (4)						
Mid	Altostratus (1)	As	+ (1)														
	Alto cumululus (3,4)	Ac						+ (3)	+ (3)	+ (3)	+ (4)						
Vert	Nimbostratus-MV (1)	Ns	+ (1)														
	Cumulus-MV (4)	Cu												+ (4)			
	Cumulus-TV (4)	Tcu													+ (4)		
	Cumulonimbus-TV (5)	Cb														+ (5)	+ (5)
Low	Stratus (1)	St		+ (1)								+ (1)					
	Stratocumulus (3)	Sc						+ (3)	+ (3)	+ (3)							
	Cumulus (4)	Cu										+ (4)	+ (4)				

Vert=Vertical or multi-étage, MV=Moderate or deep vertical, TV=Towering vertical.

### WMO varieties

#### Opacity-based

- Opacus ("thick and shadowy") an opaque sheet of stratiform or stratocumuliform cloud.
- Perlucidus ("translucent") sheet of stratocumuliform cloud with small spaces between elements.
- Translucidus ("transparent") thin translucent patch or sheet of stratiform or stratocumuliform.

#### Pattern-based

- Duplicatus ("double") closely spaced often partly merged layers of cloud in one of several possible forms.
- Intortus ("twisted") curved and tangled cirriform.
- Lacunosus ("full of holes") thin stratocumuliform cloud distinguished by holes (sometimes known as fallstreak holes) and ragged edges.
- Radiatus ("radial") clouds in one of several possible forms arranged in parallel lines that appear to converge at a central point near the horizon.
- Undulatus ("wavy") stratiform or stratocumuliform cloud displaying an undulating pattern.
- Vertebratus ("skeletal and bone-like") cirriform arranged to look like bones, a skeleton or calcium.

The following table shows the cloud varieties arranged across the top of the chart from left to right in approximate descending order of frequency of appearance. The genus types associated with each variety are sorted from top to bottom in the left column in approximate descending order of average overall altitude range. Where applicable, the genera and varieties are cross-classified to show the species normally associated with each combination of genus and variety. The exceptions include altostratus that has varieties but no species, towering cumulus and cumulonimbus that have species but no varieties, and nimbostratus has no species or varieties.

Etage	Name	Abbrev.	Tra	Per	Opa	Dup	Und	Rad	Lac	Int	Ver
		Abbrev.	Translucidus	Perlucidus	Opacus	Duplicatus	Undulatus	Radiatus	Lacunosus	Intortus	Vertebratus
High	Cirrus	Ci				+ Fib + Unc		+ Fib + Unc		+ Fib	+ Fib
	Cirrocumulus	Cc					+ Str + Len		+ Str + Cas + Flo		
	Cirrostratus	Cs				+ Fib	+ Fib				
Mid	Alto cumululus	Ac	+ Str	+ Str	+ Str	+ Str + Len	+ Str + Len	+ Str	+ Str + Cas + Flo		
	Altostratus	As	+		+	+	+				
Vert	Cumulonimbus (TV)	Cb									
	Cumulus (TV)	Tcu									
	Nimbostratus (MV)	Ns									
	Cumulus (MV)	Cu						+ Med			
Low	Stratocumulus	Sc	+ Str	+ Str	+ Str	+ Str + Len	+ Str + Len	+Str	+Str + Cas		
	Cumulus	Cu						+ Hum			
	Stratus	St	+ Neb		+ Neb		+ Neb				

### WMO supplementary features

#### Precipitation-based supplementary features

- Praecipitatio ("falling") cloud whose precipitation reaches the ground.
- Virga ("twig, branch") cloud whose precipitation doesn't reach the ground

#### Cloud-based supplementary features

- Arcus ("arch or bow") feature mostly attached to cumulus, thick with ragged edges.
- Incus ("anvil") top part of Cb cloud, anvil-shaped feature.
- Mammatus; WMO term: *mamma* ("breast") feature in the form of round pouches on under-surface of a cloud.

- Tuba ("funnel", shaped like a tube) feature in the form of a column hanging from the bottom of cumulus or cumulonimbus.

Accessory clouds

- Pannus ("shredded cloth") shredded accessory cloud that forms in precipitation below main cloud.
- Pileus ("capped") hood-shaped accessory cloud.
- Velum ("a ship's sail") an accessory cloud in the form of a sail.

The supplementary features are associated with particular genera as follows. They are sorted from left to right in approximate decreasing order of frequency of occurrence for each of three categories. The genus types (including some cumulus sub-types) are arranged from top to bottom in approximate descending order of average overall altitude range.

Etag	Name	Class	Precipitation-based		Cloud-based				Accessory cloud			
			Virga	Præcipitatio	Incus	Mamma	Arcus	Tuba	Pannus	Pileus	Velum	
	Cirrus	Ci				+						
High	Cirrocumulus	Cc	+			+						
	Cirrostratus	Cs										
Mid	Alto cumulus	Ac	+			+						
	Altostratus	As	+	+		+			+			
Vert	Cumulonimbus (TV)	Cb	+	+	+	+	+	+	+	+	+	+
	Cumulus (TV)	Tcu	+	+		+	+		+	+	+	+
	Nimbostratus (MV)	Ns	+	+					+			
	Cumulus (MV)	Cu	+	+		+					+	+
Low	Stratocumulus	Sc	+	+		+						
	Cumulus	Cu		+								
	Stratus	St										



A translucent wave cloud -alto cumulus lenticularis



Mammatus over Squaw Valley

Mother clouds

- Cumulogenitus – formed by the spreading out of cumulus mother clouds.
- Cumulonimbogenitus – formed by the spreading out of cumulonimbus mother clouds.

and so on....

Mutatus mother cloud

- Cumulomutatus -

and so on...

The possible combinations of genera and mother clouds can be seen in this table. The genitus and mutatus clouds are each sorted from left to right in alphabetical order. The genus types (including some cumulus sub-types) are arranged from top to bottom in the left column in approximate descending order of average overall altitude range.

Etag	Name	Class	Genitus mother										Mutatus mother									
			Abbrev.	Ac	As	Ci	Cc	Cs	Cu	Cb	Ns	St	Sc	Ac	As	Ci	Cc	Cs	Cu	Cb	Ns	St
			altocumulo	altostrato	cirro	cirrocumulo	cirrostrato	cumulo	cumulonimbo	nimbostrato	strato	stratocumulo	altocumulo	altostrato	cirro	cirrocumulo	cirrostrato	cumulo	cumulonimbo	nimbostrato	strato	stratocumulo
High	Cirrus	Ci	+			+										+						
	Cirrocumulus	Cc										+		+		+						
	Cirrostratus	Cs				+					+			+	+							
Mid	Alto cumulus	Ac						+	+										+	+		
	Altostratus	As	+														+					
Vert	Cumulonimbus (TV)	Cb	+	+				+		+								+				
	Cumulus (TV)	Tcu																				
	Nimbostratus (MV)	Ns						+	+				+	+								+
	Cumulus (MV)	Cu	+								+											+
Low	Stratocumulus	Sc		+				+	+		+		+						+	+		
	Cumulus	Cu						+	+		+											+
	Stratus	St	+								+											+

Informal terms officially proposed for WMO classification

- Aviaticus cloud - persistent condensation trails (contrails) formed by ice crystals originating from water vapor emitted by aircraft engines. May resemble cirrus, cirrocumulus, or cirrostratus depending on atmospheric stability and wind shear. Proposed as a WMO genitus cloud *homogenitus* (man-made).
- Fallstreak hole – supercooled altocumulus or cirrocumulus distinguished by a hole with ragged edges and virga or wisps of cirrus. Proposed as a WMO supplementary feature, possibly to be named *cavus* (hole).
- Kelvin–Helmholtz cloud - Crested wave-like clouds formed by wind-shear instability that may occur at any altitude in the troposphere. Proposed as a WMO supplementary feature, possibly with the Latin name *fluctus*.
- Pyrocumulus and pyrocumulonimbus - cumulus and cumulonimbus clouds formed by quickly generated ground heat; including forest fires, volcanic eruptions and low level nuclear detonation. Proposed as a WMO genitus cloud, possibly with the Latin name *flammagenitus*, or *homogenitus* in the case of small cumulus formed by contained human activity.
- Roll cloud – elongated, low-level, tube shaped, horizontal formation not associated with a parent cloud. Proposed as a WMO stratocumulus species, possibly to have the Latin name *volutus*.<sup>[16]</sup>

WMO and informal terms related to free-convective cloud types and storms

- Accessory cloud (WMO supplementary feature) – secondary cloud that is associated with but separate from a main cloud.
- Anvil (WMO supplementary feature incus) – the anvil top of a cumulonimbus cloud.
- Anvil dome (WMO supplementary feature incus) – the overshooting top on a Cb that is often present on a supercell.
- Anvil rollover – (slang) circular protrusion attached to underside of anvil.
- Arcus cloud (WMO supplementary feature) – arch or a bow shape, attached to cumulus, thick with ragged edges.
- Backsheared anvil – (slang) anvil that spreads upwind, indicative of extreme weather.
- Clear slot or dry slot (informal term) – an evaporation of clouds as a rear flank downdraft descends and dries out cloud and occludes around a mesocyclone.
- Cloud tags (WMO species fractus) – ragged detached portions of cloud.
- Collar cloud (WMO velum accessory cloud) – ring shape surrounding upper part of wall cloud.
- Condensation funnel (WMO supplementary feature tuba) – the cloud of a funnel cloud aloft or a tornado.
- Alto cumulus castellanus (WMO genus and species) – castle crenellation-shaped altocumulus clouds.
- Cumulus (WMO genus) – heaped clouds.
- Cumulus castellanus – (informal variation of WMO genus and species cumulus congestus) cumulus with tops shaped like castle crenellations.
- Cumulus congestus (WMO genus and species) – considerable vertical development and heaped into cauliflower shapes.
- Cumulus fractus (WMO genus and species) – ragged detached portions of cumulus cloud.
- Cumulus humilis (WMO genus and species) – small, low, flattened cumulus, early development.
- Cumulus mediocris (WMO genus and species) – medium-sized cumulus with bulges at the top.
- Cumulus pileus (WMO genus and accessory cloud) – capped, hood-shaped cumulus cloud.



Roll cloud over Wisconsin

- Cumulus praecipitatio (WMO genus and supplementary feature) – cumulus whose precipitation reaches the ground.
- Cumulus radiatus (WMO genus and variety) – cumulus arranged in parallel lines that appear to converge near the horizon.
- Cumulus tuba (WMO genus and supplementary feature) – column hanging from the bottom of cumulus.
- Cumulonimbus (WMO genus) – heaped towering rain-bearing clouds that stretch to the upper levels of the troposphere.
- Cumulonimbus calvus (WMO genus and species) – cumulonimbus with round tops like cumulus congestus.
- Cumulonimbus capillatus (WMO genus and species) – Cb with cirriform top.
- Cumulonimbus incus (WMO genus and supplementary feature) – Cb capillatus with anvil top.
- Cumulonimbus mamma (WMO genus and supplementary feature) – Cb with pouch-like protrusions that hang from under anvil or cloud base.
- Cumulonimbus pannus (WMO genus and accessory cloud) – shredded sections attached to main Cb cloud.
- Cumulonimbus pileus (WMO genus and accessory cloud) – capped, hood-shaped cloud above a cumulonimbus cloud.
- Cumulonimbus praecipitatio (WMO genus and supplementary feature) – Cb whose precipitation reaches the ground.
- Cumulonimbus tuba (WMO genus and supplementary feature) – column hanging from the bottom of cumulonimbus.
- Debris cloud (informal term) – rotating "cloud" of debris found at base of tornado.
- Funnel cloud (WMO supplementary feature tuba) – rotating funnel of cloud hanging from under Cb, not making contact with ground.
- Hail fog (informal term) – a shallow surface layer of fog that sometimes forms in vicinity of deep hail accumulation, can be very dense.
- Hot tower (informal term) - a tropical cumulonimbus cloud that penetrates the tropopause.
- Inflow band (informal term) – a laminar band marking inflow to a Cb, can occur at lower or mid levels of the cloud.
- Inverted cumulus (informal variation of WMO supplementary feature mamma) – cumulus which has transferred momentum from an exceptionally intense Cb tower and is convectively growing on the underside of an anvil.
- Knuckles (informal variation of WMO supplementary feature mamma) – lumpy protrusion that hangs from edge or underside of anvil.
- Pyrocumulus and Pyrocumulonimbus– intense ground-heat cloud proposed for WMO classification (see above).
- Rope – (slang) narrow, sometimes twisted funnel type cloud seen after a tornado dissipates.
- Rope cloud (informal term) – A narrow, long, elongated lines of cumulus cloud formation that develop at the leading edge of an advancing cold front or weather fronts that is often visible in satellite imagery.<sup>[17]</sup>
- Scud cloud (informal term for WMO species fractus) – ragged detached portions of cloud that usually form in precipitation.
- Shelf cloud (informal term for WMO supplementary feature arcus) – wedge-shaped cloud often attached to the underside of Cb.
- Stratus fractus (WMO genus and species) – ragged detached portions of stratus cloud that usually form in precipitation (see also scud cloud).
- Striations (informal term for WMO accessory cloud velum) – a groove or band of clouds encircling an updraft tower, indicative of rotation.
- Tail cloud (informal term) – an area of condensation consisting of laminar band and cloud tags extending from a wall cloud towards a precipitation core.
- Towering cumulus (TCu) (aviation term for WMO genus and species cumulus congestus) – a large cumulus cloud with great vertical development, usually with a cauliflower-like appearance, but lacking the characteristic anvil of a Cb.
- Wall cloud (informal term) – distinctive fairly large lowering of the rain-free base of a Cb, often rotating.

## Other planets

### Venus

Thick overcast clouds of sulfur dioxide in three main layers at altitudes of 45 to 65 km that obscure the planet's surface and can produce virga.<sup>[18]</sup>

### Stratiform

Overcast opaque clouds sheets.

### Stratocumuliform

Wave clouds with clear gaps through which lower stratiform layers may be seen.<sup>[19]</sup>

### Cumuliform and cumulonimbiform

Embedded convective cells that can produce lightning.

### Mars

Clouds resembling several terrestrial types can be seen over Mars and are believed to be composed of water-ice.<sup>[20][21]</sup>

### Extremely high cirriform

Noctilucent clouds are known to form near the poles at altitudes similar to or higher than the same type of clouds over Earth.<sup>[22]</sup>

### High cirriform

Thin scattered wispy cloud resembling cirrus through which the planet's surface can be seen.

### High stratocumuliform

Thin scattered wave-cloud resembling cirrocumulus.

### Low stratocumuliform

Wave-cloud resembling stratocumulus, especially as a polar cap cloud over the winter pole which is mostly composed of suspended frozen carbon dioxide.<sup>[20][21]</sup>

### Surface-based

Morning fog of water and/or carbon dioxide commonly forms in low areas of the planet.

### Jupiter and Saturn

Cloud decks in parallel latitudinal bands at and below the tropopause alternatingly composed of ammonia crystals and ammonium hydrosulfate.

### Cirriform

Bands of cloud resembling cirrus located mainly in the highest of three main layers that cover Jupiter.<sup>[23]</sup>

### Stratiform and Stratocumuliform

Wave and haze clouds that are seen mostly in the middle layer.

### Cumuliform and cumulonimbiform

Convective clouds in the lowest layer that are capable of producing thunderstorms and may be composed at least partly of water droplets.<sup>[24]</sup> an intermediate deck of ammonium hydrosulfide, and an inner deck of cumulus water clouds.<sup>[25][26]</sup>

### Uranus and Neptune

Clouds layers made mostly of methane gas.<sup>[27]</sup>

### Cirriform

High wispy formations resembling cirrus.

#### Stratiform

Layers of haze-cloud that lack any distinct features.

#### Cumuliform and cumulonimbiform

Lower-based convective clouds that can produce thunderstorms.<sup>[27]</sup>

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## See also

Cloud species

## External links

- http://nephology.eu International Cloud Atlas online (http://nephology.eu)
- Cloud Classification (National Weather Service) (http://www.srh.weather.gov/srh/jetstream/clouds/clouds\_intro.htm)
- Ten Basic Cloud Types (National Weather Service) (http://www.srh.noaa.gov/srh/jetstream/clouds/cloudwise/types.html)
- Cloud Appreciation Society (http://www.cloudappreciationsociety.org/gallery/)
- Texas A&M Cloud Glossary (http://www.met.tamu.edu/class/Metr304/Exer10dir/cloudglossary.html)
- Cloud-identification site (http://www.theairlinepilots.com/met/clouds.htm)
- UK Met Office cloud classification page (http://www.metoffice.gov.uk/learning/clouds/cloud-names-classifications)
- Cloud Atlas (Atlas Chmur) (http://www.chmury.pl) (in Polish)
- NOAA (http://www.noaa.gov)

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