

Descriptions and differences of the ten cloud genera

Cirrus (Ci)	
Definition	Detached clouds - white delicate filaments - white or mostly white patches or narrow bands - fibrous or silky appearance
Physical constitution & appearance	Composed of ice crystals. When in patches may be thick enough to obscure sun. Always white when sun is sufficiently high in the sky.
Main difference between Ci and other clouds	<u>Ci and Cc</u> - Ci clouds are mainly fibrous or silky in appearance. No small cloud elements in the form of grains or ripples. <u>Ci and Cs</u> - Ci clouds are discontinuous. If in patches or bands, Ci has smaller horizontal extent or narrow continuous parts, often difficult to distinguish when near horizon. <u>Ci and Ac</u> - Ci clouds more silky or fibrous. <u>Ci and As</u> - Ci clouds have smaller horizontal extent and are mostly white in appearance.
Formation	Ci tufts often form in clear air. They also may result from the transformation of non-uniform Cs by evaporation of its thinner parts.
Cirrocumulus (Cc)	
Definition	Thin white patch or sheet or layer of cloud without shading, composed of very small elements in the form of grains, ripples. Merged or separated and more or less regularly arranged. Most of the elements have an apparent width of less than one degree. i.e. the thickness of one finger at arm length spans one degree, provided that the cloud element is more than 30° above the horizon.
Physical constitution and appearance	Almost exclusively ice crystals. Supercooled water droplets may be present, but is usually rapidly replaced by ice crystals. The elements may rarely, consist of small tufts, always thin enough to reveal sun or moon. Corona or irisations sometimes observed.
Main difference between Cc and other clouds	<u>Cc and Ci</u> - See Ci. <u>Cc and Cs</u> - Divided into small cloudlets. May include fibrous or silky portions, but they do not predominate. <u>Cc and Ac</u> - Most of the elements smaller than Ac (< 1 deg) and without shading. Cc may form in clear air, or as a result from a transformation of Ci or Cs, or from a decrease in size of the elements of an area of Ac.
Cirrostratus	

(Cs)	
Definition	Transparent whitish cloud veil of fibrous or smooth appearance, totally or partly covering the sky that may produce halo phenomena.
Physical constituents and appearance	Mainly ice crystals. May occur in the form of a fibrous veil with thin striations or may resemble a nebulous veil. Edge is sometimes sharply defined, but more often frayed with cirrus. Cs is never thick enough to prevent ground objects from casting shadows. Halo phenomena often observed with thin Cs. It may be so thin that halo is only indication of its presence.
Main difference between Cs and other clouds	<u>Cs and Ci</u> - See Ci <u>Cs and Cc or Ac</u> - Cs does not exhibit features such as grains & ripples. <u>Cs and As</u> - Thinner than As and may show halo phenomena Slowness in apparent movement and thickness variation are characteristics of Cs which give useful guidance distinguishing Cs from As or St. <u>Cs and St</u> - Cs whitish throughout and has fibrous appearance. <u>Cs and haze</u> - Cs differs from haze as the latter is opalescent or has a dirty yellow - brownish colour. It is often difficult to discern Cs through haze.
Formation	Formed as a result of the slow ascent of extensive layers of air to sufficiently high levels. It may also be formed by the merging of Ci or elements of Cc. Cs may evolve from the thinning of As or the spreading out of the CB anvil.
Altostratus (As)	
Definition	Grey or bluish cloud sheet or layer of striated, fibrous or uniform appearance, totally or partly covering the sky and having parts thin enough to reveal the sun at least vaguely as through ground glass. Altostratus does not show halo phenomena.
Physical constitution and appearance	As is composed of water droplets and ice crystals, rain drops and snow. As is most often formed as a result of slow ascent of extensive layers of air to sufficiently high levels. In the tropics, As is sometimes produced by the spreading out of the middle or top of Cb. It may also develop from an Ac layer or the thickening of Cs layer.
Main difference between As and other clouds	<u>As and Cs</u> - As prevents ground objects from casting shadows and shows ground glass effect, while Cs shows halo phenomena. <u>As and Ac</u> - As is distinguished by its more uniform appearance. <u>As and Ns</u> - As always has thinner parts through which sun may be revealed As is also lighter grey and the under surface is usually less uniform than Ns. When on moonless nights doubt exists, it is As if no rain or snow is falling.
Formation	Most often formed by the slow ascent of extensive layers of air to sufficiently high levels. May also evolve from the thickening of a layer of Cs or by the thinning of a layer of Ns, the spreading out of a Cb or develops from an Ac layer.
Nimbostratus (Ns)	
Definition	Grey cloud layer, often dark, thick enough throughout to blot out the sun.

	Appearance is rendered diffuse by more or less continuously falling rain or snow. Low ragged clouds frequently occur below the layer with which they may/may not merge.
Physical constitution and appearance	Ns is composed of water droplets, rain drops, snowflakes, crystals or a mixture. Ns is often formed as a result of slow ascent of extensive layers of air to sufficiently high levels or from thickening As.
Main difference between Ns and similar clouds	<u>Ns and As</u> - See As <u>Ns and Ac</u> - Ns lacks clearly defined elements or distinct lower surfaces. <u>Ns and St</u> - Ns produces rain or snow but precipitation from St is drizzle. <u>Ns and Cb</u> - When observed beneath Cb having the appearance of Ns, lightening, thunder or hail will identify the cloud as Cb.
Formation	Ns is most often formed as a result of the slow ascent of extensive layers of air to sufficiently high levels. It may also develop from the thickening of As, or rarely Sc or Ac. There are occasions when it forms by the spreading out of Cb.
Alto cumulus (Ac)	
Definition	White or grey or both white and grey patch sheet or layer of cloud, generally with shading composed of laminae, rounded masses, rolls etc. Sometimes partly fibrous or diffuse, may or may not be merged. Most of the regularly arranged elements have an apparent width of between $1^\circ - 5^\circ$ i.e. the width of three fingers at arm length and the cloud $> 30^\circ$ above horizon.
Physical constituents & appearance	Mainly composed of super-cooled droplets; a corona or irisation is frequently observed. Alto cumulus sheets often occur simultaneously at two or more levels and vary considerably in transparency.
Main difference between Ac and other clouds	<u>Ac and Cc</u> - If the clouds have shading, they are by definition Ac, even if their elements have an apparent width of less than 1° . Clouds without shading are Ac if apparent width of most regularly arranged elements is $> 1^\circ$ and $< 5^\circ$. <u>Ac and As</u> - Ac if there is any evidence of the presence of rounded masses, rolls. <u>Ac and Sc</u> - If most of the regularly arranged elements have an apparent width of $1^\circ - 5^\circ$ s, then the cloud is Ac.
Formation	Ac often forms on the margin of an extensive layer of rising air, or as the result of turbulence or convection in the middle level. Ac may be produced by the increase in the size of the thickening of at least some elements of a sheet of Cc or the transformation of As or Ns. Ac often forms as the result of the spreading out of Cu or Cb.
Strato cumulus (Sc)	
Definition	Grey or whitish (or both) patch, sheet or layer. Almost always has dark parts composed of tessellations, rounded masses & rolls which are non fibrous which may or may not be merged.

	Most of the regularly arranged small elements have an apparent width of $> 5^\circ$.
Physical constitution & appearance	Composed mainly of water droplets. The size, thickness and shape of the elements vary over a wide range. Sc varies considerably in its transparency.
Main differences between Sc and other clouds	<u>Sc and Ac</u> - If most of the regularly arranged elements are more than 5° then the cloud is Sc. <u>Sc and As, Ns or St</u> - The evidence of the presence of elements denotes Sc. <u>Sc and Cu</u> - Sc elements generally occur in groups or patches, generally with flat tops. If Sc tops are in the form of domes, they rise from merged bases
Formation	Sc is frequently formed by the spreading out of Cu or Cb. Produced by turbulence or convection near the base of Ns or As. Can also form as a result of the lifting of a layer of St.
Stratus (St)	
Definition	Generally grey cloud layer with fairly uniform base, but can sometimes appear in the form of ragged patches. When sun is visible, its outline is clearly discernable.
Physical constituents and appearance	St usually composed of small water droplets. When thick, it may contain drizzle droplets, or snow grains. Generally forms as a grey nebulous fairly uniform layer with a low base. It may be so thin that outline of sun or moon can be clearly seen through it. Generally, however, it is opaque enough to mask the sun or moon.
Main difference between St and similar clouds	<u>St and As</u> - St does not blur outline of the sun. <u>St and Ns</u> - St generally has a more uniform and clearly defined base. St has a "dry" appearance in contrast to the "wet" appearance of Ns. Produces only drizzle. <u>St and Cu</u> - Ragged St is less white and less dense and has smaller vertical extent than ragged Cu.
Formation	St in a layer forms as a result of the cooling of the lower atmosphere. Ragged St in the form of accessory clouds may also be produced under the influence of turbulence, when air is moistened by precipitation falling from As, Cb, Ns or Cu. St may develop from Sc, when the under surface of Sc lowers or loses its shape. A common form of St is the slow lifting of fog layer due to warming of earth's surface or an increase in wind speed.
Cumulus (Cu)	
Definition	Detached clouds, generally dense and with sharp outlines. Develop vertically in the form of rising, mounds, domes, towers, etc., the upper part often resembling a cauliflower. The sunlit parts are almost brilliant white, bases being relatively dark & nearly horizontal. Sometimes Cu is ragged.

Physical constitution and appearance	<p>Cu is composed mainly of water droplets.</p> <p>Ice crystals may form in those parts of cloud in which the temperature is $\leq -10^{\circ}\text{C}$.</p> <p>Cu may vary greatly in vertical extent from a flattened appearance to the appearance of huge sprouting cauliflower.</p> <p>In either case, precipitation in the form of rain-showers occur.</p> <p>Ragged Cu of bad weather may form beneath large precipitation Cu.</p>
Main difference between Cu and similar clouds	<p><u>Cu and Sc</u> - Identified as Cu while tops remain dome shaped and bases are not merged.</p> <p><u>Cu and As or Ns</u> - If precipitation is of showery type cloud is Cu.</p> <p><u>Cu and Cb</u>- As long as upper parts are sharply defined and no fibrous or striated texture is apparent, the cloud is Cu.</p> <p>If accompanied by lightening, thunder or hail, it is then Cb.</p>
Formation	<p>Cu develops in convective currents which occur when the lapse rate in the lower layers is sufficiently steep.</p> <p>Such lapse rates may be set up in various ways of which the commonest are:</p> <ul style="list-style-type: none"> ➤ The heating of the air near the earth's surface. ➤ Cooling or advection of cold air layers with vertical expansion. ➤ Lifting of air layers with vertical expansion.
Cumulonimbus (Cb)	
Definition	<p>Heavy dense clouds with considerable vertical extent like a mountain or huge tower.</p> <p>At least part of its upper portion is usually smoothed, fibrous or striated and nearly always flattened.</p> <p>This part often spreads out in the shape of an anvil or vast plume.</p>
Physical constitution and appearance	<p>Cb composed of water droplets and, especially in the upper portions, of ice crystals.</p> <p>It also contains large rain drops and often snow-flakes, ice pellets or hailstones.</p> <p>Often the horizontal and vertical dimensions of Cb are so great the characteristic shape of the cloud as a whole can only be seen when observed from a distance.</p>
Main difference between Cb and similar clouds	<p><u>Cb and Ns</u> - When covering a large expanse of the sky, it can easily be confused with Ns.</p> <p>The character of the precipitation is showery or, if accompanied by thunder, hail or lightening will identify the cloud as Cb.</p> <p><u>Cb and Cu</u> - Cb if at least part of its upper portion loses the sharpness of its outline.</p> <p>Thunder, lightning or hail indicates the presence of Cb.</p>
Formation	<p>Cb normally evolves out of large well developed Cu by a continuously transforming.</p> <p>Cb sometimes develops from Ac or Sc, the upper parts of which have turret-like protuberances.</p> <p>It may also form as the result of the transformation and development of a portion of As or Ns.</p>

The international classification is based on the ten CLOUD GENERA, which we have just dealt with, while SPECIES and VARIETIES has been established, SUPPLEMENTARY FEATURES and ACCESSORY CLOUDS are added.