Cloud appearance

The appearance of a cloud is determined by the nature, sizes, number and distribution in space of its constituent particles. It also depends on the intensity and colour of the light received by the cloud. In addition, the appearance is affected by the relative positions of the observer and the source of light (luminary) with respect to the cloud.

The appearance is best described in terms of the dimensions, shape, structure, texture, luminance and colour of the cloud. We shall first consider the luminance and colour of clouds.

Luminance

The luminance or brightness of a cloud is determined by the light reflected, scattered and transmitted by its constituent particles.

This light comes, from for the most part, directly from the luminary or from the sky. It may also come from the surface of the earth, being particularly strong when reflected by sunlight or moonlight from an ice or snowfield.

The luminance of a cloud may be modified by intervening haze. Furthermore, the luminance may be modified by optical phenomena such as haloes, rainbows, coronae, glories, etc.

During daytime, the luminance of the clouds is sufficiently high to make them easily observable, while on a moonlit night, clouds are visible when the moon is more than a quarter full. By contrast, clouds are generally invisible on a moonless night.

Clouds are visible at night in areas with sufficient strong artificial lighting. A layer of clouds, so illuminated, may provide a bright background against which lower cloud fragments stand out in dark relief.

Colour

Since light of all wavelengths is almost equally diffused by clouds, the colour of clouds depends primarily on that of the incident light.

Haze between the observer and the cloud may, however, modify cloud colours; it tends to make

distant clouds look yellow, orange or red.

Cloud colours can also be influenced by special luminous phenomena.

When the sun is sufficiently high above the horizon, clouds or portions of clouds which chiefly diffuse light from the sun are white or grey.
Parts which receive light mainly from the blue sky are bluish grey.
When the illumination by the sun and the sky is extremely weak, the colours vary with height of the cloud and its relative position with regard to the observer and the sun.

At night, the luminance of the clouds is usually too weak for colour vision; all observable clouds appear black to grey, except those illuminated by the moon, which present a whitish appearance. Special illumination (fires, lights of large cities) may, however, sometimes give a more or less marked colouring to certain clouds.

Optical thickness

cloudatlas.wmo.int/optical-thickness.html

The optical thickness of a cloud is the degree to which the cloud prevents light from passing through it. Optical thickness depends on the physical properties and the cloud dimensions. The observer should record the optical thickness, and indicate the direction in which the clouds or cloud layers have the greatest thickness. Table 13 provides a numerical scale for optical thickness.

Table 13. Scale for optical thickness of clouds

Scale	*Description*	*Comment*
1	Very weak	Blue of the sky is discernible through the cloud
2	Weak	The cloud hides the blue of the sky, but does not prevent the Sun from casting shadows; such a cloud is usually white but may be light grey
3	Moderate	The cloud has a good generalluminance, but noticeable shading in places; when present as an extensive sheet or layer, the cloud is light grey
4	Strong	The cloud is strongly shaded; when present as an extensive sheet or layer, the cloud appears dark grey; when the layer is discontinuous or formed of scattered elements, the parts directly exposed to the Sun are white and fairly brilliant
5	Very strong	The cloud is dark, except for the parts exposed to the Sun, which are brilliantly white; the cloud has a threatening appearance