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AIR MINISTRY
METEOROLOGICAL OFFICE

CLOUD FORMS

DEFINITIONS AND
PHOTOGRAPHS

LONDON
HIS MAJESTY'S STATIONERY OFFICE

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M.O. 233 (5th Edition)

AIR MINISTRY

METEOROLOGICAL OFFICE

CLOUD FORMS

ACCORDING TO THE
INTERNATIONAL CLASSIFICATION

The Definitions and Descriptions

APPROVED BY THE
INTERNATIONAL METEOROLOGICAL COMMITTEE

WITH
PHOTOGRAPHS OF CLOUDS

Issued by the Authority of the Meteorological Committee

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1941

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- C_H 7 Veil of cirrostratus covering the whole sky.
- C_H 8 Cirrostratus not increasing and not covering the whole sky.
- C_H 9 Cirrocumulus predominating, and a little cirrus.

CLOUD FORMS

ACCORDING TO THE INTERNATIONAL CLASSIFICATION

In outline the classification of the clouds is based upon that originally put forward by Luke Howard at the beginning of the 19th century, namely, **cirrus**, the thread-cloud; **cumulus**, the heap-cloud; **stratus**, the flat cloud or level sheet; and **nimbus**, the rain-cloud. The details of a more precise classification occupied the attention of meteorologists in many countries during the latter part of the century, among whom were specially prominent our own countrymen, the Rev. Clement Ley and the Hon. Ralph Abercromby. A book by Mr. Clement Ley entitled "Cloudland" is well known to meteorologists. Mr. Abercromby contributed a number of papers on the subject, laying stress upon the most important fact that cloud forms are not peculiar to special localities or latitudes, but are the same for all parts of the world. Both these gentlemen unfortunately died before an agreed international classification was adopted. Other meteorologists who were specially active in this work were Professor H. H. Hildebrandsson, of Uppsala, Sweden; M. Léon Teisserenc de Bort, of Paris; and M. A. Riggensbach, of Zürich, Switzerland.

A classification was agreed on at the International Conference at Munich in 1891, and as a sequel the first edition of the "International Cloud Atlas" appeared in 1895. It has run through several editions since that date, the last appeared in 1910 and is now out of print.

After the War 1914-8 the need for a new Atlas was acutely felt, and an International Commission for the Study of Clouds was set up in 1922, under the presidency of General E. Delcambre, the Director of the Office National Météorologique de France, to undertake this work. An "Abridged edition for the use of observers" was produced in 1930, and the complete Atlas with separate editions having the text in French, English and German was published in 1932.

In this Atlas there was introduced a modification which was of very great importance. In the earlier Atlas the cloud had been considered as an entity rather than as a feature of the sky which should be considered in relation, not only to all the other clouds present, but also to the development in time. This involved some radical changes in the conception of how clouds should be viewed and some differences in the nomenclature of clouds. This conception has led to the International code for reporting cloud types, and in

the Atlas an attempt was made to give in order examples not only of the basic classification but also of the sky types to which numbers are given in the reporting code.

In the present edition of Cloud Forms the plates are arranged in a similar manner, whereby examples of the reporting code furnish also specimens of the International classification. Below there is given an outline of the International classification and the specifications of the code figures for reporting cloud forms together with some explanatory remarks.

The description of each photograph and its relation to the International classification is printed beneath it.

The following summary of the International classification is based on Part I of the English edition of the International Cloud Atlas.

I.—TABLE OF CLOUD CLASSIFICATION

At nearly all levels clouds may appear under the following forms:—

- (a) *Isolated*, heap clouds with vertical development during their formation, and a spreading out when they are dissolving.
- (b) *Sheet clouds which are divided up into filaments, scales, or rounded masses*, and which are often stable or in process of disintegration.
- (c) *More or less continuous cloud sheets*, often in process of formation or growth.

Classification into families and genera

Family A : High clouds (mean lower level 6,000 m. (20,000 ft.)).*

- Form b 1. Genus Cirrus.
2. Genus Cirrocumulus.

Form c 3. Genus Cirrostratus.

Family B : Middle clouds (mean upper level 6,000 m. (20,000 ft.), mean lower level 2,000 m. (6,500 ft.)).

- Form a } 4. Genus Altopcumulus.†
Form b }

Form c 5. Genus Altostratus.

* It should be noted that the heights given are for temperate latitudes, and refer, not to sea level, but to the general level of the land in the region. In certain cases there may be large departures from the given mean heights, especially as regards cirrus, which may be found as low as 3,000 metres in temperate latitudes, and in polar regions even almost as low as the surface.

† Most altocumulus and stratocumulus clouds come under category b; but the varieties cumuliformis and particularly castellatus belong to category a.

Family C : Low clouds (mean upper level 2,000 m. (6,500 ft.), mean lower level close to the ground).

- Form a } 6. Genus Stratocumulus.*
Form b }
Form c } 7. Genus Stratus.
8. Genus Nimbostratus.

Family D : Clouds with vertical development (mean upper level that of the cirrus, mean lower level 500 m. (1,600 ft.)).

- Form a } 9. Genus Cumulus.
10. Genus Cumulonimbus.

II.—DEFINITIONS AND DESCRIPTIONS OF THE FORMS OF CLOUDS

1. **Cirrus (Ci.).**—Detached clouds of delicate and fibrous appearance, without shading, generally white in colour, often of a silky appearance (see C_H 1, C_H 2, C_H 4).

Cirrus appears in the most varied forms such as isolated tufts, lines drawn across a blue sky, branching feather-like plumes, curved lines ending in tufts, etc.; they are often arranged in bands which cross the sky like meridian lines, and which, owing to the effect of perspective, converge to a point on the horizon, or to two opposite points (cirrostratus and cirrocumulus often take part in the formation of these bands).

2. **Cirrocumulus (Cc.).**—A cirriform layer or patch composed of small white flakes or of very small globular masses, without shadows, which are arranged in groups or lines, or more often in ripples resembling those of the sand on the sea shore (see C_H 9).

In general cirrocumulus represents a degraded state of cirrus and cirrostratus both of which may change into it. In this case the changing patches often retain some fibrous structure in places.

Real cirrocumulus is uncommon. It must not be confused with small altocumulus on the edges of altocumulus sheets.

3. **Cirrostratus (Cs.).**—A thin whitish veil, which does not blur the outlines of the sun or moon, but gives rise to halos (see C_H 5, C_H 6, C_H 7, C_H 8).

Sometimes it is quite diffuse and merely gives the sky a milky look; sometimes it more or less distinctly shows a fibrous structure with disordered filaments.

4. **Altopcumulus (Ac.).**—A layer (or patches), composed of laminae or rather flattened globular masses, the smallest elements of the regularly arranged layer being fairly small and thin, with or without shading (see C_M 3, C_M 4, C_M 5, C_M 6, C_M 9).

* Most altocumulus and stratocumulus clouds come under category b; but the varieties cumuliformis and particularly castellatus belong to category a.

These elements are arranged in groups, in lines or waves, following one or two directions and are sometimes so close together that their edges join.

The thin and translucent edges of the elements often show **irisations** which are rather characteristic of this class of cloud.

5. Altostratus (As.).—Striated or fibrous veil, more or less grey or bluish in colour (see C_M 1, C_M 2, C_M 7).

This cloud is like thick cirrostratus but without halo phenomena; the sun or moon shows vaguely, with a faint gleam, as though through ground glass. Sometimes the sheet is thin with forms intermediate with cirrostratus (altostratus translucidus). Sometimes it is very thick and dark (altostratus opacus), sometimes even completely hiding the sun or moon. In this case differences of thickness may cause relatively light patches between very dark parts; but the surface never shows real relief, and the striated or fibrous structure is always seen in places in the body of the cloud.

6. Stratocumulus (Sc.).—A layer (or patches) composed of globular masses or rolls; the smallest of the regularly arranged elements are fairly large; they are soft and grey, with darker parts (see C_L 4, C_L 5 (lower picture) C_L 7).

These elements are arranged in groups, in lines, or in waves, aligned in one or in two directions. Very often the rolls are so close that their edges join together; when they cover the whole sky—on the continent, especially in winter—they have a wavy appearance.

7. Stratus (St.).—A uniform layer of cloud, resembling fog, but not resting on the ground (see C_L 5 (upper picture)).

When this very low layer is broken up into irregular shreds it is designated fractostratus (Fs.).

8. Nimbostratus (Ns.).—A low, amorphous and rainy layer, of a dark grey colour and nearly uniform (see C_L 6).

It appears as though feebly illuminated seemingly from inside. When it gives precipitation it is in the form of continuous rain or snow.

But precipitation alone is not sufficient criterion to distinguish the cloud which should be called nimbostratus even when no rain or snow falls from it.

There is often precipitation which does not reach the ground; in this case the base of the cloud is always diffuse and looks "wet" on account of the general trailing precipitation, *virga*, so that it is not possible to determine the limit of its lower surface.

9. Cumulus (Cu.).—Thick clouds with vertical development; the upper surface is dome shaped and exhibits rounded protuberances, while the base is nearly horizontal (see C_L 1, C_L 2, C_L 7, C_L 8 (lower picture)).

When the cloud is opposite to the sun the surfaces normal to the observer are brighter than the edges of the protuberances. When

the light comes from the side, the clouds exhibit strong contrasts of light and shade; against the sun, on the other hand, they look dark with a bright edge.

True cumulus is definitely limited above and below; its surface often appears hard and clear cut. But one may also observe a cloud resembling ragged cumulus in which the different parts show constant change. This cloud is designated fractocumulus (Fc.).

10. Cumulonimbus (Cb.).—Heavy masses of cloud, with great vertical development, whose cumuliform summits rise in the form of mountains or towers, the upper parts having a fibrous texture and often spreading out in the shape of an anvil (see C_L 3, C_L 8 (upper picture), C_L 9).

The base resembles nimbostratus, and one generally notices *virga*. This base has often a layer of very low ragged clouds below it (fractostratus, fractocumulus).

Cumulonimbus clouds generally produce showers of rain or snow and sometimes of hail or soft hail, and often thunderstorms as well.

If the whole of the cloud cannot be seen the fall of a real shower is enough to characterise the cloud as a cumulonimbus.

As compared with the specifications set out in the first International Cloud Atlas (reprinted in early editions of this handbook) the most important new features are the omission of "nimbus" and the inclusion of the new type "nimbostratus".

In addition to *families* and *genera* which suffice for the broad classification of cloud forms, the new International Atlas also recognises *sub-genera*, *species*, *varieties* and *casual details* to which distinguishing latin adjectives are applied for purposes of more precise differentiation.

For details of these sub-classifications reference should be made to the Atlas. It is proposed, in this handbook, to refer only to the varieties which are already so well known that their names have come into general use. These are distinguished by the adjectives "cumuliformis," "lenticularis," "castellatus" and "mammatus."

Cumuliformis.—Various types of clouds, particularly cirrus, altocumulus and stratus may in certain circumstances assume a rounded appearance resembling cumulus. The adjective "cumuliformis" is added to the name of the cloud to indicate this condition (e.g., stratus cumuliformis).

Lenticularis.—Groups of cirrocumulus, altocumulus and stratocumulus, sometimes show an ovoid form with sharp edges, resembling the cross-sections of a lens. The adjective "lenticularis" is added to the name of the cloud to indicate this structure (e.g., altocumulus lenticularis) (see C_M 4).

Castellatus.—Added to the name altocumulus to indicate the turreted or crenellated appearance sometimes assumed by individual cloudlets of middle height, usually in summer (see C_M 8).

Mammatus.—The lower surface of certain cloud sheets sometimes forms pouches or breasts. This structure is distinguished by the adjective “mammatus” or the prefix “mammato,” *e.g.*, “cumulonimbus mammatus.”

Remarks on the classification of clouds.—The problem presented to those who classify clouds is of a dual character. There are first the forms of individual clouds, stratus, cumulus and cirrus, while the other forms are really aggregates, or groups of clouds or cloudlets, arranged sometimes in a continuous mass, sometimes in rows or waves, not infrequently in double or even triple sets of waves. There are all sorts of gradations, from the dappled mackerel sky of cirrocumulus to the altocumulus, often with a dense central portion and separate clouds on the margins, the irregular masses of stratocumulus, and finally the continuous strata which are to be found at various different levels—low, intermediate, and high. We can hardly exclude the continuous stratus itself from consideration as a group or aggregate, because when it thins it breaks up into detached clouds.

Lenticular, lentil-shaped or almond-shaped clouds have attracted some attention in recent times. They have a peculiar outline. In many cases they are very suggestive of an airship, and are perhaps the clouds in “Hamlet” which are “very like a whale.” In others the inner part of the cloud becomes very thin, or disappears, so that the shape looks like a large horse-shoe as seen from beneath at a great distance. Photographs and eye observations show that the bank of clouds which keeps its position with little apparent change is really composed of a mass of cloudlets, forming and drifting into the cloud bank with the wind at one side and drifting away from it and dissolving at the other. Thus the stationary appearance of the cloud bank is illusory as regards the wind. The wind blows through the cloud bank, which is formed by the massing of the drifting cloudlets. The cloudlets belong apparently to the type of altocumulus or cirrocumulus. Upon two examples of this type of cloud Mr. Clarke remarks as follows:—“Very often the intermediate clouds of the cirrocumulus, altocumulus and stratocumulus types may be seen massed together in long oval or torpedo-shaped sheets. These are termed lenticular clouds from the resemblance of their form to that of the cross-sections of a lens. These lenticular masses are found sometimes detached but at other times cover the sky in dense sheets at several different levels, and are generally seen when the wind is blowing from some point in the south-west quadrant. The following conditions are found to accompany their appearance: (1) the sky, when visible, is usually of a very intense blue colour; (2) the barometer is exceedingly unsteady, rising and falling jerkily at very short intervals of time; (3) the wind is usually strong or high and of a very gusty character, and in addition there is a periodic rise and fall in its average velocity. At times the lower clouds, such as cumulus and stratus, are seen to

assume a somewhat similar form in quiet weather, but in such cases the conditions above mentioned will be absent.”

The term “mammatus” was formerly associated exclusively with cumulus but mammatus structure is frequently observed on the under surface of an anvil of so-called “false cirrus” (now called cirrus nothus) projecting from a mass of cumulonimbus. A structure to which the name mammatus is appropriate, though differing somewhat from the typical form, is also sometimes seen beneath sheets of stratus and altostratus. The characteristic “cumulonimbus mammatus” has a peculiar heavy and ominous appearance.

A word must be added about cirrus. It is generally understood to be not only a cloud of thread-like structure, as its name implies, but at the same time a very high cloud, its normal height being about 9 Km., or nearly 30,000 ft. No doubt the best and most durable examples are to be found at those great heights, but thread-like clouds, indistinguishable in appearance from wisps of true cirrus, may be found at much lower levels just as the cirrus nothus is formed at various heights. C. K. M. Douglas, from close observation in an aeroplane, expresses the opinion that masked thread-like structure is always attributable to clouds formed of ice crystals, and if that be the properly distinctive characteristic of the thread-like structure, it only hampers our conception of the atmospheric processes if we assume all clouds which show that structure to be at a very high level. The form resembles trails of falling precipitation, and it is possible that the fall of the particles relative to the air (itself often rising) tends to produce a fibrous structure in the cloud. Ice crystals are much larger than most water particles (other than rain-drops) and tend to fall faster and further without evaporating. Clouds which are definitely fibrous have a considerable vertical extension, but in cold weather they may exist entirely below 4 Km. Very thin delicate layers of cloud (often high) may sometimes appear wisp-like, especially under the influence of perspective, but this structure is different from the true fibrous type. These delicate layers often show iridescence when near the sun or moon, indicating that they are almost certainly not composed of crystals.

For the purpose of reporting clouds for synoptic observation the following codes are used:—

CODE FOR FORM OF LOW CLOUD (C_L)

Code Figure	Form of Cloud
0	No low clouds.
1	Fair weather Cu.
2	Large Cu. without anvil.

CODE FOR FORM OF LOW CLOUD (C_L)—continued

Code Figure	Form of Cloud
3	Cb.
4	Sc. formed by the spreading out of Cu.
5	Layer of St. or Sc.
6	Ragged low clouds of bad weather (or fracto-nimbus).
7	Fair weather Cu. and Sc.
8	Large Cu. (or Cb.) and Sc.
9	Large Cu. or Cb. and ragged low clouds of bad weather.

CODE FOR FORM OF MEDIUM CLOUD (C_M)

Code Figure	Form of Cloud
0	No medium clouds.
1	Typical As. (thin).
2	Typical As. or Ns. (thick) Sun or Moon invisible.
3	Single layer of Ac. or high Sc.
4	Ac. in isolated bands. Individually decreasing (often lenticular).
5	Ac. in bands (increasing).
6	Ac. formed from the spreading out of Cu.
7	Ac. associated with As. or As. with parts resembling Ac.
8	Ac. castellatus (or Ac. in ragged fragments).
9	Ac. in several layers generally associated with fibrous veils and a chaotic appearance of the sky.

CODE FOR FORM OF CIRRUS CLOUD (C_H)

Code Figure	Form of Cloud
0	No cirriform cloud.
1	Fine Ci. not increasing ; sparse.
2	Fine Ci. not increasing ; abundant but not a continuous layer.
3	Anvil Ci. (usually dense).
4	Fine Ci. increasing ; usually in tufts.
5	Ci. or Cs. increasing ; still below 45° altitude : often in polar bands.
6	Ci. or Cs. increasing and reaching above 45° altitude ; often in polar bands.
7	Veil of Cs. covering the whole sky.
8	Cs. not increasing and not covering the whole sky.
9	Cc. predominating, and a little cirrus.

Examples of each code figure are given in the following pages, with brief notes about the clouds shown in the photographs, and also the plotting symbol which represents the cloud on the synoptic working charts used by forecasters.

It is clear from the descriptions of the code figures given under the various photographs that to describe the sky at a station at a particular time logically and completely it is not enough merely to know the type of clouds present ; for example altocumulus appears in seven code figures and cirrus in nine. The code figures, as the descriptions show, are not so much a dry statement of the types of clouds in the sky, as a general indication of the structure and evolution of the visible sky as a whole. For example C_M 9 is a thundery sky ; in thundery conditions degenerate cloud forms are seen which are difficult to classify, but the thundery look of the whole sky is apparent at once and without any doubt.

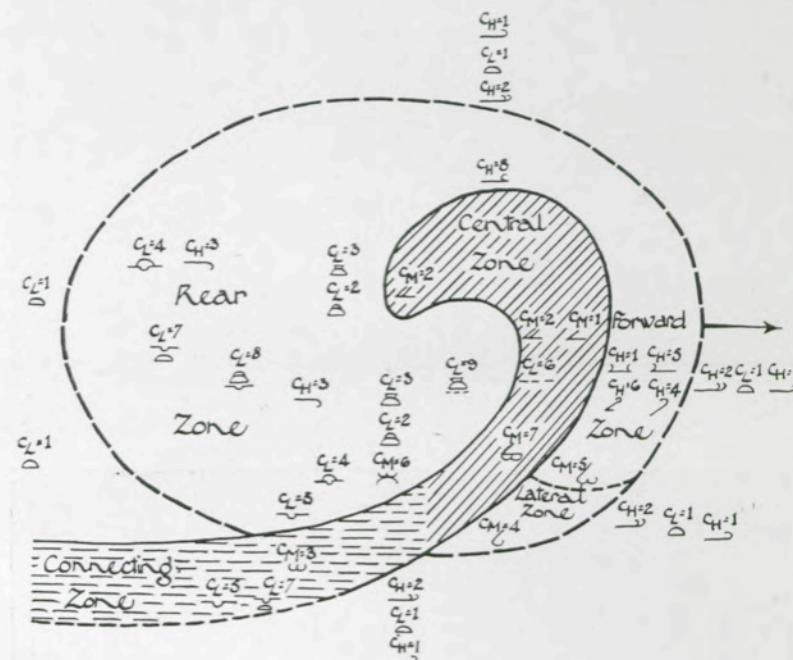
The detailed analysis of the individual clouds should follow and not precede the observations of the sky as a whole. If the observer gets used to this course he will find in a short time that the different types of sky, low, medium and high, corresponding with the code, will seem just as "live" as the typical cloud forms, and it will be just as easy to identify a type of sky as the form of a cloud.

To make an observation of cloud it is necessary to do more than survey the sky while walking to the instrument enclosure. The aspect of the sky is continually changing. It is relatively rare for

the observer to see typical clouds of one type; in most cases he will find he has difficulties at the time of observation if he has not taken the trouble to watch the evolution of the sky since the last observation. If, however, he has been able to keep it in view he will often be able to refer an indefinite type of sky, or a particular cloud to a previous formation which was typical and easy to identify. Moreover the specification of many of the code figures depends on evolution. If two figures seem to be equally applicable, the observer should in general select the higher figure rather than the lower, but he must remember that if cumulonimbus cloud is present the figure for C_L must be reported as either 3, 8 or 9.

The observer must remember that it is only when he does his job properly that the forecaster is able from his and other observers' reports to get a correct picture. It is the task of the forecaster to become instinctively aware of the aspect of the sky associated with the code figures (and plotted symbols), so that the arrangement of the symbols on the map will convey a picture to his mind of the whole skyscape. This can only be accomplished by long practice. The first step is patient observation and the deliberate classification of skies. The diagram on the opposite page is intended to assist the forecaster and it should be memorised, but it must not be used as a "rule of thumb." The forecaster must endeavour to derive from the actual symbolic synoptic maps his mental picture of the weather moving and developing over the earth's surface.

SCHEMATIC DISTRIBUTION OF THE SKY AND CLOUDS ROUND A DEPRESSION.



This diagram represents broadly the distribution of clouds in a depression arriving from the west in western Europe. There are considerable variations from the typical case. For example, it sometimes happens that the rear zone is much more extensive and may persist with secondary variations for several days over the same region.

NOTES.

- (1) Fractocumulus may occur practically anywhere in the rear zone.
- (2) The symbols for high cloud are reproduced above in black. On charts they are in red.
- (3) The specification $C_M 8$ applies to the clouds in the forward and lateral zones and $C_M 9$ to the clouds in the central zone of a thunderstorm depression (in the British Isles usually spreading from the south in summer). They are not shown on this diagram of the distribution in a normal depression.



Photo by the Office National Météorologique, Paris



Photo by G. A. Clarke

C_L1 ☼ Fair weather cumulus. The clouds look rather like cauliflowers. The bases tend to be flat and to be at a uniform level. They are scattered and have a flat and deflated appearance, even when convection is greatest in the early afternoon. Their horizontal extension is greater than the vertical. The words "Fair Weather" are not to be interpreted as a forecast; they refer to the weather at the time, and imply that there is no evidence in the sky of precipitation at the time in the neighbourhood.



Photo by the Office National Météorologique, Paris



Photo by the Meteorologisch-Magnetisches Observatorium, Potsdam

C_L2 ☼ Large cumulus without anvil. The difference between these and the fair weather cumulus is that the tops of the clouds instead of remaining rounded (and apparently quiescent) begin to bulge upwards and "rising heads" appear. These can be seen clearly in both pictures. Their edges are still well defined and are not softening at the top into cirrus cloud. In the upper picture there is a patch of thick lenticular cirrostratus. This originated from the anvil of a cumulonimbus (see C_L 3). If this cumulonimbus were still in the sky, the code figure would be 3 and not 2, even though a large amount of cumulus without anvil were present.

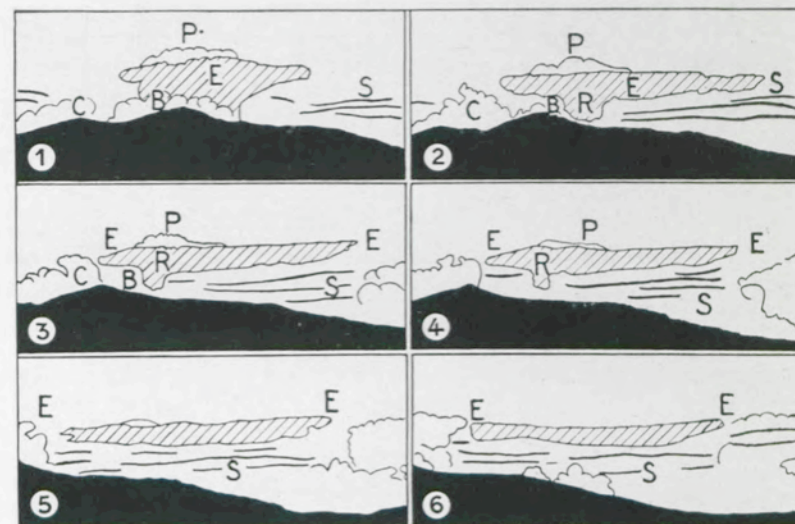


Photo by C. J. P. Cave



Photo by C. J. P. Cave

C_L3 ☼ Cumulonimbus. Seen at a distance the cumulonimbus is easily recognised by its veil of false cirrus so well shown in the lower photograph. From beneath, however, the clouds will appear heavy and lowering and heavy rain or hail will fall from them. The upper picture shows an anvil with cirrostratus blowing forward from the top of the cloud. (Do not confuse C_M 6 with anvil cloud. In C_M 6 the cloud which looks anvil shaped is lumpy like cumulus and not uniform like a mass of cirrus.)



Reproduced from the International Atlas of Clouds

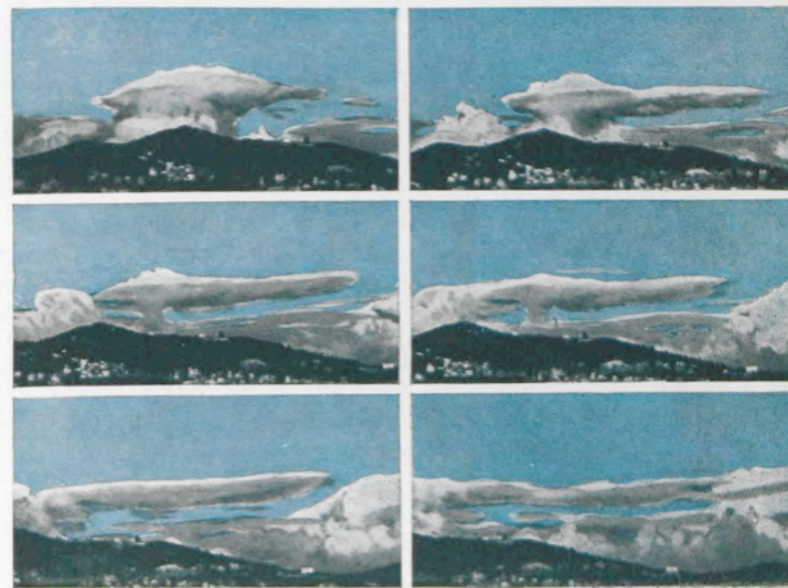


Photo by the Fundació Concepció Rabell, Barcelona

C_L4 ☼ Stratocumulus formed by the spreading out of cumulus. This cloud is formed in two ways : (a) during the day when there is a stable layer or an inversion which the convective cumulus clouds reach and cannot penetrate ; (b) in the evening when convection weakens, with or without an inversion above the cumulus. It is most common in the evening.

"The time from the beginning to the end of the series shown is 20 minutes. 1. It is clear that the top of the cloud that is growing out is of the rounded cumulus type (B) without any cirriform parts. The spreading out has been at (E) and the head of the cumulus has penetrated the extension at (P). 2. (P) has developed a little, but (B) is decreasing and (E) which is increasing in extent, is beginning to separate off, so that the extreme base of the cloud (R) is now seen. 3. (P) grows smaller, (B) has completely settled down and is detached at (R), while (E) is still developing in extent. 4. (P) has completely settled down, (R) is melting away, (E) is completely independent. 5 and 6. There is no longer any trace of (P) or (R) while (E) is fully formed : notice the pendant shreds of cloud on the lower surface. On all the photographs other bands of stratocumulus may be seen in the distance which are being drawn out into stratus ; they probably originated in the same way."



Photo by G. H. D. Evans



Photo by G. A. Clarke


C_L5  Layer of stratus or stratocumulus. As will be seen from the pictures above, code figure 5 covers two very different clouds, the stratus of lifted fog and the stratocumulus which itself may present a great diversity of type. For example stratocumulus may consist, as in the lower illustration, of wave-like lines of cloud with or without interstices; sometimes the "waves" can only just be distinguished, on other occasions the cloudsheets is broken up into cloudlets. Stratocumulus is often a dark cloud, particularly in winter, but it may be fairly light—usually when it is at a fairly high level. (If it is very high it is reported as C_M3.) It should be noted that the cloud does not necessarily cover the whole sky.



Photo by G. A. Clarke



Photo by G. A. Clarke


C_L6  Ragged low clouds of bad weather. These low clouds, fractostratus or fractonimbus, often show up very dark against the relatively lighter background of altostratus or nimbostratus. The lower picture shows typical scud (fractostratus) below a background of nimbostratus; the upper picture shows, perhaps, a less typical example but nevertheless one in which the ragged low clouds are the predominant features.



Photo by G. A. Clarke



Photo by C. J. P. Cave



Photo by F. W. Baker

C_L 7 ☼ Fair weather cumulus and stratocumulus. The stratocumuli are at different levels and are independent. The sky is distinguished from C_L 6 or C_L 9 by the two factors: (a) that the upper of the two clouds is stratocumulus and not altostratus, nimbostratus or cumulonimbus; (b) that the lower of the two clouds is cumulus and not fractostratus or scud. In the photographs the tops of the cumulus do not reach up to the stratocumulus level. This shows that the sky is neither a C_L 4 sky nor a C_L 8.



Photo by G. A. Clarke


C_L 8 ☼ Large cumulus (or cumulonimbus) and stratocumulus. In this type convection beneath the cloud has reached a greater development than in C_L 7 and the cumulus clouds reach right up to the stratocumulus layer.



Photo by R. A. F., Delling



Photo by G. A. Clarke

C_L9  Large cumulus (or cumulonimbus) and ragged clouds of bad weather. Beneath the base of large cumuliform cloud may often be seen scud clouds. The cumuliform cloud may be either due to intense local convection or to instability at a cold front. In the latter case, as is illustrated in the upper picture, the ragged low clouds may take the form of a roll cloud accompanying the squall. The roll may be separated or it may be joined to the cumulonimbus.

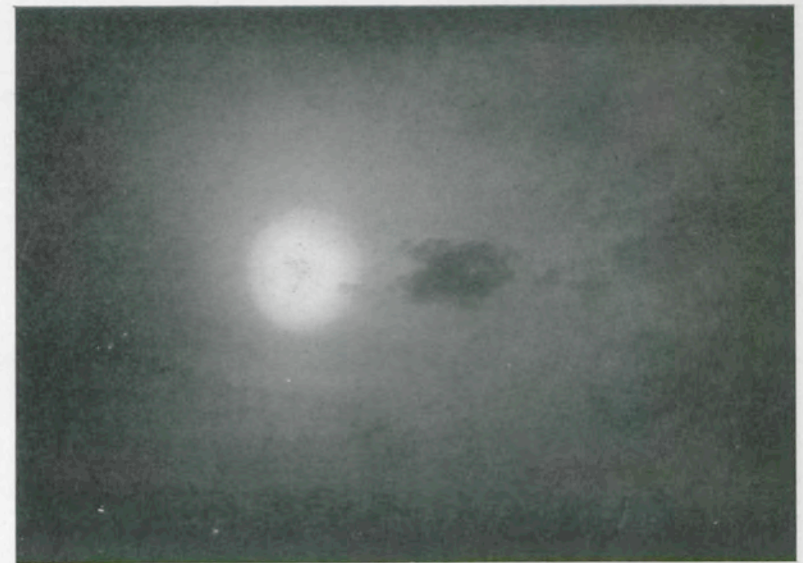


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
C_M1  Typical altostratus (thin). This is a darkish veil usually covering the whole sky, though not always. It looks rather like a thinly fogged photographic plate. The sun or moon appears as though shining through ground glass and does not cast a shadow. Halo phenomena are not seen in altostratus. A sheet of this cloud resembles thick cirrostratus (see C_{II} 7) from which it is often derived.



Photo by G. A. Clarke


C_M2  Typical altostratus (thick) (sun and moon invisible) or nimbostratus. The sun and moon are generally hidden or are indicated only by the lighter colour of one part of the cloud. Typical thick altostratus can be formed either by a thickening of thin altostratus or by the fusing together of the cloudlets in a sheet of altocumulus. The picture illustrates an example rather on the thin side; in many cases the lightness will be less evident or will not appear at all.



Photo by G. A. Clarke

C_M3 ☽ Single layer of altocumulus or high stratocumulus. Altocumulus often looks like sheep's fleeces. This type generally forms a single layer; it is fairly regular, and of uniform thickness, the cloudlets always being separated by clear spaces or lighter gaps; the cloudlets are neither very large nor very dark. This layer is generally fairly persistent, it does not change or disappear quickly. Cases of altocumulus which are so dense that the waves do not show lighter parts should be reported as C_M 7.



Photo by G. A. Clarke

C_M4 ☾ Altocumulus in isolated patches—often lenticular. The cloudlets may be as small as cirrocumulus, but lenticular altocumulus shows delicate colouring (iridisation). Where this is so, the clouds are often scattered over the sky quite irregularly and may be at different levels. Though individually they may be changing, the amount of cloud over the whole sky generally remains about the same.



Photo by Lindenberg Observatory

C_M5 ☾ Altocumulus in bands (increasing). In this type either the bands are great elongated masses, sometimes appearing rather dark, often of a roughly lenticular shape, or the ordinary altocumulus waves are crossed by blue lanes, so that they appear like bands (with the waves across the bands). An essential feature of this type is that the sky becomes more and more covered. Often the layer thickens up as in the photograph or has another layer of cloud lower and darker forming beneath it.



Photo by G. A. Clarke

C_M6 ☾ Altocumulus formed from the spreading out of cumulus. Cumulus clouds of sufficiently great vertical development may undergo an extension of their summits while their bases may gradually melt away. The process is similar to that of C_L 4 but at a higher level. The cloud which looks anvil-shaped must not be confused with C_L 3.



Photo by C. J. P. Cave

C_M7 ☞ Altocumulus associated with altostratus or altostratus with parts resembling altocumulus. Different types are comprised in this section. There may be two definite layers of altostratus and altocumulus or the altocumulus may be thickening into altostratus by the cloudlets fusing together or altostratus may break up into altocumulus. Cases of altocumulus, which are so dense that the waves do not show light parts (wrinkled altostratus), should be classed as C_M 7.



Photo by G. A. Clarke

C_M8 M Altocumulus castellatus (or altocumulus in ragged fragments). The character common to these types of altocumulus is vertical development, a turret or a dome shape. These clouds are often the precursors of thunderstorms. Altocumulus castellatus is composed of small cumuliform masses with more or less vertical development, but scattered tufts, white or grey, without definite shadows, and with the rounded parts very slightly domed should also be included as C_M 8.



Photo by the Office National Météorologique, Paris

C_M9 ☞ Altocumulus in several layers generally associated with fibrous veils and a chaotic appearance of the sky. The sky has a disordered heavy, and stagnant appearance. It is very complex with patches of medium cloud more or less fragmentary, superposed, often badly defined and giving all the transitional forms between low altocumulus and the fibrous veil.



Photo by the Fundació Concepció Rabell, Barcelona

C_H1 — Fine cirrus not increasing; sparse. Wisps of cloud at a very high level; they may be scattered over a large part of the sky but they do not amount to very much; the amount does not increase noticeably either in time or in any particular direction.

The clouds do not collect into sheets and bands, and there is no tendency for the elements to fuse together into masses of cirrostratus. The cirrus cloud whose strands end in an upturned hook or tuft must not be included in this class.



Photo by G. A. Clarke

C_H2 — Fine cirrus not increasing; abundant but not a continuous layer. The definition of this type is the same as the preceding, with the exception that in this type the cirrus is more abundant over the whole sky, but without any tendency to increase in any particular direction.



Photo by G. A. Clarke

C_H3 — Anvil cirrus (usually dense). This cirrostratus is usually seen at the top of a thunder cloud—it looks like a dense white mass, and as the cloud develops the cirrus shoots upwards and outwards and has the appearance of an “explosion.” Frequently it is blown away in a stronger wind and makes the cloud look like a great anvil in the sky (see C_L 3). Sometimes the cirrus gets entirely separated from the thunder cloud and then appears as rather dense separate white masses.



Photo by the Fundació Concepció Rabell, Barcelona

C_H4 — Fine cirrus increasing; usually in tufts. This type of cirrus which is often in the form of streaks ending in a little upturned hook or in a small tuft, increases in amount both in time and in a certain direction. In this direction it reaches to the horizon where there is a tendency for the cloud elements to fuse together, but the clouds do not pass into cirrostratus.



Photo by G. A. Clarke

C_H5 ㄣ Cirrus or cirrostratus increasing; still below 45° altitude; often in polar bands. Sheet of fibrous cirrus partly uniting into cirrostratus, especially towards the horizon in the direction where the cirrus strands tend to fuse together; the cirrus is often in a herring-bone formation or in great bands converging more or less to a point on the horizon. In this class is also included a sheet of cirrostratus which does not cover the sky and is below 45° altitude.



Photo by G. A. Clarke

C_H6 ㄣ Cirrus or cirrostratus increasing and reaching above 45° altitude; often in polar bands. The definition of this type is the same as the previous one, with the exception that the cloud reaches more than 45° above the horizon. (N.B.—Altitudes if not measured instrumentally are deceptive; it is common to over-estimate a point in the sky. A point at 30° altitude will appear to be about 45° altitude.)



Photo by G. A. Clarke

C_H7 ㄣ Veil of cirrostratus covering the whole sky, either (a) a thin uniform nebulous veil, sometimes hardly visible, sometimes relatively dense, always without definite detail, but producing halo phenomena round the sun and moon; or (b) a white fibrous sheet with, more or less clearly defined fibres, often like a sheet of fibrous cirrus from which indeed it may be derived.



Photo by G. A. Clarke

C_H8 ㄣ Cirrostratus not increasing and not covering the whole sky. This is a case of veil or sheet cirrostratus reaching the horizon in one direction but leaving a segment of blue sky in the other direction; this segment of blue sky does not grow smaller, otherwise it would be reported as C_H 5 or C_H 6. Generally the edge of the sheet is clear-cut and does not tail off into scattered cirrus.



Photo by G. A. Clarke

CH9 ☞ Cirrocumulus predominating, and a little cirrus. Cirrocumulus is a wavy type of "mackerel" sky with a delicate fine structure. Cirrocumulus is not to be confused with small altocumulus. There must be either evident connexion with cirrus or cirrostratus, or the cloud observed must result from a change in cirrus or cirrostratus.

Cirrocumulus may occur with any of the types 1 to 8.

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