Cloud observations and coding

Observers still provide most of the high-quality cloud information. However, output from laser cloud-base recorders can help (see pages 9 and 12). More detailed information on cloud identification is available online at **www.metoffice.com/bookshelf/clouds/index.html**

Here is an 'ABC' to help with cloud observing:

Amount **B**ase height, type **C**oding up

Amount

Reported as oktas (eighths) of the sky covered by cloud.

- Imagine the whole sky is divided into quarters, then eighths (as shown below in the 360° panoramic view).
- Decide how much of the sky is covered by cloud in each eighth.
- Add up all eighths to give total cloud cover.

To decide the amount of each cloud type, decide how much sky is covered by that cloud type, as if it were the only type in the sky.

In the example below, the total cloud cover is considered to be about 3 oktas (eighths).

Base height, type

Base height is used with shape and texture to decide cloud type.

The four main cloud classifications	
cirrus	a filament or tuft
nimbus	a rain bearer
stratus	a layer
cumulus	a heap or pile

The prefix *alto*, meaning height, is used for medium-level cloud. These five terms combine to give ten basic cloud types with simple, two-letter abbreviations (see pages 4 to 6).

A nearby mountain or hill of known height can help you work out the cloud-base height for low cloud. If you are unable to work out the cloud-base height for medium or high cloud types, use the guide heights quoted within the appropriate description notes (pages 5 and 6).

For cloud with a lumpy, cumulus-type texture, the apparent size of the lumps can indicate the height of the cloud. By holding your arm outstretched with fingers together, the width of each element can determine its type (low, medium or high).

- **low cloud** three fingers or more
- **medium cloud** about two fingers
- **high cloud** one finger or less

The base height of cumulus clouds can be estimated (but only if the relative humidity is less than 80%) by subtracting the dew-point temperature from the dry-bulb temperature, and multiplying by 400, to give height in feet.

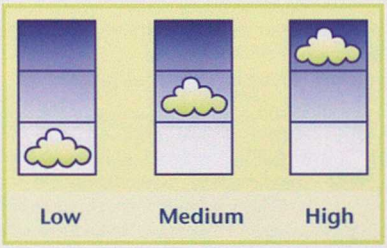
For example: **(12 °C – 8 °C) x 400 = 1,600 feet**

Cloud description tables

A summary of the ten main cloud types is provided on pages 4 to 6. The following symbols are used to indicate the type of precipitation that can fall from each cloud type.

Key to precipitation in cloud description tables	
rain	
drizzle	
snow	
snow pellets	
hail	
ice pellets	
snow grains	

Key for cloud height



Note **Low** clouds are usually only made of water droplets, with clear cloud edges.

Medium clouds are usually only made of water droplets or a mixture of water droplets and ice crystals.

High clouds are usually only made of ice crystals, edges often fuzzy.

Low cloud descriptions

Type/normal base range	Possible precipitation	Cloud features	Colour	Description/notes	Sun/Moon visible?	Code C
Low clouds — usually only made of water droplets, with clear cloud edges						
Cumulonimbus *(Cb)* 1,500-6,000 ft		Cauliflower-like large towers, often with anvil-shaped fuzzy tops	Brilliant white where sunlit, base relatively dark. Can appear very dark, especially with precipitation falling	Heavy, dense, mountain of huge towers. Top can be fibrous and is often flattened into an anvil shape *(the top is made of ice crystals)*. Squally winds common	Can be hidden	9
Cumulus *(Cu)* 1,000-6,000 ft		Small cells, vertical rolls or towers	Brilliant white where sunlit, base relatively dark	Develop vertically — rising mounds, towers, like bulging cauliflowers. Increase in surface temperature will usually lead to rise in base height	Can sometimes be hidden but cloud will be lit from behind	8
Stratus *(St)* Surface to 1,500 ft		Layer or patches	Grey	Uniform base. Can be ragged in patches, especially with precipitation	Can be hidden, although clearly seen when stratus is thin	7
Stratocumulus *(Sc)* 1,000-6,000 ft		Layer or patches	White, some shading	Series of rounded rolls, may be merged, usually regular pattern. Can often form from spreading out of cumulus	Can be hidden when stratocumulus is thick enough	6

Medium cloud descriptions

Type/normal base range	Possible precipitation	Cloud features	Colour	Description/notes	Sun/Moon visible?	Code C
Medium clouds — usually water droplets or a mixture of water droplets and ice crystals						
Nimbostratus *(Ns)* Surface to 10,000 ft		Thick layer	Grey, often dark	Low base. Often diffuse base due to precipitation. Base usually below 7,000 ft in precipitation	Hidden	5
Altostratus *(As)* 7,000 to 16,500 ft		Often thin layer, but can thicken with time	Greyish/bluish, no shadows	Striated, fibrous or uniform sheet, which often covers whole sky. May thicken *(base lowers)* to become nimbostratus. Typical height 15,000 ft	Can be seen through thin altostratus as if through ground glass, otherwise hidden	4
Altocumulus *(Ac)* 7,000 to 16,500 ft	Rarely	Layer or patches. Various types including the lens and turreted varieties	Usually white, sometimes shading	Layer or patches, can be rounded or rolls. Can be distinct or merged. Even if <1 finger, if shaded, must be Ac and if >1 finger but not shaded, must be Ac, rather than Cc. Typical height 10,000 ft	Can be hidden by thick altocumulus	3

High cloud descriptions

Type/normal base range	Possible precipitation	Cloud features	Colour	Description/notes	Sun/Moon visible?	Code C
High clouds — usually made of ice crystals only — edges usually fuzzy						
Cirrostratus *(Cs)* 16,500 to 35,000 ft	None	Thin layer	Transparent, whitish	Thin layer, total/part cover of sky, no structure, diffuse appearance. May thicken to become altostratus. Typical height 25,000 ft	Can often see a halo around Sun/Moon	2
Cirrocumulus *(Cc)* 16,500 to 35,000 ft	None	Often a patch, but can be a layer	White, no shading	Very small lumps, rippled, usually regular pattern. Usually associated with cirrus or cirrostratus. Typical height 25,000 ft	Can usually see position of Sun/Moon	1
Cirrus *(Ci)* 16,500 to 35,000 ft	None	Patches, various types, often dense appearance	White, but coloured when the sun is very close to the horizon	Hooks, filaments, tufts, narrow bands, fibrous, silky sheen. Falling ice crystals can create trails. Typical height 35,000 ft	May be a halo. Dense patches can veil or hide Sun/Moon	0

Coding up

There are several parts to coding up cloud in your synoptic observation.

- Total amount (N) of cloud of ANY type
- Height (h) of the lowest layer of cloud above the station
- Total amount (N_h) at LOW cloud types, or MEDIUM cloud types if there are NO low cloud types
- Types of cloud, of the highest priority, of LOW (C_L), MEDIUM (C_M) and HIGH (C_H) types (e.g. if you can see cumulus and cumulonimbus, you report the cumulonimbus, as it has higher priority)
- Individual cloud layers (amount, type, and base height above the station) of significant amounts:
  - first report the lowest layer of any amount;
  - next, report the lowest layer of at least 3/8;
  - next, report the next-lowest layer of at least 5/8;
  - then report any cumulonimbus that has not already been included in those three layers.

Remember that, for the purposes of coding, a 'layer' refers to each cloud type that appears to be at a similar level. It does not mean that the cloud itself has to be in a layer.

Total cloud amount (oktas/eighths)

Code N	Description
0	No cloud in the sky *(cloudless)*
1	One eighth or less, but not zero
2	Two eighths
3	Three eighths
4	Four eighths
5	Five eighths
6	Six eighths
7	Seven eighths or more, but cloud not covering sky completely
8	Sky totally covered by cloud
9	Sky obscured *(e.g. thick fog)* or cloud amount cannot be estimated
/	No observation

Coding for base height of lowest cloud layer 'h'

Code h	Height of lowest cloud layer above station
0	0 – 149 ft
1	150 – 299 ft
2	300 – 599 ft
3	600 – 999 ft
4	1,000 – 1,999 ft
5	2,000 – 2,999 ft
6	3,000 – 4,999 ft
7	5,000 – 6,499 ft
8	6,500 – 7,999 ft
9	8,000 ft and above or no cloud
/	height unknown *(e.g. base at lower level than station)*

Useful tips

Drizzle is usually produced by stratus but occasionally by stratocumulus.

Showery precipitation is ONLY produced by cumulonimbus and large cumulus.

Occasionally, rain (or rarely snow) reaches the ground from altocumulus castellanus (turreted). Thunder can also occur from this cloud type, mainly in the summer months, when rain can be heavy.

- ALWAYS report height in feet above station.
- ALWAYS report Cb if showers/thunder with hail/snow.

Vaisala CT25K laser cloud-base recorder (LCBR)

Automatic LCBRs are now installed at many synoptic stations and can provide valuable information. However, they do have limitations and the output should always be treated with caution.

Brief guide to CT25K toolbar icons

a. Cloud detection graph — cloud bases only displayed

b. Cloud intensity graph — cloud bases and laser return intensity displayed

c. Backscatter graph — laser backscatter only displayed

d. Combined cloud and backscatter graph — a, b, and c above displayed *(this option can be permanently enabled via the 'Cloud graph settings' menu)*

e. Status of ceilometer — current status of instrument, useful if problems occur

f. Measurement message — text version of graphical display

g. Sky condition window — not used, data already displayed

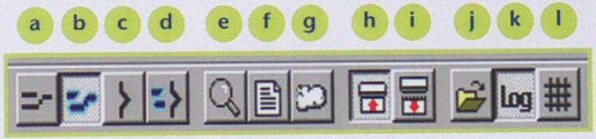
h. Open communications port — leave open at all times

i. Close communications port — not to be activated

j. Open off-line file — open to 'Play' logged files, on a dual-running CT25K program

k. Logging on/off — leave 'On' at airfields

l. Grid on/off — controls the graph background grid



Cloud identification chart

The pictures below will help you to choose the cloud type code C to use for each individual cloud layer.

LOW

© RK Pilsbury

1 Cu of little vertical extent, or ragged Cu other than of bad weather, or both

© RK Pilsbury

2 Cu of moderate or great vertical extent

© Crown

3 Cb without clearly fibrous or striated upper part

© RK Pilsbury

4 Sc formed by the spreading out of Cu

© RK Pilsbury

5 Sc not formed by the spreading out of Cu

© Crown

6 St, or ragged St other than that of bad weather, or both

© CS Broomsfield

7 Ragged St or Cu of bad weather, or both

© Crown

8 Cu and Sc with bases at different levels

© RK Pilsbury

9 Cb with clearly fibrous or striated upper part

MEDIUM


© RK Pilsbury

1 Semi-transparent As


© RK Pilsbury

2 Opaque As or Ns


© CS Broomsfield

3 Semi-transparent Ac predominant


© RK Pilsbury

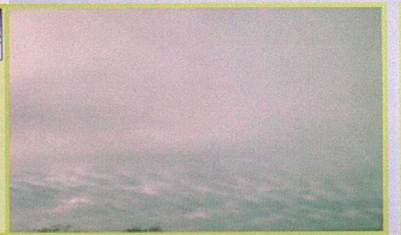
4 Ac continually changing appearance or in the shape of almonds or lenses


© CS Broomsfield

5 Ac invading the sky


© RK Pilsbury

6 Ac formed by the spreading out of Cu or Cb


© RK Pilsbury

7 Ac at two or more levels/mostly opaque Ac/Ac with As or Ns as well


© RK Pilsbury

8 Turreted Ac or Ac in tufts


© RK Pilsbury

9 Chaotic sky

HIGH

1 Ci in filaments or hooks more than other Ci

2 Dense Ci + turreted Ci + Ci in tufts more than other Ci

3 Dense Ci originating from Cb

4 Ci invading the sky

5 Cs not exceeding 45°

6 Cs exceeding 45°

7 Cs covering the whole sky

8 Cs not invading the sky

9 Cc alone or more than any Ci and Cs combined

LCBR settings

- From the 'File' menu make sure that 'Open port' is always ticked.
- From the 'Log' menu make sure that 'On' is always ticked at airfields.
- To configure grid ranges, colours and so on, select the 'View' menu followed by 'Cloud graph settings'.

The minimum range is surface to 2,000 ft. The maximum range is surface to 25,000 ft. The cloud height axis (y) is labelled in thousands of feet (K).

- Make sure you can see the status bar at the bottom of the screen with the current logging and error status. If something goes wrong, the offending status bar window will turn red.
- If the system does not correct itself after a short time, contact the Met Office Helpdesk (0845 300 0300). Click on the 'Status of ceilometer' icon to get details of the fault.

LCBR data logging

At airfields, data are continually being logged to the PC hard drive, in case of an aircraft incident.

- You only need to keep files up to two weeks old. If you are made aware of an aircraft incident, copy the relevant files to CD for future reference.
- Delete 'old files' from the hard drive each month. This will stop it becoming overloaded.

SPOT-ON Observers Guide: Cloud identification v1 3/03
Designed and produced by the Met Office. *02/0303*