

Those white fluffy things

I haven't flown IFR since I lived in Melbourne, which means since 2000. That means that, like those who've never had an instrument rating, my main interest in clouds nowadays is how to avoid them. But even while dodging them, there's quite a lot you can know about the day's weather by looking at the clouds. Here's a very small sample.

The types

There are two types of people in the world: those who divide the world into two types of people, and those who don't. Since I'm one of the former, let's start with dividing clouds into two types – cumuliform and stratiform.

Cumuliform clouds are sometimes small, sometimes big and sometimes monstrous, but generally heaped and fluffy, and they tend to be separated from each other. They're formed by unstable air rising and cooling, and because it cools to the dewpoint at a certain height, the clouds typically have flat bases. So if that's what you see, you know the visibility is probably going to be good because all the smoke and haze and pollution is being carried up and not trapped down low. You also know it may be bumpy, especially near the clouds. If it rains, it will generally be showers. And because the clouds are more often than not separated from each other, often you can duck and weave around them.

Stratiform clouds are flatter, more likely to cover a larger portion of the sky, and indicate a stable atmosphere. If that's what you see, you can expect any smoke or haze to be trapped within a few thousand feet of the ground, and the visibility may not be so great. Rain from these is more likely to be continuous. And to fly VFR, you're more likely to have to be either above them or below them.

High clouds

Another way to divide clouds into groups is by height, and this means the height of their base, not their tops. That's why cumulonimbus, even though they can grow higher than a Dreamliner can fly, are classed as low cloud.

Of the ten main classes of cloud, the three high ones are **cirrus (Ci)**, **cirrostratus (Cs)** and **cirrocumulus (Cc)**. The bases are at least 18,000 feet high (depending on which meteorology textbook you read, you may see slightly different numbers), and being well into sub-zero territory, they're made of ice crystals. They are typically fibrous or hair-like, they're not associated with much weather, and they're too high for us to worry about. Cirrus and cirrocumulus are generally very thin-looking clouds, and the sun shining through cirrostratus often makes a halo.

Mid-level clouds

These are the ones with a base between 8,500 and 18,000 feet (again, numbers are subject to change.) **Alto cumulus (Ac)** are usually rounded clumps of cloud, often in layers covering a lot of the sky. They are formed by air lifting due to turbulence, convection (heating), or orographic lifting (being pushed up by mountains). If they're lenticular (lens-shaped) and sitting on top of a mountain, that's a warning of mountain waves. They often look much like your low-level cumulus cloud, except the lumps are smaller and higher.

Altostratus (As) is another mid-level cloud, that usually has a layered, fairly uniform appearance and covers a lot of the sky. Often it's thin enough that you can see where the sun is. The textbooks usually say the sun appears as through ground glass. I've never ground glass up and looked at the sun through it, and if you haven't either, just think of frosted glass like your bathroom window. Altostratus often tells you a cold front is inbound.

Low clouds

These are the ones we're most interested in, partly because they're the ones we may have to dodge, and also because they're the ones that tell us the most about the weather.

Nimbostratus (Ns) are dark and grey (*nimbo-* implies rain), thick enough to block out the sun, and usually produce heavy continuous rain. They're usually associated with warm fronts, which we don't see a lot of here because they're a higher-latitude phenomenon (remember higher latitude means further from the equator, not further north!)

Cumulus (Cu) clouds are fluffy and usually bright white, separated from each other, with flat bases and cauliflower tops.

Stratus (St) clouds are some shade of grey, in layers, with a fairly uniform base, and covering a lot of the sky. Fog is just stratus cloud with a base of zero feet.

Stratocumulus (Sc) are some shade of grey, with some patches darker than others, in layers with a base that is fairly uniform, but not as defined as the base of cumulus clouds.

Saving the best for last: **Cumulonimbus (Cb)** are thunderstorm clouds. They're heavy and dense, can grow well into the stratosphere, and at the top they sometimes look like an anvil due to the wind blowing their tops along. Avoid. Preferably by a long way.

Some sample photos of each type are below, and if you have some better shots, especially ones taken from the comfort of your cockpit, I'm sure Paul will be happy to fit them into the next edition of Flyabout!



Figure 1: Cirrus



Figure 2: Cirrocumulus



Figure 3: Cirrostratus with halo effect



Figure 4: Altocumulus



Figure 5: Altostratus



Figure 6: Nimbostratus



Figure 7: Stratus



Figure 8: Fair-weather cumulus



Figure 9: Stratocumulus



Figure 10: Cumulonimbus with anvil top