Cloud Types in Flight Simulation

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With Microsoft Flight Simulator now using real-time weather data to produce meteorological conditions around the world, the relevance of weather and cloud types becomes even more important to flight simmers. Microsoft have partnered with Swiss company Meteoblue to map the world's weather patterns. By splitting the world into 250 million boxes which measures wind speed, temperature, pressure and other factors, *Flight Simulator 2020* is now able to replicate real world weather events with amazing accuracy. Even the conditions within hurricanes can now be experienced. With a high level of realism, players can fly directly through the eye of a storm, around the outer edges and even at high altitudes where planes freeze over and de-icing is essential.

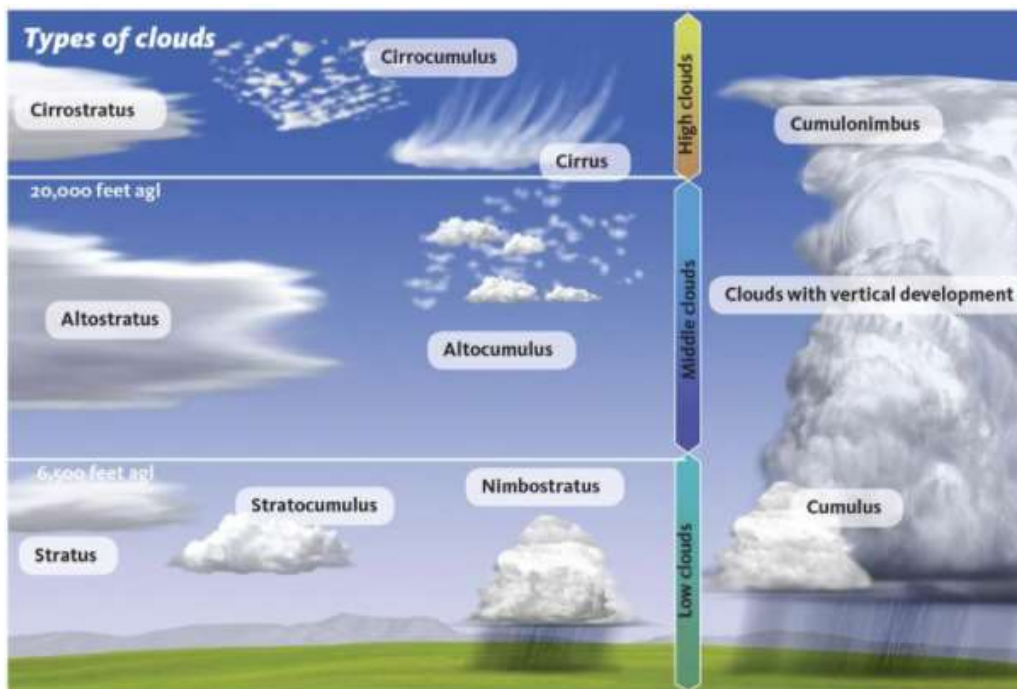Picture: Courtesy of Joe Corrigan

Cloud types provide a valuable insight into weather conditions locally, along the length of a planned route and at your destination airport. In conjunction with Meteorological Aerodrome Report (METARs) and Terminal Aerodrome Forecasts (TAFs) decision making on critical matters such as whether you fly under VFR or IFR conditions – or not at all – are possible. So, knowing what weather conditions align with particular cloud types is essential knowledge for the well-prepared virtual pilot in this latest iteration of *Flight Simulator.*

Cloud types

Clouds are given different names according to their shape and height in the sky. Some clouds are puffy like cotton while others are grey and uniform. Some clouds are near the ground, while other are at extremely high altitudes. Another factor which identifies cloud types is the weather which accompanies them. Clouds are classified broadly into four main categories with ten different types:

- Low level clouds
- Middle level clouds
- High level clouds
- Clouds with vertical development

The diagram on the following page illustrates the different cloud types and the altitudes at which they form and appear.

Low level clouds

Stratus clouds are uniform grayish clouds that often cover the entire sky. They resemble fog that does not reach the ground. Usually no precipitation falls from stratus clouds, but sometimes they may drizzle. When a thick fog lifts, the resulting clouds are low stratus.

Stratus cloud examples

Nimbostratus clouds are the typical "rain cloud". They form a dark grey, wet looking layer associated with continuously falling rain or snow if it's cold enough. They often produce precipitation that is usually light to moderate.

Nimbostratus cloud examples

Clearly these clouds are not conducive to IFR flying and could even provide a turbulent and possibly icy IFR experience.

Middle level clouds

Clouds with the prefix "alto" are middle level clouds that have bases between 6,500 to 23,000 feet. **Altocumulus clouds** are middle level clouds that are made of water droplets and appear as gray, puffy masses, sometimes rolled out in parallel waves or bands. The appearance of these clouds on a warm, humid summer morning often means thunderstorms may occur by late afternoon. From a flying perspective, they should be watched with caution and avoided if possible. They can change quickly and turn a VFR flight into a real challenge.

Altocumulous cloud examples

Altostratus clouds are gray or blue-gray middle level clouds composed of ice crystals and water droplets. These clouds usually cover the entire sky. In the thinner areas of the cloud, the sun may be dimly visible as a round disk. Altostratus clouds often form ahead of storms that will produce continuous precipitation. They should therefore be treated with respect when flying as an indication of what may be ahead of you.

Altostratus cloud examples

High level clouds

Cirrus clouds will have lots of blue sky accompanying them. They are thin and wispy blown by high winds into long streamers. They are considered "high clouds" forming above 20,000 ft. Cirrus clouds usually move across the sky from west to east. They generally mean fair to pleasant weather and a delight to fly in at high altitudes.

Cirrus cloud examples

Cirrostratus clouds cover much more of the sky compared to cirrus clouds. They are thin, sheet like high clouds that often cover the entire sky. They are so thin that the sun and moon can be seen through them, often producing a halo effect.

Cirrostratus cloud examples

Cirrocumulus clouds appear as small, rounded white puffs. The small ripples in the cirrocumulus sometimes resemble the scales of a fish. A sky with cirrocumulus clouds is sometimes referred to as a "mackerel sky."

Cirrocumulous cloud examples

Clouds with vertical development

Cumulus clouds are puffy clouds that sometimes look like pieces of floating cotton. The base of each cloud is often flat and may be only 1000 m (330 ft) above the ground. The top of the cloud has rounded towers. When the top of the cumulus resembles the head of a cauliflower, it is called cumulus congestus or towering cumulus. These clouds grow upward, and they can develop into a giant cumulonimbus, which is a thunderstorm cloud and perilous to fly in

Cumulous cloud examples

Cumulonimbus clouds are thunderstorm clouds that form if cumulus congestus clouds continue to grow vertically. Their dark bases may be no more than 300 m (1000 ft) above the Earth's surface. Their tops may extend upward to over 12,000 m (39,000 ft). Tremendous amounts of energy are released by the condensation of water vapor within a cumulonimbus. Lightning, thunder, and even violent tornadoes are associated with the cumulonimbus.

Cumulonimbus cloud examples

It goes without saying that in the real world flying in or around these clouds should be avoided at all costs. Nonetheless, flight simmers are taking the opportunity to experience this meteorological phenomenon by being virtual storm chasers and flying through the recent Hurricane Laura which hit the Gulf Coast of the USA.

Image: Asobo Studio/Xbox Game Studios via Petri Levälahti/Twitter

References

UCAR: Centre for Science and Education (2020), *Cloud Types*, https://scied.ucar.edu/learning-zone/clouds/cloud-types Accessed 20 October 2020 Accessed 20 October 2020

Sarikas, Christine (2018) *How to Identify the 10 Different Types of Cloud*, https://blog.prepscholar.com/what-are-the-different-types-of-clouds Accessed 20 October 2020

Marshall, Cas (2020) *Microsoft Flight Simulator players are chasing Hurricane Laura*, https://www.polygon.com/2020/8/27/21403992/microsoft-flight-simulator-storm-chasers-hurricane-laura Accessed 20 October 2020.