

Avoiding Thunderstorms

No one should be flying through a thunderstorm. But with good planning and decision making, and free access to MetFlight GA, thunderstorms are easily avoided.

Wind, Icing, and Lightning

All the wind formations you don't want to deal with as a pilot, such as microbursts, wind shear, and tornados can feature in cumulonimbus (Cb) clouds.

With strong updrafts and downdrafts, severe turbulence will occur inside a Cb. Vertical movement can be in excess of 5000 ft per minute in New Zealand – sufficient to tear the wings off an aircraft.

Strong winds, variable in direction and strength, are common at surface level in the vicinity of a Cb. These can be particularly hazardous to aircraft on takeoff or landing.

Flying through a thunderstorm will often lead to moderate to severe icing, especially in the cloud immediately above freezing level.

Only a small percentage of Cb clouds generate lightning, but it can travel a very large distance from its parent cloud.

"If you choose to fly in the vicinity of Cb clouds, say within five kilometres, you risk the possibility of taking a lightning hit," says Greg Reeve, Meteorologist with MetService, based at Ohakea.

"The damage to your aircraft can range from nothing (buy a Lotto ticket!) to complete destruction in worst-case scenarios."

Getting Wet

With a thunderstorm comes precipitation: rain, sleet, snow, and hail. This reduces visibility significantly. It will affect runway surfaces for takeoff and landings. Hail can be a major

hazard to aircraft. While hail in New Zealand is rarely larger than 10 mm, hail stones the size of tennis balls are not unheard of, and they could do significant structural damage to your aircraft.

Planning

The best defence against a thunderstorm is to avoid flying into one in the first place. Fortunately, they're relatively easy to avoid and with free access to MetFlight GA, there's no excuse to be oblivious about where they are.

"While predicting exactly when and where a thunderstorm will occur is based on probability, MetService forecasters know how to recognise the conditions that will trigger the formation of Cb cloud," says Peter Lechner, CAA's Chief Meteorological Officer.

"MetFlight GA will give you the likely timing and location of Cbs, so you know where not to fly."

If there's likely to be Cbs near your destination, or the route you plan to take, decide if you really need to go. If you do, make sure you have an escape plan so you can alter your route to avoid forecast Cb activity. This means carrying extra fuel should you have to divert.

Identifying Thunderstorms

Being able to identify conditions that lead to a Cb forming, recognising the three different stages (cumulus, mature, anvil), and size of a Cb will help you avoid inadvertently flying into a thunderstorm.

The initial (cumulus) stage of Cb development involves updrafts only. Turbulence is light to moderate and most other Cb hazards won't have materialised, although light rain is possible during this stage.

"There is, however, one hazard that may become severe during this stage," says Greg. "And that's airframe icing due to the large super-cooled liquid water droplets being carried aloft into the cloud by the updrafts."

In the mature stage, all the hazards associated with thunderstorms may now exist. At this stage, there will be heavy precipitation at the surface and an anvil will start to form at the top of the cloud.

Once the anvil starts to become glaciated, the Cb has entered its final stage.

"At this point the updrafts cease and the hazards quickly weaken and disappear, often leaving only the anvil behind. This remaining cloud is benign," says Greg.

"Each stage lasts about half an hour, so the total life cycle of an upright, stationary Cb is around 1.5 to 2 hours. However, a thunderstorm rarely forms in isolation. There are usually others in the vicinity at different stages in their life cycles."

Don't Be Afraid to Turn Back

If you get caught en route, and can't fly around a thunderstorm, then either turn around, or land at an alternative aerodrome until the storm passes.

"And thanks to your earlier good planning, you'll have plenty of fuel to get to your alternate aerodrome," says Peter Lechner.

"If the storm is over your destination aerodrome, then hold off, or divert."

Greg Reeve adds, "While many aircraft have been successfully flown through thunderstorms in New Zealand and overseas, there is also a very large number of aircraft that have crashed during the attempt. The MetService's advice is simple: Avoid! Avoid! Avoid!"

Check the Weather

Log in free to Metflight GA to get up-to-date weather information so you can avoid thunderstorms and other weather nasties. ■

Progress on ADS-B

The New Southern Sky project of shifting aircraft flying in controlled airspace to ADS-B is moving quickly. Here's an update.

If you're a regular reader of *Vector*, you'll already know that New Zealand's ageing radar systems will have reached the end of their useful lives by 2021, and are to be replaced with ADS-B (Automatic Dependent Surveillance – Broadcast) technology.

ADS-B will transmit more information more often from each aircraft to air traffic controllers, allowing them a more complete picture of who is doing what in controlled airspace.

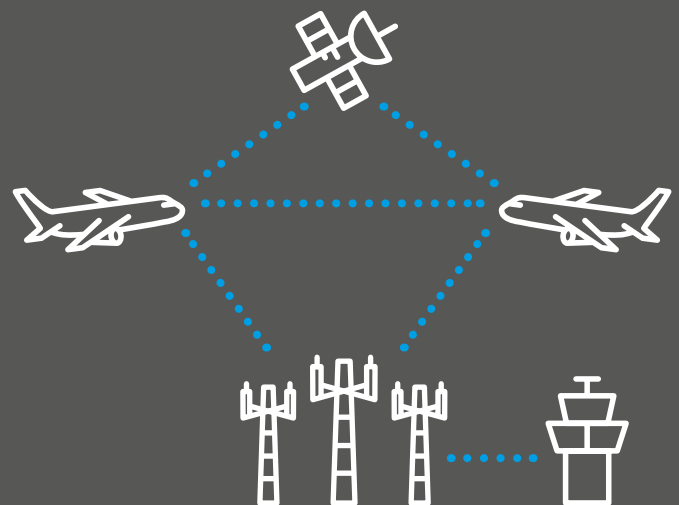
If you fly in controlled airspace, we suggest you read the new FAQs page at www.nss.govt.nz, "Guidance and Advice". It covers everything from the whats and whys of ADS-B through to installation and operational requirements, and offers advice on what to do if you want to equip now.

The CAA is developing a discussion document going out for public feedback in 2017 on the proposed ADS-B mandate for all controlled airspace below FL 245 from 31 December 2021.

The discussion document will consider options for reducing costs as much as possible for General Aviation, and examine the implications for operators with unique concerns, such as gliders, and other aircraft with size, weight, and electronic restrictions.

Airways recently signed a contract with a French company, Thales, to install ground equipment for the \$12 million ADS-B network. Installation work will begin in early 2017.

Cabinet has agreed on the publication of a Notice of Proposed Rule Making (NPRM) for a rule requiring all aircraft flying above FL 245 to be equipped with operational ADS-B from 31 December 2018. If you want your say on the NPRM and associated Advisory Circular, register with our email notification service at www.caa.govt.nz/subscribe. ■



An on-board transponder broadcasts an aircraft's position, altitude, and velocity directly to air traffic control. Richer and more accurate information than that from current transponder systems means more efficient traffic management and improved safety.