

- At any given time, there are an estimated 2,000 thunderstorms in progress, mostly in tropical and subtropical latitudes.
- About 45,000 thunderstorms take place each day.
- Annually, the United States experiences about 100,000 thunderstorms.
- About 16 million thunderstorms occur annually around the world.
- The lightning from these storms strikes Earth about 100 times each second.

Thunder

Nature's Tem



By LCdr. Greg Ireton

As a young AG, I was the duty weather observer one eventful day at good old LPI at Chambers Field, NAS Norfolk. It was common to experience “airmass” thunderstorms during the summer. One in particular provided excitement for me, as well as a C-9B driver.

During the standard display of anger from an afternoon thunderstorm, lightning hit dead on the runway centerline and sent large chunks of concrete flying. Only a few minutes away, a C-9B was on approach. Despite the storm, the pilot said he needed to land. He made a textbook landing, skillfully avoiding the large hole in the runway during rollout.

This flight easily could have ended in disaster if Mother Nature had unleashed her full fury. Thunderstorms present aviators with many meteorological hazards: extreme turbulence and icing, low-level wind shear, microbursts, lightning strikes, and hail. They can spin off tornadoes, flood aircraft engines, and abruptly change altimeter readings on final.

Often called nature’s heat engine, thunderstorms are born from cumulus clouds that grow into towering cumulus and, ultimately, reach adulthood as cumulonimbus. While thunderstorms can occur anytime during the year, they most often occur in the late afternoon to

Thunderstorms: C-9B's Tantrum

early evening on hot summer days. They can form by themselves (single cell, super cell, or airmass), or in clusters (frontal, squall lines, or mesoscale-convective complexes-MCCs). Thunderstorms harness energy equal to—and often greater than—the energy released by the atomic bombs dropped on Japan in World War II.

Turbulence is the greatest meteorological danger to aviation. It is caused by the tremendous updraft and downdraft winds within the thunderstorm. The most severe turbulence is between 8,000 and 15,000 feet AGL. Updraft winds can be greater than 65 feet per second, with roller coaster intensity, but without the

are between 0 and minus 15 degrees Celsius. Supercooled water (that exists at below-freezing temperatures—it's a thermodynamic thing) will freeze on contact with an aircraft. Clear icing can be extremely hazardous, extremely quickly.

Hail is regarded as one of the worst hazards of thunderstorm flying. It usually is found between 10,000 and 15,000 feet AGL, with the greatest frequency of hail at the mature stage. Hail can produce serious structural damage to an aircraft in just a few seconds. It can be found as far as five miles outside and ahead of an advancing thunderstorm.

Microbursts are yet another hazard well-known for bringing down airplanes sooner than expected. They are small-scale, intense downdrafts that, upon reaching the surface, spread outward in all directions. The greatest threat from a downdraft often occurs in the front or leading edge of a thunderstorm. Because of their small size (less than one mile to 2.5 miles), and their short life span (usually less than 15 minutes), downdrafts most often occur over areas without surface precipitation.

Microbursts are not easily detectable, using conventional weather radar or wind-shear alert systems. The intensity of the downdraft can reach 100 feet per second. Horizontal winds near the surface can be as strong as 45 knots, resulting in a 90-knot shear (headwind to tailwind change for a traversing aircraft) across the microburst. A major consideration for pilots is that a microburst will intensify for about five minutes after it strikes the ground.

Refer to the Safety Center's website, www.safetycenter.navy.mil/aviation/articles/thunderstorm.htm, for more information on other hazards. You'll also find do's and don'ts of thunderstorm flying, and you'll learn how to interpret radar echoes on in-flight weather radars. Good luck, and don't forget to get that NATOPS-required weather briefing or to update your brief if thunderstorms are forecasted. 🦅

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Roll cloud. The dark leading edge of a thunderstorm indicates the presence of a gust front, which is caused by a microburst. This feature is also a visual indicator of low-level wind shear.

tracks. Downdraft winds also can produce turbulence, but they usually are less severe and occur below 10,000 feet AGL. Downdrafts can push a plane into the ground, regardless of the presence of a runway.

Icing is another significant hazard associated with thunderstorms. It can occur during all three stages of a thunderstorm, the cumulus or developing stage, mature stage, and the dissipating stage. Icing generally occurs in the mature and dissipating stages, the middle levels of the thunderstorms, where the temperatures