Summer 2026

FAA Safety BRIEFING

A Pilot's Guide to WEATHER

Federal Aviation Administration

U.S. Department
of Transportation

**Federal Aviation
Administration**

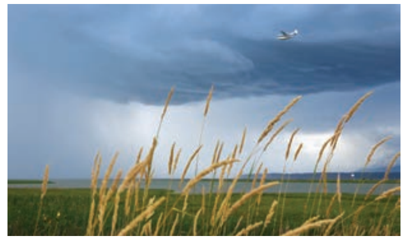
ISSN: 1057-9648
FAA Safety Briefing
Summer 2026
Volume 65/Number 3

Published four times a year, *FAA Safety Briefing* promotes aviation safety by discussing current technical, regulatory, and procedural aspects affecting the safe operation and maintenance of aircraft. Although based on current FAA policy and rule interpretations, all material is advisory or informational in nature and should not be construed to have regulatory effect. Certain details of accidents described herein may have been altered to protect the privacy of those involved.

The Office of Management and Budget has approved the use of public funds for printing *FAA Safety Briefing*.

bit.ly/m/FAASB
www.faa.gov/Safety_Briefing

ABOUT THIS ISSUE...



The Summer 2026 issue of *FAA Safety Briefing* magazine focuses on aviation weather and its critical effect on safe GA flying. Articles review some basic causes of weather activity, how certain conditions can affect pilot safety, and tools you can use to aid your weather decision-making process.

Contact Information

The magazine is available on the internet at:
www.faa.gov/safety_briefing

Comments or questions should be directed to the staff by:

- **Emailing:** SafetyBriefing@faa.gov
- **Calling:** (202) 267-1100
- **Tweeting:** @FAASafetyBrief

Subscription Information

The Superintendent of Documents, U.S. Government Publishing Office, sells *FAA Safety Briefing* on subscription and mails up to four renewal notices.

For New Orders

Subscribe at bookstore.gpo.gov/products/faa-safety-briefing, telephone (202) 512-1800 or toll-free 1-866-512-1800 or scan the QR code on this page.

Subscription Problems/Change of Address

Send your mailing label with your comments/request to Superintendent of Documents, U.S. Government Publishing Office, Contact Center, Washington D.C., 20408-9375. You can also call (202) 512-1800 or 1-866-512-1800 and ask for Customer Service, or fax your information to (202) 512-2104.

FAA Safety BRIEFING

The FAA Safety Policy Voice of Non-commercial General Aviation

DEPARTMENTS

SHARPENING YOUR SUMMER SAFETY WEATHER SKILLS

Summer flying is upon us, and with it, the skies grow even busier. As pilots prepare their aircraft and plan their flights, we highlight the importance of weather awareness and its critical role in ensuring a safe flight.

Longer days and increased flying opportunities are often countered by unique weather challenges. Understanding the intricacies of summer weather patterns, from thunderstorms to turbulence, is vital in ensuring safe and enjoyable flights. This issue of *FAA Safety Briefing* will refresh your memory of important weather essentials and provide helpful strategies for coping with Mother Nature.

Thunderstorms are front and center when it comes to summer flying hazards. In fact, the National Oceanic and Atmospheric Administration estimates that about 100,000 thunderstorms occur each year in the U.S., with 10% reaching severe levels. Given their frequency and potential for damage, it's critical to have a plan to weather the storm. You'll find several thunderstorm avoidance strategies in the article, "Steering Around Storms," including tips on what to do during an in-flight encounter.

Severe weather comes in many forms, and thunderstorms are only part of the picture. In the article "Beyond the Briefing," we take a closer look at several other extreme weather phenomena, such as tornadoes, hail, turbulence, and icing. Avoiding or mitigating different weather hazards requires more than simply reading a meteorological aerodrome report (METAR); it demands a deeper understanding of the atmospheric mechanics to recognize warning signs and steer clear of danger.

While an unplanned encounter with instrument meteorological conditions (IMC) may not seem dangerous, it is deceptive and remains a leading cause of fatal accidents. In the article, "Silver Linings, Silver Bullets, and Other Fictions," we deliver helpful strategies to avoid this scenario.

> **UNDERSTANDING THE INTRICACIES OF SUMMER WEATHER PATTERNS, FROM THUNDERSTORMS TO TURBULENCE, IS VITAL IN ENSURING SAFE AND ENJOYABLE FLIGHTS.**

One of the best strategies for avoiding dangerous weather is to have a high-level view of what drives changes in the atmosphere. In the feature "Air Masses and Fronts" you'll learn about a global perspective on frontal systems and air masses, revealing how these dynamic elements can influence your next flight. By understanding the broader patterns driving weather changes, pilots can make more informed go/no-go decisions.

Speaking of sound decision-making, there's no better way to enhance the safety of your next flight than by performing a proper pre-flight weather briefing. But with the abundance of weather data available, choosing which resources to use (and when) can be a challenge. Cut through the clutter and read "Too Much Weather," with a time-to-flight guide to weather products.

Also in this issue, learn more about the importance of creating and updating your visual flight rules (VFR) flight plans, maintenance tips for combatting corrosion, and the FAA's Weather Camera Program manager, Cohl Pope. As an additional resource, check out the GAJSC's Fly Safe topic on understanding aircraft performance at bit.ly/4dbjjRJ. It provides some important weather-related tips to consider when calculating your aircraft's performance limitations, such as weight and balance and density altitude. These FAA resources should help expand your weather wisdom and guide you in making well-informed decisions before your next flight.

Lastly, the FAA would like to recognize the hundreds of airmen who were honored as FAA Master Pilots and Master Mechanics in 2025. These esteemed awards are a tribute to achieving 50 years of safety and professionalism as a pilot or mechanic. I'd also like to honor this year's National General Aviation Award winners: Flight Instructor of the Year **Mike Kloch**, Aviation Technician of the Year **Roger Whittier**, and FAASTeam Representative of the Year **Mike Jesch**. Please join me in congratulating these men and women for their amazing achievements.

Safe flying!

AVIATION NEWS ROUNDUP

New Measure to Enhance Safety Between Airplanes and Helicopters

The FAA announced a new measure earlier this year to enhance safety in areas where helicopters often cross both arrival and departure paths near busy airports.

The general notice (GENOT), which suspends the use of visual separation between airplanes and helicopters, now mandates that air traffic controllers will instead use radar to actively manage these aircraft to keep them separated at specific lateral or vertical distances. This upgraded safety protocol is based on a yearlong review by the FAA, which used innovative tools to analyze cross-traffic data and incident reports.

Visual separation occurs when air traffic controllers advise pilots of nearby aircraft and allow them to remain visually clear of those aircraft, rather than using standard separation. The FAA's analysis revealed that, in high-traffic areas, visual separation was not an effective safety mitigation.

Many helicopter operators accustomed to obtaining immediate approval to transit through certain areas may have to adjust their flight routes or be delayed while controllers ensure they maintain a safe distance from other aircraft.

When helicopter pilots conducting urgent medical or law enforcement missions request to fly through these heavy-traffic areas, airline operations to those airports may be disrupted to allow these missions priority clearance.

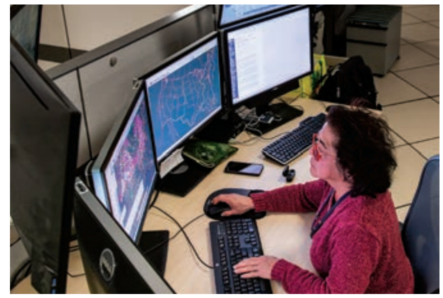
For more information, including a timeline of the actions taken to address this hazard, visit bit.ly/4wny10I.

NOAA Improves Aviation Forecasts to Bolster U.S. Air Travel

The National Oceanic and Atmospheric Administration (NOAA) recently launched a new weather forecast system to improve predictions of two aviation hazards that pose threats to flight safety and cause anxiety among passengers: airplane icing and turbulence.

Covering the contiguous United States, the new Domestic Aviation Forecast System (DAFS) (developed with funding from the FAA's Aviation Weather Research Program) generates more detailed forecasts of evolving icing and turbulence risks, giving pilots real-time intelligence about changing weather conditions along their flight path.

One of the tools provides enhanced forecasts of in-flight icing probability, severity, and supercooled large droplet conditions. Ice buildup can affect the performance and efficiency of propellers and rotors, stability and steering controls, radio antennas, air intakes and more, sometimes with deadly consequences. The risk is especially high in clouds containing supercooled large drops, which can pose a significant danger for some aircraft.



NOAA National Weather Service meteorologists provide thousands of aviation weather forecasts each day.

The program also improves the prediction of several types of turbulence that can cause serious injuries to aircraft occupants and airframe damage and require rerouting of flights. In addition to low-level turbulence, clear-air turbulence, and mountain-wave turbulence, the updated algorithm also predicts turbulence within clouds ranging in size from small storms to large systems.

For more information, visit bit.ly/NOAA_forecast.

Selections for Pilot Program Testing Next-Gen Aircraft

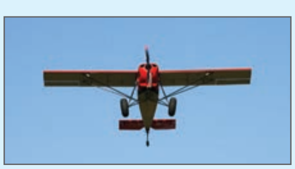
The FAA has selected eight proposals for the brand-new Advanced Air Mobility and Electric Vertical Takeoff and Landing (eVTOL) Integration Pilot Program (eIPP). eVTOLs are futuristic aircraft that have the potential to generate new jobs, connect communities, and strengthen

#FLYSAFE GA SAFETY ENHANCEMENT TOPICS

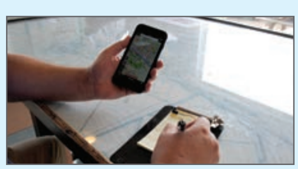
Please visit gajsc.org/flysafe for more information on these and other topics.

GAJSC

JULY
Tailwheel Endorsement



AUGUST
Weather Resources



SEPTEMBER
Advanced Air Mobility

American leadership in aviation.

This first-of-its-kind program is accelerating the safe integration of next-generation advanced air mobility aircraft into the national airspace and ensuring the United States leads the way in aviation innovation.

Together, these pilot projects will create one of the largest real-world testing environments for next-generation aircraft. In addition to offering the American people an exciting window into the future of aviation, the FAA will use data from the pilot projects to develop new regulations that safely enable this technology at scale.

The eight selected projects span 26 states and involve leading aircraft manufacturers, operators, and state partners. They include a range of operational concepts, including:

- Urban air taxi services;
- Regional passenger transportation (including short takeoff and landing aircraft);
- Cargo and logistics networks;
- Emergency medical response operations;
- Autonomous flight technologies; and
- Offshore and energy-sector transportation.

For more information, including details on the specific projects, visit bit.ly/4cWUABI.

50 Years of Turning Safety Reports into Safer Skies

April marked 50 years of NASA's Aviation Safety Reporting System (ASRS) continuous operations. Established to improve national airspace safety, the program has analyzed over 2.3 million reports from pilots, controllers, and mechanics to identify hazards and prevent incidents.

ASRS also disseminates important information from those reports and related products to appropriate authorities and the public at large with the sole intent of improving flight safety. That purpose drives ASRS duties, activities, and products, each beginning with an incident that someone deemed worthy of reporting, regardless of how insignificant it may have appeared.

The next half-century will hold many opportunities for ASRS. Emerging technologies such as drones, electric vertical takeoff and landing (eVTOL) vehicles, and commercial space vehicles are expanding their operations throughout the National Airspace System (NAS). As these and other technologies advance, new safety issues will emerge. ASRS remains robust and poised to identify deficiencies and discrepancies in the NAS. It continues to disseminate critical information to the aviation community, improve flight safety in future systems, and enhance research in human factors and recommendations in all aviation endeavors.

For more information, or to submit a report, visit asrs.arc.nasa.gov.

High Stakes with High Wires

Flying near wires requires focus, planning, and the right tools. For helicopter pilots, wires can be difficult to see, especially in low light or complex terrain — which is why awareness and preparation are so important. To learn more, check out the video "Flying in the Unforgiving Wire Environment" from the FAA's *Rotorcraft Collective*.

You can find this video and the entire playlist at bit.ly/RotorPlaylist.

Radio Frequency Reductions

Based on Federal Register comments received regarding the FAA's intent to decommission the entire remote communications outlet (RCO) infrastructure in the continental United States, Hawaii and Puerto Rico, the FAA has modified its plan. The FAA will reduce the number of radio frequencies used by Flight Service Stations (FSS) to communicate with aircraft inflight and will eliminate 670 redundant RCOs and retain 272 outlets, which will provide adequate coverage for system users.

The reduction will align RCO infrastructure with the decrease in pilot demand for inflight services. The proposal excludes frequencies designated for use in Alaska.

In February 2026, a safety risk management panel determined that all hazards associated with RCO reduction could be safely mitigated.

Visit the Flight Service website at faa.gov/flightservice for the list of frequencies to be retained and those scheduled for removal beginning in fall 2026.

2026 AirVenture Procedures

The FAA published the Oshkosh 2026 Notice — a must-read for anyone flying an aircraft to AirVenture. The document outlines procedures for many types of aircraft that fly to Oshkosh for the event, as well as aircraft that land at nearby airports.

The 2026 procedures once again include ATC-assignable transition points designed to help manage congestion during peak arrival periods. Western transition fixes at Endeavor Bridge, Puckaway Lake, and Green Lake may be activated by air traffic control when traffic volumes warrant. When in use, they will be announced via arrival ATIS and are intended to improve sequencing and reduce holding delays for inbound aircraft.

After transitioning into the arrival flow, pilots are expected to follow the standard Fisk arrival procedure, comply with ATC instructions, and maintain spacing behind preceding aircraft. The arrival system remains one of the most tightly controlled and high-density VFR procedures in general aviation, safely sequencing thousands of aircraft into Oshkosh during the event.

Go to bit.ly/OSHnotice to download the notice and ensure safe operations on arrival and departure.

DR. SUSAN NORTHRUP, FAA FEDERAL AIR SURGEON

A PILOT'S GUIDE TO HYPOTHERMIA AND HYPERTHERMIA

Since the topic of this issue is weather, a refresher on hypothermia (body temperature too low) and hyperthermia (body temperature too high) seems appropriate. Although the relative risk of one versus the other certainly varies with the season, both are potential year-round concerns.

First, a review of the basics. In simplest terms, body temperature reflects the balance between heat produced from metabolic processes and heat lost to the environment. We lose heat through evaporation (sweat and respiration), radiation, conduction, and convection. The latter three can also result in a net gain depending on the environment. The brain's hypothalamus regulates our body temperature. We shiver and constrict peripheral blood vessels (vasoconstriction) when cold. When it is too warm, we sweat and dilate blood vessels (vasodilation), which can cause us to feel faint or actually faint (syncope). Illness, medications (including many that the FAA authorizes for flight duties), and illicit drugs can interfere with thermoregulation, predisposing to either hypothermia or hyperthermia. As the subject of taking precautions with medication for hypothermia and hyperthermia is not typically part of a routine pilot-physician discussion, be sure to ask your doctor about any medications that you might be on and pay attention to your own response to them.

Even mild hypothermia can compromise safety of flight. Initially, the only manifestation is shivering without impact on cognition or functioning. As the core body temperature drops, you may be impaired even if you still feel alert. The key here is to address the problem early, even making a precautionary landing if the problem persists. While most general aviation aircraft have cabin heat available, its effectiveness varies, and the risk of carbon monoxide (CO) inhalation, while low, is always present.

Let's highlight a couple of precautions for using a pulse oximeter (O2 monitor). When you are cold, vasoconstriction is common. As a result, blood flow to the extremities is reduced, and an O2 monitor can show relative hypoxia even though there is adequate oxygenation of central tissues (like the brain). The treatment is to warm up; of course, adding supplemental oxygen won't hurt, but it doesn't address the fundamental problem. In addition, the risk of CO poisoning increases with the use of cabin heat. Not only poisonous, CO also imparts a red tint to the skin that can "fool" a pulse oximeter into a normal reading even when you are hypoxic. If you see readings that look too good (such as 100% at 10,000 feet MSL), be skeptical.

The other side of the coin is hyperthermia. It is not uncommon to see exertional heat illness in athletes, military personnel, and others who engage in strenuous activities. On a hot day, moving an aircraft with a towbar, multiple trips to the FBO (or many flights for instructors), a lack of physical fitness, and/or being overweight can all contribute to hyperthermia and a heat-related illness. Many GA aircraft cabins readily heat up in the summer sun, and most lack air conditioning; as a result, heat exposure can continue until an aircraft reaches altitude. Furthermore, the lack of convenient bathroom access often prompts many pilots to limit their fluid intake, resulting in dehydration. This leads to irritation and poor judgment and increases susceptibility to heat-related illnesses. As noted earlier, illnesses (even with mild symptoms) and various medications can reduce heat tolerance.

So, how is hyperthermia most likely to present itself? Symptoms include disorientation, irritation, headaches, and difficulty concentrating. If these symptoms are present, step back to cool down and rehydrate. Fly during a cooler time of day if possible. I also encourage avoiding multiple flights without a break. One of the challenges of hyperthermia is that even mild cognitive impairment can hinder a person's ability to recognize their own impairment. Prevention and early intervention are key to a safe flight.

Finally, while most flights are local and relatively short, in many parts of the country, relatively hostile terrain can be close. Carry at least some survival equipment appropriate for the season. Don't survive the crash just to succumb to exposure!

Dr. Susan Northrup received a bachelor's degree in chemistry, a medical degree from The Ohio State University, and a master's degree in public health from the University of Texas. She is double board-certified by the American Board of Preventive Medicine in Aerospace Medicine and Occupational Medicine. She is a retired U.S. Air Force colonel and a former regional medical director for Delta Air Lines. She is also an active private pilot and aircraft owner.

FAA SAFETY CENTER FORUMS

July 20–25, 2026

EAA AIRVENTURE OSHKOSH 2026

	08:30 – 09:45	10:15 – 11:30	12:00 – 13:30	14:00 – 15:30	16:00 – 17:00
MONDAY JULY 20	**Decision Making in a Crisis** CDR Kirk Lippold HSLD Aviation LLC WINGS: BK1 AFS0144334	**What Pilots Should Know About Drones** Greg Reverdiau Pilot Institute WINGS: BK3 AFS0144335	**Was That For Us? Being Safe Around Runways** Jenny Settle FAA WINGS: BK2 AFS0144336	**Pilot Biases that Contribute to VFR into IMC** Dr. Ian Johnson FAA WINGS: BK1 AFS0144337	**Flying the Colorado Mountains** Bill Standerfer Colorado Pilots Assoc. WINGS: BK1 AFS0144338
TUESDAY JULY 21	**Aircraft Battery Airworthiness** Chris Holder Concorde Battery AMT: AFS0144351	**TFRs: How to Avoid a Fighter Intercept** Trevor Boswell NORAD WINGS: BK3 AFS0144354	**Aerospace Medicine Update** Dr. Susan Northrup FAA WINGS: BK3 AFS0144355	**MOSAIC Final Rule Overview** Marcel Bernard FAA WINGS: BK3/AMT AFS0144356	**Weather or Not to Fly** Jeff Arnold Leidos WINGS: BK3 AFS0144362
WEDNESDAY JULY 22	**General Aviation Awards** Flight Instructor of the Year AMT of the Year FAASTeam Rep of the Year	**Really Worth it? Study of Improper/Inadequate ADM** Greg Feith Crash Detective WINGS: BK1 AFS0144370	**It's a Risky Business** Ray Heyde FAASTeam Rep WINGS: BK2/AMT AFS0144373	**Straight Talk About Aviation Safety** John & Martha King King Schools WINGS: BK1 AFS0144372	**What's in the Bag? Could it be Dangerous Goods?** Kimberly Eckhart FAA WINGS: BK3 AFS0144376
THURSDAY JULY 23	**Tire Maintenance and Impact on Aircraft Safety** Randy Hedrick Michelin AMT: AFS0144377	**Fundamental Electric Systems** Tim Gauntt Hartzell Aviation AMT: AFS0144378	*No Session* **Meet the FAA** @ Theater in the Woods *No Session*	**How to Pass Your Checkride** Sarah Rovner DPE WINGS: BK3 AFS 0144379	**Medical Certification & Expectations** Dr. Samuel Ko, Dr. Clayton Cowl WINGS: BK3 AFS0144380
FRIDAY JULY 24	**Overview of Oil and Oil Filter Analysis** Wayne Odegard Aviation Laboratories AMT: 1.0 AFS0144438	**How to Fly ODPs and SIDs** Ed Verville CFI, DPE, TCE, APD WINGS: AK2 AFS0144440	**Checklists: Airplanes Change, But Checklists Never Do** Larry Bothe Former DPE WINGS: BK3 AFS0144441	**MOSAIC Final Rule Overview** Marcel Bernard FAA WINGS:BK3/AMT AFS0144442	**Kicking Tin: What I Learned from the Crash Site** Patrick Hempen FAA Retired WINGS: BK3 AFS0144443
SATURDAY JULY 25	**In-Flight LOC: The Most Frequent Cause of Fatal Accidents** Ed Verville CFI, DPE, TCE WINGS: BK1 AFS0144449	**How to Talk to ATC** Heather McNevin FAA Retired WINGS: BK3 AFS0144450	**Power Loss at 300 Feet** Philip Mandel FAASTeam Rep WINGS: BK3 AFS0144453	**Flying the Colorado Mountains** Bill Standerfer Colorado Pilots Assoc. WINGS: BK1 AFS0144454	**Was That For Us? Being Safe Around Runways** Mark Cozad FAA WINGS: BK2 AFS0144455

FAA Forums Open Daily at 8:30 a.m. unless otherwise noted.

SCHEDULE IS SUBJECT TO CHANGE.

For updates, scan the QR code to the right or go to AirVenture forums at bit.ly/FAA Forums.

STEERING AROUND THE STORMS

A GA Guide to Understanding Thunderstorms

By Nicole Hartman

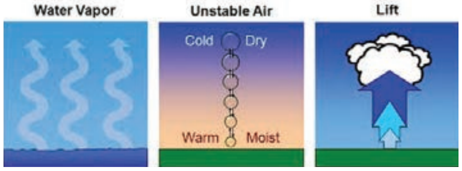
An illustration of a GA airplane avoiding a thunderstorm.

Weather awareness is crucial in general aviation (GA) for several reasons, the primary being safety. Pilots must be mindful of potential hazards, such as thunderstorms, to make informed decisions that ensure the safety of passengers, crew, and the aircraft.

Thunderstorms are a significant weather hazard for pilots due to their complex and severe nature, presenting several risks that can compromise safety. Let's get a better understanding of thunderstorms, how they impact GA, and how to prepare for them.

Thunderstanding

A thunderstorm is a type of storm characterized by lightning and thunder, produced by cumulonimbus clouds. They require moisture, rising unstable air, and a lifting mechanism (e.g., sun heating the ground or a cold front) to form, and are often accompanied by heavy rain, strong winds, and sometimes hail and tornadoes.



The ingredients of a thunderstorm.

There are four types of thunderstorms:

- *Ordinary cell (pulse)* — consists of a one-time updraft and one-time downdraft.
- *Multi-cell (cluster)* — form in clusters, with numerous cells in various stages of development merging together.
- *Multi-cell (squall line)* — forms in a line that can extend laterally for hundreds of miles.
- *Supercell* — a special kind of single-cell thunderstorm that can persist for many hours.

Each type of thunderstorm goes through three stages: developing (cumulus), mature, and dissipating.

According to the National Oceanic and Atmospheric Administration (NOAA), there are an estimated 14.6 million thunderstorms each year worldwide, and at any given moment, there are roughly 2,000 thunderstorms in progress. On average, there are about 100,000 thunderstorms each year in the U.S. alone, and about 10% of these reach severe levels.

So, it's important to understand the impact of thunderstorms on general aviation since this weather isn't uncommon.

Thunderstorms are associated with severe turbulence, which can lead to loss of aircraft control, passenger injuries, and structural stress on the aircraft or inflight break ups of the aircraft. Turbulence within and around thunderstorms is often unpredictable and can range from moderate to extreme.

Downpours can also bring wind shear and microbursts. These phenomena involve sudden changes in wind speed and direction, which can be particularly dangerous during takeoff and landing. A microburst can cause a rapid loss of altitude and can overwhelm an aircraft's ability to maintain controlled flight.

And when there's thunder, there's lightning. While aircraft are designed to withstand lightning strikes, they can still cause electrical system failures or minor structural damage. Lightning can also disorient pilots and temporarily impair visibility.

Proper training and education are essential for effectively preparing for and responding to thunderstorms, but avoidance is the best tactic.

Thunderstorms can also create conditions conducive to icing, even during summer, which can accumulate on the aircraft's wings and control surfaces, degrading performance and potentially leading to a stall. Hailstones large enough to damage an aircraft's exterior may also be encountered. Hail can be thrown significant distances from a thunderstorm, often falling in clear air several miles away from the main storm cloud. While generally found within 2 nautical miles of a parent storm, hail can travel about 6 to 18 miles away from the updraft. This can lead to costly repairs and, in severe cases, compromise flight safety.

Intense rainfall during a thunderstorm can significantly reduce visibility, making navigation challenging and increasing the risk of spatial disorientation. It can also affect the aircraft's performance, particularly during takeoff and landing. Strong vertical air movements from downdrafts and updrafts within thunderstorms can pose serious challenges to aircraft stability and altitude control, leading to potential loss of control. Heavy rain can also potentially lead to hydroplaning, which could risk a loss of control on the ground.

Thunderstorms can develop quickly and unexpectedly, making them difficult to predict and avoid. This rapid development can catch pilots off guard, especially those without access to real-time weather updates.

Estimating Your Exposure

Weather forecasting and thunderstorm detection are critical components in aviation, enabling pilots to anticipate and manage weather-related risks effectively. Let's review the tools available to assist with decision-making.

Weather Forecasting

- **Meteorological Data Collection**: Weather forecasting relies on collecting data from various sources, including weather stations, satellites, radar systems, and weather balloons. This data provides information on temperature, humidity, wind speed and direction, and atmospheric pressure.
- **Numerical Weather Models**: Meteorologists use sophisticated computer models to simulate atmospheric conditions and predict weather patterns. These models integrate historical data and current observations to forecast future weather scenarios.
- **Short-Term and Long-Term Forecasts**: Forecasts range from short-term (hourly and daily) to long-term (weekly or monthly). Short-term forecasts are particularly valuable for pilots as they provide up-to-date information on immediate weather conditions.
- **Specialized Aviation Forecasts**: Aviation-specific forecasts, such as terminal aerodrome forecasts (TAFs) and meteorological aerodrome reports (METARs), offer detailed insights into conditions at airports, including visibility, cloud cover, wind patterns, and potential weather hazards (bit.ly/TAFdata).
- **Weather Briefings**: Pilots are required to obtain weather

briefings before flights. These briefings summarize current and anticipated weather conditions, helping pilots plan routes and make informed decisions.

Thunderstorm Detection

- **Weather Radar**: Ground-based radar systems are essential for detecting thunderstorms. They can identify areas of precipitation, intensity, and movement, allowing meteorologists to pinpoint thunderstorm activity and track its progression.
- **Satellite Imagery**: Satellites provide a bird's-eye view of weather systems, capturing images of cloud formations, temperature variations, and atmospheric moisture. This helps in identifying and monitoring thunderstorms over large areas, including remote regions.
- **Lightning Detection Networks**: Specialized networks detect lightning strikes, offering real-time data on thunderstorm activity. This information is crucial for determining the location, intensity, and movement of thunderstorms.
- **Stormscope and Onboard Weather Radar**: Some aircraft are equipped with stormscopes and onboard weather radar systems that allow pilots to detect thunderstorms in-flight. These tools help pilots navigate around hazardous weather conditions.
- **Air Traffic Control (ATC) Coordination**: ATC can provide pilots with real-time updates on weather conditions, including thunderstorm locations and movements.

> **According to NOAA, there are an estimated 14.6 million thunderstorms each year worldwide, and at any given moment, there are roughly 2,000 thunderstorms in progress.**

This coordination helps manage airspace and direct aircraft away from severe weather.

However, James Kelly, career helicopter pilot and FAA Principal Operations Inspector-Rotorcraft, cautions pilots to be cognizant of the technology on their aircraft. "Many helicopters and GA aircraft don't have some of the more advanced avionics in them, like stormscopes and moving map radar. Those aviators need to be even more diligent about preflight weather briefings and route choices." Kelly urges pilots to "use PIREPs, ask approach/departure or ATC for weather updates, and when possible, use affordable tools like flight planning apps as an enhancement when more advanced avionics are not available."

Circumventing the Storm

So, what strategies can pilots use to minimize the risk of encountering a thunderstorm? Proper training, pre-flight

planning, technology utilization, and vigilant in-flight monitoring and decision-making are key.

Pilots should learn about weather phenomena, including how thunderstorms form, their characteristics, and the conditions that lead to their development. Training should cover how to analyze weather data, interpret forecasts, and understand the implications of various weather reports, like METARs and TAFs.

Pilots also need to be equipped to assess the risks associated with flying near thunderstorms and make informed decisions about whether to proceed, delay, or divert. And they should practice techniques for maintaining control during severe turbulence, including reducing speed and using instruments to maintain orientation. Flight simulators can be used to create realistic scenarios involving thunderstorms, allowing pilots to practice handling turbulence, reduced visibility, and system malfunctions in a controlled environment.

Regular updates and refresher courses on weather and thunderstorm avoidance should be part of recurrent training, ensuring pilots stay current with best practices and technological advancements. Pilots can also benefit from reviewing case studies of thunderstorm encounters and discussing experiences with peers to gain insights and improve their own preparedness.

Before every flight, pilots should obtain a comprehensive weather briefing that includes forecasts and current conditions. Understanding the potential for thunderstorm development along the planned route is essential, and alternate routes with safer weather should be considered if the original path looks questionable.

In flight, take advantage of the technology available to detect thunderstorms and assess their intensity and movement. Leverage real-time weather apps and services that provide updates and alerts on thunderstorm activity but be cognizant that weather display data can be 15 to 20 minutes older than the age indicated on the screen. This latency means, in fast-moving weather, the display shows where dangerous weather was, not where it currently is. Also consider using a stormscope to detect lightning activity, providing additional information on the presence and proximity of thunderstorms. As a general guideline, maintain at least a 20-nautical mile distance from thunderstorms to evade severe impacts. Be prepared to adjust altitudes to avoid turbulence associated with thunderstorms. Flying above the storm's altitude can sometimes be an option, but it's crucial to ensure clearance from the storm's top.

If severe thunderstorms are forecasted or observed, consider delaying or canceling the flight. And be prepared to divert to an alternate airport if thunderstorms are encountered en route. Pre-identifying potential diversion airports is part of good pre-flight planning.

> **Understanding the potential for thunderstorm development along the planned route is essential, and alternate routes with safer weather should be considered if the original path looks questionable.**

In-Flight Encounters

Despite using the strategies previously mentioned, weather happens. Encountering a thunderstorm in-flight can be challenging and requires prompt, decisive action to ensure safety. If you find yourself in this situation, be sure to:

- Focus on flying the aircraft and keeping it stable. Use the autopilot if it's capable of handling turbulence and helps maintain control.
- Avoid making abrupt or large control inputs. Maintain a steady attitude and allow the aircraft to ride through the turbulence rather than fighting it.
- Slow down to the recommended turbulence penetration speed (V_a). This speed is typically lower than cruise speed and helps minimize structural stress on the aircraft.
- Concentrate on keeping the wings level. Avoid turning to prevent increased load on the aircraft structure during turbulence.
- Rely on instruments for navigation and maintaining flight parameters, especially if visibility is reduced. This helps prevent spatial disorientation.
- Be prepared for strong vertical air currents. Try to maintain a steady altitude but allow for temporary altitude deviations if necessary to maintain control.
- Inform ATC of your position and situation. Request assistance or rerouting if necessary. ATC can provide updates on weather conditions and guidance on navigating around the storm.
- If equipped, use onboard weather radar to identify the most intense parts of the storm and attempt to navigate around them, avoiding the storm's core.
- Ensure that all loose items are secured to prevent injury or damage. Brief passengers on what to expect and ensure seat belts are fastened.
- While lightning is unlikely to cause major damage, it can be disorienting. Be prepared for potential temporary loss of visibility or instrument glitches.
- If the situation does not improve or if the storm is particularly severe, consider diverting to an alternate airport. Safety should always be the priority.
- Maintain a calm and focused demeanor. Effective management of the situation relies on clear thinking and adherence to procedures.

Kelly recalls flying a helicopter tour in the Grand Canyon when the weather took a turn. "I encountered a downdraft while trying to climb out of the canyon. With max power applied and at the best rate of climb speed, I could not climb fast enough to exit the canyon. My only option was to circle inside the canyon until we got out of the downdraft, or it moved on." Kelly stresses the need to remain levelheaded, stating, "staying calm and using practical judgment when your aircraft's performance is impacted by wind and downdrafts is vital for safety."

Given the hazards, pilots must exercise caution when thunderstorms are present or forecasted. Proper training and education are essential for effectively preparing for and responding to thunderstorms, but avoidance is the best tactic. By incorporating these strategies, pilots can significantly reduce the risks associated with thunderstorms and enhance the safety and success of their flights.

Nicole Hartman is an *FAA Safety Briefing* associate editor and technical writer-editor in the FAA's Flight Standards Service.

LEARN MORE

NOAA Introduction to Thunderstorms
bit.ly/noaa-thunderstorms

FAASTeam Pamphlet, Thunderstorms—Don't Flirt…Skirt 'Em
bit.ly/4vzUzdx

FAA *Aeronautical Information Manual*, Chapter 7, Section 1
bit.ly/AIMCh7

FAA *Aviation Weather Handbook*
bit.ly/AviationWx

AC 91-92, *Pilot's Guide to a Preflight Briefing*
bit.ly/3qQRAhh

14 CFR § 91.103, *Preflight action*
bit.ly/PreflightAction

"Building Confidence with the Conditions," *FAA Safety Briefing*, Jan/Feb 2024
bit.ly/4wVERe6

NTSB Safety Alert SA-017, *In-Cockpit NEXTRAD Mosaic Imagery*
bit.ly/NTSBSA

Navigating the Physics-Based Traps of Wild Weather

By Rebekah Waters

While the mantra "don't fly in bad weather" is sound advice in theory, the reality of the cockpit is often much more complex. Weather is dynamic; it evolves faster than the standard briefing cycle can refresh.

A pilot might depart in clear conditions only to encounter a localized microburst or a rapidly maturing convective cell along their route. To survive these encounters, pilots must move beyond simply reading a METAR (meteorological aerodrome report). Understanding the raw mechanics of extreme weather allows a pilot to recognize the warning signs in the windshield long before they appear on a tablet screen.

Basic flight training teaches students to fly a wide arc around convective weather. However, extreme weather rarely presents itself as a solid, immobile wall. Instead, it acts as a series of traps. For general aviation (GA) aircraft, which often lack the climb performance to top weather or the structural mass to absorb high-velocity impacts, these traps are particularly lethal. In the GA realm, the margin for error isn't just thin — it can vanish in seconds.

"There is no disgrace in deciding not to go, divert, or do a complete 180 turnback to your departure airport when the weather changes unexpectedly," said FAA Aviation Safety Inspector Marcel Bernard. "Don't ignore the obvious and take advantage of real-time weather access. When you have any doubts about acceptable weather conditions for your flight, always have plan B and execute it as necessary. There have been many times when I have done just that and was relieved of the stress of flying in unfavorable, unexpected, or hazardous weather conditions."

The 20-Mile Danger Zone

The FAA recommends a minimum 20-nautical-mile buffer from severe thunderstorms because hazards like tornadoes can extend far beyond the visible storm. While tornadoes are spawned by thunderstorms, they do not have to remain within the boundaries of the storm. They are erratic and often move at ground speeds exceeding 60 knots.

While scientists continue to debate the exact triggers of tornado genesis, we know they result from extreme atmospheric instability and wind shear. For a pilot, a tornado represents an environment of aerodynamic extremes far exceeding the structural design limits of light aircraft. But the dangers of a tornado extend far past the funnel cloud. Tornadic winds, which can exceed 200 knots, cause extreme wind shear and turbulence and loft trees, vehicles, and other debris into the air. Knowing what to watch for is crucial to staying well clear of the danger zone:

- *Inflow Bands or "beaver tails:"* Beware of smooth, flat cloud bands extending from the eastern edge of a rain-free base toward the east or northeast. These suggest the storm is actively sucking in low-level air, creating a spiraling inflow that precedes rotation.
- *The Wall Cloud*: This is a localized, persistent lowering from the rain-free base. If you see this area begin to rotate, a funnel is likely imminent.
- *Rear Flank Downdraft (RFD)*: Watch for a "clear slot" or a brightening near the wall cloud. This indicates cold air is wrapping around the storm's backside, often the final mechanical "shove" needed to drop a tornado to the ground.

Pilots should never attempt to fly anywhere near a tornado. Since tornadoes usually form from supercell thunderstorms, avoiding these weather conditions altogether is the safest option.

The High-Altitude Kinetic Trap

Like tornadoes, hail is a product of violent vertical energy. Hailstones are forged in the updraft, often passing through the freezing level multiple times and growing larger with each cycle before gravity finally wins. Hail is a kinetic trap.

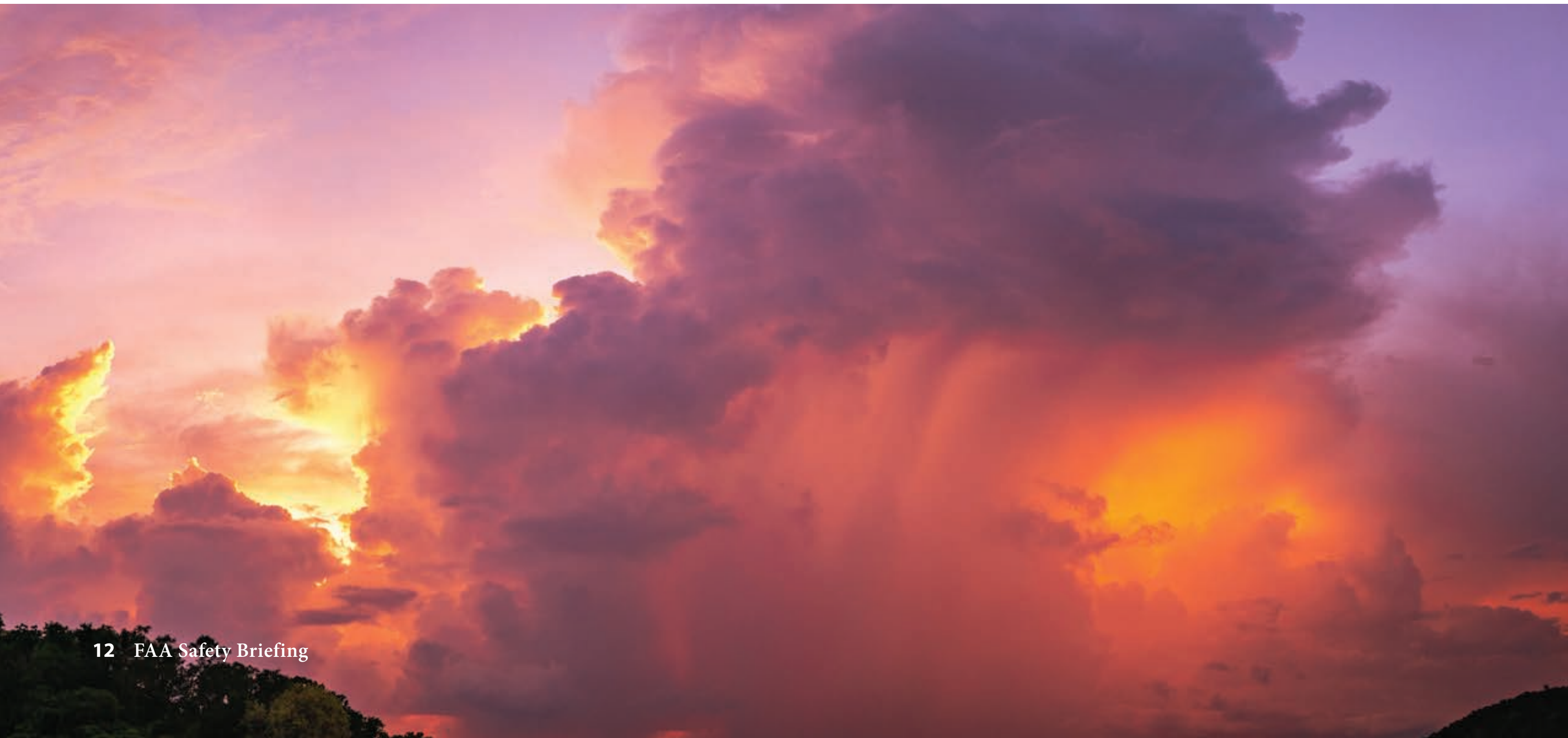
Even if hail isn't present at the surface, large hail is almost always present in the upper levels of a severe cell. Strong updrafts can eject hailstones horizontally, meaning pilots can encounter airframe-shattering ice up to 20 miles downwind of the storm core. For a light aircraft, hail doesn't just dent the skin; it can shatter windscreens and deform the leading edge of a wing, significantly impairing lift. Pilots must take care to avoid hail. Even commercial airliners have been forced to land after hail has caused severe damage in-flight.

> **Even if hail isn't present at the surface, large hail is almost always present in the upper levels of a severe cell.**

To avoid encountering this kinetic trap, it is crucial to recognize storm features that produce hail. Watch for heavy rain mixed with large, bright, or rapidly changing precipitation. Storms are more likely to produce hail when strong updrafts are present. Be sure to watch for turbulence and wind shear, which are also common in hail-producing storms.

The Invisible Structural Load

At its most basic level, turbulence is caused by disrupted airflow. Instead of moving in a smooth, predictable stream, it becomes chaotic, swirling, and irregular. Airflow can be disrupted by physical objects such as mountains or urban structures, but most turbulence is weather-driven. Weather can lead to convective turbulence, frontal turbulence, and clear air turbulence. National Transportation Safety Board data shows that approximately 57.7% of turbulence-related




Pilots must take care to avoid hail.

accidents are caused by convective activity. Turbulence is more than just a discomfort; it is a series of rapid, high-magnitude G-load fluctuations.

Turbulence comes from several sources: thermal currents, wind shear, temperature inversions, and mountain waves. The trap here is clear air turbulence (CAT). It occurs without visual warning, often miles away from the visible clouds of a thunderstorm or thousands of feet above the anvil. Even though convective turbulence causes more accidents, clear air turbulence is a close second at 28.8%.

Preflight planning, real-time monitoring, and in-flight adjustments are the best ways to reduce encounters with turbulence. Beyond G-AIRMETs and SIGMETs, look for "mountain wave" signatures on satellite imagery if flying near ridges. Be especially wary in the afternoon during summer months when convective currents are at their peak. When pilots encounter unexpected chop, they should slow to their aircraft's maneuvering speed (V_a) to protect the airframe's structural integrity.

> **Preflight planning, real-time monitoring, and in-flight adjustments are the best ways to reduce encounters with turbulence.**

The Performance Limit Bolt

Microbursts are small, intense pockets of sinking air that can be part of larger wind systems. For a landing or departing aircraft, they are a nightmare of disappearing performance. This trap has three stages:

1. Formation: Precipitation falls and evaporates, cooling the air and making it denser and heavier.
2. Impact: The cold "slug" of air hits the ground and spreads out in all directions.
3. Dissipation: The wind moves away from the impact point, often leaving a "curl" or dust ring on the ground.

As you fly into a microburst, you first encounter a strong headwind (increasing performance). The trap is the sudden transition to a massive downdraft followed by a strong tailwind. This creates a "performance vacuum" that can exceed the climb capability of any piston engine.

GA aircraft have less thrust reserve and margin of error, so, as with other wild weather traps, avoidance is the best course of action. Be on the lookout for cumulonimbus clouds, turbulence, or downdraft indicators. Unstable air with strong wind shear — atmospheric instability — can trigger microbursts. Sometimes visual cues are present. Watch for rain that evaporates before hitting the ground and a swirling dust cloud at the surface.

Plan ahead and consider rerouting or delaying when thunderstorms are expected. Monitor weather continuously and climb or turn away when a storm or gust front is detected. If pilots encounter microbursts, they should reduce speed to give themselves more time to react. In an updraft, climb slowly and change course slightly outward from the storm center. In a down draft, descend slowly and slightly adjust course toward the center. In this situation, pilots should maintain instrument discipline and avoid relying on visual cues.

> **Plan ahead and consider rerouting or delaying when thunderstorms are expected.**

The Silent Decay of Lift

Icing is a subtle trap that changes the very physics of how your wing works. It doesn't just make the aircraft heavier; it fundamentally alters the aerodynamics. Icing is a cumulative hazard. The longer an aircraft collects ice, the worse the hazard becomes.

This weather trap usually requires two things: visible moisture and temperatures at or below freezing, although some structural icing can occur at temps above freezing. The most dangerous icing often occurs in the top few thousand feet of cloud decks or in convective cells where supercooled large droplets exist. These droplets remain liquid below freezing until they contact the airframe. This impact provides the necessary “shock” to trigger an instantaneous freeze that coats the wings, windshield, and propeller in ice. The resulting ice doesn't just add weight; it increases drag by as much as 100% while reducing maximum lift by 30%.

Icing can also present hazards with engines and instruments. Carburetor icing can occur even on warm, humid days due to the venturi effect cooling the intake air. To learn more about carburetor icing, check out “Breaking the Ice,” in the Sept/Oct 2023 issue of *FAA Safety Briefing* (z). For GA pilots, this manifests as a mysterious drop in

rpm or manifold pressure. Pitot-static icing can lead to erroneous airspeed and altitude readings.

Pilots should watch for icing conditions like temperature inversions. Be aware that the temperature doesn't always drop as the aircraft climbs. Pilots may find "warm" air aloft that is actually dropping freezing rain into the colder air below. This is a recipe for rapid, severe icing.

Icing is a major aviation hazard. The best way to deal with this wild weather trap is to avoid it altogether. If an aircraft lacks de-icing equipment, the only safe strategy is a 180-degree turn or a calculated altitude change to exit the visible moisture or find warmer air. Advisory Circular (AC) 91-74B, *Pilot Guide: Flight in Icing Conditions*, has more information on the principal factors related to flight in icing conditions (bit.ly/AC91-74B).

> **Icing is a subtle trap that changes the very physics of how your wing works.**

The Interconnected System

While these five hazards can occur independently, they are usually byproducts of the same phenomenon: the life cycle of a thunderstorm. Check out “Steering Around the Storm” in this issue for a better understanding of the significant hazards they pose, and how to stay safe. The National Weather Service motto says it best: “Be weather aware and fly prepared.” Understanding the physics-based traps posed by wild weather is more than just reacting to the hazards; it is anticipating them and staying well clear. Pilots should always check the latest conditions, study the forecasts, and always — always — have a "Plan B" before the trap snaps shut.

Rebekah Waters is an *FAA Safety Briefing* associate editor. She is a technical writer-editor in the FAA’s Flight Standards Service.

LEARN MORE

Ice Induced Stall Pilot Training Video
bit.ly/IceStall

Predicting Icing Conditions in 57 Seconds Video
bit.ly/PICin57

FAA *Aviation Weather Handbook*
bit.ly/AviationWx

NWS, What is a Microburst?
bit.ly/42nosBc

Microbursts: What Makes Them So Dangerous? - Pilot Institute
bit.ly/microburst-dangers

Silver Linings, Silver Bullets, and Other Fictions

Avoiding VFR Flight Into Instrument Weather

By James Williams

Flying under visual flight rules (VFR) is a great way to experience general aviation (GA). VFR offers a sense of freedom that many pilots prize. So long as the weather cooperates, pilots can fly VFR from one end of the country to another. VFR flying allows a more flexible, less rigid approach than instrument flight rules (IFR). In some cases, VFR flexibility can offer advantages over IFR, even when the weather deteriorates, and air traffic control (ATC) procedures may restrict operations. While they are edge cases, these circumstances do exist. And some pilots prefer to hold complete control of the flight rather than balance it with ATC. VFR weather minimums can be as low as one mile of visibility and remain clear of clouds.

Flying under VFR certainly provides pilots with a sense of freedom and flexibility, but it also presents significant risks, particularly the danger of inadvertently entering instrument meteorological conditions (IMC). This scenario is one of the leading causes of fatal accidents in general aviation. While many pilots may have a story of a narrow escape that taught them an invaluable lesson, some may inadvertently develop a risky habit. An analysis of the National Transportation Safety Board (NTSB) accident database from 2014 to 2023 reveals 180 IMC-related general aviation accidents, with a fatality rate exceeding 82%. These tragic incidents resulted in the loss of 268 lives and left another 29 individuals seriously injured.

Dangerous Fictions

We all use idioms as shorthand heuristics to get through life, but the fit of these idioms can be less than ideal when misaligned with the circumstances. One of the titular examples is a case in point. We use the idea of a silver lining to a dark cloud to motivate us in a difficult situation. But this fiction, applied to our literal flying, is a terrible idea. There is no silver lining to VFR into IMC. That dark cloud is just an increased risk.

The other titular example is an exposition of our desire to find quick, easy, and complete solutions to problems. But again, in reality, silver bullets are rare, if they exist at all. Solutions are rarely single-factor. In the case of VFR into IMC, the obvious silver bullet would be an instrument rating. But our research shows that, over several years, the majority of accident pilots were instrument-rated, and the decade's average was about 55% lacking an instrument rating. This implies that proper instrument training alone, while it can reduce the risks, is not a silver bullet.

If these fictions are less than helpful in our efforts to reduce or eliminate VFR into IMC accidents, what is the solution?

Helpful Realities

Reality does not provide silver bullets, but it does provide solutions. As previously mentioned, an instrument rating doesn't eliminate the risk of an IMC encounter, but it does give pilots the tools to extricate themselves. However, it's important to remember that even if you are instrument current, the goal should remain a rapid escape, not continuation. If you are current and plan to continue into IMC, you should go ahead and file IFR. Note that if weather conditions are deteriorating and you are instrument-current and capable, the time to file is before you are in the clouds. Avoiding the increased temptation of continuation bias may be a challenge for instrument-rated pilots, but on balance, the additional skills are worth pursuing and provide a net safety benefit, especially for self-aware pilots.

Another common intervention is better weather information. Here, there are limitations to our data. The massive increase in the use of commercial weather services is a boon to the availability of weather information. Still, it makes tracking whether a pilot received a weather briefing and what that briefing contained less complete. Even so, our data shows that more than a quarter of accident pilots received a documented briefing and/or demonstrated a clear understanding of the weather conditions they would encounter later. So once again, we see that a proposed silver bullet, while more effective than the last point, is still not completely effective. But it is a part of the solution.

Another prevalent risk is spatial disorientation (SD). The NTSB cited SD in nearly 50% of accidents they reviewed. SD is a condition in which the pilot loses awareness of the aircraft's basic orientation. While SD can occur in other conditions, the IMC environment is particularly prone to disorientation due to the lack of visual references, especially at night. The body's ability to sense a change in position through organs like the vestibular system can be tricked by gradual changes over time, leaving the pilot in an ever-tightening spiral while thinking they are flying straight and level when lacking a visual reference. Without training and experience, it's very easy to fall prey to SD.

Additionally, a series of other factors were present in some accidents but not as foundational as those we've previously discussed. The NTSB cited instrument failure in only seven accidents over the 10-year period. The agency cited in-flight breakups in 14 cases, mainly due to thunderstorm encounters. While these causes do deserve consideration, they are largely covered by existing training around partial panel and thunderstorm avoidance.

Probably the most challenging factor is that more than 40% of accidents show some level of intentional flight into IMC. This can vary from the more innocent zip through a brief bit of cloud to get to a presumed clearing beyond, to the flagrant violations of operating rules. In all these cases, the pilot knew, or should have known from clearly visible conditions, that VFR was not going to be possible but took off anyway. A good intervention strategy could help greatly in these cases.

Creating Your Safety Arsenal

As we've been documenting, there are no silver bullets, but there are some regular bullets in this metaphorical context. By combining these items into a multifaceted safety approach, we can create an arsenal that reinforces safety strategies to prevent a potentially dangerous IMC encounter.

At the strategic level, investing in an instrument rating is probably the best foundation, if possible. While more than a few instrument-rated pilots were involved in VFR into IMC accidents, the rating does give you a much better tool set to deal with any encounters. Another addition to

your toolbox is a good set of personal minimums. Creating a set of personal minimums gives pilots an objective set of metrics to aid in making go/no-go decisions and helps them avoid external pressures.

At the operational level, using a flight risk assessment tool (FRAT) is a good way to enforce standards, such as personal minimums. It also reinforces proper weather briefings to ensure conditions have been carefully considered. FRATs can be as simple as a basic spreadsheet. You can find an example from the FAA Safety Team (FAASTeam) at bit.ly/FAAST_FRAT. Once pilots get some experience using one, they can start customizing it for their specific circumstances. FRATs are an excellent way to establish self-accountability and detect building risk before it becomes apparent in any one factor.

At the cockpit level, keeping flying skills sharp is critical. The best way to do that is to practice regularly. Pilots can accomplish this in many ways. The FAASTeam WINGS Pilot Proficiency Program is a great place to start. WINGS has the added benefit of meeting the flight review requirements, but the core concept of a continual proficiency approach is key. Finding a good instructor or two and booking routine flights is a great way to keep building skills.

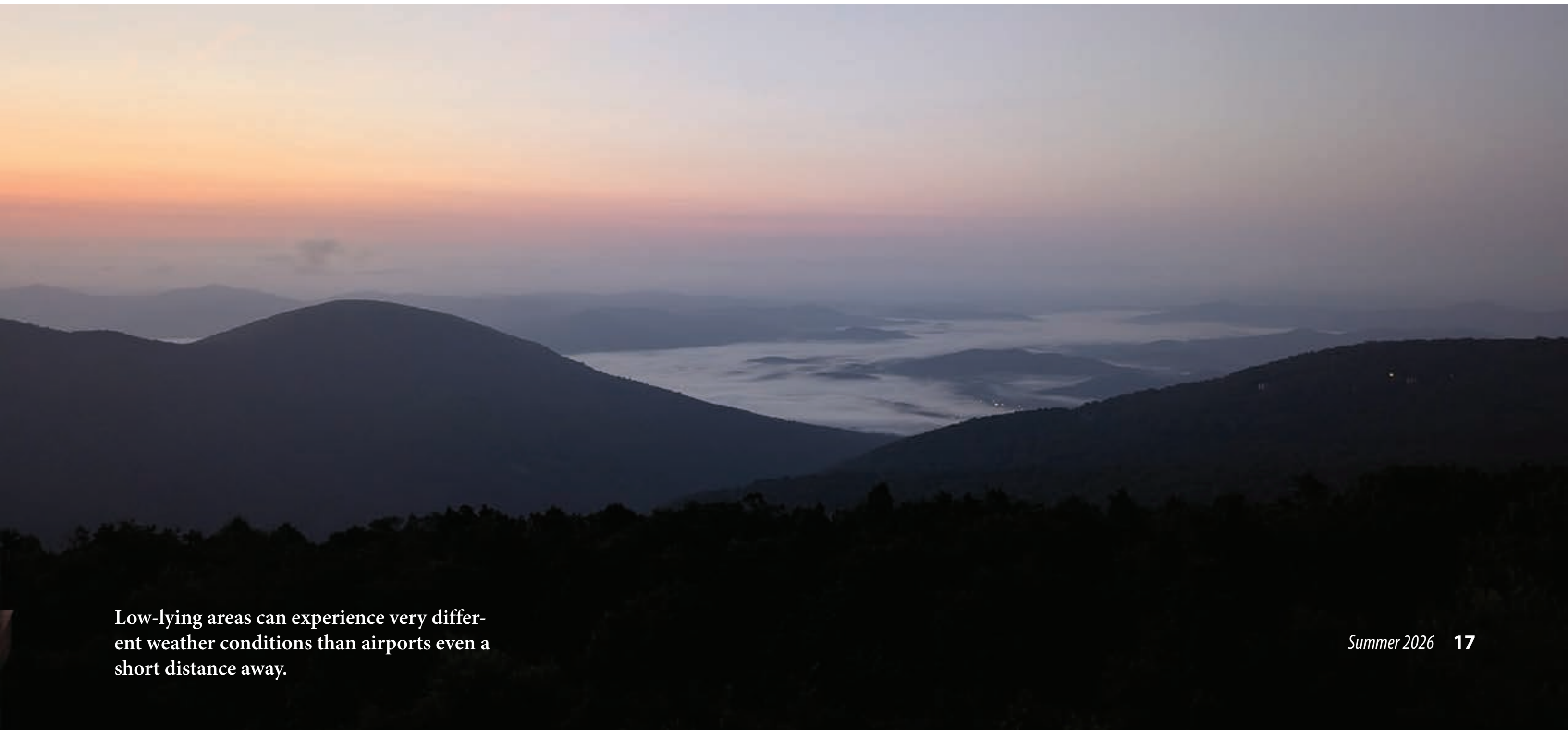
Hand-flying skill is only part of the challenge of aviation. Decision-making is another important skill, and just like flying, pilots can practice it. Modern technology allows us to get weather briefings and "plan" a flight quickly. These fictional flights are a great way for pilots to run through their FRATs and decision-making process. Since there isn't any intent to fly, external pressures are eliminated while skill is built. And these practice runs can be a good reference for later flights (i.e., pilots who can decide to no-go on a practice flight plan with no pressure can probably do the same on a real flight with similar conditions).

Arming ourselves with this collection of skills, systems, and practices will have the impact of our fictional silver bullets while providing an actual silver lining.

James Williams is *FAA Safety Briefing*'s associate editor and photo editor. He is also a pilot and ground instructor.

LEARN MORE

USHST's Unintended Flight into IMC Conditions Safety Initiative
USHST.org/56secs



Low-lying areas can experience very different weather conditions than airports even a short distance away.

AIR MASSES AND FRONTS

The Movers and Shakers of Weather

By Tom Hoffmann

Weather has a tricky tendency to show up unannounced and throw a continent-sized wrench in a pilot's flight plans. It's a scenario all too common within the general aviation (GA) community and can have risky consequences for unprepared pilots.

So, what can pilots do to keep weather surprises from ruining their flight? A look at air masses and fronts could offer much-needed insight.

The Big Picture

During pre-flight weather planning, pilots are correct to focus on local conditions and forecasts that affect their route of flight. However, it's the bigger picture of weather that often gets a casual glance, or worse, is overlooked altogether. Having a panoramic view can provide the extra bit of insight pilots need to make a more informed go/no-go decision or develop a backup plan. Let's take a comprehensive view into air masses and fronts and how their actions (and interactions) could influence what pilots encounter on their next flight.

By definition, air masses are large bodies of air that take on the characteristics of their surrounding environment — namely, temperature and humidity — with fairly uniform distribution. They form in certain source regions where air can remain stagnant for days. The weather here in the United States is influenced by air masses formed in four regions (see Figure 1). We have the continental polar (cP) air mass that brings cold, dry air from Canada; the maritime polar (mP) air that brings in moist, cool air from the northwest and northeast oceans; the maritime tropical (mT) regions that bring warm, moist air from the Gulf of America and

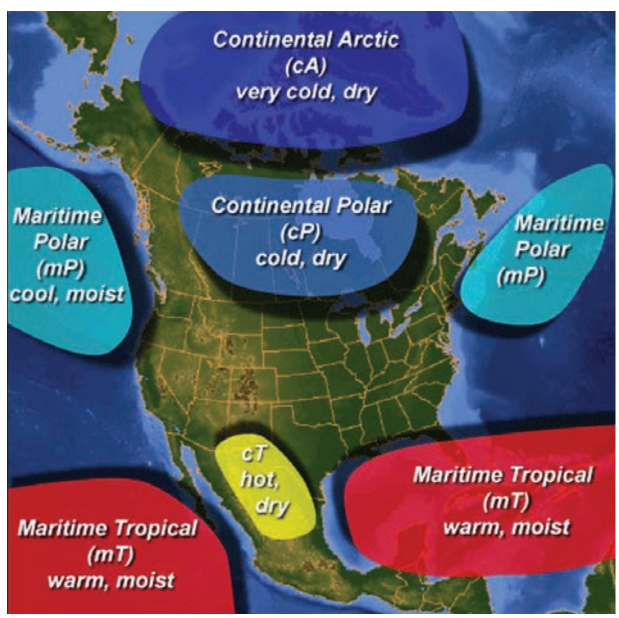


Figure 1. Illustration of air mass types and where they develop over North America.

southern oceans; and finally, the continental tropical (cT) air mass with hot, dry air that forms over Mexico and the southwest United States. There is also a fifth, somewhat infamous region that can affect U.S. weather, known as the continental arctic (cA). The polar vortex we've heard so much about the last few years was exactly this, the cA air mass pushing down over parts of the United States, causing a deep freeze that forced its way into the deep south.

Common by-products of an advancing cold front include pronounced wind shifts and the formation of clouds.

On the Front Lines

Like most things in the atmosphere, air masses are constantly on the move once they're formed. We can attribute that motion to the sun's energy as it heats the air mostly around the equator. Once heated, the air rises and then flows back towards the poles. Conversely, the colder and denser air at the poles sinks and slides back toward the equator. It's a hive of climate activity when you also throw in gravity, a planet that spins at more than 1,000 mph, and a complete range of orographic features. All this energy affects air mass movement and ultimately determines whether we need sunglasses or an umbrella to face the day.

As different air masses move around in the atmosphere, they inevitably collide and try to push each other around. It's a massive and often violent game of give-and-take. When two or more different air masses clash, the area is appropriately called a front.

Fronts come in four different varieties: warm, cold, occluded, and stationary (see Figure 2). As even a non-aviator would likely derive from watching the evening news, cold fronts are denoted with blue spikey bands pointed in the direction of movement and form when an advancing cold air mass is replacing a warmer air mass. It might help to imagine the spikey points as giant shovels picking up the warmer air in front of it. The action can sometimes be dramatic, especially when there are large differences in temperature, pressure, and humidity. A good example — and the reason why we see such violent springtime weather across the Great Plains — is when cool, dry air from Canada smacks into the much warmer, humid air rising from the south.

Common by-products of an advancing cold front include pronounced wind shifts and the formation of clouds. The type of cloud depends on the stability of the air mass in the frontal zone, but pilots can generally expect billowy cumulus, or its more stormy relative, cumulonimbus, if sufficient instability and moisture abound. Cold fronts also move rapidly — around 25 to 30 mph in most cases — but some have been clocked at highway speeds of 60 mph!

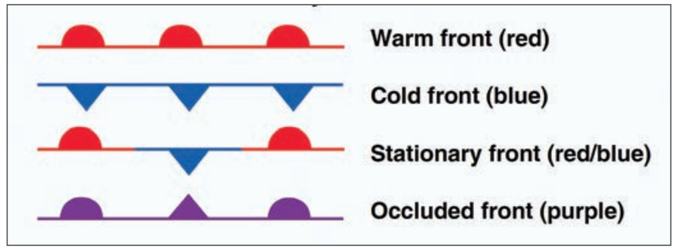


Figure 2. The four main types of fronts as depicted on a weather chart.

On The Warm and Fuzzy Side

At the opposite end, warm fronts form when an advancing warm air mass replaces a colder air mass. Maps depict them with red semicircles, which one can envision as bubbles of warm air rising and displacing the cooler air in front of them. Warm fronts are slower than their colder cousins and less pronounced with regard to their overtaking action. There's usually more of a gentle slope as warmer and less dense air rides up over colder air. Because of this, the humidity in this warmer air condenses as it rises, leading to more widespread areas of thick, soupy weather. In fact, clouds and rain can often precede the surface passage of a warm front by hundreds of miles — something a VFR-only pilot will want to watch out for. A weather map may show a warm front over Missouri, but its IFR-inducing effects could already be several hundred miles east over central Kentucky.

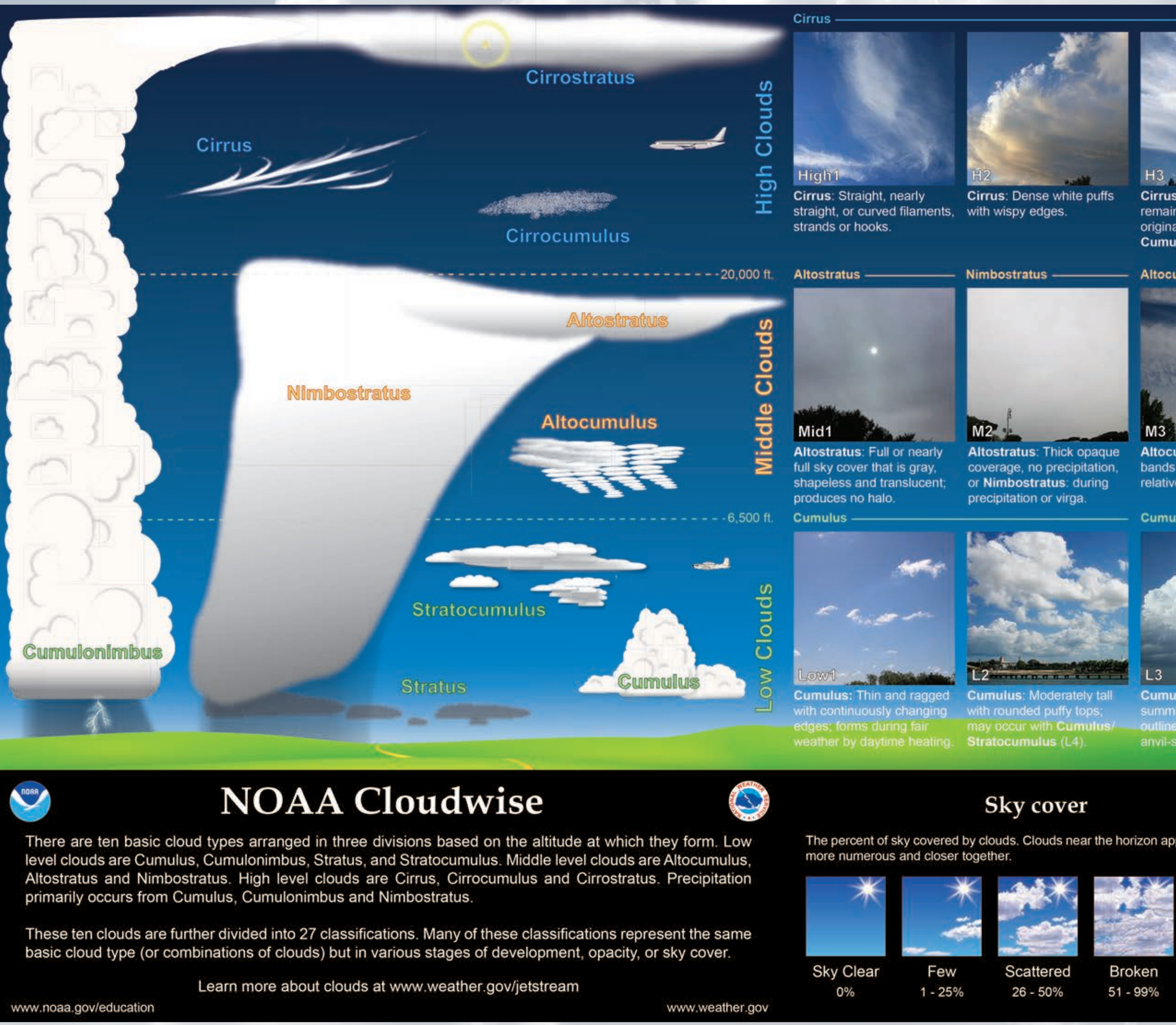
Rounding out the four frontal types are stationary fronts and occluded fronts, which are a "hybrid" of cold and warm fronts. In a stationary front, neither the cold nor the warm side has enough energy to replace the other. They both remain in a sort of a stalled pattern, sometimes for days, with the resulting weather becoming a mixture of the two. While this may seem like a somewhat stable scenario, it's not uncommon for the edges of a stationary front to kink or bend and become a breeding ground for bad weather. When an upper-level trough (or an area of lower pressure aloft) approaches a stationary front, the front will begin evolving into a frontal system consisting of a warm front and a cold front that will typically start moving eastward. Weather maps depict stationary fronts with alternating red and blue line segments, with the cold/warm symbols pointing in opposite directions.

Occluded fronts form when air masses of different temperatures meet. It's basically a cold front that catches up and passes a warm front, displacing the warm air mass aloft in the process of pushing into the cold air mass ahead. This air mass "sandwich" is a recipe for having the worst of both worlds, so to speak, as there's potential for the hazardous features of both cold and warm fronts to be on full display.

(Continued on Page 22)

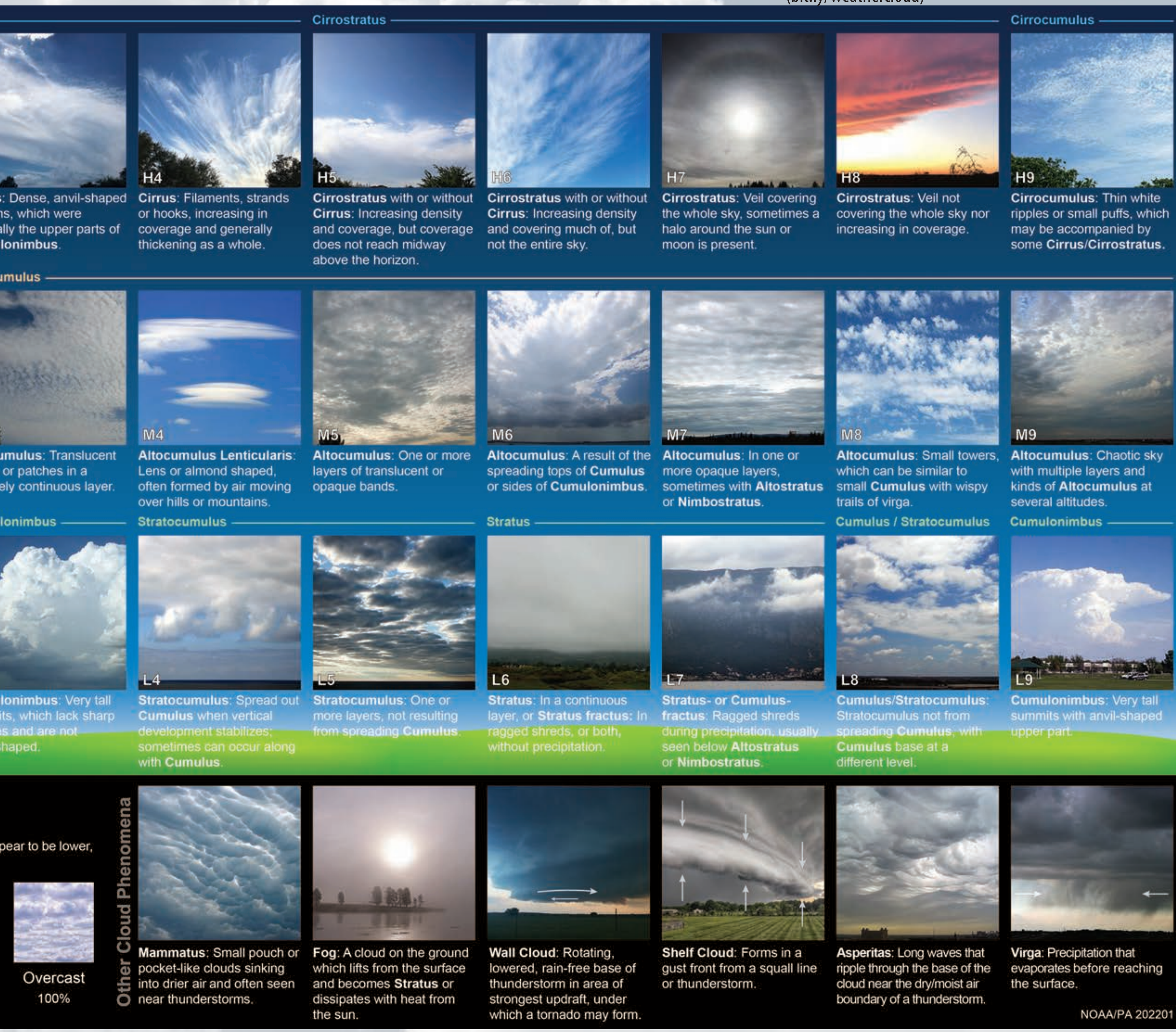
GET CLOUDWISE

Know Your Cloud Types and the Altitudes They Form



This chart offers a detailed look at how clouds are classified by their appearance and altitude. Understanding cloud formations is crucial for aviation safety, as they serve as direct indicators of atmospheric stability, moisture, turbulence, icing, and visibility challenges. By accurately interpreting cloud types, altitudes, and the associated weather phenomena, pilots can make well-informed decisions to avoid hazards and ensure compliance with aviation regulations.

Scan to Download PDF
(bit.ly/weathercloud)



(Continued from Page 19)

That means thunderstorms, poor visibility, and shifting winds are all possible. An occluded front is depicted as a purple line with alternating triangles and semi-circles.

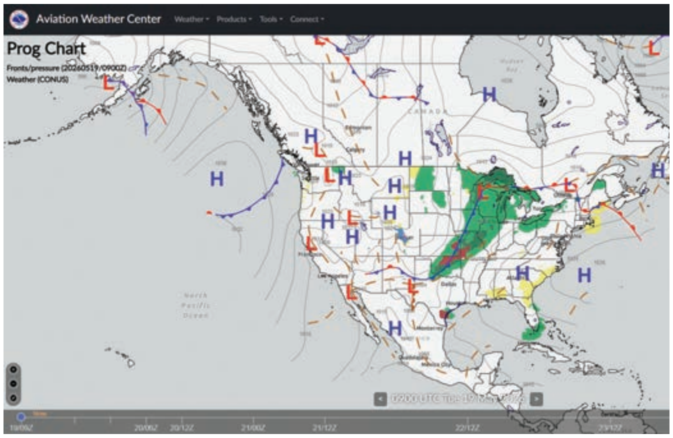


Figure 3. A sample surface prognostic chart.

Get Up Front with Fronts

Weather charts provide tons of useful planning data. A surface analysis chart, for example, provides a big-picture view of areas of high and low pressure spanning the lower 48, along with frontal boundaries, temperatures, dew points, wind directions and speeds, local weather, and visual obstructions. Using this chart as part of a preflight can help pilots identify potential trouble spots to focus on or discuss further with a weather briefer. Significant weather and surface prognostic charts (see Figure 3) are two others that can help with painting a good mental picture of the weather.

Another source of information for the big picture is the Area Forecast Discussions (AFD) that each National Weather Service (NWS) office across the nation provides (bit.ly/4dSZHCh). These text discussions, which the NWS produces two to four times each day, cover the critical weather features that will be causing the expected weather over the next seven days. Not to be mistaken for the Area Forecast Synopsis, these discussions can provide the equivalent of a flight briefing synopsis and more.

It's important to remember that no two fronts are the same; always expect the unexpected.

Forward, March!

Here are a few strategies pilots can use in the vicinity of a front.

When flying towards a front, if conditions start to deteriorate, land and let the front pass before continuing. Use this chance to reassess the conditions, recalibrate the plan, and perhaps refuel (both pilot and the aircraft). A passing front will likely also cause a shift in wind direction and velocity. The planned approach for the destination may no longer be an option, despite what the initial forecast indicated. Instead, be prepared to land on a much shorter runway or at an alternate airport if the crosswind component is too much to handle. Keep an eye on the altimeter, too. A pressure change when crossing a front is a given.

Passing through the front does not necessarily mean the hazard is over. Even with a cold front, clouds and rain that are usually confined to within a few miles of its boundaries could, in some cases, extend well behind it. And for that matter, there also doesn't need to be a front nearby to experience adverse weather; that can happen anywhere. Upper-level troughs and lows can generate adverse weather without having an associated surface front.

Pilots should always be prepared and have several backup plans. Pilots should reassess the weather continuously during the flight and use as many in-flight sources as possible: onboard radar, ADS-B In-provided weather, air traffic control (ATC), and, of course, their own two eyes. Allowing for a greater margin of error, especially at night or in low-visibility situations, can be crucial.

Air masses are large bodies of air that take on the characteristics of their surrounding environment — namely, temperature and humidity — with fairly uniform distribution.

It's important to remember that no two fronts are the same; always expect the unexpected. Forecasts are generally accurate but far from exact. About the only sure thing one can count on with any approaching front is that some type of weather change is imminent.

Be prepared for unexpected weather and avoid any unwanted surprises.

Tom Hoffmann is the editor of *FAA Safety Briefing*. He is a commercial pilot and holds an A&P certificate.

LEARN MORE

FAA's *Aviation Weather Handbook*, Chapter 11, Air Masses, Fronts, and the Wave Cyclone Model
bit.ly/AviationWx

AOPA Safety Spotlight: Air Masses and Fronts
bit.ly/4tpciTc

GA Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision-Making
bit.ly/4ttgT79 (PDF)

TOO MUCH WEATHER

How to Choose Which Resource to Use and When

By William E. Dubois

The early airmail pilots called farmers down range — on their party phone lines — to ask about the weather along the route. Naturally, a farmer's view of weather and a pilot's view of the weather aren't the same, so there was inevitable trouble. But it was the best information at the time.

Fast-forward a hundred years to the Golden Age of Air Travel, with a wealth of weather products available through government and commercial websites, feeds, and apps. The challenge for the modern pilot is knowing what to look at and, perhaps more importantly, when to look at it.

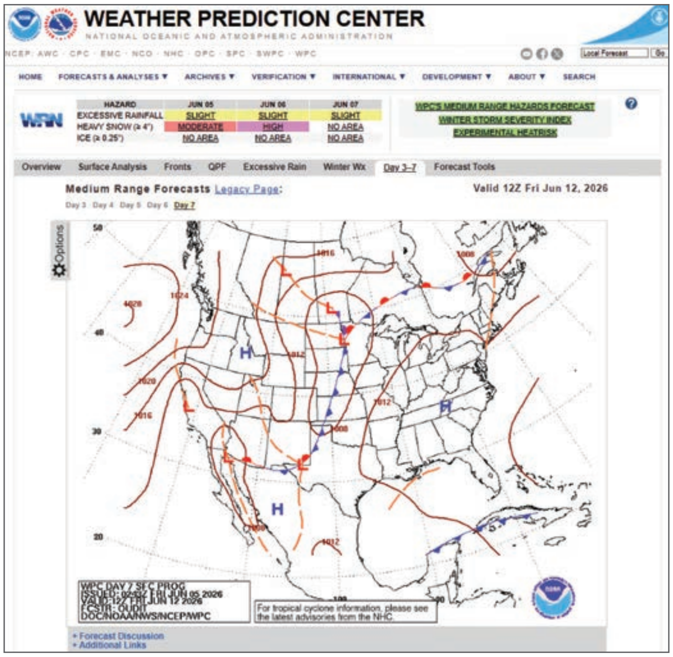
> **The challenge for the modern pilot is knowing what weather product to look at and, perhaps more importantly, when to look at it.**

As it turns out, certain types of weather products are best suited to particular windows of time ahead of a flight. Here, just in time for the next "mail run," is a time-to-flight guide to weather products.

1 Week Before Your Cross-Country Flight

When it comes to long-range weather, the only accurate prediction is that the further out the forecast, the less accurate it is. So, while many weather products offer forecasts out to ten days, or even longer, at this range, the *Farmer's Almanac* is likely to be as accurate as a scientific forecast.

That said, there's one type of weather product that's helpful when looking at weather very long range, and that's the Surface Prog (Prognostic) Chart, from the Weather Prediction Center's website (bit.ly/SurfProgMed). This chart is also included in many electronic flight bag (EFB) apps. (Note, not all EFBs include the longest-range surface



A sample surface prog chart.

analysis charts). A prog chart is a computer-generated map that displays the anticipated state of the atmosphere at a specific time in the future, whereas an analysis chart shows current conditions.

The prog chart offers only the very broad strokes of the predicted weather — basically, pressure systems and fronts. As this is big-picture weather, be sure to look at the big picture itself: use the national chart rather than a regional one and use it to assemble a mental image of not only the weather over your route, but what could be over the horizon as well. This far out, the predicted weather is unlikely to be exactly where it's forecast, but it's likely to be somewhere in the vicinity.

The best use of prog charts is to treat them like children's flip-books. Pilots should look at them several days leading up to their target date. This will give pilots a moving picture of how pressure systems and fronts are projected to travel across the country. The nature of the fronts tells pilots what kinds of clouds, ceilings, and precipitation they might encounter, and the location and number of pressure systems give clues to possible wind speed and direction.

5 Days Before Your Cross-Country Flight

In the five-day window, try using Weather Underground (wunderground.com), which, in addition to National Weather Service (NWS) data, leverages crowd-sourced data from tens of thousands of personal weather stations. Weather Underground's 10-day tab gives a nice graphic display of key weather metrics day-to-day and lets pilots get a sense of how stable, or not, the upcoming weather will be.

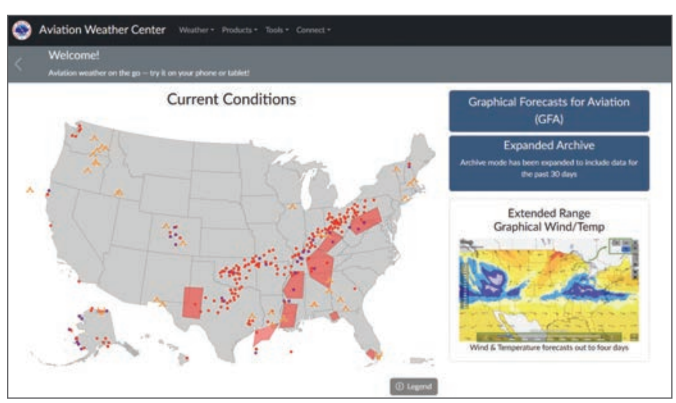
Another benefit of Weather Underground is that pilots can get a forecast for even the smallest, most out-of-the-way airport, which is not true of most aviation weather forecasts. It does, however — like most commercial weather products — lack ceiling data.

3 Days Before Your Cross-Country Flight

Once a flight is three days out, check out Air Sports Net's Aviation Weather Report at usairnet.com. It's a free website that uses NWS data but displays it in a graphic meteogram-esque dashboard that provides pilots with an effective visual summary of upcoming weather. That said, the site only gives forecasts for a limited number of airports, which must be selected from a drop-down menu by city name. If a pilot's flight is in a part of the country that's new to them, they will have to spend some time in Google Maps figuring out which forecast locations are closest to their flight path. But the dashboard does include ceiling data information — both the lowest cloud level and the ceiling base — that's especially critical for VFR flyers.

Area forecast discussions give pilots a regional perspective on the forecasted weather, as well as the relative strengths and weaknesses of the particular forecasts.

Although strictly a text-based product in our graphic era, the Area Forecast Discussion — available either online at bit.ly/WeatherAFD or via your EFB by tapping almost any airport — is often enlightening and a good choice several days before a flight. The discussions give pilots a regional perspective on the forecasted weather, as well as the relative strengths and weaknesses of the particular forecasts. They are written by NWS forecast staff in the various offices, and while sometimes a bit overly technical, the personality of the individual authors often shines through, giving them a human touch.



A screenshot of the Aviation Weather Center webpage.

2 Days Before Your Cross-Country Flight

As a pilot's flight closes in, their new best friend is the GFA, or Graphical Forecast for Aviation, found at the AviationWeather.gov website, a product of NWS's Aviation Weather Center.

This is an amazing public tool that lets pilots visualize a wide variety of weather, as well as graphical SIGMETS (significant meteorological information) and AIRMETS (airmen's meteorological information), over a zoomable map of the country. But, like the ecosystem of weather products itself, the number of options can present a challenge. If a pilot selects every possible option and layer to display, they will have difficulty being able to interpret anything. But if they limit their viewing options to their specific needs and mission, it's highly effective.

One standout feature of AviationWeather.gov is a sliding bar at the bottom of many maps that lets a pilot slide back and forth in time to "see" how the weather is forecast to move and change. This is a great tool to help a pilot's decision-making process when it comes to weather-triggered accelerated or delayed launch times.

Another tool allows pilots to superimpose their route of flight over many of the forecast maps for enhanced situational awareness during weather study.

The Night Before Your Cross-Country Flight

Now it's TAF time, the terminal aerodrome forecast. TAFs are issued for around 700 airports in the country, so while there might not be forecasts for the airports a pilot is landing at, or their alternates, there will likely be one close by.

Many EFB providers also have their own proprietary plain-English versions of TAFs called an MOS, for model output statistics. Airports with TAFs always have an MOS; these generally extend the forecast to three or more days (the TAF only goes out 24 to 30 hours) and break the forecast into smaller slices of time, which is nice in dynamic weather conditions. MOS forecasts are also often available for airports that don't issue TAFs.

Wind prediction mobile apps are another popular night-before tool among many pilots and can help visualize wind speed and direction over the route of flight. The Windy app, for example, animates forecast winds with meteor-like moving streaks, color-coded for velocity, and features a time slider for future-casts.

The Morning of a Pilot's Flight

First, get the standard briefing online at 1800WXBrief.com. If a pilot has any questions or is unsure about the briefing, they shouldn't hesitate to call Flight Service. The local perspective of the briefers is invaluable, especially if the pilot is flying to an area of the country where they are not intimately familiar with the sky. Often, Flight Service can clue a pilot in to how local geography or other factors can impact the forecast.

An inflight display of turbulence probabilities. (Garmin Photo)

In Flight

In flight, for strategic planning, Automatic Dependent Surveillance-Broadcast In (ADS-B In) feeds of ground-based weather radar can show a pilot the approximate position of precipitation. At fuel stops, EFBs also do a splendid job of displaying the bands of winds aloft for choosing a groundspeed-friendly altitude, and some of them interface with the growing network of FAA weather cameras that let a pilot "look out the window" at the weather of an airport hundreds of miles away. If a pilot has not seen one of these in action before, each camera shows the current view and displays a clear-day reference image so that the pilot can judge how different, or not, the real-time feed is from what it could be. Real-time data and images are available at more than 900 camera locations across the U.S. and Canada (weathercams.faa.gov).

> **The growing network of FAA weather cameras lets a pilot "look out the window" at the weather of an airport hundreds of miles away.**

An EFB is also a handy tool for checking recent METARs (meteorological aerodrome reports) over and around your route to get a sense of ceilings, visibility, and winds. And again, at fuel stops, EFBs offer a quick way to look up the telephone numbers for Automated Weather Observation Systems (AWOS) and Automated Surface Observation Systems (ASOS) stations out of radio range, for real-time weather checks ahead on your route.

Yeah. Basically, a pilot's own aviation-savvy (robotic) farmer.

William E. Dubois is a widely-published flight training subject matter expert, and a dual master ground instructor accredited by both MICEP and NAFI. He is an airplane owner, a commercial pilot, and a program manager at Infinity Flight Group's New Jersey headquarters.

The Weather Plan You Never Write Down

Understanding Flight Plans, Flight Following, and Search-and-Rescue Services

By Jeff Arnold

Most pilots are great at planning the flight they intend to fly.

Pilots look at the weather, choose a route and altitude that make sense, pick a reasonable departure time … and sometimes file a flight plan. But sometimes they don't. If the weather looks marginal, pilots will glance through alternates and maybe even write down a few airport codes. Even if all looks good, they still check for the usual trouble spots — TAFs (terminal aerodrome forecasts), radar, NOTAMs (Notices to Airmen), etc. It's a familiar rhythm, and for most flights, it works just fine.

What pilots don't often consider is that there are two audiences for that flight plan.

The first is obvious: the pilot flying. The weather briefing, route selection, and timing are all tools to help pilots decide whether to go (or not) and how to manage the flight once airborne.

The second audience usually doesn't enter our thinking at all and only emerges if the flight isn't completed as planned.

A Routine Cross-Country

Imagine a routine, daytime cross-country flight in a typical single-engine airplane. Nothing exotic. A few hundred miles, good fuel reserves, and no hard schedule on the other end.

The weather picture during preflight is workable. Not severe, not perfect. There's a broad system moving through the region, ceilings are trending down later in the day, and some scattered showers are possible along the route, but it's still VFR (visual flight rules). The forecasts line up well enough to suggest the flight can be completed before things really begin to deteriorate.

The pilot chooses the route with the weather in mind. Staying closer to reporting stations makes sense, and the selected altitude avoids stronger winds, keeping options open. Estimated time en route reflects the winds aloft and the planned route. The pilot identifies an alternate (or two) — not because they're expected to be needed, but because they're there.

The pilot files a VFR flight plan, and the picture is clear … at least for now.

At this point, the preflight planning and weather briefing have done their job, and the pilot feels confident supporting a reasonable "go" decision.

An activated VFR flight plan helps to ensure that if weather, time, mechanical issues, or other circumstances intervene, someone knows where the flight was intended to be — and when.

VFR Flight Following vs. VFR Flight Plans — What's the Difference?

Before continuing, it's worth clarifying some common misconceptions among the pilot community pertaining to VFR flight plans and VFR flight following. Pilots sometimes use the terms interchangeably, but VFR flight plans and VFR flight following serve very different purposes, especially when weather becomes a factor.

VFR flight following is an air traffic service. When workloads permit, ATC (air traffic control) provides traffic advisories, radar identification, and limited assistance. This service can be extremely helpful in busy airspace or during long cross-country flights. What it does not do is establish a pilot's intent or timing if the flight doesn't end normally or departs from the intended plan. Flight following typically lasts only from initial contact until the aircraft is at a sufficient distance from the destination that allows the pilot to change to the appropriate frequency for traffic and airport information. If anything happens before contact is established — or after it's terminated — you could be on your own. If radar contact is lost or a flight never arrives, flight following alone doesn't trigger initiation of a search-and-rescue activity.

Note that staffing and workload constraints, as well as radar and radio coverage limitations, can sometimes restrict ATC's ability to provide flight following services. This may result in pilots hearing some version of: "Squawk 1200 and have a safe flight." Also note that pilots should be specific when requesting flight following to their destination. Many pilots mistakenly believe that just requesting flight following implies coverage to their destination without specifying it.

A VFR flight plan, on the other hand, is exactly what your instructor taught you: a service that exists for one reason — search and rescue (SAR). It documents where the aircraft intends to go, how long the flight is expected to take, and when someone should start asking questions if it doesn't arrive. When a VFR flight plan is activated, it indicates that you've departed and starts the clock. If that clock

If SAR resources have a clear picture of what the pilot knew and intended, the search starts with sharper focus and a reduced search radius.

runs out, Flight Service has a defined baseline to act on.

There's also an important distinction between filing and activating a VFR flight plan. Filing places a flight plan into the system, but until it's activated — by radio, phone, or electronic means — it remains a proposal only and will automatically drop out of the system two hours after the proposed departure time. A flight plan that's not activated provides no protection if the flight goes awry, and no SAR services will be initiated.

Many pilots use both VFR flight plan and flight following services. Flight following can help manage traffic and airspace. An activated VFR flight plan helps to ensure that if weather, time, mechanical issues, or other circumstances intervene, someone knows where the flight was intended to be — and when.

These two services solve

Weather planning doesn't end at takeoff and doesn't belong to just one audience.

different problems. Weather has a way of testing both.

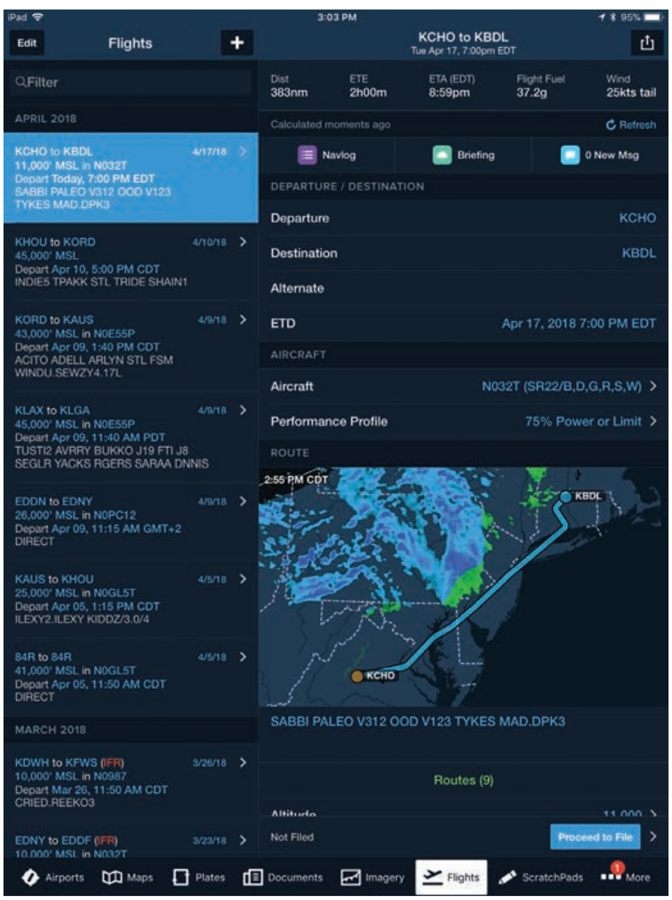
When Weather Starts Editing the Plan

Once airborne, the weather begins to drift slightly away from the forecast. Not dramatically — but enough to require attention.

Ceilings are a bit lower than expected. Visibility varies more than the forecast. A few buildups appear earlier than planned. None of this is unsafe in and of itself, but it nudges the flight away from the neat, straightforward assumption conceived on the ground.

Small decisions follow. A few miles left for better visibility. A slightly lower altitude to stay under a cloud layer. A longer leg than planned to avoid weather over unfamiliar terrain. Gradually, the flight no longer resembles the original plan.

This is where experience matters. The pilot is adapting, staying ahead of the airplane, and keeping the flight safe,



An EFB displaying flight planning info. (ForeFlight Image)

legal, and controlled. From the cockpit, it feels like good decision-making.

What's easy to miss is that the story of the flight is starting to change — and not all of those changes are being recorded.

The Fork

At this point, the flight can unfold in two very different ways.

Path One: The Quiet Update

The pilot takes a moment to update their VFR flight plan. They file an amended route or ETA (estimated time of arrival). Maybe a quick in-flight radio call to Flight Service is in order to explain the deviation and confirm the new weather picture. Nothing dramatic — just a small adjustment that reflects reality instead of the original plan.

From the cockpit, this feels almost unnecessary — maybe even a waste of time. The pilot already knows where they are and what they're doing.

From the outside, however, the story of the flight has just been rewritten to match the changing conditions.

Path Two: The Silent Adjustment

The pilot continues without updating their flight plan. The deviations are manageable, and the destination is still within reach. Filing an amendment feels optional, maybe even inconvenient or cumbersome.

The airplane keeps moving. The pilot stays busy flying and making decisions in-flight.

Once an aircraft becomes overdue — typically around ETA plus 30 minutes — the SAR process is initiated.

The original flight plan, however, remains frozen in time — describing a flight that no longer exists.

When the Clock Matters

If the flight arrives safely, both flight paths look the same in hindsight. The differences vanish the moment the engine shuts down, and the pilot closes the flight plan.

If it doesn't, the differences matter immediately.

Once an aircraft becomes overdue — typically around ETA plus 30 minutes — the SAR process is initiated. The first questions aren't dramatic ones. They're practical:

- Did the aircraft depart and/or arrive?
- What was the intended route?
- What weather was forecast along the way?
- How long should the flight have taken?
- Where did it most likely divert to if weather or

mechanical conditions forced a change?

Those answers don't come from the cockpit. They come from whatever information is left behind.

Weather plays a quiet but central role here. Winds, ceilings, and visibility trends shape where an aircraft might have diverted, descended, or turned back. If SAR resources have a clear picture of what the pilot knew and intended, the search starts with sharper focus and a reduced search radius. If not, the search area grows, sometimes quickly.

When a flight plan was kept current, i.e., when weather-driven changes were communicated, the reconstructed story closely resembles what actually happened. When it hasn't, searchers are left trying to reconcile real-world weather with an outdated narrative.

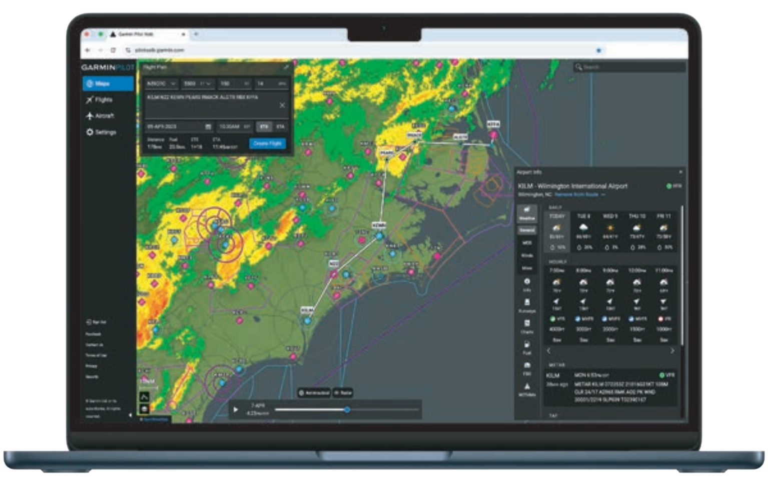
That difference can affect where resources look first, how wide the search becomes, and how long it takes for help to arrive.

Case in Point: A Little-known Service

In November of 2025, a pilot flying under VFR without flight following or a flight plan experienced an engine failure and made an emergency landing in a marsh. The aircraft quickly began to submerge. The pilot was able to exit and swim to a nearby embankment, but he couldn't cross the marsh and was left several miles from any road or structure. With cold seasonal conditions and wet clothing, the threat of hypothermia was real.

A friend watching the flight's ADS-B track online noticed it abruptly ended in a remote area. Sensing something was wrong, he contacted Flight Service and initiated a "Concerned Party SAR" (a service that, at the time, the friend did not know was provided.) Using the last known position and available flight information, Flight Service specialists worked with the Coast Guard to narrow the search area. The Coast Guard located and rescued the pilot within a few hours.

In this case, there was no flight plan to reference and no automatic trigger for action — only a concerned friend who noticed the track had ended in an unexpected place. That early call was critical to the outcome. In many others, no one is watching. A VFR flight plan is often a reliable way to help ensure that someone is watching.



(Garmin Image)

The Flight You Hope No One Else Ever Flies

None of this necessarily means pilots should plan for failure. It's meant to emphasize and recognize that weather planning doesn't end at takeoff and doesn't belong to just one audience.

Remember that good weather preflight planning supports safe decisions in the cockpit. Clear flight plan updates and timely amendments support everyone else if those decisions don't lead to a normal ending.

Most flights will never need that second audience. But when they do, the clarity of the story you left behind makes all the difference.

Leave a Better Trail

If you file a VFR flight plan, consider including cell phone numbers for people onboard in the remarks section when practical.

If an aircraft becomes overdue, search-and-rescue teams, including Civil Air Patrol, may attempt to use those numbers early in the process to help determine the flight's last known location or establish contact.

Jeff Arnold is the Director of Innovation and Outreach for Leidos Flight Service. He is an Oklahoma State University graduate and an active flight instructor. He previously served as a meteorology adjunct instructor at Tarrant County College's flight program, program manager for two large flight academies, and is a former Flight Service weather briefer and air operations manager.

ROLL *of* HONOR

Wright Brothers *Master Pilot Award*

The FAA's most prestigious award for pilots is the Wright Brothers Master Pilot Award. It is named in honor of the first U.S. pilots, the Wright brothers, to recognize 50 years of exemplary aviation flight experience, distinguished professionalism, and steadfast commitment to aviation safety. In 2025, we recognized the following Master Pilots. For more about the award, go to bit.ly/faamasterpilot.

Glen Alsworth	AK
Dan Bale	AK
Barry Byrne	AK
Gerald Casey	AK
Daniel Chadbourne	AK
Steven Collins	AK
David Fagre	AK
Kathleen Fagre	AK
George Hobson	AK
Terry Kennedy	AK
Wayne Meyer	AK
John Miller	AK
Victor Olsen	AK
Charles Pohland	AK
Brian Porterfield	AK
Harry Ricci	AK
John Schwamm	AK
Cecil Shuman	AK
Douglas Staats	AK
Frederick Swalling	AK
Phyllis Tate	AK
Arvid Weflen	AK
Stanley Wren	AK
———	
Russell Ferrell	AL
Kevin Schultz	AL
———	
Jackie Bishop	AR
John Broome	AR
Ralph Chapman	AR
William Duncan	AR
Stephen Foster	AR
Marvin Homsley	AR
Ricky Kent	AR
James Looney	AR
Marion Maneth	AR
Robert Maneth	AR
Wallace Sitton	AR
Kenneth Turner	AR
Daniel Westbrook	AR
———	
Joseph Abrahamson	AZ
Scott Allen	AZ
Charles Baker	AZ
Kenneth Barnett	AZ
Rodney Brackin	AZ
James Brendel	AZ
Michael Christensen	AZ
Stephen Cirino	AZ
Russell Demaray	AZ
John Dempsey	AZ
Ronald Diedrichs	AZ
Julian Fruhling	AZ
David Fry	AZ
Gareth Gilson	AZ
Michael Gonzales	AZ
Raymond Grimes	AZ
Kristopher Hefton	AZ
Peter Hermes	AZ
Felix Hernandez	AZ
Mark Hitchcock	AZ
Stephen Hohl	AZ
Russell Hustead	AZ
James Kahn	AZ
Steven Loranger	AZ
Cecil Loter	AZ
John Mingle	AZ
Myron Nelson	AZ
James Olson	AZ
Edward Robertson	AZ
Richard Schein	AZ
Daniel Tokarski	AZ
Howard Woodruff	AZ
Roy Wooten	AZ
———	
George Alleman	CA
Ronald Allen	CA
Adam Alpert	CA
Rick Atkins	CA
Thomas Barbre	CA
Samuel Bishop	CA
Peter Cavitt	CA
Ron Darcey	CA
Ronald Davis	CA
Richard Devirian	CA
Timothy Dickerson	CA
Merrill Eastcott	CA
James Econome	CA
Peter Friedman	CA
Fred Handal	CA
Harry Harding	CA
Kirk Heiser	CA
Keith Herrel	CA
Charles Hicks	CA
John Kerr	CA
Jamie Kopf	CA
Andre Long	CA
David Lowe	CA
Edward Markie	CA
Roland McKee	CA
Edward Miller	CA
Donald Myhra	CA
Deen Oehl	CA
Michael Pappas	CA
Rod Pierson	CA
Gregg Plambeck	CA
Nader Poursartip	CA
John Robinson	CA
Susan Royce	CA
Dennis Sanders	CA
Patrick Scribner	CA
Thomas Smith	CA
John Steuernagle	CA
John Tainter	CA
Michael Terhune	CA
Diran Torigian	CA
David Wardall	CA
Lewie Webb	CA
Steven Wilkens	CA
Rhon Williams	CA
Scott Williams	CA
Clarence Williams	CA
Howard Yound	CA
———	
Kamal Abed	CO
Daniel Berry	CO
Charles Dickinson	CO
Charles Dyer	CO
Robert Freeman	CO
Daniel Graham	CO
Alexander Hauzer	CO
Jerre Hill	CO
Douglas Houston	CO
Phillip Irwin	CO
Charles Johnson	CO
Donald Kuskie	CO
William Lundell	CO
Thomas Maher	CO
James McGrevey	CO
John Meador	CO
David Novotny	CO
Lev Prystupa	CO
Robert Sannwald	CO
David Simenauer	CO
Delmar Smith	CO
Roy Space	CO
Jon Stark	CO
Joseph Thibodeau	CO
Alfred Uhalt	CO
Robert Venohr	CO
Steve Vessey	CO
Gregory Winker	CO
———	
Alan Amato	CT
Beverly Jones	CT
Howard Rocklen	CT
Richard Sanville	CT
———	
Richard Greenhut	DC
———	
Francis Gallagher	DE
Everett Warfel	DE
———	
Diego Alfonso	FL
Brian Applegate	FL
E. Arundel	FL
Harold Bailey	FL
David Baldwin	FL
Jose Barbosa	FL
William Barron	FL
Mary Bryant	FL
Fredric Buckingham	FL
Gorden Burgess	FL
Daniel Caldwell	FL
John Catanesi	FL
Benjie Coleman	FL
David Cowan	FL
Van Crosby	FL
Carl Cross	FL
Mark Davies	FL
Jack Davis	FL
Albert de Shaw	FL
Jorge Diaz-Silveira	FL
Russell Dow	FL
Merton Erickson	FL
Alan Estis	FL
Ronald Ferraiuolo	FL
Michael Foor	FL
Thomas Goonen	FL
Gerald Guess	FL
Gregory Halpin	FL
William Hammond	FL
Bruce Hargis	FL
Robert Harris	FL
Hubert Helfer	FL
Donald Hemphill	FL
Mark Hlavin	FL
Roger Hoover	FL
Kim Ingerslev	FL
Herbert Johnson	FL
Mark Johnson	FL
Lee Jones	FL
Ronald Kaplan	FL
Keith Kaplan	FL
Michael Katz	FL
Patricia Kihm	FL
Keith Kilgallen	FL
Richard Klein	FL
Gregory Knowles	FL
Karl Krumke	FL
Michael Kwiat	FL
Michael Lebhaft	FL
Terrance Lee	FL
Todd Leiss	FL
Albert Lewis	FL
Donald Long	FL
Richard Longlott	FL
George Loudakis	FL
Wayman Luy	FL
Kevin Mahoney	FL
John Malone	FL
Gayl Masson	FL
David Matuska	FL
Rickey McClure	FL
Douglas McGowan	FL
Paris Michaels	FL
Charles Mills	FL
Steven Moore	FL
Patricia Ohlsson	FL
Joseph Orzeck	FL
Thomas Parker	FL
Gary Parker	FL
John Platt	FL
Thomas Rau	FL
Stephen Reeves	FL
Kenneth Robinson	FL
Oneida Rollins	FL
Kathleen Royer	FL
John Ruettinger	FL
Geoffrey Schuck	FL
Larry Sirmons	FL
Charles Spinelli	FL
Gregg Sternbach	FL
Joseph Teets	FL
Richard Turner	FL

2025

Charles Wattam FL
Fred Wayne FL
Leslie Weaver FL
Richard Wedemeyer FL
Steven Wellman FL
Scott Welty FL
Michael Willits FL
Debra Young FL

James Argo GA
Raymond Bell GA
Keith Bransky GA
Jerry Brillant GA
Timothy Buchman GA
Michael Charles GA
Hector Colon GA
Donald Commer GA
James Cox GA
Mark Davis GA
George Duke GA
Roy Dunn GA
Edward Esserman GA
Robert Gatliff GA
Wendell Haley GA
Francis Hayes GA
Richard Hayes GA
Steven Holder GA
James Jones GA
Charles Kaiser GA
William Leftwich GA
Richard Marr GA
Oran Miller GA
Robert Moore GA
Charles Nosil GA
James Rinehart GA
Richard Smith GA
Thomas Smither GA
David Snyder GA
Richard Stark GA
Michael Stewart GA
James Tatum GA
Paul Thompson GA
William Walker GA
John Watson GA
Edgar Williams GA

Jeffrey Acord HI
George Read HI

James Bartholomew IA
Paul Berge IA
Robert Booth IA
Randall Brookhiser IA
William Ebbinga IA
James Kaldenberg IA
Bruce Oviatt IA
Andy Sauer IA

Christopher Clarke ID
Ralph Crosgrove ID
Kenneth McCune ID
Donald Mullen ID
Don Wood ID

Jeffrey Bartels IL
Ceward Batson IL
Kim Carter IL
Lonnie Horn IL
Mark Janowski IL
James Johnson IL
Dell McCoy IL
James McCoy IL
John McKee IL
Keith Merrill IL
Henry Priester IL
Neil Swartzbaugh IL
Robert Thompson IL
David Warner IL
George Wilts IL
Robert Ziegler IL

Terry Dill IN
Brent Drake IN
Daniel Keen IN
Richard Knight IN
Scott Martin IN
Gregory Miller IN
Curtis Simonye IN
James Temple IN
Daniel Wertman IN
Robert Wohlstadter IN

John Bell KS
David Bodlak KS
Martin Brown KS
Charles Brown KS
Roland Davis KS
John Eppright KS
Luis Garrido KS
Alan Gaul KS
Rodney Goering KS
Robert Kenneson KS
Allan Krahn KS
Charles LeMaster KS
Dan Linn KS
Earl Long KS
Gregg Lundquist KS
William Lyddon KS
Ronald Renz KS
William Rokiski KS
Gary Roper KS
Randolph Shields KS
David Ward KS
David Wiebe KS

Robert Boswell KY
John DuBarry KY
Robert Hartin KY
Ronald Hill KY
David Marks KY
John Owens KY
James Riddle KY

Howard Cole LA
James Grant LA
Gerald Huggins LA
William Kelley LA
Keith Rutherford LA
Derrell Spurlock LA

Lawrence Gelb MA
Philip Johnson MA
Georgia Pappas MA
John Singleton MA
Charmian Sperling MA
Dennis Walach MA
Lucy Young MA

Abdon Ackad MD
Harris Blackwell MD
John Bussard MD
Daniel Callow MD
Robert Colvin MD
Steven Dalton MD
Michael Freed MD
Daniel Morris MD
Richard Van Lehn MD

William Albair ME
John Boyce ME
Dennis Bradley ME
R. Cianchette ME
John Knight ME
John Milligan ME

Dennis Doren MI
Hubert Eisen MI
Ronald Evans MI
William Foley MI
Craig Fortson MI
John Freitas MI
Michael Hargrave MI
John Henne MI
Raymond Hill MI
Mathew Jacobs MI
John Johnson MI
Timothy Juhl MI
Kevin Malone MI
Fred McCaskill MI
James Nowacki MI
Dale Nuss MI
Larry Pack MI
James Schock MI
Mark Taylor MI
Elliot Zeltzer MI
Kenneth Zimmerman MI

Andrew Brown MN
Margaret Drescher MN
Vincent Long MN
Robert Shadduck MN
Paul Stieler MN
Michael Swiridow MN
Michael Willey MN
Theodore Wyrowski MN

Gregory Bittner MO
Gilbert Clay MO
Thomas Cook MO
John Cox MO
Thomas Glass MO
Theodore Irons MO
William Jagust MO
Edward Lavin MO
Harold Moss MO
James Thorne MO
Steven Von Gruben MO

Alfred Bogen MS
Rocco Bonura MS
William Carrothers MS
Steven Kane MS
Robert Le Tourneau MS
Robert Mims MS
David Perdue MS
Larry Sutton MS
Gregory Travis MS
James Wade MS

Kenneth Coffland MT
Wilbur Fultz MT
Gunnar Hagstrom MT
Fred Hasskamp MT
Robert Hollister MT
Alan Lee MT
Daniel Lilja MT
Lawrence Nelson MT
Michael Schwartz MT

Arnold Andresen NC
Campbell Barnett NC
Robert Barnett NC
John Bryan NC
Barry Fetzer NC
Lawrence Ganse NC
Mark Glazer NC
Robert Hayes NC
Terry Ingold NC
James Javurek NC
Alan Kane NC
Craig Kirkpatrick NC
John Larsh NC
Charles Martell NC
William McKee NC
Jonathan McKinnon NC
Judson McLester NC
John Morgan NC
Jay Nabors NC
Raymond Parker NC
Russel Williams NC
Richard Woodbury NC
Stephen Zollo NC

Jon Kreilkamp ND
Grover Riebe ND

John Edson NE
David Fritz NE
Thomas Johnson NE
Darrell Nelson NE
John Prestia NE
Douglas Roth NE

Barry Borella NH
Daniel Kelley NH
Robert Valli NH

Joseph Abegg NJ
Richard Amon NJ
John Beck NJ
Robert Pantaleo NJ
Thomas Richter NJ
Thomas Weston NJ

James Ahern NM
Jon Daffer NM
Rowland Dewing NM
Kevin Dunshee NM
Kenneth Hinkes NM
Barry Leff NM
Robert McCoy NM
Louie Navar NM
Ross Palmer NM
Michael Petrofes NM
James Unruh NM
Arthur Woods NM

Charles Crickmer NV
Lester Hoisington NV
Michael Radomsky NV

Thomas Dawes NY
Steven Favale NY
David Lewis NY
Michael Schneider NY
Carroll Teitsworth NY

Ronny Alldredge OH
George Antonell OH
Eric Barnum OH
Bruce Bream OH
Ronald Carroll OH
Larry Clark OH
Jerry Epstein OH
Martin Ferrari OH

ROLL *of* HONOR 2025

Carl Fisher	OH
Jay Hand	OH
Noble Hollis	OH
Rodney Kramer	OH
Mark McCarthy	OH
Albert Nels	OH
Gregory Pfeil	OH
Louis Plazner	OH
Jon Speer	OH
Ricky Summers	OH
Julius Szenegeto	OH
Michael Wells	OH
Chester West	OH
Richard Willis	OH
Ralph Holliday	OK
Gary Brown	OR
Kenneth Chapmen	OR
Audie Deckard	OR
James Hicks	OR
Thomas Jolma	OR
Alan Kellogg	OR
David McGraw	OR
Samual Morris	OR
Ronald Poe	OR
Robert Reid	OR
James Roberts	OR
Michael Ryer	OR
Bernard Schneider	OR
Gerald Van Grunsven	OR
Richard Van Grunsven	OR
Neal Wright	OR
Dennis Wright	OR
Mark Daniels	PA
Keith Feaga	PA
Richard Halstick	PA
John Hinson	PA
Walter Hortman	PA
Jack Kimberly	PA
Merrill Mirman	PA
Daryl Myer	PA
Robert Newman	PA
Richard Noll	PA
Ross Nye	PA
Charlie Parsons	PA
Thomas Riemer	PA
Bruce Russell	PA
Clyde Smith	PA
Christine St. Onge	PA
Daniel Sweazen	PA
Timothy Tate	PA
Alfred Arlen	RI
Michael Angelastro	SC
Hancel Bagnal	SC
Mark Bailey	SC
William Bell	SC
Robert Bindus	SC
James Bird	SC
Ron Bland	SC
Douglas Carmody	SC
Joseph Caruso	SC
Frank Delahanty	SC
Robert Fancher	SC
Bradley Gibbs	SC
Julian Hill	SC
David King	SC
Charles Luddeke	SC
Donald McDonald	SC
Richard Smith	SC
James Stoia	SC
John Stoll	SC
Robert Sweet	SC
Claude Timmerman	SC
Keith Wave	SC
Lewis Wilson	SC
Bruce Beecroft	SD
Henry Kliner	SD
Orvin Olivier	SD
Gary Petik	SD
David Timmons	SD
John Allen	TN
Errol Bader	TN
Robert Cope	TN
James Fltcher	TN
John Miller	TN
George Mueller	TN
Edward Pataky	TN
Douglas Small	TN
Stanley Stepp	TN
Michael Taylor	TN
David Tyler	TN
Daniel Valle	TN
Eric Vancourt	TN
Bayard Walters	TN
James Witt	TN
Edward Woerle	TN
Joe Bain	TX
Peter Beadling	TX
Kevin Brandt	TX
Steven Bray	TX
Randy Broiles	TX
Bob Brown	TX
Randall Brown	TX
Jerry Browning	TX
Brett Bucelluni	TX
David Buffington	TX
Charles Burgar	TX
Edwin Burnet	TX
William Burns	TX
Lyle Byrum	TX
James Caine	TX
William Caton	TX
Albert Clark	TX
Jim Collom	TX
Richard Coon	TX
David Daniels	TX
Clint Davis	TX
Edward Delehant	TX
Randy Deutschendorf	TX
Thomas Divine	TX
James Dixon	TX
Mario Dongellini	TX
Barry Dunning	TX
Thomas Dusin	TX
Timothy Eldredge	TX
Gary Evans	TX
Alan Feltis	TX
William Ferrier	TX
John Fodermaier	TX
Gene Galka	TX
James Garbett	TX
Richard Gensheimer	TX
Felipe Gonzalez	TX
Hugh Grandstaff	TX
James Green	TX
Gerald Griffin	TX
William Grothues	TX
John Gwynne	TX
Adam Hamedi	TX
Darrell Harris	TX
Michael Hassel	TX
Mark Huffstutler	TX
Ivan Janssen	TX
David Johnson	TX
Richard Jones	TX
Stephen Kern	TX
James Kilsheimer	TX
Charles King	TX
John Krogstad	TX
Kenneth Lantz	TX
Vincent Lawrence	TX
Henry Leonard	TX
Stanley Lindholm	TX
Harold Martindale	TX
Glenn Mathis	TX
David McKee	TX
Wayne Meisetschleager	TX
Dayton Miller	TX
Jay Miranda	TX
Neil Muxworthy	TX
Patrick Nuytten	TX
Douglas O'Connor	TX
William O'Donnell	TX
Kent Olson	TX
Tevis Pappas	TX
James Piot	TX
Gary Planter	TX
Anthony Quartano	TX
Douglas Reed	TX
Don Reed	TX
Neil Rinearson	TX
Lynn Rippelmeyer	TX
Davis Rohr	TX
William Rush	TX
Keith Russell	TX
John Ryan	TX
William Samuels	TX
Charles Scott	TX
Chris Shaw	TX
William Signs	TX
Neil Smith	TX
Randy Smith	TX
Harold Storer	TX
Donald Tedrow	TX
Walter Timms	TX
Thomas Tomaras	TX
George Toombs	TX
Gary Walker	TX
Jimmy Walton	TX
Anthony Watson	TX
Wayne Weslander	TX
William White	TX
Gregory White	TX
Gary Whitfield	TX
Randy Wiliams	TX
John Williams	TX
Larry Wood	TX
David Wyant	TX
Kenneth Bollinger	UT
Max Kieffer	UT
Glendon Olsen	UT
Danny Sorensen	UT
Norman Stauffer	UT
Gilbert Williams	UT
John Bryant	VA
Mark Buchner	VA
John Calhoon	VA
Roger Coffman	VA
Walter Edwards	VA
Curtis Hartman	VA
Robert Lambert	VA
John Lawler	VA
Ronald Meyer	VA
Paul Miles	VA
Roger Roberts	VA
Robert Shumaker	VA
Charles Southhall	VA
William Whiteford	VA
Timothy Alentiev	WA
William Anders	WA
Steve Catalano	WA
Gregory Fort	WA
Mark Gehlen	WA
Howard Henderson	WA
Philip Hintze	WA
Timothy Lewis	WA
Ronald Mitchell	WA
Michael Moore	WA
Roger Patry	WA
Lyle Pfeifer	WA
Scott Reisback	WA
LaVern Sorenson	WA
Robert Stoney	WA
Erin Talbott	WA
Richard Wegener	WA
David Wheeler	WA
James Boxrud	WI
Timothy Lemke	WI
Gary Lowe	WI
James Notstad	WI
Henry Peterson	WI
Vincent Pisha	WI
Terry Railing	WI
Tomas Thomas	WI
Edward Ward	WI
Thomas Wildes	WI
Wynne Williams	WI
Samuel Bellotte	WV
John Ellis	WY
John Koehler	WY

(bit.ly/faamasterpilot)

ROLL *of* HONOR 2025

Charles Taylor *Master Mechanic Award*

The FAA's most prestigious award for aircraft mechanics is the Charles Taylor Master Mechanic Award. It is named in honor of the first aviation mechanic in powered flight, Charles Taylor, to recognize 50 years of exemplary aviation maintenance experience, distinguished professionalism, and steadfast commitment to aviation safety. In 2025, we recognized the following Master Mechanics. For more about the award, go to bit.ly/faamastermechanic.

Brian Andrus	AK
Terry Kennedy	AK
Victor Olsen	AK
Brian Porterfield	AK
Arvid Weflen	AK
Craig Wilson	AK
———	
Loren Triefenbach	AL
———	
James Looney	AR
David Vaughan	AR
Daniel Westbrook	AR
———	
Gary Bliss	AZ
Terry Farmer	AZ
David Gardner	AZ
Heros Kajberouni	AZ
Robert Oliver	AZ
John Pursell	AZ
George Watts	AZ
———	
George Alleman	CA
Rick Atkins	CA
Ronald Davis	CA
Robert Duboise	CA
Michael Kielbasa	CA
David Lowe	CA
Steven Lunde	CA
Paul McKenzie	CA
Nader Poursartip	CA
Michael Terhune	CA
Victor Viti	CA
David Wardall	CA
Mark Wiebe	CA
———	
Clyde Barker	CO
Stanley Galloway	CO
Sidney Jensen	CO
Raymond Middleton	CO
———	
Martin Farrar	CT
Robert Lenert	CT
———	
James Janaitis	DE
———	
Robert Barnes	FL
Benjie Coleman	FL
Paul Collins	FL
Jorge Diaz	FL
Chales Gantz	FL
Frank Johnson	FL
Robert Kearney	FL
Wayman Luy	FL
Ronald Oberholtzer	FL
Ruben Rodriguez	FL
Perry Siler	FL
Christopher Snow	FL
Warren Stevens	FL
Joseph Teets	FL
Murray Thole	FL
———	
Paul Antkowiak	GA
Don Commer	GA
Mel Duhon	GA
Ricky Icenogle	GA
Richard Marr	GA
Paul Martin	GA
Douglas Saville	GA
Kenneth Secrest	GA
———	
Fred Bungcayao	HI
———	
James Bartholomew	IA
William Ebbinga	IA
———	
Michael Brown	ID
Kenneth McCune	ID
Brock Wright	ID
———	
George Ballard	IL
Serge Balsamo	IL
Kenneth Kopriva	IL
Dennis Morton	IL
———	
Melvin Crane	IN
David Fulton	IN
Larry Patrick	IN
John Wolfe	IN
———	
Steven Brooks	KS
Irving Freige	KS
Gerald Griggs	KS
Randell Hooks	KS
Michael Kelley	KS
Robert Kenneson	KS
Philip Kliewer	KS
Allan Krahn	KS
Dan Linn	KS
Earl Long	KS
William Lyddon	KS
Kenneth Newell	KS
Gary Roper	KS
David Ward	KS
Carl Weaver	KS
Robert Young	KS
———	
Robert Stewart	KY
———	
Milton Geltz	LA
Gerald Huggins	LA
———	
John Boyce	ME
———	
Gary Dunn	MI
Frederick Liskovec	MI
Stephen Paone	MI
Richard Paone	MI
Daniel Peacock	MI
Alan Sallans	MI
William Sherwood	MI
James Timoszyk	MI
———	
Thomas Cook	MO
Tim Wakeman	MO
Timothy Wakeman	MO
———	
Rocco Bonura	MS
Sheldon Burgess	MS
John Harle	MS
Gerald Leblanc	MS
———	
Wilbur Fultz	MT
Thomas Hillesland	MT
Leonoard Patton	MT
———	
Donald Bonney	NC
Nelson Conarroe	NC
William Craig	NC
Donald Ellsworth	NC
Kevin Flood	NC
Bernard Gerstemeier	NC
Mark Glazer	NC
Terry Ingold	NC
Larry LaFosse	NC
Thomas Malechuk	NC
Wayne Smith	NC
Steven Spaeth	NC
———	
Kenneth Chann	NJ
Frank Dunker	NJ
James Gieger	NJ
———	
Daniel Allison	NM
———	
Philipf Baehr	NV
Dean Benedict	NV
George Nieves	NV
———	
Charles Bracken	NY
Juan Capellan	NY
Bruce Haughie	NY
Charles McPhee	NY
Lorenzo Meccariello	NY
Carlos Mercado	NY
Michael Shearer	NY
Genna Suraci	NY
———	
Wayne Grow	OH
Richard Haynes	OH
Mark Kotch	OH
James Popik	OH
Jay Shearer	OH
Salvatore Valentino	OH
Michael Wells	OH
Ralph Holliday	OK
Steve Slone	OK
Raymon Taylor	OK
Kim Allain	OR
Kenneth Chapman	OR
Steve Pankonin	OR
Robert Reid	OR
———	
Joseph Flury	PA
Thomas Ledgerwood	PA
———	
David Cardullo	RI
———	
James Stoia	SC
———	
Donald Barber	TN
Paul Cierzniewski	TN
Roger Dahler	TN
George Douglas	TN
Merlin Grigsby	TN
David Hays	TN
William Kelly	TN
Edward Woerle	TN
———	
Rodney Blake	TX
Mike Bridges	TX
Jim Collom	TX
James Dixson	TX
Richard Hammack	TX
Darrell Harris	TX
Ronald Hughes	TX
Boyd Kempf	TX
Randolph McDonald	TX
Allan Mekush	TX
Douglas O'Connor	TX
William Signs	TX
George Smith	TX
Joseph Suszczynski	TX
Thomas Travis	TX
Terry Wallace	TX
Red Warren	TX
Wayne Weslander	TX
Randy Wiliams	TX
Robert Williams	TX
———	
William Bridges	UT
———	
Nancy Jones	VA
———	
Richard Sylvester	VT
———	
Michael Enderud	WA
Dwight Ford	WA
Daniel Neil	WA
Michael Paone	WA
Guy Sahlman	WA
Donald Schoolcraft	WA
Erin Talbott	WA
———	
Glenn Butts	WI
Raymond Felber	WI
Mark Grimshaw	WI
Richard Pedersen	WI
———	
Edwin Glass	WV

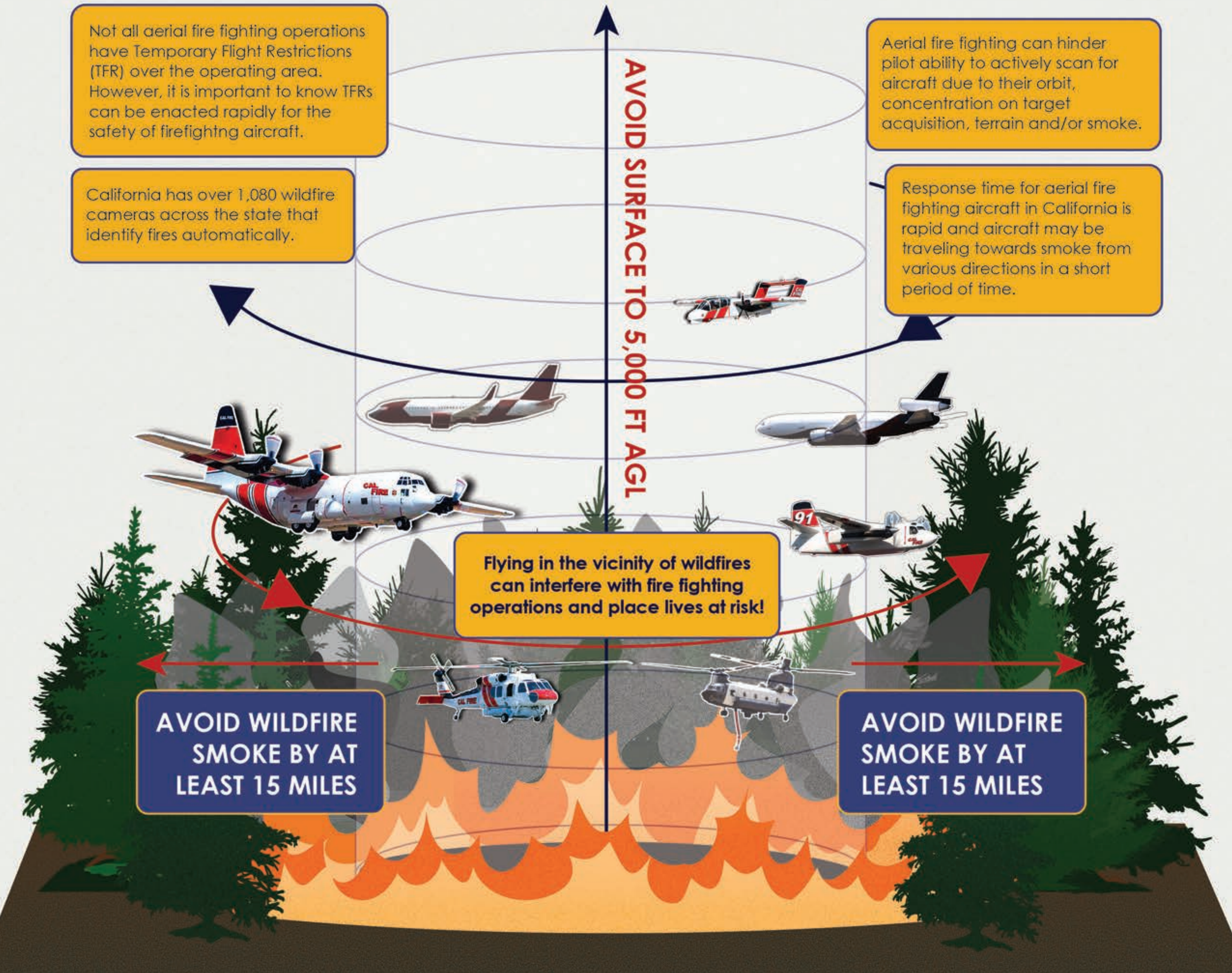
(bit.ly/
faamastermechanic)

WARNING

MID-AIR COLLISION HAZARD

IF YOU SEE WILDFIRE SMOKE, FLY AWAY!

Multiple helicopters and airplanes flying in different patterns at varying altitudes should be expected above a wildfire. Aircraft will be circling the fire area, including the column of smoke, actively engaged in firefighting operations.



DO NOT REPORT FIRES THAT HAVE FIRE FIGHTING AIRCRAFT ON-SCENE. TO REPORT A WILDFIRE THAT YOU THINK HAS NOT BEEN REPORTED, CONTACT THE SERVICING TOWER, APPROACH, OR FLIGHT SERVICE STATION.

PRODUCED IN COOPERATION WITH THE USDA FOREST SERVICE, WHICH IS AN EQUAL OPPORTUNITY PROVIDER, EMPLOYER, AND LENDER.

JAMES WILLIAMS

AN UPDATE TO YOUR FORECASTING

The FAA places significant emphasis on providing detailed handbooks on a variety of aviation-related subjects. Weather is, of course, included. The *Aviation Weather Handbook* (AWH) was updated this spring, making it the perfect reason to revisit it in this weather-focused issue of *FAA Safety Briefing*. Just as pilots should routinely get updated forecasts before flight, it's advisable to refresh your basic weather knowledge, too.

This issue serves as an excellent refresher on several aviation weather topics, but space limitations mean that it may not have the depth on any one topic that pilots may desire. The AWH offers an overview of how weather services are provided by various government agencies and private organizations, and describes the basics of what information is provided and how to obtain it.

The AWH also covers the theory behind weather systems and the atmospheric structure. It addresses some of the underlying principles that drive larger trends, such as heat, temperature, and water vapor. These concepts, along with how heat is transferred in the atmosphere and beyond, form a bedrock layer that underpins many of the more advanced concepts that can create weather traps for pilots.

Building on these concepts, the AWH discusses a key component of Earth's atmosphere: atmospheric heat imbalances. Many natural systems are driven by the need to equalize, and how that equalization takes place can drive systems like the weather. Whether it's heat or pressure (two key weather drivers), the natural desire to balance can be seen in microscale examples. Mixing hot and cold water results in a warm or tepid result. Opening a soda can or bottle will result in a pop or hiss as the high pressure inside the vessel escapes into the surrounding environment. While important as examples, these simple demonstrations don't capture the complex systems that drive our weather.

The Aviation Weather Handbook is available at bit.ly/AviationWx.

Further chapters build on the foundation to dive into aspects of weather that directly impact pilots. Aspects such as winds, fronts, and air masses add further complexity to our system. Those middle layers provide more support for direct impacts such as cloud formation and precipitation. Along with wind, clouds and precipitation are probably the most closely watched factors by pilots when making go/no-go decisions. For a pilot, dealing with wind conditions can either lead to minor inconveniences, like increased fuel burn/lower ground speeds, or to potential safety concerns from wind speeds that exceed the aircraft's crosswind component. Clouds and precipitation can create instrument meteorological conditions (IMC) and potentially dangerous weather, such as thunderstorms, hail, and tornadoes. Even for instrument-rated pilots, these conditions can pose challenges warranting a no-go decision, underscoring the need to understand them for flight safety. There is also a chapter dedicated to weather radar. As weather radar information has moved from the preserve of business and airline aircraft with onboard systems to being a widely available tool, it is critical to understand what the information the pilot is seeing means and how they can use it.

The AWH next moves into more situational weather that may not impact pilots directly but can be a crucial resource to understand before they encounter it. Mountain weather may not be applicable to a Florida pilot, and tropical weather might not apply to a Montana pilot, but these chapters are worth reviewing before venturing into those new environments. Another environment that almost every pilot will never encounter is space. But space has weather, and it can affect us on Earth, especially with regard to communication and space-based navigation like GPS. Space weather covers processes that occur outside of the Earth's traditional atmosphere and are primarily driven by the sun. It includes phenomena like solar flares, solar winds, and coronal mass ejections (CME).

We hope this article inspires pilots to sharpen their weather skills and explore the newly updated AWH. By staying current with weather, pilots play a crucial role in enhancing airspace safety.

James Williams is *FAA Safety Briefing*'s associate editor and photo editor. He is also a pilot and ground instructor.

CHRIS TROXELL

EYES IN THE SKY – FOR SAFETY

It was August 2024 in Queens, New York, when a terrifying scenario unfolded. A trio of armed invaders forced their way into a home and held several residents against their will. Fortunately, one resident managed to call 911, and a unit responded with a special helper — in the sky.

"They didn't know we had drones overhead, equipped with infrared cameras that can detect their body heat, and officers on the ground able to see the drone footage on an iPad," said NYPD Deputy Commissioner of Operations Kaz Daughtry. "The drones gave our ground unit the exact location of the intruders, and we were able to take those individuals into custody. It was amazing."

This arrest is just one example of how the DOT and FAA are enabling law enforcement agencies across the country to explore a new frontier in public safety drones.

More public safety organizations are deploying drones to speed response times with support from the FAA, which can quickly issue authorizations such as Beyond Visual Line of Sight (BVLOS) waivers. FAA-licensed drone pilots deploy them for response to emergencies, including crimes, fires, auto accidents, and missing-person reports. Some use them to inspect infrastructure after a natural disaster. First-responder drones provide timely, critical information — live video — to responding officers.

The FAA's team of airspace and aviation safety specialists can instruct emergency responders on how to start a drone program, and they can also provide emergency authorizations to first responders around the clock. In April last year, the FAA introduced a streamlined application process for part 107 and part 91 operational waivers for drones. In just eight months, the agency issued more than 950 waivers, benefiting police, fire, and rescue agencies.

"Drone tech has reached a point where we can now allow police departments and other first responders to fly their drones further and without numerous visual observers," said the FAA's Kerry Fleming, manager of the FAA's System Operations Support Center.

Police departments like those in Chula Vista, California, and Pearland, Texas, have been using drones as first responders for years.

"I've literally watched these drone systems save lives," said Brandon Karr, a former police officer who started Pearland Police Department's UAS program in which officers fly drones without visual observers. "And we can clear 911 calls 24% to 25% of the time with drones, alone, and beat officers to the scene by 3 to 6 minutes."

Pearland PD, the NYPD, and some other departments with BVLOS waivers launch camera-equipped drones from protective, rooftop-mounted charging stations.

"The box opens up, the drone spins up, takes off, and will take a pre-programmed route to our call," said David Cameron, a retired officer from the Campbell, California, police department who created and still manages its drone program.

The NYPD has a similar setup with drones positioned across the city. The speedy aircraft can reach any part of Central Park in less than two minutes.

"That was very important to us because the park is over 800 acres of land, and we've seen an uptick in crime there," Daughtry said. "The drones can get to areas where a patrol car can't go."

The FAA is working hard to take the drones-as-first-responder concept to communities far and wide, large and small. Nimble drones are adaptable to a variety of environments — from urban to rural — and are taking safety to new heights.

"Technology has caught up to the imagination," Fleming said. "Allowing them to fly out further distances, in some cases replacing a visual observer with technology, is a huge advantage for first responders across the entire country."

Check out faa.gov/uas for rules, resources and tools to help you fly drones safely.

JESSICA KRUSE

A GUIDE TO POST-STORM AIRFRAME INTEGRITY AND CORROSION RISKS

Atmospheric conditions are the primary drivers of aircraft structural degradation. After a severe weather event or prolonged exposure to coastal and/or polluted environments, a standard pre-flight check is insufficient. Instead, look for latent defects that compromise flight safety.

Hydraulic and Chemical Attack Below the Surface

The Electrolyte Factor: Rain isn't just water; it's a transport mechanism for pollutants and salts. In coastal or industrial zones, this creates a conductive electrolyte that triggers galvanic corrosion between dissimilar metals (i.e., aluminum skin and steel fasteners).

Invasive Moisture and Capillary Action: Dynamic pressure during high winds forces water into lap joints and crevices, where it stays trapped by capillary action. You must verify that all belly and wing-root weep holes are unobstructed. Standing internal water is the number one cause of intergranular corrosion — a silent killer that eats the metal from the inside out.

Fuel System Contamination: Storm-driven pressure differentials can "breathe" moist air into fuel vents. Drain all sumps until the fuel is 100% free of suspended water or slugs (accumulated contaminants that move through the fuel lines as a single, solid mass). Undetected moisture leads to microbial growth (fungus) in the tanks and can lead to rough engine operation, fuel starvation, power loss, and engine stoppage.

Mechanical Erosion and High-Velocity Sandblasting

Leading Edge and Propeller Pitting: Rain, hail, and wind-borne dust at high velocities act as mechanical abrasives. Inspect leading edges, propellers, and radar domes for pitting. These microscopic craters are stress concentrators — areas where structural cracks are likely to propagate over time under flight loads.

Turbine and Compressor Erosion: For turbine powered aircraft, salt, dust, sand, and other airborne contaminants can be ingested through the engine inlet and coat internal blades. Operators should follow the aircraft and engine manufacturer's maintenance instructions for post-operation inspections, compressor desalination washes, turbine rinses, and performance recovery washes. In salt-laden or dusty environments, more frequent engine washing may be recommended.

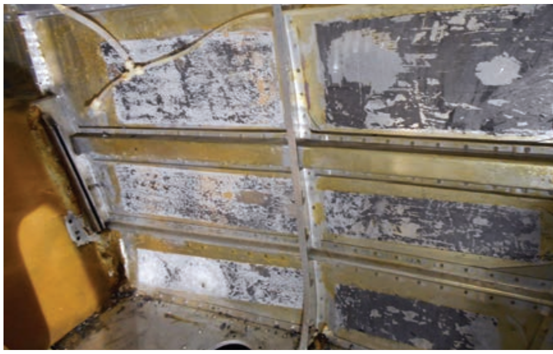
Structural Stress and Airframe Working

Smoking Rivets: High-wind buffeting on a parked aircraft can exceed design limit loads. Look for grayish, smoky streaks trailing from rivets. This indicates the storm's energy caused the skin and frame to work against each other, physically wearing down the metal and compromising the fastener's shear strength.

Control Surface Integrity: Check all hinges, pulleys, and control cables for binding or grit. Heavy rain washes away essential lubricants. Reapply anti-corrosion compounds to these moving parts to ensure smooth control response and prevent cable fraying.

Electrical and Avionics Hazards

Lightning Strike Entry/Exit Marks: Inspect the extremities — wingtips, tail surfaces, and the nose. Look for tiny, charred spots or burn marks. Even a minor discharge can compromise static wicks or induce "noise" into sensitive avionics, potentially leading to intermittent instrument failure in instrument meteorological conditions (IMC).



Cabin areas are particularly corrosion-prone. (Photo by Dennis Wolter)

Pitot-Static Obstructions: Storm driven debris, insects, dirt, and moisture can block pitot tubes, drain holes, and static ports. After a storm, inspect these openings for obstructions, trapped moisture, or contamination.

The Bottom Line for Operators

Corrosion is a cumulative hazard. Every weather event, major or minor, contributes to the aircraft's structural aging. By treating the post-storm period as a dedicated window for a specialized inspection, you can neutralize chemical and mechanical threats before they evolve into *aircraft-on-the-ground* status or, worse, a structural failure in flight.

Remember, always document inspections and remedial cleaning in the aircraft logbooks to maintain the chain of airworthiness.

Jessica Kruse is an analyst with the Aircraft Maintenance Division within FAA's Flight Standards Service.

LEARN MORE

AC 43-4B, *Corrosion Control for Aircraft*
bit.ly/AC43-4B

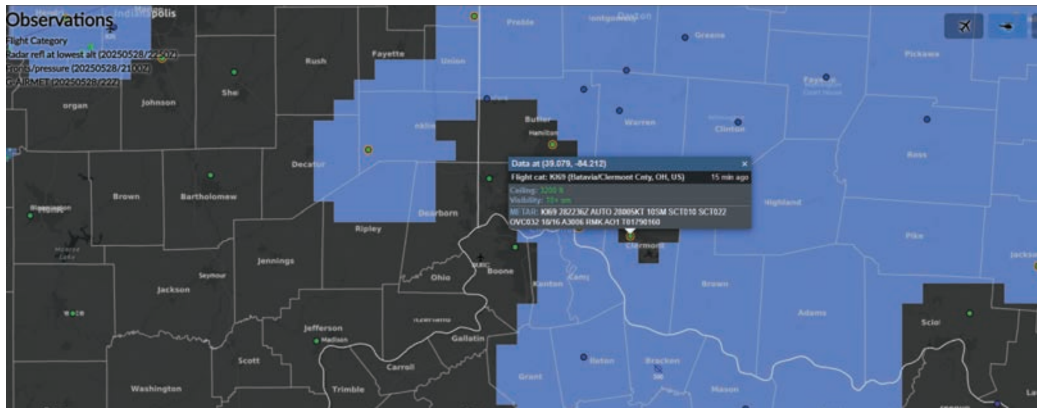
BEWARE OF THE GREEN DOT SYNDROME

A quick glance at the weather for a short night flight shows green dots at both the departure and destination — good to go right?

The colored dots come straight from the National Weather Service symbology. Green is for visual flight rules (VFR) with ceilings above 3,000 feet and visibilities greater than five statute miles. From there, the conditions get worse. Blue indicates marginal VFR, red is for instrument flight rules (IFR), and magenta is for low IFR, where ceilings are less than 500 feet, or visibility is less than one mile.

The color categories are based on the lowest ceilings, not the lowest overall cloud layer. That means only broken or overcast layers are used to determine the ceiling and corresponding flight category — scattered and few layers do not count. For example, a scattered layer at 400 feet under a broken layer at 3,100 feet would still be categorized as green VFR, despite being just one "sector" away from turning magenta and low IFR.

When the pilot only sees green dots on the weather chart and looks no further, that is what we call the Green Dot Syndrome. Remember, green does not always mean you are good to go.



A screenshot of the Weather Observation map with "Flight Cat Dots" checked.

Luckily, the Aviation Weather Center added a new symbol online to help pilots understand the true weather situation — green with a yellow/orange band or ring. This indicates that the ceiling is VFR, but that there are few or scattered cloud layers reported below 3,000 feet above ground level.

Some other things to think about:

- A meteorological aerodrome report (METAR) only samples a small area around the reporting station. Conditions can be very different, even a short distance away.
- Weather can change faster than the METAR update cycle, especially in unstable conditions.
- Watch for small temperature dew point spreads. When the spread narrows, low cloud or fog formation is likely.
- Use all available weather tools, not just the METAR, to build a complete and more accurate picture of current and forecast conditions.

For these very reasons, when making a weather decision, pilots must consider all associated layers of clouds reported, ceiling or not.

When the pilot only sees green dots on the weather chart and looks no further, that is what we call the Green Dot Syndrome.

Currently, the Aviation Weather Center is the only entity providing pilots with this symbolic information. Incorporate color-coded displays on the observation layer of AviatonWeather.gov in your big-picture weather analysis to see areas with few and scattered layers that could impact you.

Flight Category

Symbol	Category	Description
●	VFR	No ceiling or ceiling greater than 3,000 feet AGL and greater than 5 mile visibility
●	VFR*	VFR with non-ceiling clouds below 3,000 ft AGL
●	MVFR	1,000 to 3,000 feet AGL and/or 3 to 5 miles
●	IFR	500 to below 1,000 feet AGL and/or 1 mile to less than 3 miles
●	LIFR	Below 500 feet AGL and/or less than 1 mile
●	n/a	Ceiling and/or visibility unavailable

This table shows color-coded flight categories (not rules) that describe ceiling and visibility conditions for aircraft operations, based on National Weather Service criteria to improve situational awareness of ceilings and visibility. The yellow/orange ring indicates potential hazards for low-level flights, even if green VFR conditions exist.

Matt Johnson is a helicopter air ambulance pilot, flight instructor, and FAA-designated pilot examiner. He shares industry insights as a regular columnist for *Rotor Pro* magazine.

Check out our GA Safety Facebook page at **Facebook.com/groups/GASafety.**

If you're not a member, we encourage you to join the group of nearly 17,000 participants in the GA community who share safety principles and best practices, participate in positive and safe engagement with the FAA Safety Team (FAASTeam), and post relevant GA content that makes the National Airspace System safer.

Frequency Fog

Recently, a member of the GA Safety Group on Facebook posted the following question about tower vs. ground frequency for discussion:

This happened on a flight review: I cleared the runway at a towered airport and then waited for almost a minute before the tower told me to contact ground. The instructor admonished me for not switching to ground as soon as I cleared the runway, but I thought I had to wait. Who's correct here?
— Tammy C.

Other members were glad to share their support or offer another perspective:

You were correct, and you might give your instructor a gentle reminder of AIM 4-3-14. It says: 'A pilot who has just landed should not change from the tower frequency to the ground control frequency until directed to do so by the controller.'
— Kevin

It depends on the circumstances. At a typical one-runway GA airport, a minor issue usually (but could still be a conversion). However, at a busy airport with landings on two closely spaced parallel runways, the tower will control both runways and the area between them. If the pilot lands on the outer runway and doesn't stay on the tower frequency, he/she could lose an opportunity to cross the inner runway, and/or may block the exit for the next aircraft landing on the outer runway, which may further have a ripple effect.
— Warren

Excellent points! As Kevin stated, the *Aeronautical Information Manual* (AIM) Section 4-3-14(c) notes that a pilot who has just landed should not change from the tower frequency to the ground control frequency until directed to do so by the controller. As pilots, we're accustomed to receiving instructions to switch to or monitor the ground frequency immediately after landing. Even if the frequency was quiet, it's possible that the controller was engaged in another activity off of the tower frequency, such as a call from TRACON on the landline, listening to a readback on the clearance delivery frequency, or even a briefing to a relieving controller. That said, once you've exited the runway and more than a few moments have passed without an instruction to change frequencies, query the controller: "[Airport] tower, Skyhawk 123 Alpha Bravo, exited Runway 18 at Taxiway Charlie. Would you like us to contact ground?"

As Warren noted, in some cases, the tower controller may need you to stay on their frequency, so don't switch to ground until you are instructed to do so.

Photo Faux Pas

In the Mar/Apr 2026 issue, we failed to give credit where credit was due by omitting proper attribution for images used in the print version of the magazine. For that, we sincerely apologize and want to ensure that Oscar Socarras gets the recognition he deserves for the pictures below. Oscar is a management and program assistant with the FAA at Miami Executive Airport (KTMB). Oscar has an enthusiasm for photography and aviation and enjoys merging his passions by attending air shows and capturing the action. Thank you for contributing to the *FAA Safety Briefing*, Oscar!

Let us hear from you! Send your comments, suggestions, and questions to SafetyBriefing@faa.gov. You can also reach us on X (formerly known as Twitter) @FAASafetyBrief.

We may edit letters for style and/or length. Due to our publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards District Office or air traffic facility.

ON THE WINDS OF CHANGE

Weather is an important and ever-present factor in aviation, influencing flight paths and how pilots shape their operational strategies. Its dynamic nature is a reminder that change is an integral part of a pilot's environment. In that same vein, the *FAA Safety Briefing* magazine is currently embracing a few changes to better serve our community of aviators and technicians. This issue, themed around expanding your knowledge of weather, marks the beginning of our transformation — a journey that promises to enhance our content and structure, ensuring that we remain at the forefront of aviation safety and innovation.

One of the most significant changes

> THE FAA SAFETY BRIEFING MAGAZINE IS CURRENTLY EMBRACING A FEW CHANGES TO BETTER SERVE OUR COMMUNITY OF AVIATORS AND TECHNICIANS.

is our shift from a bi-monthly publication schedule to a quarterly production cycle. By transitioning to a Summer, Fall, Winter, and Spring schedule, we aim to provide more comprehensive, in-depth coverage of the topics that matter most to our readers and dedicate more resources to ensure that each issue is packed with actionable information.

With the aviation industry entering a new era of technological innovations, our magazine will expand its coverage to include emerging technologies such as electric vertical takeoff and landing (eVTOL) aircraft and advanced air mobility (AAM). These innovations are poised to redefine the landscape of general aviation, offering new opportunities for growth. Additionally, we will delve into the FAA's ambitious ATC modernization plan, exploring how advancements in air traffic control can enhance safety and efficiency in our increasingly busy skies.

Another exciting change involves the digital presence of our articles. We will be transitioning from publishing on Medium.com to FAA's "Cleared for Takeoff" blog at faa.gov/blog. This move is designed to create a more integrated experience for our readers, providing streamlined access to a wealth of aviation safety. "Cleared for Takeoff" will serve as a central hub for our digital articles, ensuring that you have the most reliable and up-to-date information at your fingertips.

In addition, we aim to improve our magazine's web presence in the near future to be more engaging and interactive. Be on the lookout for our enhanced landing page soon at faa.gov/safety_briefing.

On the social media front, we plan to expand our content on FAA's

> WE INVITE YOU TO SHARE YOUR THOUGHTS, SUGGESTIONS, AND INSIGHTS WITH US BY EMAILING SAFETYBRIEFING@FAA.GOV.

Instagram, LinkedIn, and Facebook channels, as well as the General Aviation Safety Facebook group (facebook.com/groups/GAsafety). We also recently re-branded and streamlined our X channel (@faasafetybrief) to FAA Safety Alerts. Tweets here will focus more on important aviation safety notifications, such as Airworthiness Directives, FAA handbook updates, Safety Alerts for Operators, TFR notices, and other safety-critical information.

Our commitment to delivering top-notch content remains unwavering, and we are excited to embark on this journey of transformation with you. As we continue to explore new horizons in aviation safety, your feedback will be invaluable in shaping the direction of our magazine. We invite you to share your thoughts, suggestions, and insights with us by emailing safetybriefing@faa.gov. Your input will help us refine our approach and ensure that we continue to serve our community effectively. Thank you!

Tom Hoffmann is the editor of *FAA Safety Briefing*. He is a commercial pilot and holds an A&P certificate.

PAUL CIANCIOLO

COHL POPE

Program Manager, FAA's Program Management Office

"I've held technical, engineering, and management positions supporting the Weather Cameras and Visual Weather Observation System programs," he notes. "And since 2022, I have been the program manager overseeing its evolution."

Originally from Vernal, Utah, Daniel Cohl Pope has a knack for taking things apart. His goal was always to fix it, whatever it was, broken or not. That hands-on mentality led Cohl to enlist in the Air Force in 1990 to repair and keep aircraft flying.

"My dad was big into airplanes, and the Air Force provided me an opportunity to be a mechanic and fix things all day long," he recalls.

Cohl worked on jet engines and propellers/rotors on helicopters, cargo planes, and fighters. After serving and moving to Alaska in 1998, he earned his bachelor's degree in computer science. He first began working with the FAA as a developer on a technical support services contract.

Over the past 25 years, Cohl supported FAA programs and systems, including remote control equipment, remote communications, backup emergency communications, and runway approach and end lighting through the Technical Support Services and National Airspace System integration support contracts. However, most of his time was spent working on the FAA's Weather Camera Program (weathercams.faa.gov).

The Weather Camera Program works to improve aviation safety and efficiencies, reduce weather-related aviation accidents and flight interruptions, and improve aviation flight decision-making. It provides pilots, dispatchers, flight service specialists, and National Weather Service forecasters with near real-time visual weather information at airports, mountain passes, and other strategic locations along regular-use air routes. There is also a weather camera overlay on the interactive map on the Flight Service Pilot Web Portal at 1800wxbrief.com.

"Using weather cams enables informed flight planning and proactive decision-making by increasing knowledge about whether it is safe to fly before becoming airborne and during flight," explains Cohl.

Recently, Hawaii got 26 new camera sites where pilots had limited weather information. Another 160 camera sites are in the pipeline for Alaska and the contiguous United States.

"The biggest challenge with Alaska is the sheer size of the state combined with limited communications and power options to support navigational aids," he adds.

To improve upon the current weather camera system, the Visual Weather Observation System uses an advanced 360-degree-view camera and a full suite of weather sensors to provide both visual and textual weather information from a single platform. The omnidirectional camera provides current near-real-time images of the surrounding area, including critical topography and obstructions. The weather sensors provide textual information, including wind speed and direction, cloud height, visibility, present weather, temperature, dew point, rain accumulation, and pressure.

"This new addition will see growth and added coverage soon," he adds. "We have installed the first three sites, and we expect to install 60 total sites in the next three years in Alaska and U.S. territories."

WITH GREAT WEATHER POWER AT YOUR FINGERTIPS COMES GREAT PREFLIGHT PLANNING RESPONSIBILITY.

With great weather power at your fingertips comes great preflight planning responsibility. Take the time to call Flight Service, use the weather camera website, and obtain all the information available to you prior to takeoff. Don't fly out just to turn around or get stuck in a sticky situation. Live to fly another day.

Paul Cianciolo is an aviation safety analyst and associate editor for *FAA Safety Briefing* magazine. He is a U.S. Air Force veteran and an auxiliary airman with Civil Air Patrol.

U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

FORWARDING SERVICE REQUESTED

Official Business
Penalty for Private Use $300