

Flying in Weather

Good ideas, techniques, and practices

I Fly for Fun

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Flying since September 1986; Private pilot since April 1987; IFR rating since August 1988

2600+ hours logged, 500+ hours IFR – 367 hours actual IFR, 145 hours simulated IFR

'68 Cessna 150 IFR 1986-1989; '65 Cessna 172 IFR 1990-1992; '78 Cessna 182 IFR 1992-present

Destinations include: Orlando, Florida; Williamsburg / Jamestown, Virginia;

Pennsylvania; Portland, Maine; Houghton, in Michigan's UP; Oshkosh;

Iowa; Rapid City, South Dakota; San Antonio, Texas

General Principles and Practices from 36 Years of Flying in Weather

Take-offs and Landings in Weather

Density altitude matters. You can normally “assume” the density altitude is within the acceptable range in South Carolina, unless your airplane is under-powered or overloaded, or both. In higher-elevation airports, like Mountain Air (pvt) in North Carolina, at 4432 feet, or Rapid City (RAP) in South Dakota, at 3482 feet, or Telluride (TEX) in Colorado at 9070 feet, even jets need to

calculate density altitude. Be able to do the math. Practice until it is easy and even intuitive.

Weather Forecasts

Watching how the weather forecast changes over the several days prior to your flight can tell you something about the weather’s current nature, its expected behavior, and the degree of uncertainty. Start watching the forecast for your entire route at least five days prior.

See five sets of forecast charts at: https://scottcrosby.info/weather/week_forecast.html.

Flying in Weather for VFR Pilots

Fly by visual ground reference. “VFR on top” is not recommended.

That hole you were expecting at your destination is gone, and you are low on fuel . . .

VFR into clouds – you have ninety seconds to live.

Case 1 – cloud distances: 500’, 1,000’, 2000’, 3 miles visibility – me in my Cessna 150 as a new pilot headed for an SCBC breakfast: keeping your distance while making a U-turn.

Case 2 – flying by visual **ground** reference: JFK Jr. – ocean, atmosphere, dusk, haze;

Case 3 – flying by Visual Flight **Rules** into terrain – IFR pilot in Kobe Bryant’s helicopter

Night flying – always be able to fly by visual ground reference;

e.g., flying from Greenville to Charlotte at night: are those unlit areas on the ground, or clouds?

Flying in Weather for IFR Pilots

Rule # 1: Be able to fly the airplane manually – better than the autopilot. An autopilot is *reactive*; you can feel the air’s inputs on the yoke, and be *proactive* in maintaining the airplane’s orientation, and so minimizing the impact on your passengers’ stomachs.

Rule # 2: Practice partial-panel IFR flying. Your life depends on being able to fly partial-panel.

Your Turn Coordinator operates on the same principle as your inner ear. It has no gyros, and is no substitute for an Artificial Horizon, but it is usually all you have, *when (not if)* the AH fails.

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My experience: Lost vacuum three times (so far), all in solid IMC.

Decide what your plan is to be. You are PIC, not ATC ("What are your intentions?" is proof).

Tell ATC: "I can change altitude or direction, but not both at once. Give me enough time for slow descents and wide, easy turns in making my approach into the airport." Hold them to that; no exceptions.

Rule # 3: Do not be reluctant to contact ATC and alter your IFR Flight Plan en route – more than once if necessary.

Contact ATC as soon as you are certain you need to change your flight plan.

Nor is it unreasonable to inform ATC that you are deviating if you must.

Since ex-astronaut Scott Carpenter's Cessna 210 got torn apart flying through a thunderstorm east of the Smokies, ATC is now required to be cognizant of the weather. Work with ATC, and let them work for your benefit and safety.

"Center, that line of buildups I am soon going to be passing through is building from the south faster than expected, and clouds are now right in front of me. Deviating to the north. I should be past the line and able to resume Direct to KPIA at DELCO intersection."

Your Airplane

Pick a good IFR platform.

A 182 is very stable and has a 75-gallon fuel capacity, leaving 670 lbs. for passengers and baggage. That is over six hours of fuel. You will need to land before the 182 does. A typical flight leg is 3½ to 4 hours, but in a bad headwind or with

a great tailwind, you can stretch the leg to 5 hours without worry.

Keep your airplane in good repair.

Don't let the list of issues grow. Get them fixed. Maintain your airplane like your life depends on it.

Redundancy for IFR – Recommendations



When the Garmin G-5 laser AH was installed, the old vacuum AH was moved over to the right side – redundancy. But that also enables its use by a pilot in the right seat. Flying by an AH not right in front of you is difficult at best.

Redundant Weather Aids

Redundancy also includes how you watch the weather: take advantage of the free ADS/B weather. ADS/B weather is **radar-based**. Display it on ForeFlight on your iPad.

Also buy a Garmin 510 Aero and get a subscription to XM weather, which is **satellite-based**. With two weather sources, if one source fails, you still have the other.

Also, **constantly compare** the weather images from the two sources. Observing the differences will give you a more detailed understanding about the weather you are approaching.

Both ADS/B and XM weather are at least six minutes old. Building weather can grow

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substantially in that time. Use your weather information as a general aid, not to weave and zig-zag between build-ups.

Watching the weather change for an hour as you fly towards it gives you an almost intuitive awareness of how the weather is changing, and your best options for what to do: straight through it, deviate, change your destination, or reverse course. Make a safe decision.

Glass panels

If you have a glass panel, can you fly your airplane IFR to a landing successfully if it quits? If your “backup” AH is not directly in front of you, can you immediately switch to it, reorient your thinking, and fly an instrument approach?

Practice until you can. It may convince you to relocate your backup AH more centrally.

You say you have two glass panels, and can switch to the other if necessary? **Is there any commonality in their installations?** If so, that is a **single point of failure**. Assume it **will fail**. What will you do?

Separate glass panels should be on separate circuit breakers and have separate GPS antennas. Follow the path all the way to your **common audio panel, and microphone and headphone connections**.

A short-circuit in one push-to-talk switch on one yoke can disable all transmissions. What will you do?

Consider buying a hand-held comm radio that has jacks which will work with your headphones. Keep its batteries charged up, and test it every week or two to confirm it is working.

What is not to like about Glass Panels

Analog dials – the “six pack” – are readable at a glance – casually, at a glance, or out of the corner of your eye. That is easy, which is important in turbulence, when you want to devote your focus elsewhere.

“Tapes” on a glass panel require deliberate focus; you must take the time to look at and read them. If you have a glass panel, be able to read it when the plane feels like it is being kicked around by a sadist, and successfully fly the approach – onto a 5,000’ runway.

Behavior of Clouds

Mushy, Amorphous Clouds?

Or well-defined, Cauliflower Clouds?

Poorly-defined clouds with tenuous, tapering streams, no vertical development, are usually benign.

Sharply-defined clouds – particularly, clouds that look like cauliflowers – indicate a strongly circulating air mass with **vertical movement**. Expect turbulence.

Look at a cloud, and ask yourself, *What made that cloud?*

If the answer is that the cloud is drifting, torn to shreds, and aimless, the winds are likely minimal.

If the answer is the cloud is sharply-defined, the vertical movement inside it will make it bumpy.

If a cloud’s shape is so unusual that you cannot figure out what made that cloud shaped as it is, assume there is more to the winds and **movement of an air mass** than you are guessing. Be safe.

You are PIC; never let ATC turn you into unsafe weather conditions: “uh, Charlotte Approach, unable to comply.” You can see that cloud; they cannot. They are used to big commercial jets and speedy business jets that are not so easily disturbed by common, daily weather features.

Layers of Clouds

If a high cloud layer is shielding a lower layer from the sun and its heat, that lower layer will usually not have much vertical movement.

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The Warnings About Clouds You Learned in the Past Are Still Very Good Advice

Always stay far away from anvil-shaped clouds, and any building cumulus and cumulonimbus clouds.

Best Times for Flying

Finish your IFR flight before noon; sometimes it will need to be even earlier.

Watch the weather for several days beforehand: if a weak front settles across your planned route of flight or near your destination, causing cloudiness and storms to begin to build after 9:30, be through it by 9:30.

Storms dissipate in the evening and at night, as the heat absorbed during the day radiates away and dissipates. **From 3:00am until dawn is the least stormy period of the day.**

From 3:00pm to dusk is the worst – and it is also when you are **tiring and more prone to mistakes.**

If necessary, take off at 3:00am, to have enough time to complete your flight prior to cloud buildups.

And go to bed 8 hours prior to get the sleep you need.

PS – Maintain your night currency.

Pilot's Challenge

Another way to look at it: plan your flight times so that you arrive at your first refueling stop just ten minutes after the FBO opens. Be their first customer of the day.

Passengers

Wives and friends you brought along tend to prefer the nicer amenities in life: sleeping normal

hours, taking unhurried showers, eating relaxed and casual breakfasts, ad infinitum.

"You're serious?"

Break the news of your plans for early departures at the first discussion about the trip, and often. Let them know your intentions while discussing the future trip, a week or two in advance of the actual flights, and again a day or two before.

Watch the forecasts daily for the week prior to the return trip, just as you did before leaving home. Let your passengers know how the weather forecast is progressing.

Remind your passengers that pre-dawn departures will be smooth and pleasant, but taking off at 9:30am – particularly from airports near a beach – can mean serious turbulence and weaving your way through seemingly-endless buildups ("The barf bags are in the seat-back pockets; would you like another mint?").

Remind them of your plans two days prior to departure, and again the day before. Finish the evening early, and urge them to get to bed.

Ultimately, you are Pilot in Command, and you are responsible for their safety – and your own. Delay a flight until the following morning, if necessary, rather than make a late departure in the face of a problematic weather forecast.

Practice IFR Planning for Weather

Pick a destination that would have weather en route. Lay out your flight plan. What would you do with regard to that weather?

Watch how the weather changes during the time of your practice flight, and its expected progression.

Could you have made it safely? Would your wife still fly with you, if you had gone through that weather? Would leaving at a different time of day make a difference?

This kind of practice can be done anytime. Repeat it 2 or 3 times each week, with different routes to different locations. Each practice flight puts you

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through a different variety of weather, and so it will teach you something new about flying in

weather. And your actual judgement concerning flying in weather will improve.

Flying and Cold Fronts

Cold fronts almost always move from west or northwest to east. The south end will trail the northern end, which will be a low-pressure area, usually moving over the Great Lakes north of Chicago. The south end can be as far away as Texas or the Gulf of Mexico.

The faster the front is moving, the higher the winds, and the greater the turbulence. A Cold front is a low-pressure area, so its winds move in a counter-clockwise motion.

Winds preceding the front will be northbound; winds behind the front will be southbound – “counter-clockwise” around the front.

Cold fronts are more common and stronger in the colder months.

The best part about a cold front, if you can arrange your flights to take advantage of it, is to fly north just ahead of the front, resulting in a tailwind going north, and then return just after the front has passed, resulting in a tailwind on the southbound return-trip as well.

Flying and Warm Fronts

Warm fronts are more common and prominent in their impact on flying in the warmer months. They tend to run more-or-less east-west, and be nondescript and indefinite – in a word, sloppy.

The result is usually the stagnant summertime air so common over the South, from Louisiana to the Carolinas, with humidity that repeatedly builds up into thunderstorms during the day, and which

then dissipates into the sultry, humid air of a Southern night.

What is needed is that rarity of summertime, a nice strong cold front to sweep through and push all that humid air out to sea – for a day or two.

This common Southern weather is one of the most important reasons why all flights should be made so that they are completed by noon at the latest.

IFR Altitudes

Cessna 150 – 5,000' and 6,000'
Cessna 172 – 7,000' and 8,000'
Cessna 182 – 9,000' and 10,000'
– and 11,000' and even 12,000'

... And back down to 5,000', 6,000'

Staying above turbulence means you have to descend back down through it. Clouds with bases at 6,000' and tops at 10,000' can have some annoying turbulence.

Remember when you used to fly that 150? Turbulence seemed less of an issue back then (except ground thermals) – because a 150 often flies *under* the clouds that make for a bumpy ride in a 182.

Sometimes, going back to those lower altitudes lets you avoid turbulence, and clouds. Keep that in mind when preparing your flight plan, especially when humidity pervades along your route.

Flight Safety Note on High Altitudes

At 11,000' or 12,000', constantly test your mental functioning. Say the alphabet backwards. Increase your scan. Calculate density altitude. Do calculus in your head.

Not everyone has biology that works well enough at those altitudes – particularly at night. At the slightest hint (e.g., peripheral vision turning dark), get lower immediately (know your MEAs!).

Inform ATC. Do not wait for ATC's permission.
You are PIC.

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The “Keep Your Wife Happy Rule”

Plan your flying so that your wife (or kids, or friends, etc.) enjoys her flight – every flight. Plan your flight time to keep her flight smooth with no (avoidable) turbulence. Not only will she be amenable to future flights, but your extra caution will provide a nice additional layer of safety to your flying, in case the weather turn sour unexpectedly.

The weather will turn sour unexpectedly, on occasion. But if you go through it early enough in the day, when the clouds are still not fully defined, the flight will be pretty much a non-event. Your wife will remember it as “our worst flight ever”, as a good story to tell her friends – never knowing what conditions would have been like if you had not been so cautious. Never mind that it would still have been a safe flight. Keep your wife happy.

And it will make her happy, compensating a *little* for having to get out of bed so early because you

Refueling and Eating

Stopping to refuel adds about an hour to your day's start-to-finish flight time: the descent, flying the approach or merging into the pattern, taxiing, the trundling out of the fuel truck, the actual refueling itself, filing the next leg's flight plan, visiting the restrooms, paying the bill, getting buckled back into your seats, preparing the airplane (did you check the oil?), receiving your clearance, taxiing out, taking off, getting pointed in the right direction, and climbing back up to altitude all adds up to put you about an hour behind where you would be if you had been able to continue.

filed your flight plan with a “crazy” 3:00am take-off time.

When you get home barely thirty minutes before the first cumulonimbus or even just the 5,000' cauliflower clouds start to appear, you will thank yourself for your foresight.

Once home, don't forget to have your wife look out a window at the darkening, ominous-looking clouds. Say only, “*That* is why we took off at 3:00am.” Then shut up. Let her have the last word. Be satisfied you got her, the plane, and yourself safely home – no matter how many times she tells the story about her crazy husband and that bumpy flight to her friends (she is bragging).

Flight Safety on Staying Awake

Just because your wife takes a nap while you are flying does not mean it is okay for you to do so.

Eating while stopped just increases that time unnecessarily. Save time by packing sandwiches, snacks, and drinks. Pick a quiet, boring part of the flight when you will have an uninterrupted half-hour or so, put the airplane on autopilot (or at least set the trim), and break out the food.

Flight Safety on Your Menu Items

Cookies and drinks with sugar in them can make you drowsy, and make it extremely difficult to stay awake.

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Regional Weather Patterns Across the U.S.

The collected experience of 36 years of flying.

Weather in South Carolina and from Virginia south to southeast Georgia

The weather in South Carolina, and in fact from central Virginia to southeast Georgia, is generally very similar. If you can fly in South Carolina's non-coastal weather, you will not find the weather's behavior very different anywhere in the airspace east of the Smokies and the Appalachians, west of the Atlantic coast, south of Manassas and Richmond, and north of Florida.

The only significant exception is the freezing level, during cold weather. Particularly north of Lynchburg and Raleigh, the freezing level can be quite a bit lower.

Generally, weather to the east of the Appalachians is some combination of the air which has made its way over the Appalachians, merging with the Gulf Stream air moving up from the Gulf of Mexico (hurricanes notwithstanding).

Weather (an air mass) which has crossed the Appalachians has had to drop some of its water in Tennessee before it can rise high enough to cross over the mountains, so it tends to be dryer, and unlikely to cause precipitation in the Carolinas.

Weather (an air mass) which has made its way up from the Gulf of Mexico is likely to be quite humid. As it travels north, it cools, and so must release some kind of precipitation as it moves north.

Estimate where, watch what actually occurs, and learn why you were wrong and how to do better.

It is up to you to develop your experience observing the weather (even on days when not intending to fly) and your judgment as to which source of air is going to dominate your flights, and how.

Weather along the Atlantic coast

The coast and the 30 or 40 miles inland are affected by off-shore and on-shore winds. This is particularly true from Virginia southwards through the Carolinas, to Savannah and Jacksonville.

As the sun sets, the land cools more quickly than the ocean water. So as the night wears on, air is drawn from over the land out to sea, due to the rising of the warmer ocean air.

This pattern reverses mid-morning, about 9:00am, as the land warms up. Winds dwindle, pause, and then reverse, shifting to on-shore, bringing moist ocean air into position over the land. As the heat of the day warms that air, it rises, and condenses into clouds that become very bumpy very quickly. Count on that occurring by 11:00am, unless you have studied weather conditions enough to know that the day in question will be an exception.

Weather in Florida

Essentially, Florida weather is "coastal" everywhere in the state. You can practically set your watch by the daily thunderstorms that dominate Florida skies at 3:00pm.

Plan your flight to any Florida destination to be complete by noon.

Side Note – Safe Flight Routing to Florida

When flying to and from Florida, file your flight plan to fly from the Upstate to Augusta-Colliers IRQ VOR, then threading your way (i.e., file a route, but expect ATC to modify it) through the Restricted areas to the Alma AMG VOR, Taylor TAY VOR, Gainesville GNV VOR, and finally to the Ocala OCF VOR, and then on to your destination – e.g.,

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Kissimmee ISM or Orlando Executive ORL for the mid-state theme parks (including Cape Kennedy!).

Refuse any routing along the coast – e.g., from Savannah's Hunter SVN VOR overwater east of Jacksonville via Victor 437 to Ormond Beach OMN VOR, and then on to ISM or ORL.

Do you carry water survival gear – i.e., a life raft – in case you have an engine failure? The Coast

Guard says the survival rate with only life vests is nil.

And how are you planning on surviving in the so-called “land” that is actually the alligator- and crocodile-infested swamps between Beaufort, South Carolina and Jacksonville, Florida?

Better to use the inland routing over Gainesville and Ocala, and do your Florida flying over solid ground.

Weather over the Smokies

The weather from thirty miles or so west of the Smokies through the very easternmost edge of the Smokies is a mini-system all by itself.

Weather moving east from the Mississippi Valley must drop its moisture before it can climb higher to get over the Smokies, thus frequently forming low clouds and fog to the mountains' west. However, the Smokies are not a solid wall; many small V-shaped crevasses exist on the western side of the range, and within it. So some moisture finds its ways into the valleys within the Smokies, filling them with clouds and fog.

Plan on flying west over the Smokies at 10,000' or even 12,000' to get above expected turbulence.

Plan on flying east over the Smokies at 9,000' or even 11,000'.

Altitude is safety. Flying over the Smokies at these high altitudes means you can glide to an airport behind you or ahead of you, should you have an engine failure. Plan, and be prepared: know what your options are for a glide at every instant throughout your flight over the mountains.

When returning to the Upstate over the Smokies, note that Atlanta Center controls the airspace until you are past Table Rock and over the flatlands. Even though Atlanta will hand you off to Greer Approach earlier, while you are still in the Smokies, Greer Approach is not authorized to allow you to begin your descent until you have crossed the line between Atlanta's airspace and Greer's airspace.

If you are in VFR conditions coming over the Smokies

Centers control the airspace above 10,000'. **Approach** (e.g., Greer Approach or Charlotte Approach) controls the space below 10,000'. If there is no Approach or Approach is closed when you are in the air, Center controls the space below 10,000' as well.

Before Atlanta Center hands you off to Greer Approach, request clearance down to 6,000 feet (4,000 feet does not provide sufficient clearance over Table Rock) from Atlanta. Keep talking to them until you get it.

On your inbound flight, GMU and GYH Towers may treat you as if you are a lot lower, or able to descend as fast as a jet. They will urge you to take headings too close to the airport or descent rates which you may find problematic (greater than 500 feet per minute). GMU wants to keep you away from GYH, and both GMU and GYH want to keep you away from GSP flightpaths.

Limit your descent rate to 500 feet per minute. Do not put your passengers in pain. At descents greater than 500 fpm, their ears will not pop quickly enough.

You are PIC. It is up to you to request a heading, route, or 360-degree turn that will allow a proper decent and air speed. ATC will just have to deal with it.

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Weather over the Western North Carolina and Virginia

When flying to the northeast, plan your flight to stay just slightly east of the Appalachians. For example, file from GMU, GYH, or SPA airports to the GENOD intersection, then to BZM (Barretts Mountain) VOR, then to MRB (Martinsburg, WV) VOR, then HAR (Harrisburg, PA) VOR, and on to your destination.

ATC will offer you direct routing from GENOD to MRB (or to an intersection just west of MRB), but turn that down.

The direct route has two faults: it is bumpier, and there are fewer options if you have an emergency. Using the BZM-to-MRB route adds barely a couple of minutes, but it keeps you out of the mountains and over the flatlands – a smoother and safer route.

If you fly at all west of Roanoke ROA, or more than a couple miles west of Shenandoah SHD, **your flight path is too far west**, and the air currents coming over the mountains will make that clear.

Stay on the mountains' east side.

Weather and Getting Past the Charlotte

Commercial traffic enters the Charlotte Class B from the northwest, southwest, northeast, and southeast points of the compass.

On your route from GYH, GMU, or SPA headed north via GENOD and BZM, that traffic crosses overhead at 10,000 feet, descending. If you file

for 9,000 feet, you may be asked to deviate. At 7,000, probably not.

Similarly, on your return flight, at 10,000 feet it is likely you will be asked to descend to 8,000 well in advance of what you might expect.

Weather and Getting Past the DC TFR

Fly west of the TFR; avoid the over-water route east of the TFR.

From GYH, GMU, and SPA, that is usually the best route in terms of both time and fuel. Make the Martinsburg MRB VOR, the Hagerstown HGR VOR, or one of the intersections just west of the TFR and the **R-4009 Restricted Area** (Camp David), and Harrisburg HAR VOR your waypoints.

If you are headed to southeastern Pennsylvania or New Jersey, from Martinsburg MRB VOR, file V39-143 to Lancaster LNS VOR, and then on to your destination. MRB-V39-143-LNS will let you thread between the TFR and R-4009.

Avoid turbulence: stay east of the mountains.

Weather over eastern Pennsylvania

Pennsylvania is where three different weather systems typically converge: the weather moving up from the Carolinas and Virginia, the weather moving from the Plains and the Mississippi-Ohio River Valleys, and the polar weather moving southeast from Alberta and western Canada.

Figure out which stream of weather will be dominant during your flight. Plan your altitudes accordingly. It is not unusual for clouds and clear air to exist in layers. Picking the right layer can mean being in the clear for hundreds of miles, and

feeling really glad you are not a couple thousand feet higher or lower.

Be aware of the freezing levels. Expect icing in Gulf air. Air that just dumped its moisture over the Alleghenies in western Pennsylvania or air which is part of an Alberta Clipper should have little moisture, but wet clouds with temperatures above 32°F will obviously still be conducive to icing. Plan what you will do if it occurs.

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In wintertime, a thin layer of clouds that came over the Alleghenies, with clear layers below it to the ground and above it to blue sky may possibly allow passage without icing. But even if you believe that to be true, keep your eyes on your wings' leading edges, and get out of the clouds

immediately, whether that means by climbing or descending. Icing kills.

As always, fly early in the day if possible.

Weather over eastern New York and New England

Include Wilkes-Barre LVZ VOR in your flight plan headed into or from New England (i.e., HAR-LVZ is a good leg through Pennsylvania).

From LVZ, stay as far north and away from New York City and Boston as possible. It is quite common to be given a route by ATC that includes several legs from intersection to intersection, using contorted Victor routes, regardless of what you filed.

As always, fly early in the day. Since New England is at a cooler latitude, weather changes are less severe than in the South. Nevertheless, adhere to the "Keep Your Wife Happy Rule".

Icing in June?

Even in June, keep an eye on your outside air temperature and the wings' leading edges. You may discover that you are encountering icing in New England skies. Calculate how far you must descend to get the ice to dissipate. Then tell ATC to let you down. They will ask you to stand by until they can authorize you. Granted it is a busy airspace, but do not delay. Threaten to use the "E"-word (i.e., declare an emergency) if they do not expedite your descent now. ATC does not like having to file reports any more than you do; they will soon respond with a lower altitude.

Weather Flying to Texas

Flying to Austin or San Antonio Texas means flying around Houston. Texas and Louisiana west of the Mississippi River tend to be a single weather system. Consider the crossing of the Mississippi River as your transition from the Texas-Louisiana weather system to the Southern weather system with its stagnant humidity as already described.

Flying home from Texas to South Carolina definitely implies starting the return flight at 3:00am or so. Land in South Carolina about 11:30am. Check the weather across your route

about 1:30, and both you and your passengers will be glad you are finished flying for the day.

In winter weather, with clouds north of Atlanta and low freezing levels, you may have to file your flight plan to fly south of Atlanta and turning north towards South Carolina somewhere around SINCA; i.e., once you are clear of Atlanta approaches.

Meridian, Mississippi, makes a good mid-point to refuel. It is about half way along the seven hours of flying.

Kentucky Weather

Weather along the Ohio River often builds on that river's moisture. That line of clouds builds stronger as the morning progresses – another factor that encourages early-morning flying.

On return flights, watch for developing weather in the eastern half of Kentucky as you approach the Smokies. Steer clear of small clouds which – if they were to combine – would be anvil-shaped.

Always stay far away from anvil-shaped clouds.

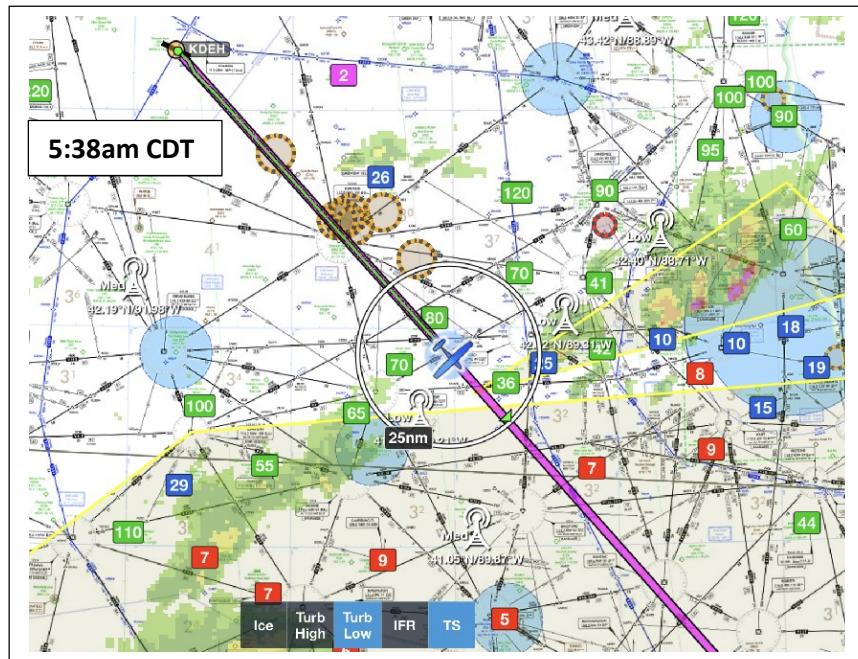
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Weather Flying Northwest to Illinois, Iowa, and Wisconsin

Particularly in Summer, sometimes it seems like there is a Low endlessly stalled over Chicago and the Great Lakes.

Even if you stay further south (e.g., refueling or waypoint over Peoria PIA or Quincy UIN), there is frequently a front associated with that Low that trails all the way down to Oklahoma; there is not going around it. Flying to or from Iowa or similar points west of the Mississippi River can often require that the time of your passage through that front be the primary determining factor for your flight schedule.



Storms can remain strong well into the night, due to the northward movement of warmer southern air along the front. It is not fun to watch how quickly that weather builds right before your eyes, as well as on the ADS/B and XM weather displays.

Your best option may require that you pass through the front about 5:00am; i.e., just before sunrise, when the weather is at its relative calmest.

Weather Flying West to South Dakota

It is not unusual for a weak cold front to stall in eastern South Dakota, with a wall of storms that just will not clear enough for a safe flight, even before dawn.

Otherwise, clear weather from Iowa to west South Dakota is the norm early in the day. As always, watch for buildups after noon.

Flight Safety – Check Your Density Altitude

When flying to the edge of the Rockies, always calculate your density altitude. The altitude for Rapid City RAP is 3482', but the density altitude can reach above 5,000'.

Flying in the Rockies

Flying in the Rockies is a whole new skill set for those of us used to flying further east.

Even the valleys between mountains can be at 5000', 6000', or even 7000'. Even the performance of an automobile suffers. The mountains are much higher. Airports in the Rockies tend to have very long runways – which seem not at all that long when you are attempting to take off.

The fact that the smallest airplanes at Telluride TEX, 9070', are Cessna 182s, Mooneys, and Bonanzas should make the normal flying conditions – and the consequent density altitudes – at high-altitude airports clear to any pilot.

Air movement over mountains that tall is problematic; hence high wind-speeds and severe

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turbulence in and near mountain passes can be the norm.

Flying early in the day is the only choice, if and when flying is possible at all.

Filing IFR to assure flight-following is recommended, but limiting flying to VFR conditions helps to assure flight safety.

Usually, you do not want to be in the clouds in those mountains – especially if you do your homework and learn what causes those clouds.

Hurricanes

Obviously, flying near a hurricane or even near one of the arms where small tornadoes are possible is an unsafe choice.

But a hurricane can affect the weather hundreds of miles distant.

With a hurricane still in the Gulf of Mexico and south of New Orleans, a flight from San Antonio, Texas, to Greenville that normally refuels at Lafayette LFT or Meridian MEI can require refueling in east Arkansas or northwest Mississippi, and routing that takes it north around Memphis and then direct to Chattanooga, before turning southeast to Dalton, Georgia, and finally east to Electric City ELW and then home. Even with the hurricane still below New Orleans, expect lightning in north Mississippi and Alabama.

Hurricanes generally have one of three likely paths.

Hurricanes that turn north in the Atlantic, if they are far enough west, will travel up the East Coast, the half over land weakening and the half over water remaining stronger. Coastal hurricanes typically merge in Pennsylvania and New Jersey with a cold front coincidentally making its way across the U.S. at the same time.

Hurricanes in the Gulf of Mexico, if they stay westbound, will make landfall in Mexico or Texas.

Hurricanes in the Gulf of Mexico that turn north west of Pensacola, Florida, will generally travel up the Mississippi River valley, and then follow the Ohio River valley and cross over the Appalachians in Pennsylvania (or sometimes continue into Quebec) as rainstorms, with some flooding.

Hurricanes in the Gulf of Mexico that turn north east of Pensacola, Florida, will generally travel up through Georgia, the Carolinas, and Virginia, weakening along the way into strong rainstorms that will still cause some flooding.

From Pennsylvania, hurricanes will generally proceed northeast up through New England and depart into the North Atlantic off Maine and Newfoundland.

If you arrive at your destination in Maine and are later followed there by the remnants of a hurricane, delay your departure until the storm – and its remnant clouds – are out to sea. The cold front that trails along like a tail can mean a smooth tail-wind all the way back to South Carolina, with cloud layers in New England and New York, and continued clearing as you fly south.

Conclusion

Accept the challenge that flying in weather offers.

You are not a meteorologist, but you have one advantage over them: you actually *experience* the weather.

Learn how the weather works and how it acts, and why it varies. Use that knowledge to increase your safety and comfort – and even more: **use the weather** to your flying advantage.

The best advice: “Expect what happens.”

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