
AOPA Pilot | Issue No. 47 | December 2003

## Pre-Flight Preparation

In preparing for your flight, you first might want to get a general idea of the weather. You can do this by obtaining Graphic weather from DUATS or by getting basic information from one of the following FAA sources: **Transcribed Weather Broadcasts (TWEB)**, the **Pilot's Automatic Telephone Answering Service (PATWAS)**, **Telephone Information Briefing Service (TIBS)**. This may help in deciding what time you want to go and which route you would take. The next step is to get a briefing tailored to your individual needs from either contacting the nearest **FAA Automated Flight Service Station (AFSS)** or **DUATS**. Any one of three types of briefings may be requested: **standard, abbreviated or outlook**.

A **standard briefing** should be requested before every flight, even when you have received prerecorded or mass media weather information (e.g., TWEB, A.M. WEATHER). A standard briefing, whether received from an AFSS or DUATS, fulfills all the preflight weather-briefing requirements. After providing the necessary background information, you will automatically receive the following:

| | | | |
|---|---|---|---|
| •Surface Observations | METAR | • AIRMETs | WA |
| •Terminal Forecasts | TAF | • Amended Severe Weather Forecasts | WW-A |
| •Winds Aloft Forecasts | FD | • Center Weather Advisories | CWA |
| •Pilot Reports | UA | • Convective SIGMETs | WST |
| •Radar Summaries | SD | • Hurricane and Tropical Depressions | WH |
| •FDC NOTAMs | FDC | • Severe Weather Forecast Alerts | AWW |
| •NOTAMs-D | NO | • Severe Weather Outlooks | AC |
| •SIGMETs | WS | • Severe Weather Warnings | WW |
| •Area Forecasts | FA | | |

An **abbreviated briefing** should be requested if you have sufficient information to make a go/no-go decision with only selected additional information. After providing the pertinent background information, you will be able to request specific types of weather.

An **outlook briefing** should be requested for long-range flight planning. This briefing contains forecasts for a flight departing more than 6 hours in the future. Closer to time of departure, an abbreviated or standard briefing should be obtained. The outlook briefing includes:

| | |
|---|---|
| • Terminal Forecasts | TAF |
| • Winds Aloft Forecasts | FD |
| • Area Forecasts | FA |
| • SIGMETs | WS |
| • AIRMETs | WA |
| • Center Weather Advisories | CWA |
| • Convective SIGMETs | WST |
| • Severe Weather Warnings | WW |

After receiving weather information, either for short or long-range flights, consider carefully if conditions are suitable for your intended flight.

## Winter Weather

The elements typical of winter are our enemies. Ignorance of winter weather, or failure to respect it, can be deadly. Weather related information included in PIREPs, SIGMETs, CWA, and other advisories always require special attention. This information will always be an important factor that pilots must consider. No matter what time of year, timely action is important.

Don't be fooled into thinking that winter weather replaces hazards that exist during the rest of the year. Icing, turbulence, low level wind shear, restricted visibilities, and even thunderstorms can and do exist during all seasons.

Weather, as it pertains to aviation, has been around for a long time. (At least since the beginning of aviation, right?) Advisory Circular 00-6A Aviation Weather has been around since 1965 under its present title and dates back to 1943 under other titles. But it still remains an excellent source of information on winter weather and hazards.

Icing

When we were younger, many of us used to look forward to getting a taste of icing, or if you prefer, frosting. And even today, some of us still look forward to it, but not on the job. Because we know that while icing is great on a spoon or a cake, it does nothing to enhance the workings of an airfoil.

Aircraft icing is one of the hazards we have been talking about that can be with us all year but gets extra attention during the winter. Ice, including frost, can be a hazard because of the way it affects airframes and power plants. Accumulations of ice on the outside of aircraft impair wing lift and propeller

***Please retain your DUATS Newsletters for future reference.***

thrust. Ice can reduce engine performance to dangerous levels. In the most severe cases, it can cause engine failure. The double danger is that while lift and power are being reduced, that same icing is increasing the weight of the aircraft - a deadly vicious circle.

There are several forecasts that contain warnings of icing. However, PIREPs are the only source of actual icing reports. PIREPs of icing are more than just nice to know information. PIREPs are included in DUATS standard briefings and may be requested as the weather type UA in DUATS abbreviated briefings.

Because of their importance, please remember to also file icing PIREPs when you encounter those conditions.

Just a Reminder - Portions of FAR 91 and 135 prohibit VFR flights into areas of known light icing under some conditions. Therefore, it is important that all icing conditions, even LIGHT ICING, be reviewed by and reported from pilots.

**Forecasting the Icing Hazard**

What do the meteorologists at NWS look at when trying to determine if an icing hazard exists? How do they determine where the hazard will be during the valid time of the upcoming area aviation forecast?

In a nutshell, they try to figure where there will be enough moisture to form clouds above the freezing level. If they look at the moisture too far above the freezing level, we find we're tracking ice crystals instead of liquid water droplets.

That brings up an important question. Why do we have liquid water above the freezing level? Liquid cloud droplets in an environment of rising air can rise a substantial distance above the freezing level, becoming colder and colder, without freezing as long as they remain undisturbed. What does undisturbed mean? Well, if an airplane would happen to fly through these "supercooled" cloud droplets, the droplets would most likely freeze on impact with the aircraft. At least the smaller drops would freeze instantly into rime ice. If the clouds happened to be made up of larger drops, it might take a few seconds for the drops to freeze into a glaze of clear ice.

Generally speaking, the stronger the upward motion of the droplets within the cloud, the greater the vertical distance the droplets will rise before changing into ice crystals. However, meteorologists studying clouds have learned that 95% of the cloud droplets at the minus 16 degrees Celsius (C) level have changed into ice crystals already, and at the minus 25 degrees C level, 99.9% of the droplets have change to ice crystals. So we should expect occurrences of aircraft icing to be scarce at temperatures around minus 16 degrees C and essentially nil at minus 25 degrees C or colder.

So in addition to forecasting the horizontal and vertical extent of cloud formations above the freezing level, the meteorologist must determine which cloud areas will most likely contain significant amounts of supercooled water droplets during a specific 12-18 hour period. Needless to say, this is no easy task.

**Points to Remember**

Pilots should use both icing forecasts and icing **PIREPs (UA)**. Forecasts delineate general areas of icing potential while **PIREPs** pinpoint actual encounters. In using **PIREPs**, remember that conflicting reports of type or intensity may be due to different types of aircraft. By piecing together several reports, you frequently can get a more comprehensive picture of icing potential.
An **Area Forecast** (**FA**) always contains a section on icing. It specifies freezing levels, expected changes in freezing level, and altitudes where icing is most likely. **SIGMETs** (**WST**) and **AIRMETs** (**WA**) are also an excellent source of icing information.

Remember the following points:

In stratiform clouds, rime icing may be very extensive horizontally. An altitude change of the aircraft to either a flight level with above freezing temperatures or one colder than minus 5 degrees Celsius (C) likely will alleviate icing conditions. An altitude change also may take the flight out of clouds.

In cumuliform clouds, clear ice usually is encountered with brief, heavy accumulations from 0 degrees C to minus 10 degrees C and lesser amounts at lower temperatures. Any flight path change to get out of the clouds and into visual conditions is in order.

In freezing rain due to frontal overrunning, a climb into the warmer air aloft is in order. Above freezing temperatures may be found at a lower level in some cases; but then, terrain must be considered.

**You Really Ought to Know**

As aviators, we must all be knowledgeable about the basic conditions which are most likely to produce winter flying problems Aircraft icing can occur either in the air or on the ground. A common condition for icing is when an aircraft taxis through slush or water at or near freezing. It can also occur when aircraft fly through precipitation and the air temperature is near or below freezing. The most severe icing occurs with a free air temperature between 0 and -10 degrees Celsius. However, icing is not uncommon at much colder temperatures, all the way down to -40 degrees Celsius.

Cumiliform clouds are more likely to produce serious ice formation than other clouds, particularly if freezing rain is present. However, at altitudes above the freezing level, any layer of air with a narrow temperature dewpoint spread is a potential icing zone. Remember, ice can form by sublimation, water going directly from its gaseous state to the solid state, and in this case, directly from water vapor (always present in the atmosphere) to solid ice. Types of aircraft icing include clear, rime, and mixed.

CLEAR ICE
Clear ice forms when, after initial impact, the remaining liquid portion of the water drop flows out over the aircraft surface, gradually freezing as a smooth sheet of solid ice. This type forms when drops are large as in rain or in cumuliform clouds. Clear ice is hard, heavy, and tenacious. Its removal by deicing equipment is especially difficult.

RIME ICE
Rime ice forms when water drops are small, such as those in stratified clouds or light drizzle. The liquid portion remaining after initial impact freezes rapidly before the drop has time to spread over the aircraft surface. The small frozen droplets trap air between them giving the ice a white appearance.
Rime ice is lighter in weight than clear ice and its weight is of little significance. However, its irregular shape and rough surface make it very effective in decreasing aerodynamic efficiency of airfoils, thus reducing lift and increasing drag. Rime ice is brittle and more easily removed than clear ice.

MIXED CLEAR AND RIME ICING
Mixed clear and rime icing forms when water drops vary in size or when liquid drops are intermingled with snow or ice particles. It can form rapidly. Ice particles become imbedded in clear ice, building a very rough accumulation sometimes in a mushroom shape on leading edges.