

If you accidentally fly into IMC weather as a VFR pilot, **Do a 180° turn and exit the IMC.** Don't think that it will be clear in a few moments.

METAR is Observation, TAF is Forecast... The METAR only gives you a small snapshot in time. They are only good for an hour. *The information in a METAR is sequential, following a prescribed format.*

On the other hand, TAF's cover a 24 to 30 H. period and they are published 6 times a day. TAF is specific to an airport. **The most accurate part of a forecast occurs at the beginning of the forecast period.**

METAR - is meteorological aviation routine hourly observation report. Prepared every **55 minutes of an hour**. There are two types of METAR:
1- Routine METAR- transmitted every hour
2- SPECI -Special report given any time, It is necessary to update weather report.

Decode the following METAR:

KTPA 041553Z 26017KT 1SM R01L/3500VP6000FT RA BR FEW011 **BKN020** OVC050 23/22 A3006 RMK AO2 TWR VIS 2 RAB34 5LP178 T02280217 PNO 5
Tampa 4th of the month 1553Z, Wind 17 kt. from the West (260° - 17°), Visibility 1 Status Mile, Runway Visual Range for Runway 01, Variable from 3500 Feet to 6000 Feet, Rain, Mist, Cloud Cover Few (1-2/8) at 1100 Feet, **BKN (5-7/8) at 2000 feet**, OVC (8/8) at 5000 feet, Temperature in degrees Celsius 23° Dew Point 22°, Altimeter Setting 3006 In Hg, Remarks: AO2 Type of automated station, TWR VIS 2 Tower Visibility 2 Miles, RAB34 Rain began at 34 past hour, 5LP178 Sea Level Pressure 1017.8 Mb, T02280217 Hourly temperature and dew point in tenths degrees C. 22.8 to 21.7C, PNO Precipitation amount not available; 5 Maintenance Check Indicator: ASOS (The automated surface observation system) requires maintenance.

● **ATIS (Terminal Information System)** automated terminal information service (**human to monitor the system**) ATIS usually gives Alphabet Letter, wind direction and speed, temperature, dew point, altimeter setting and remarks, hourly at 55 minutes past the hour unless the weather is changing rapidly, broadcasting the time in Zulu. **Absence of the sky condition and visibility on an ATIS broadcast indicates that the ceiling is at least 5,000 feet and visibility is 5 miles or more.**

● **AWOS – Automated weather observation system.** AWOS Provides altimeter setting, wind speed, direction and gust, temperature and dew point and visibility.

● **ASOS – The automated weather observation system** which provides information about variable cloud height, variable visibility, rapid pressure change, precipitation type, intensity, accumulation etc. NOTE: * ATIS/AWOS/ASOS broadcasts, or any information a controller gives you over the radio, is **magnetic**. * All charts and textual sources (METAR, TAF, winds aloft, surface analysis charts, etc) use **true north** as the reference.

When confronted with adverse weather, **a one-eighty is a VFR pilot's best friend.**

AVIATION WEATHER & CHARTS, LIMITATIONS AND RECOMMENDED TECHNIQUES

TAF– Terminal Aerodrome Forecast is the brief statement of the expected meteorological condition. It is given for specified time period **within 5 SM of the center of the airport**. TAF is valid for 24hrs. and update every 6 hrs.
-If 24 H. updated every 6 H. and issued 4 times a day.
-If 30 H. updated every 6 H. and issued 6 times.
“Cumulonimbus cloud (CB)” is the only cloud shown in the TAF.

A TAF includes Wind, Visibility, Weather Phenomena, obstructions to vision, cloud coverage and cloud ceilings in MSL.

Decode the following TAF: The report was made on the 4th of the month 1 hour and 19 minutes ago, at 14:50 UTC Time : 11:09 (16:09 UTC)
KTPA 041450Z 0415/0518 21012G22KT P6SM VCTS SCT025CB OVC050 TEMPO 0415/0417 VRB02G30KT 3SM TSRA BKN015CB FM041700 27015G25KT P6SM SCT015 OVC030 TEMPO 0417/0420 45M RA **BKN015** FM042200 31014G24KT P6SM BKN120 FM050600 35010G18KT P6SM SCT250
Forecast valid from 04 at 15 UTC to 05 at 18 UTC.
Wind 210°/12 kt. from the South/Southwest with gusts up to 22 Kt, Visibility: 6 miles (Status Mile) Vicinity Thunderstorm (VCTS) scattered clouds at a height of 2500 ft, Cumulonimbus. Overcast at a height of 5000 ft
Temporarily from 04 at 15 UTC to 04 at 17 UTC, Wind 20 kt. from variable directions with gusts up to 30 KT., Visibility: 3 miles, broken clouds at a height of 1500 ft, Cumulonimbus. thunderstorm, rain (TSRA)
From 04 at 1700 UTC: Wind 17 kt. from the West with gusts up to 25 Kt. Visibility: 6 miles, Scattered clouds at a height of 1500 ft, Overcast at a height of 3000 ft, Temporarily from 04 at 17 UTC to 04 at 20 UTC, Visibility: 4 miles, **broken cloud layer at a height of 1500 ft**, Rain (RA),
From 04 at 2200 UTC, Wind 14 kt. from the Northwest with gusts up to 24 Kt., Visibility: 6 miles, Broken clouds at a height of 12000 ft.,
From 05 at 0600 UTC: Wind 12 kt. from the North with gusts up to 18 Kt., Visibility: P6SM means **greater than 6 statute miles**, scattered clouds at a height of 25000 ft.

Severe Weather Reports/Forecasts and Charts:

AIRMETS, SIGMETS, Convective SIGMETS, AIRMET (WAs) is an Airmen's Meteorological Information report to **all pilots**. They are valid for 6 H. It is for all the aircraft, **especially small aircraft**, (including the ceilings less than 1,000 feet and/or visibility less than 3 miles)
There are 3 types of AIRMET
* **SIERRA/IFR** - Describe IFR condition and/or extensive mountain obscuration.
* **TANGO/Turbulence** – Describe moderate turbulence ,surface wind 30 knots or more, low level wind shear.
* **ZULU/Icing**– Describe moderate icing and provides freezing level heights.

SIGMET (WSs) stands for **Significant Weather Observation** that is potentially hazardous to **all aircraft**. It is valid for 4 hrs. Unscheduled Forecast. SIGMET is issued for
1 Severe icing
1 Severe or extreme turbulence, CAT
1 Extreme rain
1 Dust storms
1 Volcanic ash.
Avoid SIGMETS, SIGMETS are serious, change rapidly, but you can work around AIRMETS. SIGMETS effect the safety of all aircraft. SIGMETS have the potential to affect **3,000 square miles of the surrounding area**

Wind and temperature aloft chart (FD) A computer prepared forecast of wind direction, wind speed and temperature at specified time, altitude, and location, issued 4 times daily.

What are the general characteristics of **low/high pressure** areas? **Note: Winds blow towards the low pressure.**
Low
Cyclone
Counterclockwise
Rising air (cooling air) ↑
Trough(extended area of LP)

CONVECTIVE SIGMET(WSTs) issued for thunderstorms: activity valid for 2 H., implies severe or greater turbulence, severe icing, and low-level windshear. WSTs includes tornadoes, lines of thunderstorms, thunderstorms over a wide area, embedded thunderstorms, hail (3/4 inch), 50 Knots/ Greater Wind Gusts.

FA- Aviation Area Forecast is a forecast of Visual Meteorological Conditions (VMC), clouds, FAs covers ten areas (USA). Issued 3 times in a day. Details provided result in a categorical outlook which allow for determining regions experiencing Instrument Flight Rules (IFR), Visual Flight Rules (VFR), and Marginal VFR conditions (MVFR). Pilots should utilize FA in conjunction with Radar/Weather Summary Charts, AIRMET, SIGMET to determine forecast en-route weather.

PIREP information concerning weather as observed by pilot in route. There are 2 types of PIREP.
1 UA – Routine 2. UUA – Urgent
PIREP include (Pilot Report)
➤ Location ➤ Time in Zulu
➤ Flight level ➤ Type of aircraft
➤ Message (Wind shear, hail hazard, turbulence etc.)
To obtain current information regarding cloud tops, icing, and turbulence check the **PIREPs**.

Wind Shear Report – wind shear described as a sudden, drastic shift in wind speed and direction that may occur at any altitude any flight level. (at least 25 Kt.) Be alert for a sudden change in airspeed and carry an extra margin of speed if wind shear is reported or forecasted on PIREP, TAF, ATC, METAR. It occurs at **all altitudes, in all directions.**

Changes in weather is caused by the sun and **unequal heating of the Earth's surface**. Shortly, **weather (winds)** is a direct result of the Earth spinning.

Where is the weather information available on the ground?

- FSS (Flight Service Station), - Call 1-800-WX-BRIEF (request Standard Weather Briefing), - Determine the sources of data: Applications and web Pages- aviationweather.gov, ftlplan.com, foreflight, sky vector, PIREPs, etc.
- Assess the expected weather hazards including departure, en route, alternate, and destination such as:
 - * **METAR&TAF, - PIREPs**
 - * **Atmospheric Composition and stability.**
 - * **Wind** (e.g., crosswind, tailwind, wind shear, mountain wave, etc.)
 - * **Temperature – Dew Point - Moisture/Precipitation**
 - * **Weather System Information** (masses, fronts, etc)
 - * **Clouds – Turbulence – Thunderstorms and Microbursts – Icing and Freezing Level Information**
 - * **Obstruction to visibility** (smoke, haze, volcanic ash, etc.) - Fog/Mist - Frost

Factors must be present for a thunderstorm (Moisture, Instability, A lifting force)
Greatest Turbulence and Lightning
A- Sufficient Water vapor. B-Unstable air. C-Updraft.
* **Cumulus Stage – Updraft** causes raindrop to increase in size
* **Mature stage** – lightning, perhaps roll clouds. (start of precipitation at surface)
* **Dissipating Stage** – Downdraft and rain begin to dissipate.

Graphic Weather Charts (Computer Based Charts): Surface Analysis Chart, Weather Depiction Chart, Radar Summary Chart, Satellite Weather Pictures. All charts are useful for Flight Planning. It is easy to reach all charts via Internet. All information is gathered by Special Weather Radar Systems.

Surface Analysis Chart This is computer prepared chart. The chart is transmitted every 3 H., It provides information about pressure system and fronts it also provides an overview of wind, temperature and dew point.

Weather Depiction Chart provides an overview of favorable and adverse weather conditions for the chart time and is an excellent resource to help you determine general weather conditions during flight planning. Valid for 3hrs. Chart shows observed Visibility and Ceiling for Pilots: (Primarily Used)
1. IFR 2. MVFR (Marginal VFR)
3. VFR

Convective Outlook Chart
48-Hour forecast thunderstorm activity. Helps show where to expect thunderstorm activity, Issued 5 times daily.

Radar Summary Chart (Precipitation Chart) indicates location of precipitation along with type, intensity, configuration, coverage, top of echo, direction of cell movement. This chart is available hourly. And contours provide an indication of the precipitation intensity and the size.

Significant Weather Prognostic Chart (SIGWX) can give you an idea of general weather condition expected in the next 12 to 24 H. from the surface to 24,000 feet MSL. (Low Level), consists of two panels. (Left/Right) Issued 4 times in a day. -SFC–FL 240 /left 12 H. / right 24 H. Chart depicts freezing levels, turbulence, and low cloud ceilings and/or restrictions to visibility (shown as contoured areas of MVFR and IFR conditions). Significant weather prognostic charts provide an overall forecast for determining areas to avoid (Freezing Level and Turbulence)

Humid air means **instability and thunderstorms**. The most hazardous: Squall Line

VFR. IFR. SVFR

VFR – Visibility 5 SM, Ceiling greater than 3000 ft. (Sky Clear)
IFR- Visibility 1-3 SM, Ceiling 500-1000 Ft
Special VFR-Visibility 1 SM, Clear of Clouds.

What are the standard temperature and pressure values for sea level? 15°C or 59°F – 29.92" Hg or 1013 Mb.

Preflight Planning:

- * **IM SAFE (I GO/No-GO) Check List**
- * Weather Briefing
- Flight Visibility,
- Cloud Coverage (Overcast, Broken) at departure, en route and destination.
- Flight School/Institute WX Mininums.
- * Performance (W&B, VFR NAV Sheet, T/O and Landing RWYs.)
- * Fuel Check and Planning at Destination.

What is the definition of a ceiling?
The height above the ground of a **broken or overcast layer**.

NOTAMS "NOTICE TO AIRMEN" Time-critical information is provided by NOTAMS, contains information such as runway closures, obstruction in the approach and departure path to airport, etc., NOTAMS are divided into 4 parts.
1. **NOTAM D** - Domestic: Runway closures etc.
2. **NOTAM L** - Local: VOR Net working etc.
3. **NOTAM FDC** - Flight Data center, chart approach plate under maintenance, amendments to instrument procedures.
4. **NOTAM M** - is for military use.
* **FDC NOTAMS contain regulatory information, such as: TFR.**

What type of clouds, visibility and precipitation would you expect from stable/unstable air?
Stable Air:
* Low barometric pressure
* Stratiform clouds,
* Fair to poor visibility,
* Smooth air,
* Continuous rain, drizzle
* Shallow lapse rate
* Good flying conditions
Unstable Air:
* Low barometric pressure
* Cumuliform clouds
* Clouds with vertical (CB)
* Turbulence (bumpy)
* Showery precipitation
* Good visibility,
* Steep lapse rate, gusty

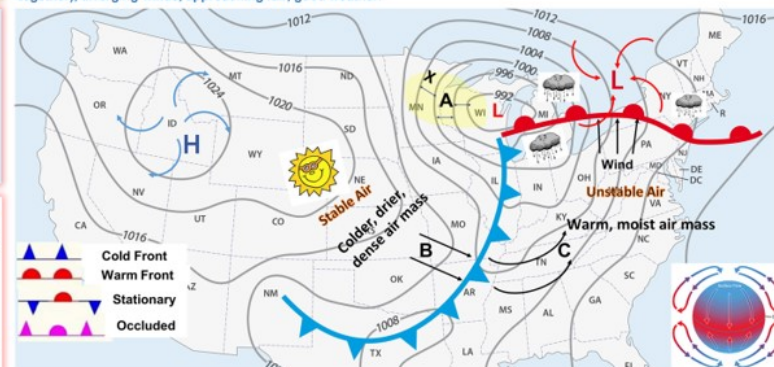
What does dew point and temperature/dew point spread mean?
Dew point is the temperature at which the air becomes saturated. (temperature to which air must be cooled to become saturated)
Fog and low clouds are most likely when the temperature/dew point spread is 5 F (2 C) or less and decreasing.
When the dew point is colder than 32 F (0 °C), then **frost will form. Frost will disrupt (spoil) the smooth flow of air over the wing**, adversely affecting its **lifting capability**. So, Frost on the wing of an airplane must always **be removed before flying**.

How does icing affect airplane performance?

Structural ice accumulation **disrupts the airflow around the aircraft**, causing **adverse effects on the aircraft's performance**. For example, ice build-up on the wings increases weight, and reduces lift. Icing on the aircraft's propeller increases drag and reduces thrust. (If engine RPM drop and fluctuation persists, descend to the safe altitude, lans as soon as practical)

Weather Fronts, Lifting Forces, Isobars, High/Low Pressure Systems

L- Low Pressure (cyclone), counterclockwise, rising warm (less dense, light air), moist air and possibly, converging winds, **bad-cloudy weather: severe storms, Cumuliform clouds, vertical development clouds (CB), turbulence (bumpy), showery precipitation, unstable weather.** **H- High Pressure (anticyclone)**, clockwise, sinking, dense cold air (air molecules close together), diverging winds, approaching fair, good weather.



Golden Rules:
* **A- Stronger winds, MN/WI, where isobars are close (X), indicating a large pressure change in the region. B-C Air moves from High to Low. Winter Fronts are the strongest, developing over Asia and North America, forming the oceanic air masses.**
** Warning from below decrease the stability of an air mass.
*** Factors must be present for a thunderstorm (Moisture, Instability, A lifting force are three necessary conditions.)