



**Federal Aviation
Administration**

**SALT LAKE CENTER ARTCC
2150 WEST 700 NORTH
SALT LAKE CITY, UTAH 84116**

FLIGHT DATA 801-320-2568



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“THE” Anatomy of a “PIREP”

Presentation by Joe Johnston

“THE” Anatomy of a “PIREP”

Currently - Air Traffic Assistant/Flight Data Specialist FAA Salt Lake
City Air Route Traffic Center (ARTCC)

2000-2023 - Utah Test and Training Range/Range Controller

1998-2020 - Michael Army Airfield/Dugway Proving Ground/Air
Traffic Control Specialist, Station

1982-2008 - Kentucky and Utah Air National Guard

Intelligence (PPIF) – Combat Control Trainee – Air Transportation
Specialist - Airfield Manager – Exercise Planner – AMC/TACC
Mission Specialist - CBRN Specialist - Logistics Specialist

AIRBOSS Wendover Airshow 2002-2010 and 2012-2017

And always a Weather Nerd!!!

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“THE” Anatomy of a “PIREP”

THINGS WE’LL TALK ABOUT

The Where are the ARTCC’s (Air Route Traffic Control Center)

What is the FAA Flight Data Section

Definitions of a Pilot Report/PIREP

Pre-Flight Briefings

Weather Briefings – Limitations to Weather Briefings – Clearances

The FAA regulations on PIREP’s

What are the basics of a PIREP

Where does a PIREP begin

What is the “Intent” of a PIREP

Who “touches” the PIREP

The audience of the PIREP

The Quality of a PIREP

How the PIREP helps the National Weather Service and the FAA

Help US help YOU!

Questions and Answers – General Discussion





“THE” Anatomy of a “PIREP”

FUNCTIONS OF THE FLIGHT DATA SECTION

1. NON-CONTROL POSITION
2. IFR FLIGHT PLAN CLEARANCES/IFR CANCELATIONS
3. NOTAMS
4. PIREPS
5. FIRE REPORTS (FIREPS)
6. TEMPORARY FLIGHT RESTRICTIONS
7. WX COORDINATION WITH THE NWS CWSU
8. LOST & OVERDUE ACFT
9. NORDO ACFT
10. CORDINATION WITH CANADIAN ATC
11. CORDINATION WITH MEXICAN ATC
12. CORDINATION WITH THE TOWER, TRACON, AND MILITARY FACILITIES



— “THE” Anatomy of a “PIREP”

- FLIGHT CLEARANCES

- VFR CLEARANCE

- IFR CLEARANCE

“THE” Anatomy of a “PIREP”

Definition of a Pilot Report/PIREP

A Pilot Report or PIREP is a report of the actual weather conditions as encountered by an aircraft in flight. Traditionally, these reports are transmitted by radio to an appropriate ground station for dissemination but, when necessary, they can be made by telephone after landing.

From the Skybrary



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“THE” Anatomy of a “PIREP”

Definition of a Pilot Report/PIREP

A Pilot Report (PIREP) is a report of meteorological phenomena encountered by the pilot in flight

These reports serve as warnings to other pilots and give Air Traffic Control (ATC) knowledge of potential hazards in order to keep pilots clear

All pilots should give reports if:

- In flight when requested
- When unusual or unforecast weather conditions are encountered
- When weather conditions on an IFR approach differ from the latest observation
- When a missed approach is executed due to weather
- When a wind shear is encountered on departure or arrival

PIREPS can relate to a variety of factors such as turbulence, airframe icing, volcanic ash, wind shear, and clear air turbulence

From the CFI Notebook



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“THE” Anatomy of a “PIREP”

Weather Briefings

PIREP Submission thru AWC

Aviation Weather Center

<https://aviationweather.gov/>

“THE” Anatomy of a “PIREP” Pre-Flight Planning



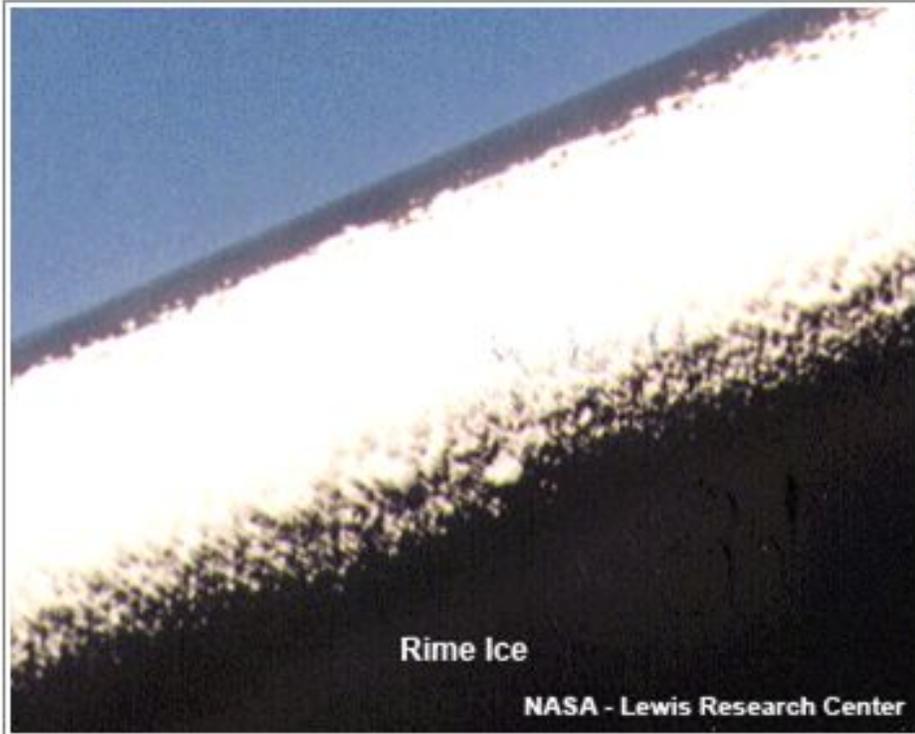
https://youtu.be/o4_3u3BH87s?list=PL5vHkqHi51DQdF_PXKQT7uJUPd4UzIxNS



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“THE” Anatomy of a “PIREP”

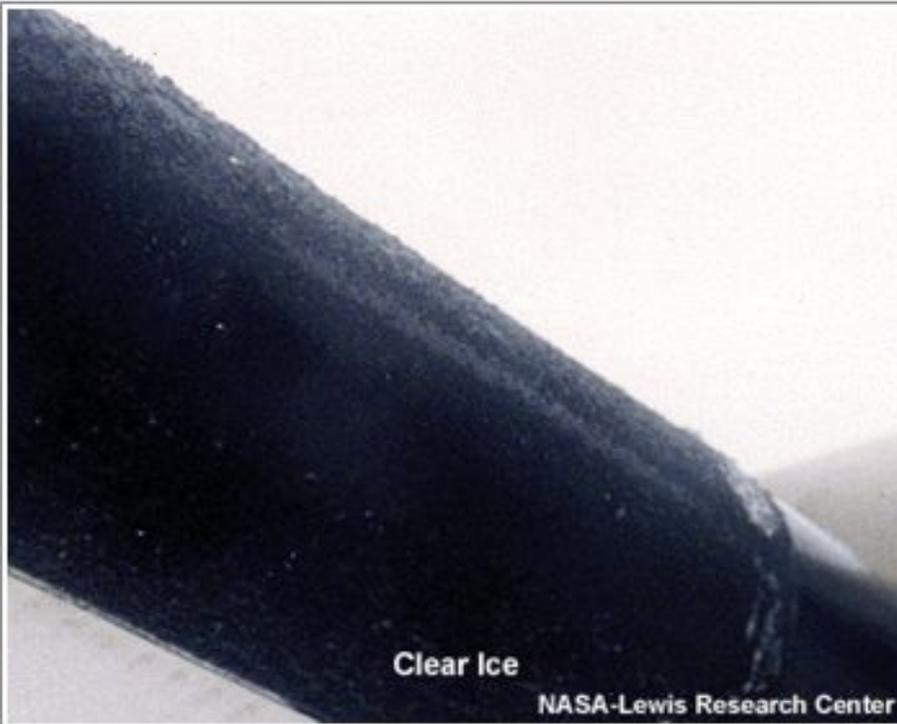
RIME ICING



Rime Icing occurs when tiny supercooled water droplets freeze onto a surface that is below freezing (typically an airplane wing or pitot tube). This tends to be nuisance rime that becomes a rough surface, although accumulation on the pitot tube can lead to instrument failure. It is the most common type of icing.

“THE” Anatomy of a “PIREP”

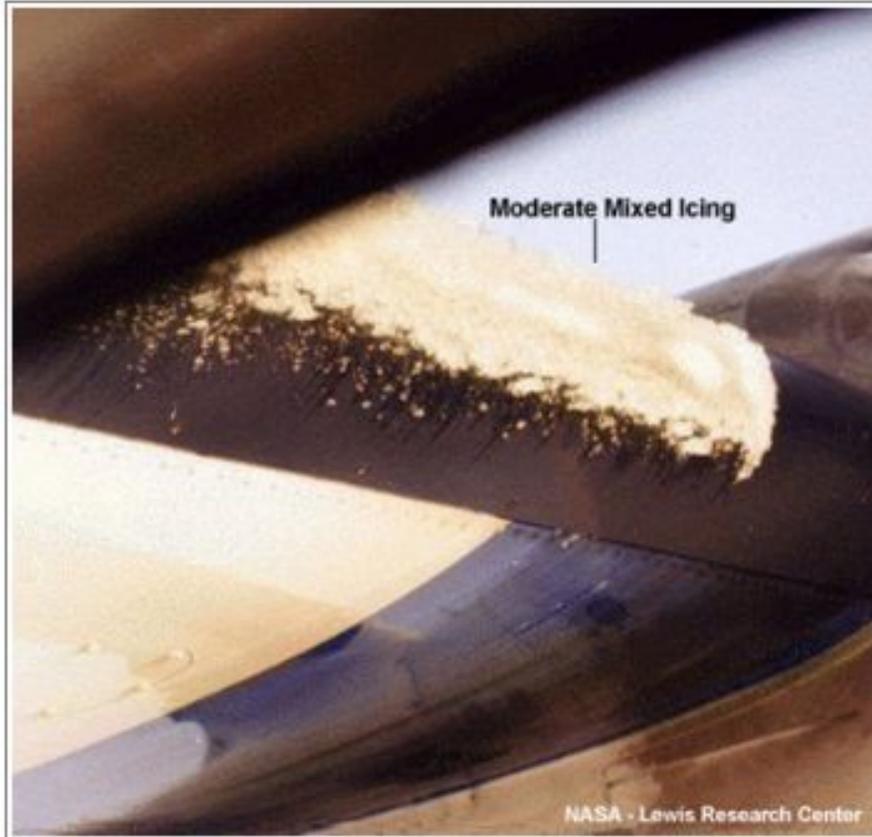
CLEAR ICING



Clear Icing occurs as a result of Supercooled Large Drops (SLD) in a cloud. These are large raindrops that have cooled to below 0°C, but are still liquid. When they come into contact with a solid object (like an airplane wing), they can accumulate rapidly as large sheets of ice. This can be very hazardous because they can disrupt the air flow and reduce lift on an aircraft. More importantly, it can spread beyond the reach of de-icing equipment on the aircraft and can be difficult for a pilot to see.

“THE” Anatomy of a “PIREP”

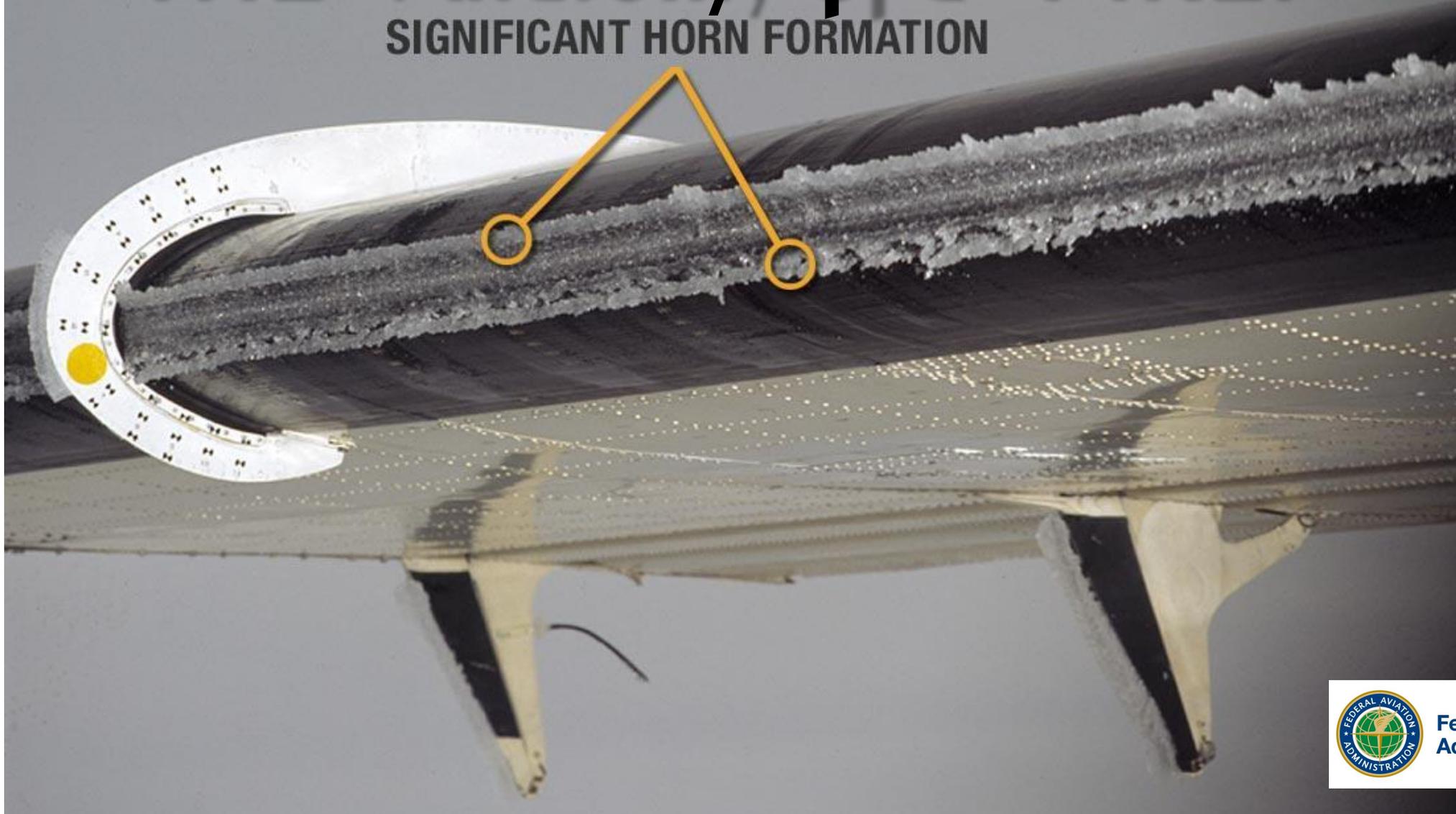
MIXED ICING



Mixed Icing is when both clear and rime ice occur at the same time.

“THE” Anatomy of a “PIREP”

SIGNIFICANT HORN FORMATION



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“THE” Anatomy of a “PIREP”

BONUS Question – What type of an aircraft is this?



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“THE” Anatomy of a “PIREP” Mountain Flying



https://youtu.be/fT3uEBdIDj0?list=PL5vHkqHi51DQdF_PXKQT7uJUPd4UzlxNS



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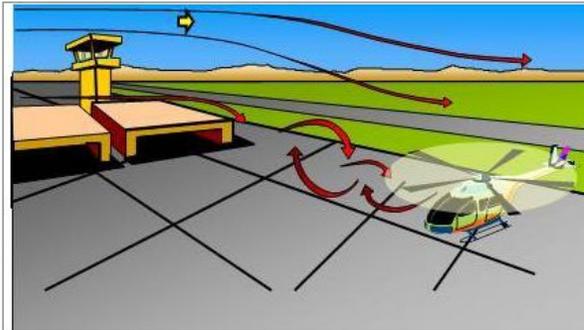
“THE” Anatomy of a “PIREP”

TURBULENCE

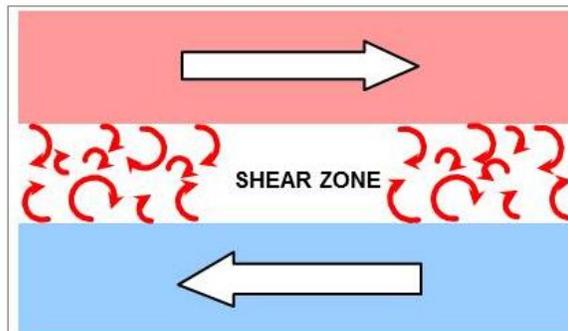


Convective Currents (commonly known as thermals) are caused by uneven surface heating during the daytime. These currents cause pockets of air to rise and affect aircraft at low altitudes.

These are most common during the spring and summer months.



Turbulent eddy motions near the ground can be caused by obstructions, such as trees, buildings, mountains, etc. It is directly related to the wind speed and the roughness of the obstructions. It is often called "mechanical turbulence".



Wind shear generates turbulence between two wind currents with different velocities and/or directions. It is commonly found in the vicinity of a jet stream, but can occur at any altitude.

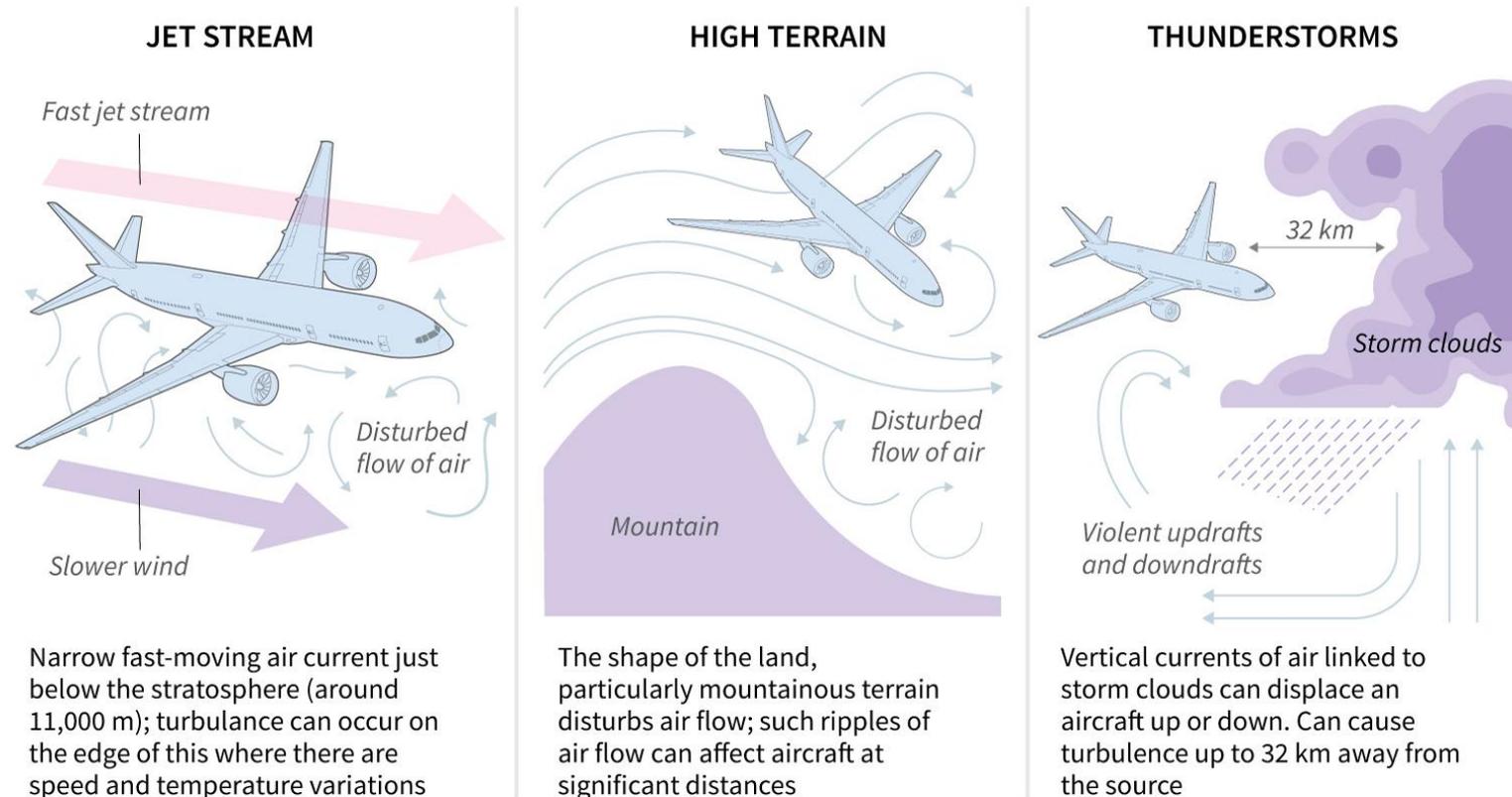
“THE” Anatomy of a “PIREP”

TURBULENCE

Clear-air turbulence (CAT)

Initial reports suggest that SQ321 may have hit clear-air turbulence, “the most dangerous type of turbulence” according to the Association of Flight Attendants

Where CAT happens



Narrow fast-moving air current just below the stratosphere (around 11,000 m); turbulence can occur on the edge of this where there are speed and temperature variations

The shape of the land, particularly mountainous terrain disturbs air flow; such ripples of air flow can affect aircraft at significant distances

Vertical currents of air linked to storm clouds can displace an aircraft up or down. Can cause turbulence up to 32 km away from the source

“THE” Anatomy of a “PIREP”

Three ingredients are needed for thunderstorms to occur: Moisture, Instability, and Lift.

Moisture can come from any nearby body of water, or by moist ground conditions.

Instability occurs when air pockets rise faster than the environment around them.

Lift can be achieved by a frontal passage, thermals, and/or convergence.

Thunderstorms can produce several hazards to aviation. These include, but are not limited to:

- **Lightning**

- **Large hail**

- **Turbulence**

- **Icing**

- **Tornadoes**

- **Downbursts**

Often, multiple hazards can develop quickly. As a result, pilots should avoid flying in or near thunderstorms.

Turbulence can occur above a developing thunderstorm, or in the vicinity of a thunderstorm due to the rapid velocity of the updraft. Oftentimes, severe to extreme turbulence is reported near thunderstorms. Turbulence has been known to occur several hundred miles downstream, so it is wise to give them plenty of distance, especially at higher flight levels.

Icing can occur in the mid to upper levels of a thunderstorm. Because of the strong updrafts and abundant moisture, moderate to severe icing with large drops can occur rapidly within a thunderstorm.

“THE” Anatomy of a “PIREP”



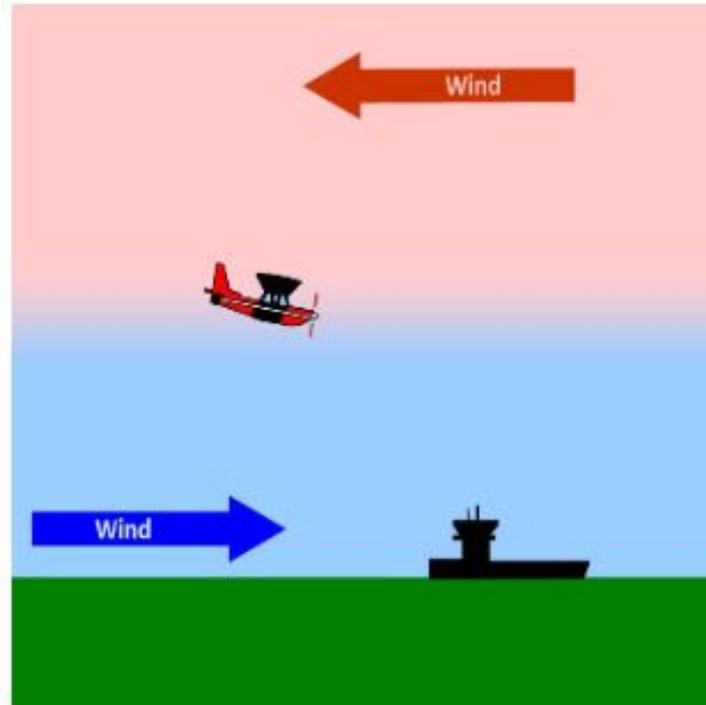
Lightning is actually not as much of a hazard to aviation as people think it is, because aircraft are equipped with static discharge arrestors. In fact, very few crashes have occurred due to lightning striking an aircraft. Still, it is important to know that a plane does not need to be in or right near a thunderstorm for lightning to occur. Lightning can come out of the anvil and strike an object several miles away.



Hail occurs when chunks of ice develop from strong thunderstorm updrafts reaching above the freezing level. When hail becomes too large and heavy for the updraft to support it, it falls to the ground. Once the hailstone falls below the freezing level, it begins to melt. If it is substantially large, it will remain mostly intact by the time it reaches the ground. Hail is much larger in the thunderstorm cloud than the ground, which can produce a major hazard to aircraft.

“THE” Anatomy of a “PIREP”

Low Level Wind Shear



Low-level wind shear (LLWS) is defined as “A wind shear of 10 knots or more per 100 feet in a layer more than 200 feet thick which occurs within 2,000 feet of the surface”. So what does this mean? It means that within the lowest 2000ft, the wind speed and/or direction is changing rapidly in a 200ft layer.

Small, general aviation aircraft are much more prone to the effects of low-level wind shear than large commercial aircraft because their approach speeds are much closer to their stall speeds.



“THE” Anatomy of a “PIREP”

FAA REGULATIONS ON PIREPS

7110.10

Chapter 8

FAA Weather Services

1. GENERAL
2. PIREPs are filed at unscheduled times with stations having sending capability to WMSCR for dissemination on the Service A domestic aviation weather system. Timely dissemination of PIREPs alert pilots to significant weather reports and improves aviation forecasts.
3. Personnel must enter PIREPs into the operational system as individual reports, not appended to a surface observation.
4. Changing weather conditions should dictate increased frequency of PIREP solicitation.



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Personal MOD-SEV Turbulence Story

Glaster N9023D

TVY-MLF MLF-IDA IDA-TVY

A BeUTAHful Day in Stockton Utah



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“THE” Anatomy of a “PIREP”



WHERE DOES A PIREP BEGIN



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“THE” Anatomy of a “PIREP”

WHERE DOES A PIREP BEGIN

Don't confuse a PIREP with a METAR

[Meteorological Aerodrome Report \(METAR\) | SKYbrary](#)
[Aviation Safety](#)

“THE” Anatomy of a “PIREP”

What is the “Intent” of a PIREP

The main intent and purpose of a PIREP is Safety!

PIREPs help the CWSU Meteorologists and others update weather data and improve the quality and accuracy of a weather forecast. These reports also assist pilots, dispatchers, and flight planners to develop a mitigation strategy for possible weather hazards encountered during a flight.

A *pilot report* or *PIREP* is a pilot’s report of **actual** weather conditions encountered while airborne. Typically, pilots file a report to ATC (Tower, Approach, or Center) or Flight Service when the weather conditions are not the same as the forecast, or when the conditions are worse than the forecast. Low visibility, turbulence, icing, and thunderstorms are good examples of actual weather conditions that may not be in the forecast but may be conditions a pilot experiences during flight.

What pilots don’t often realize is that a PIREP should also be filed when the weather is *better-than-forecast*. A PIREP filed to report good weather is just as important as a PIREP filed to report bad weather.

The FAA has a tool to submit an electronic PIREP through the National Weather Service’s Aviation Weather Center Digital Data Service (ADDs) website. Registered users can electronically submit turbulence and icing PIREPs on the site, which are instantly displayed in graphical form and distributed nationwide. Visit <https://www.aviationweather.gov/user/register> to register on the Aviation Weather Center site. Electronic Submission of Pilot Weather Reports (PIREP).





“THE” Anatomy of a “PIREP”

Who touches the PIREP

The Aircrew

The Tower

The TRACON (Approach/Departure)

The Center (In our case Salt Lake Center/ARTCC)

Flight Data (There’s one at every ARTCC)

Flight Service (LEDIOS)

The CWSU



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“THE” Anatomy of a “PIREP”

The Audience of a PIREP

IF YOU ARE A PIREP CONSUMER

PLEASE BE A PIREP PROVIDER AS WELL



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“THE” Anatomy of a “PIREP”

The Audience of a PIREP

The traditional method for making a PIREP is to tell ATC or Flight Service that you have a pilot report and let them tell you when they are ready to copy your information. **These days, though, you can also use tablet- and smartphone-friendly PIREP submission tools.** Some have auto-populated values based on user preferences or GPS data.

<https://aviationweather.gov/>



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“THE” Anatomy of a “PIREP”

The QUALITY of a PIREP

First - understand as a pilot, you will likely find yourself on both sides of a PIREP: making a report as well as using one.

Second – understand this: “garbage in, garbage out!”

Being punctual and concise with the appropriate information will SAVE LIVES!

<https://www.thinkaviation.net/how-to-read-pireps/>



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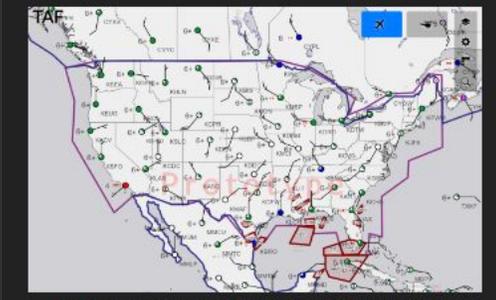
Flexible Options

Customize your display! Maps can be set to display raw or decoded data.

Current Conditions

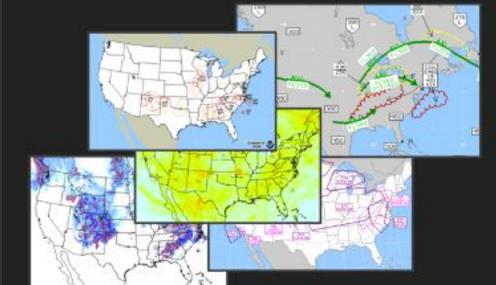


Graphical Forecasts for Aviation



Interactive maps of aviation forecasts and observations

Decision Support Imagery



Static DSS images to embed in briefing material

Station data

IDs:

Raw Decoded Remember

Where is...?

- Fully integrated GFA maps — accessed through the Weather menu
- HEMS Tool is now [GFA-LA](#) — all of the same features and more
- Radar, satellite, METARs, and other current data on the [observation map](#)



Federal Aviation Administration

Current Weather

Visit the [observation map](#) to view METARs, PIREPs



PIREP Submit

Initial section required. Refer to PIREP info in [FAA 7110](#).

UA (routine report) UUA (URGENT report)

/OV Use location

/TM Current time
4 digits in UTC (e.g. 0915, 2330)

/FL Unknown
3 digits in hundreds of feet MSL
 Climb Level Descent

/TP Unknown
4 characters max (e.g. C210, P3)

/SK - Sky Condition

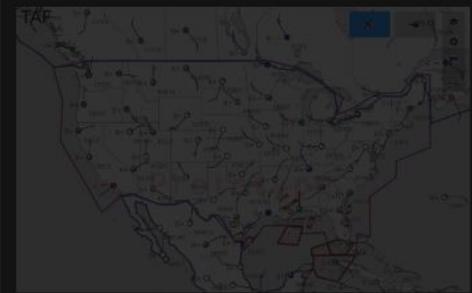
/WX - Weather and Visibility

/TA - Air Temperature

/WV - Winds

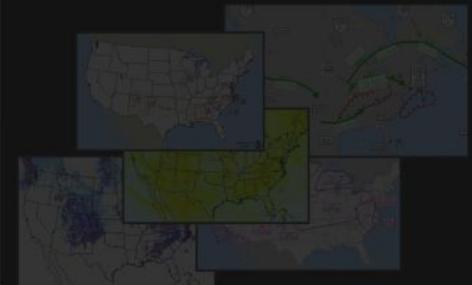
/TB - Turbulence

Graphical Forecasts for Aviation



Interactive maps of aviation forecasts and observations

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IDs:

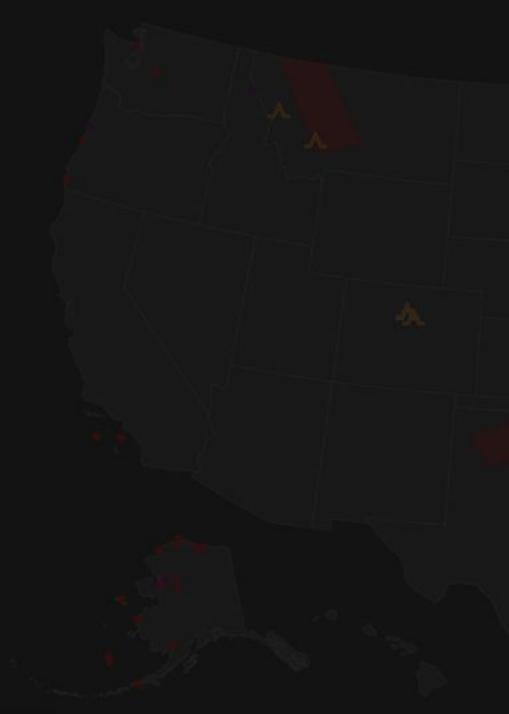
Raw Decoded Remember

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Updated SigWx graphics
Changes and enhancements coming to the SigWx



PIREP Submit

Initial section required. Refer to PIREP info in [FAA 7110](#).

UA (routine report) UUA (URGENT report)

/OV Use location
Reporting station: SLC

/TM Current time
4 digits in UTC (e.g. 0915, 2330)

/FL Unknown
3 digits in hundreds of feet MSL
 Climb Level Descent

/TP Unknown
4 characters max (e.g. C210, P3)

/SK - Sky Condition

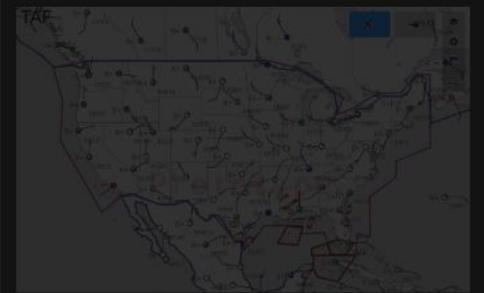
/WX - Weather and Visibility

/TA - Air Temperature

/WV - Winds

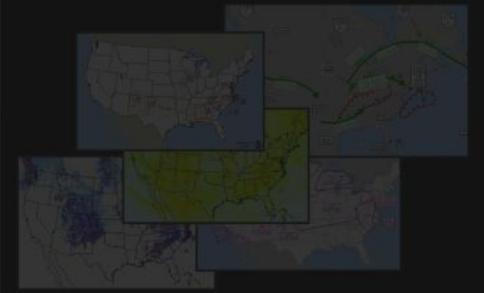
Encode Close

Graphical Forecasts for Aviation



Interactive maps of aviation forecasts and observations

Decision Support Imagery



Static DSS Images to embed in briefing material

Station data

IDs:

Raw Decoded Remember

Where is...?

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- Radar, satellite, METARs, and other current data on the [observation map](#)



Flexible Options
Customize your display! Maps can be set to display



PIREP Submit

/SK - Sky Condition

BKN - broken 5/8 to 7/8

Bases: 3 digit altitude in hundreds of feet
MSL. Leave section blank if the altitude is not known. Report variable ceilings in the Remarks section.

Tops:

Multiple Layers

/WX - Weather and Visibility

/TA - Air Temperature

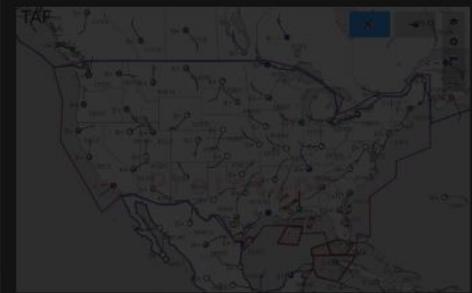
/WV - Winds

/TB - Turbulence

/IC - Icing

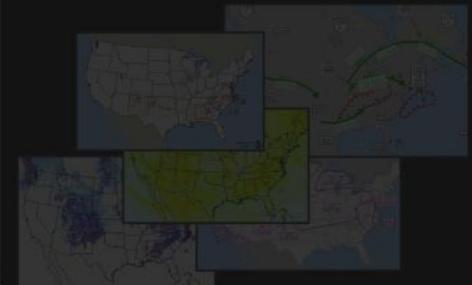
/RM

Graphical Forecasts for Aviation



Interactive maps of aviation forecasts and observations

Decision Support Imagery



Static DSS Images to embed in briefing material

Station data

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Raw Decoded Remember

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- Radar, satellite, METARs, and other current data on the [observation map](#)



PIREP Entry Results



The encoded PIREP should read as follows:

SLC UA /OV TCH270009/TM 0043/FL 190/TP A320/SK BKN063-
TOP092/WX FV03SM SHRA/TA M12/WV 28568KT/TB LGT-
MOD CHOP CONS 110-220/IC LGT RIME 190-110/RM AWC-
WEB=

If this is correct click **SUBMIT**, otherwise click **BACK**

Submit

Back



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“THE” Anatomy of a “PIREP”

WHAT ARE THE BASICS ON PIREPS

7110.10

Chapter 8

FAA Weather Services

1. Ceilings at or below 5,000 feet.
2. Visibility reported on the surface or aloft is five miles or less.
3. Thunderstorms and related phenomenon.
4. Turbulence of moderate degree or greater.
5. Icing of light degree or greater.
6. Wind shear.
7. Braking action reports less than good.
8. Volcanic eruption, ash clouds, and/or detection of sulfur gases in the cabin: hydrogen sulfide (H_2S) or sulfur dioxide (SO_2).
9. If only H_2S or SO_2 is reported with no reported volcanic ash clouds, ask the pilot if volcanic ash clouds are in the vicinity.
10. The smell of sulfur gases in the cockpit may indicate volcanic activity that has not yet been detected or reported and/or possible entry into an ash-bearing cloud. H_2S , also known as sewer gas, has the odor of rotten eggs. SO_2 is identifiable as the sharp, acrid odor of a freshly struck match.
11. https://www.faa.gov/air_traffic/publications/atpubs/fs_html/chap8_section_1.html



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PIREPs

Solicit and disseminate PIREPs when requested, deemed necessary or any of the following conditions exists or is forecast for your area of jurisdiction:

- Ceilings** AT OR BELOW **5,000'****
- Visibility:** AT OR LESS THAN **5 miles**
- Turbulence:** AT A LEVEL OF **MODERATE OR GREATER**
- Icing** OF **LIGHT DEGREE OR GREATER**

YOUR ICING PIREP MUST INCLUDE:

- Icing type and intensity
- Air temperature in which icing is occurring

****Must include cloud bases, tops and cloud coverage when available. When providing approach control services, ensure that at least one descent/climb-out PIREP and other related phenomena is obtained each hour.**

**SOLICIT AND DISSEMINATE
PIREPs**

TAKE A
STAND FOR
SAFETY



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PIREPs

Solicit and disseminate PIREPs when requested, deemed necessary or any of the following conditions exists or is forecast for your area of jurisdiction:

- **WIND SHEAR**
- **VOLCANIC ASH CLOUDS**
- **BRAKING ACTION REPORTS**
- **DETECTION OF SULFUR GASES ASSOCIATED WITH VOLCANIC ACTIVITY**

AND

Thunderstorms and Related Phenomena

RECORD WITH THE PIREPs:

TIME **TYPE** **POSITION** **ALTITUDE**

**SOLICIT AND DISSEMINATE
PIREPs**

TAKE A
STAND FOR
SAFETY

PIREP FORM

Pilot Weather Report

3-Letter SA Identifier

UA →

Routine Report

UUA →

Urgent Report

→ = Space Symbol

| | |
|---|--|
| 2. /OV → | Location: CDC350022 |
| 3. /TM → | Time: 1800Z |
| 4. /FL → | Altitude/Flight Level: 190 |
| 5. /TP → | Aircraft Type: CRJ7 |
| <i>Items 1 through 5 are mandatory for all PIREPs</i> | |
| 6. /SK → | Sky Cover: SCT090-BKN130-FEW 190 |
| 7. /WX → | Flight Visibility and Weather: 2SM -SN |
| 8. /TA → | Temperature (Celsius): M13 |
| 9. /WV → | Wind: 27069 |
| 10. /TB → | Turbulence: CONS INTMT LGT-MOD |
| 11. /IC → | Icing: MOD RIME 130-190 |
| 12. /RM → | Remarks: DURD DURC LLWS MTW |



WMO Header Information

| | | | |
|------------|------------|------------|--------------|
| TT* | AA* | ii* | CCCC* |
| UA | US | 10 | KAIS |

Pilot Weather Report

| | |
|--|--|
| METAR (SA Identifier)* | KSLC |
| 1. Message Type* | <input checked="" type="radio"/> UA <input type="radio"/> UUA |
| 2. /OV* (Location) | KSLC180030 |
| 3. /TM* (Time: HHMM) | 1200 |
| 4. /FL* (Altitude/Flight Level) | 360 |
| 5. /TP* (Aircraft Type) | B748 |
| 6. /SK (Sky Cover) | BKN078-SCT110 |
| 7. /WX (Visibility and Weather) | 2SM -RA |
| 8. /TA (Temperature: Celsius) | M25 |
| 9. /WV (Wind) | 180025 |
| 10. /TB (Turbulence) | LGT-MOD CONS MOD 430 |
| 11. /IC (Icing) | MOD RIME |
| 12. /RM (Remarks) | DURD/DURC LLWS MTW |





“THE” Anatomy of a “PIREP”

How the PIREP helps

The National Weather Service and the FAA

PIREPS help other pilots anticipate atmospheric conditions, most notably icing and turbulence. For commercial aviation, these reports can help air traffic staff guide aircraft through areas of less turbulence or icing. How do your PIREPS help NWS forecasters?

A single PIREP can influence a weather forecaster's decision to issue (or discontinue) a hazardous weather advisory, such as an AIRMET or a SIGMET, and/or amend its area. Weather researchers use PIREPs to improve the accuracy of global forecast models and turbulence and icing weather advisory products.



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“THE” Anatomy of a “PIREP”

FIRST REMEMBER THIS:

Remember that the PIREP format is 'who, where, when, and what.' Tip: Not all items are required—you can give a PIREP with only one item! Any and all information is helpful!



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“THE” Anatomy of a “PIREP”

SECOND REMEMBER THIS:

AIRMET and SIGMET weather advisories are issued to warn pilots of potentially hazardous weather conditions they might encounter while flying.

AIRMETs consist of turbulence, visibility, and icing-related warnings that are less severe than those in a SIGMET.



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“THE” Anatomy of a “PIREP”

LASTLY REMEMBER THIS:

When must ATC solicit PIREPs?

ATC is required to ask for PIREPs when the following conditions are reported or forecast:

- Ceilings at or below 5,000 feet.
- Visibility at or below five statute miles (surface or aloft)
- Thunderstorms and related phenomena.

Airboss - Joe Johnston - 2014 Wendover Airshow

Photo by William Douglas McDaniel



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“THE” Anatomy of a “PIREP”

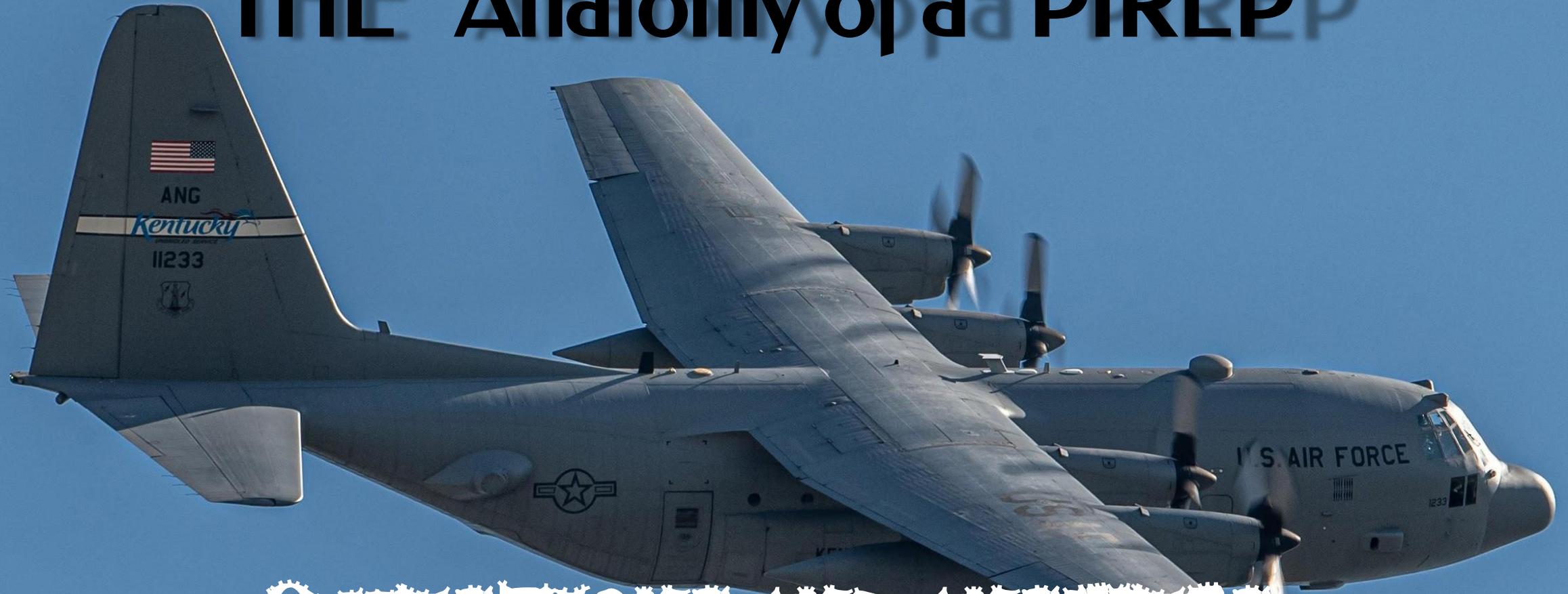


12. Help US help YOU!



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“THE” Anatomy of a “PIREP”



QUESTIONS AND ANSWERS
GENERAL DISCUSSION



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