

# Turbulence and the General Aviation Pilot

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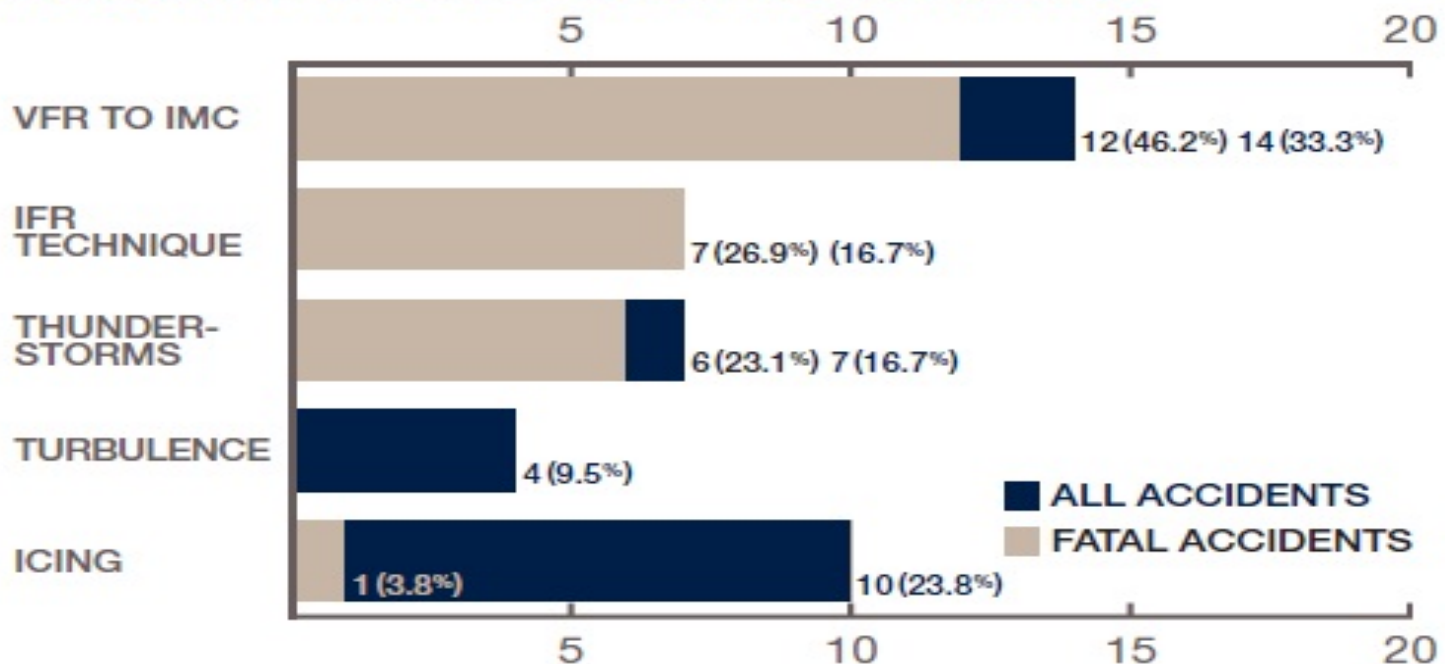
# Did you know?

- **We have learned over the years that weather is one of the weakest areas for general aviation pilots**
  - information needs to be easy to interpret, no Met. Degree needed
- **You can take the private pilot exam and fail all of the weather questions and still pass**



- Per the 2010 Joseph T. Nall report of accident trends and factors, four accidents were attributed to turbulence outside thunderstorm encounters, and everyone on board survived

FIGURE 19 : TYPES OF WEATHER ACCIDENTS



# The Importance of a Weather Briefing

- **Weather briefings and forecasts can provide plenty of clues regarding the likelihood of encountering turbulence.**
- **Receiving a weather briefing not only fulfills the regulatory preflight action requirement, but it can also help you anticipate turbulence prior to receiving PIREPs.**



# Case Study



## Non-convective Turbulence

February 10, 2005

Cessna 210– Lebec, CA

**Note: a Cessna 210 is a six seat, single engine, high performance, retractable-gear general aviation aircraft**

- The 2,000-hour commercial pilot and one passenger departed VFR from Fresno at 7:15 p.m., then obtained an IFR clearance to Santa Monica.
- There is no record of the pilot having obtained a weather briefing.





# Cessna 210





- At 8:26 he reported light rime icing at 9,000 feet and inquired about PIREPs of icing along his route
- At 8:30 the pilot requested a descent and was told he was below the sector's minimum vectoring altitude. Five seconds later he reported extreme turbulence, after which radio communications were lost
- The wreckage was later found on a wooded hillside at an elevation of 2,300 feet msl, the condition of the wreckage suggested a near-vertical descent
- The accident was blamed on a loss of control due to the flight's encounter with un-forecasted mountain wave activity that caused severe to potentially extreme turbulence and downdrafts.





- **At the time of the accident, there were no SIGMETs in effect for turbulence.**
- **An AIRMET Tango warned only of occasional moderate turbulence below 12,000 feet. However, upper-air sounding data showed “several layers of strong vertical wind shear that increased the likelihood of very strong turbulence” and conditions favoring localized mountain wave activity with the potential to cause moderate to severe turbulence, and downdrafts in excess of 1,500 feet per minute.**







- The pilot of a Gulfstream IV reported “unusually strong and unusually varied kinds of turbulence with movement up and down, as well as lateral displacement” while descending in the vicinity of the accident site, and further stated that “flight in any general aviation aircraft in those conditions would be extremely hazardous.”



# The Importance of PIREPs

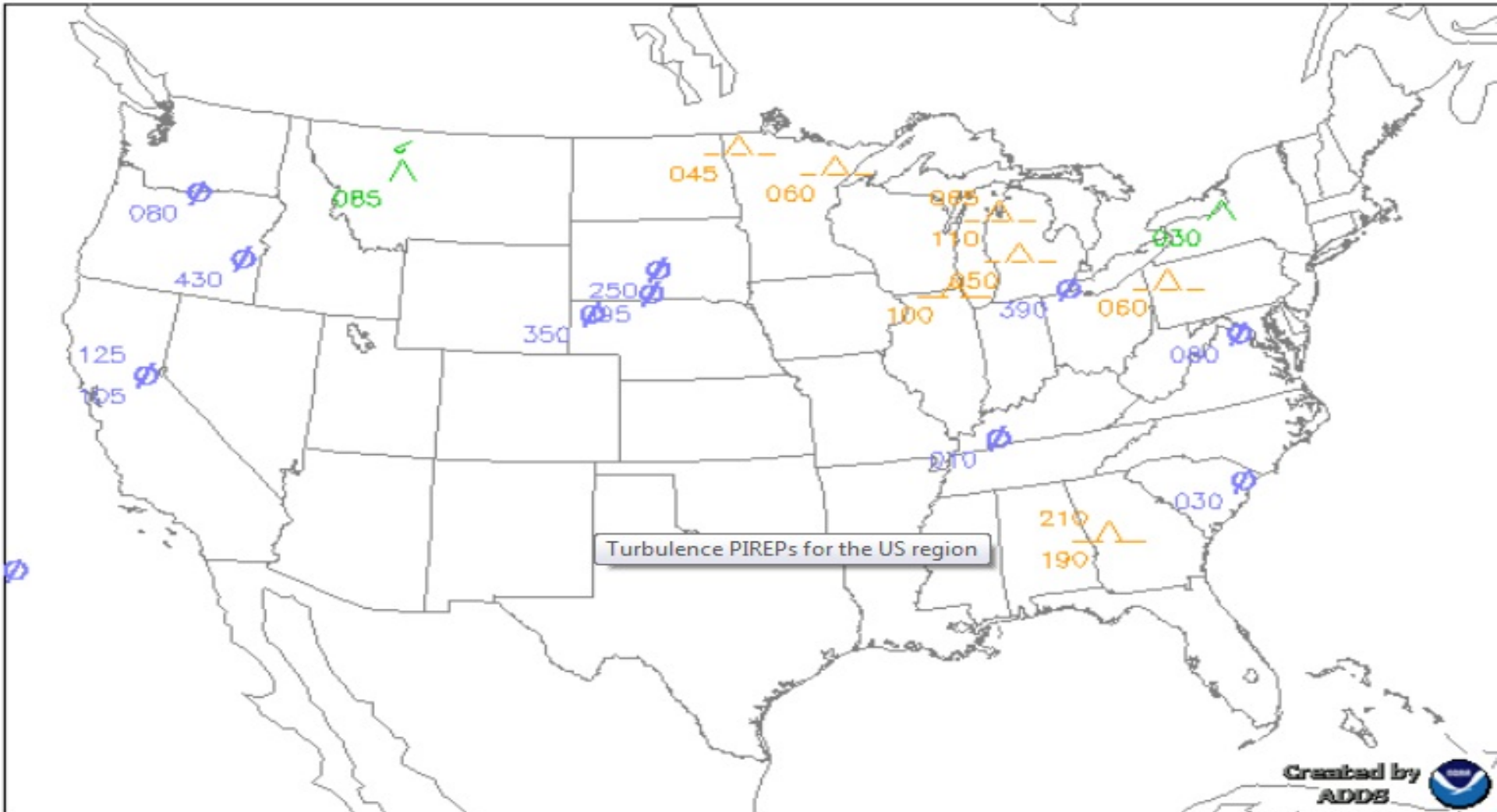


- **PIREPs that accurately describe the character and degree of turbulence the pilot encounters is critical**
  - It is very important GA pilots are educated about types of turbulence so they can report correctly
- **Over-reporting turbulence intensity**
  - Guidance in the Aeronautical Information Manual, section 7-1-23, PIREPS relating to turbulence assists GA pilots in understanding how to categorize what they are experiencing



# Pilot Reports (PIREPs) of Turbulence

1748z - 1856z 08/15/13



TB FREQUENCY:

⊕ = ISOLATED

⊖ = INTERMITTENT

⊖ = CONTINUOUS

⊕ NEG

△ LGT

△ MOD

△ SEV

--- SMOOTH-LGT

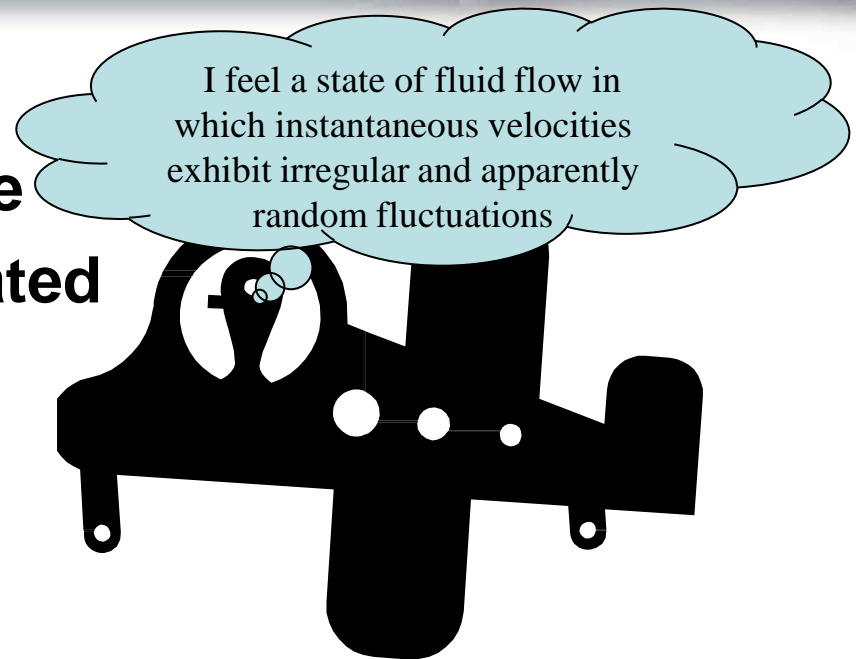
△ LGT-MOD

△ MOD-SEV

△ EXTRM

# Educating GA Pilots About Turbulence

- It is critical that pilots understand types of turbulence so they are able to make educated decisions about their flight
- AOPAs Air Safety Institute offers interactive learning as a tool



Not sure what type of turbulence to report? (Drag the description on the right to its corresponding item on the left.)

Light

Momentary slight, erratic changes in attitude and/or altitude.

Moderate

Changes in attitude and/or altitude, but the aircraft remains in positive control.

Severe

Large, abrupt changes in attitude and/or altitude.

Extreme

Aircraft is violently tossed about and is nearly impossible to control.

