

# Aviation Weather Guide TURBULENCE



Aircraft turbulence occurs when air motion is irregular because of a rapid change in speed and/or direction.

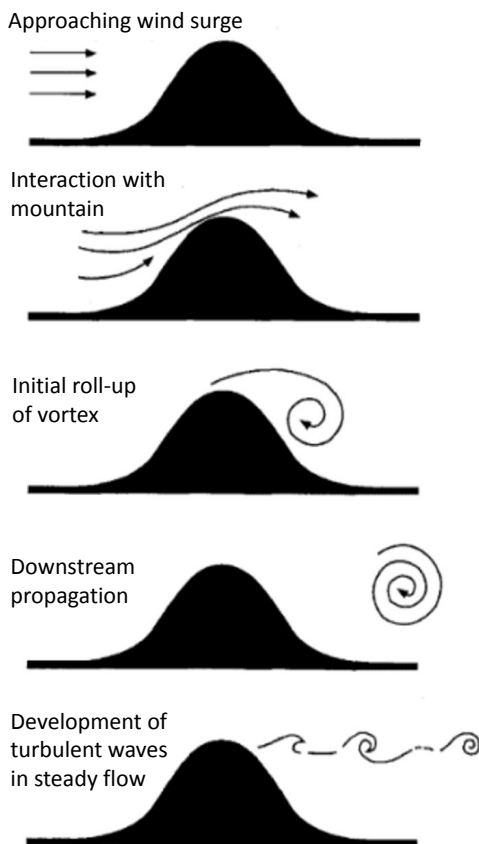
## TURBULENCE INTENSITY CLASSIFICATION

- ▲ **LIGHT** - Minor changes in altitude/attitude
- ▲ **LIGHT-MODERATE**
- ▲ **MODERATE** - More intense rapid bumps and changes in altitude/attitude; positive aircraft control is maintained
- ▲ **MODERATE-SEVERE**
- ▲ **SEVERE** - Intense and abrupt changes in altitude/attitude and variations in airspeed; temporary loss of aircraft control
- ▲ **EXTREME** - Aircraft is violently displaced and is impossible to control; may cause structural damage



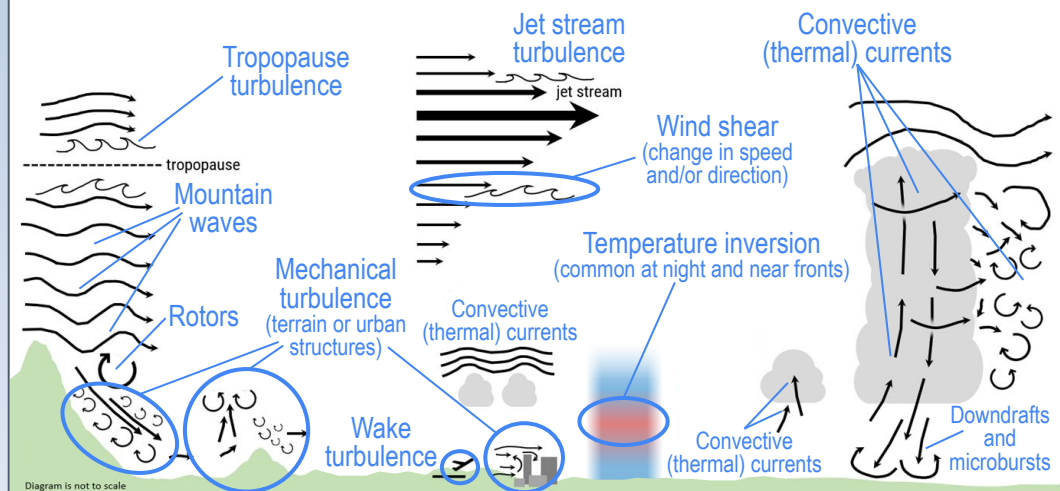
Clouds associated with mountain wave turbulence. Note the evenly spaced "stripes" of clouds and clear air located downstream of the mountain. This cloud pattern reveals locations of upward (cloud) and downward (clear air) motions.

## EVOLUTION OF MOUNTAIN WAVE TURBULENCE

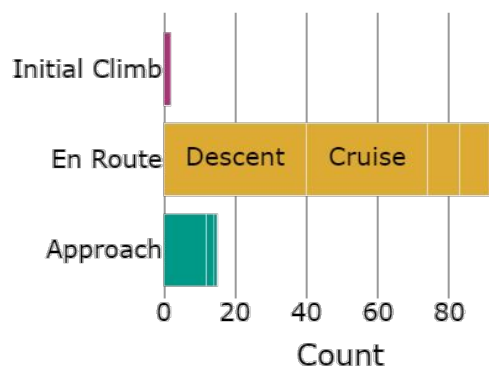


Modified from Bedard, 1993

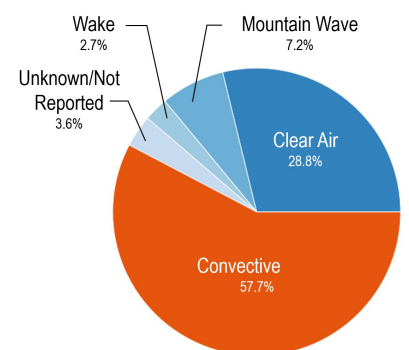
## SOURCES OF TURBULENCE



## TURBULENCE ACCIDENTS BY PHASE OF FLIGHT



## TURBULENCE ACCIDENTS BY TYPE OF TURBULENCE



Adapted from NTSB

## PRE-FLIGHT (MISSION PLANNING)

- ✈ Check the latest pilot reports along your route
- ✈ Check turbulence forecasts along your route and for the hours leading up to your planned departure.
- ✈ Check for G-AIRMETs & SIGMETs along your route. G-AIRMETs show areas where moderate turbulence is likely. SIGMETs show areas where severe turbulence is likely.
- ✈ Consider adjusting departure/arrival times. Low-level turbulence can be more frequent in the afternoon, especially in the summer.

## IN-FLIGHT (SITUATIONAL AWARENESS)

- ✈ Stay away from thunderstorms! Turbulence may occur thousands of feet above a storm and tens of miles away from a storm.
- ✈ Stay alert! **Clear Air Turbulence (CAT)** may occur *without warning*
- ✈ Be aware of wind shear, especially near thunderstorms, fronts, and during overnight/early morning hours.
- ✈ Be cautious near mountains! Strong wind perpendicular to the ridgetop may cause mountain waves (see diagram on other side).



**WE WANT  
YOUR  
PIREPS**

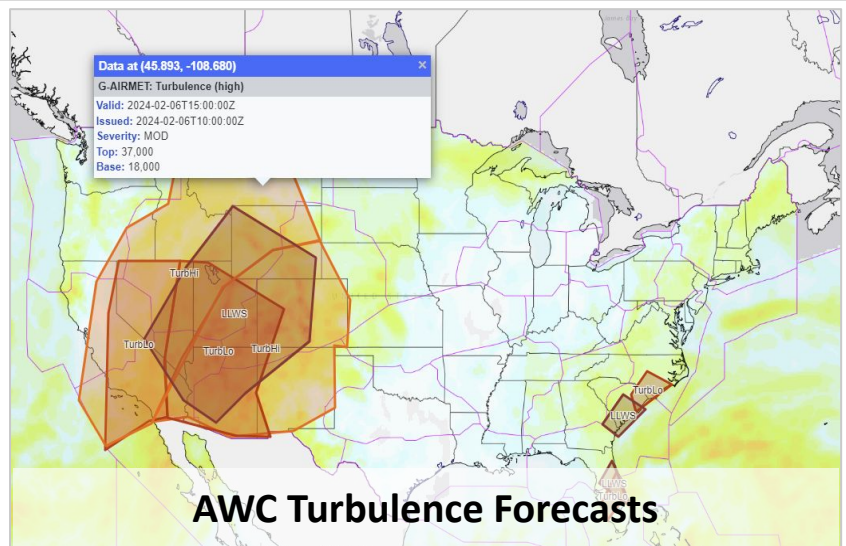
Help meteorologists make better, more accurate forecasts and assist other pilots in the airspace.

Submit PIREPS on the AWC webpage.  
(account and airman certificate # required)

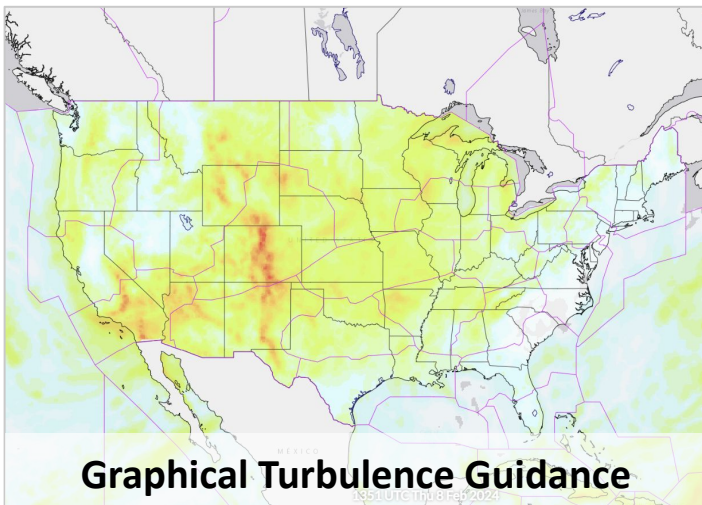
## Aviation Weather Center (AWC) Turbulence Forecast Products

**SIGMETs, G-AIRMETs, Low-Level Forecast Product (Includes mod or greater turbulence forecasts at 12 & 24 hrs from issuance)**

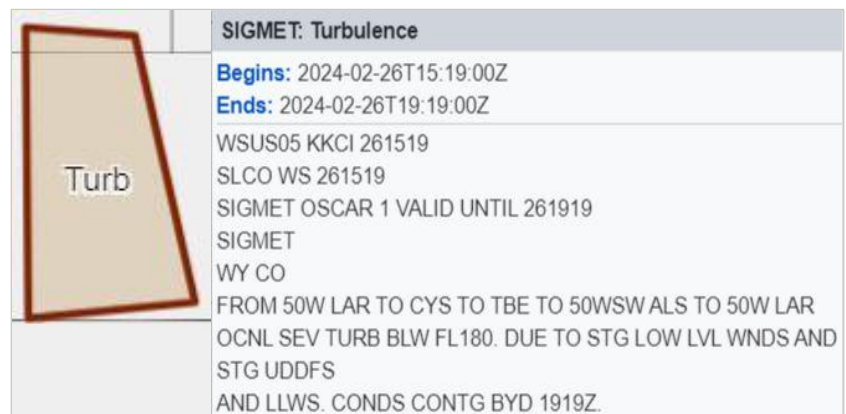
- ✈ High-Level Turbulence > FL180
- ✈ Low-Level Turbulence < FL180
- ✈ Low-Level Wind Shear
- ✈ Sustained Surface Winds > 30 knots



**AWC Turbulence Forecasts**



**Graphical Turbulence Guidance**



**Turbulence SIGMET**

**Turbulence forecast resources available at:**

**AviationWeather.gov**