

WINTER AVIATION HAZARDS

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WINTER SEASON ICING

Structural Icing

Definition: an accumulation of ice on aircraft structures in flight.



Types of Ice

Rime:

- **Rough, milky white appearance**
- **Follows contour of surface**

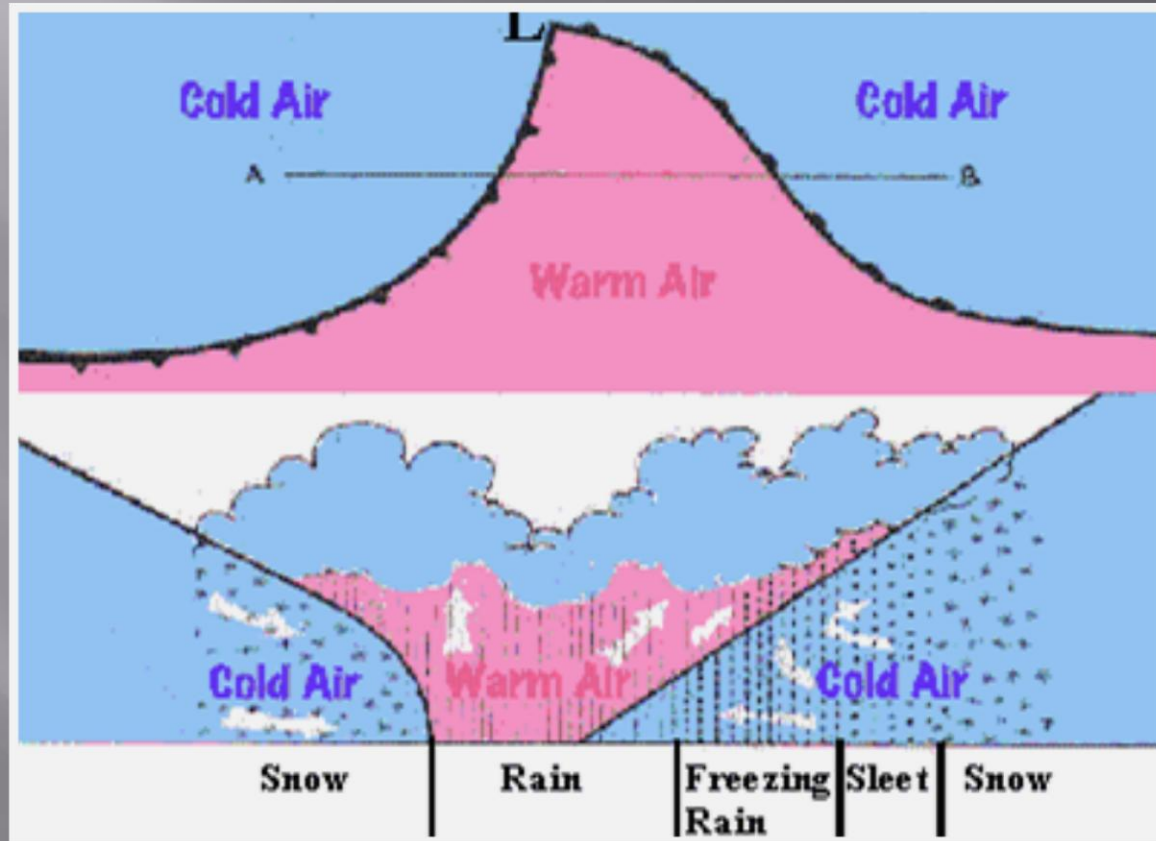
Clear (or glaze):

- **Smooth**
- **Air pockets result in lumpy, translucent appearance**

Mixed:

- **Combination of rime and clear ice.**

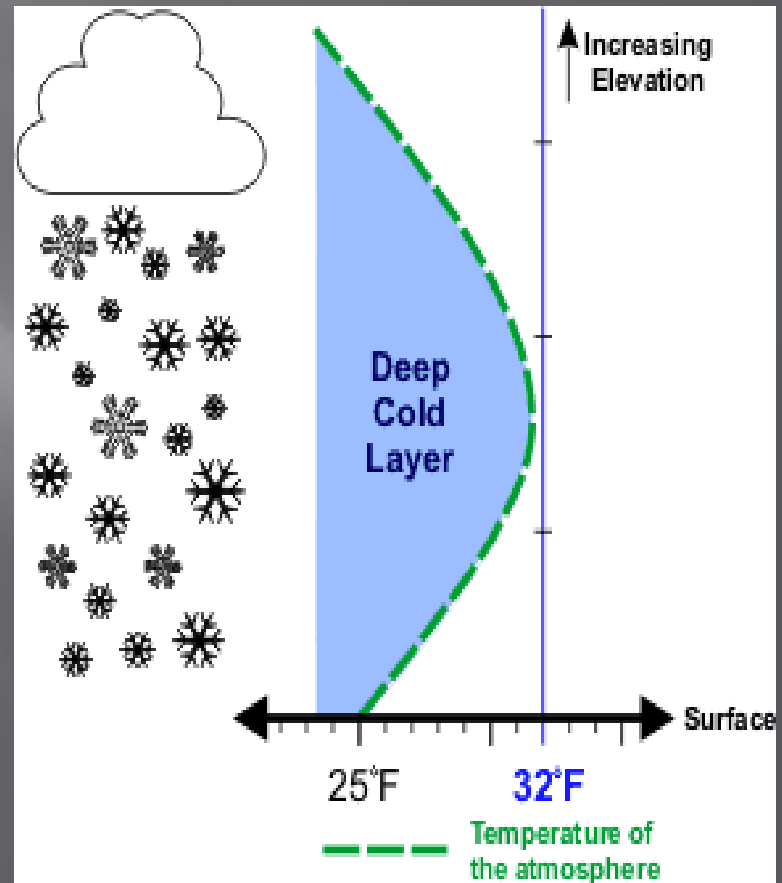
Bird's Eye and Profile of Winter Storm



Fronts and low pressure areas are the biggest ice producers.

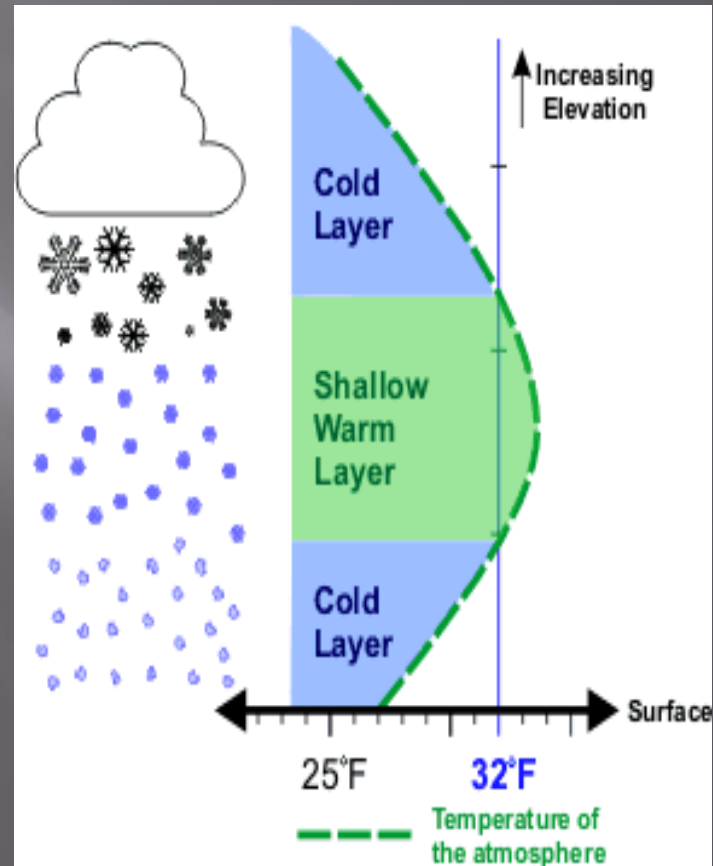
Snow

- Temperature remains below freezing throughout the column.
- Precipitation stays frozen from cloud to ground.



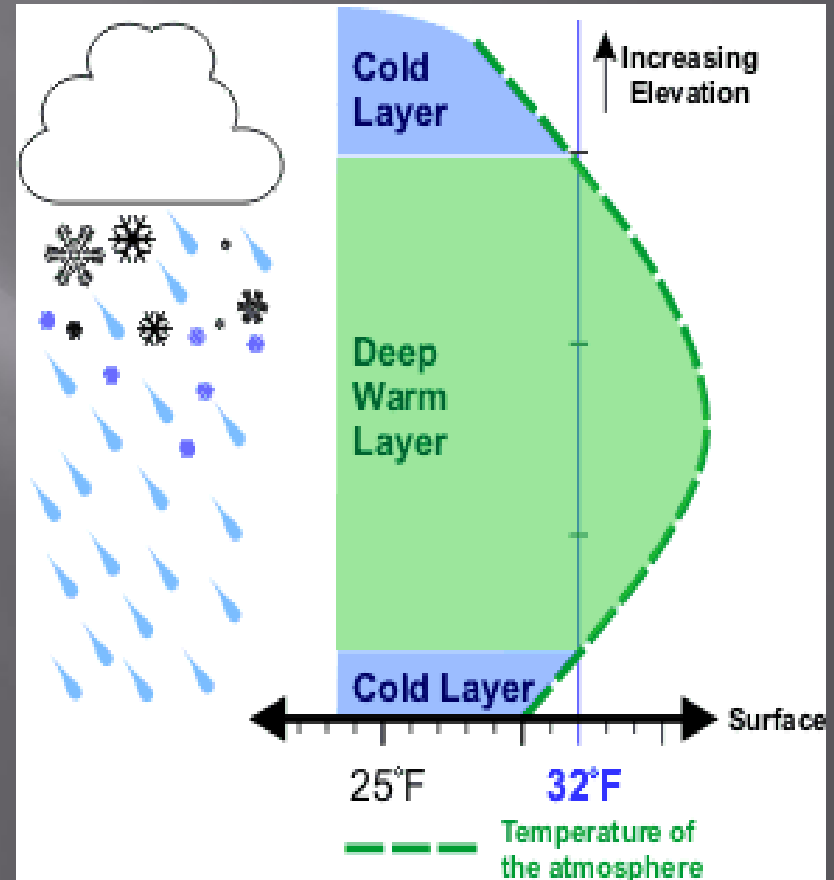
Sleet/Ice Pellets

- Shallow layer of warmer air above freezing temperatures at the surface.
- Snow melts partially in warm layer aloft, then refreezes at or near the surface.



Freezing Rain/Drizzle

- Deeper warm layer aloft above a shallow freezing layer at the surface.
- Snow melts into rain within warm layer.
- Rain doesn't freeze until it reaches the surface (or an object on the surface...like a plane!)

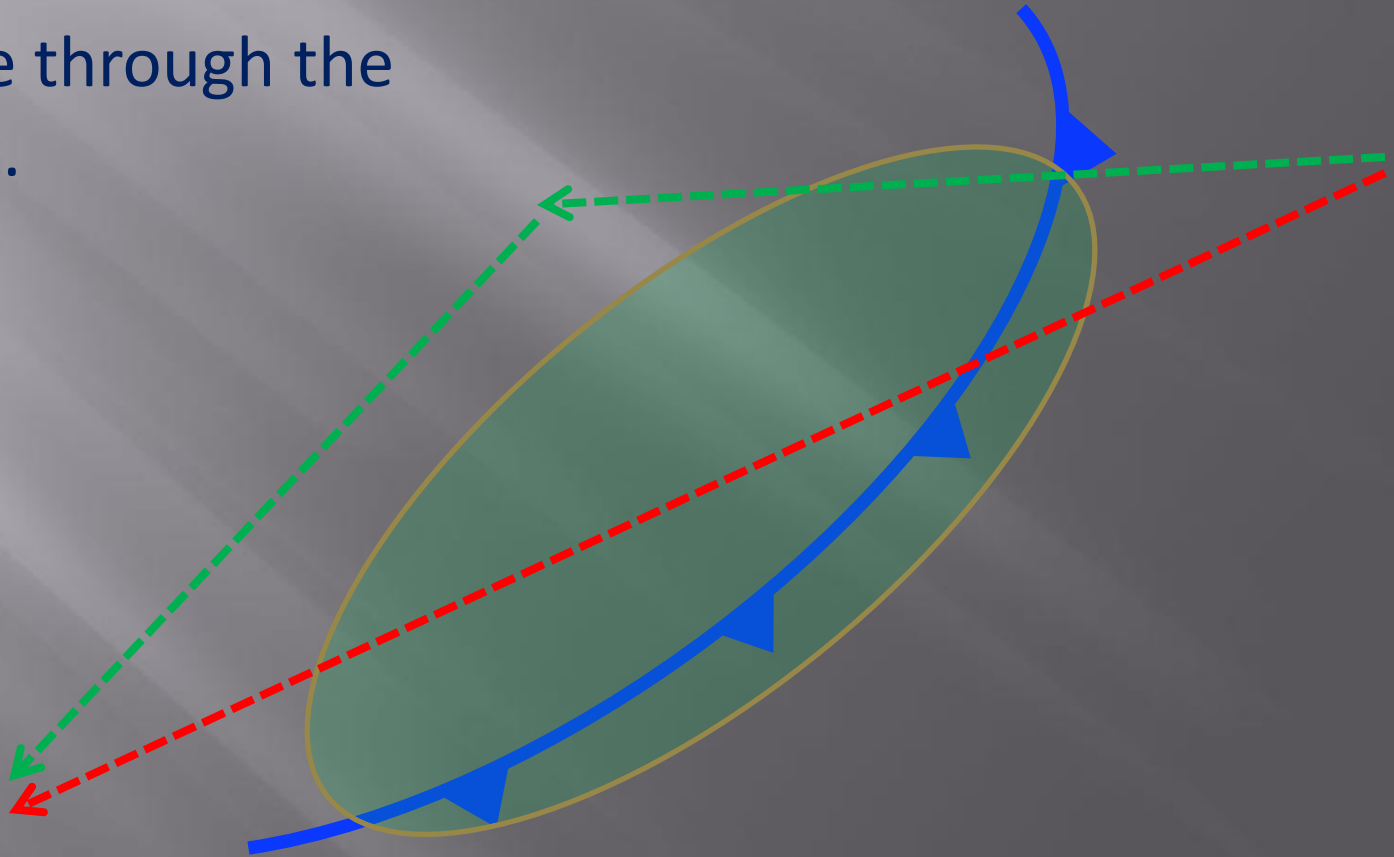


Impacts from Freezing Rain and Drizzle

- ❑ **Roughens large surface areas.**
- ❑ **Distorts airfoil shapes.**
- ❑ **Makes flight extremely dangerous or impossible in a few minutes.**
- ❑ **May develop aloft.**

Avoiding Ice Areas

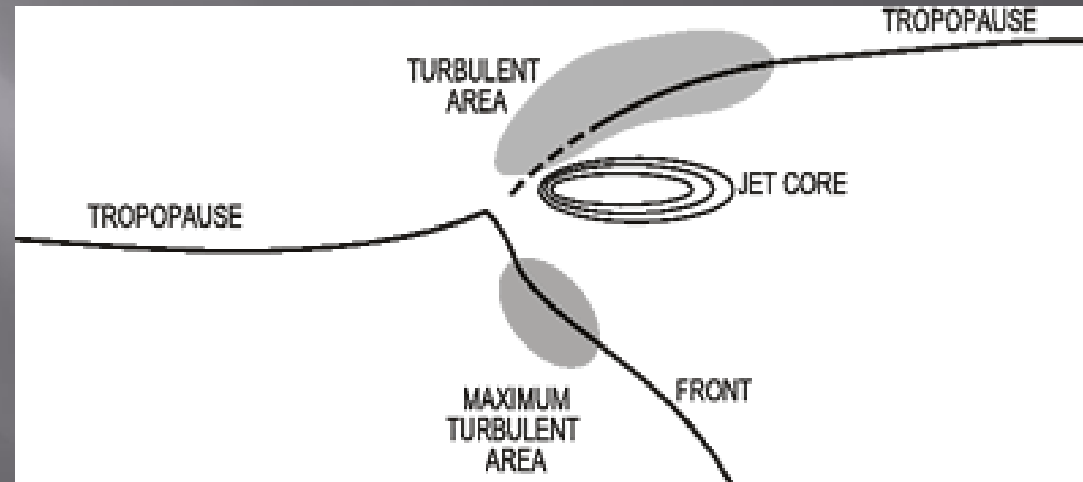
Fly the shortest route through the front.



CLEAR AIR TURBULENCE

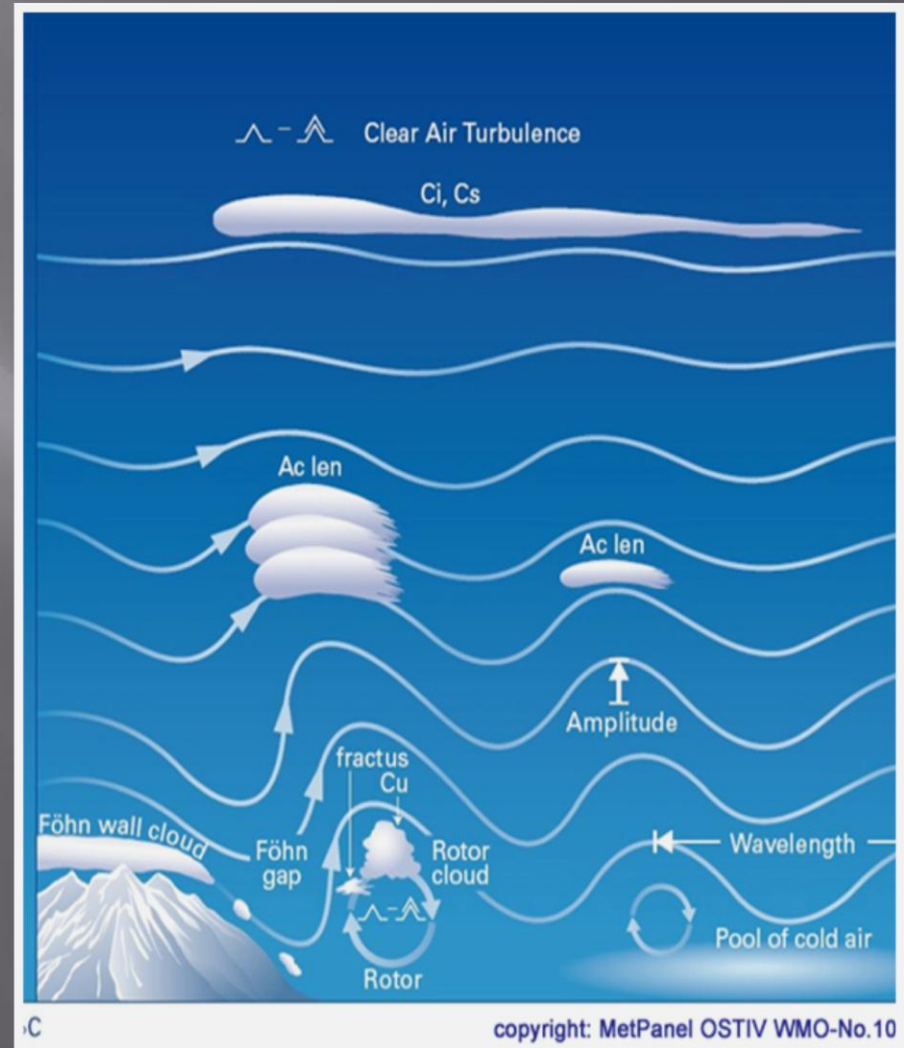
Turbulence Near Jet Stream/Streaks

- A “jet streak” is a maximum in velocity within a jet stream.
- The jet stream, essentially a ribbon or stream of fast-moving air, creates turbulent eddies within the slower-moving air surrounding it, much like the eddies along the banks of a creek or stream.
- Turbulence is likely near jet streams and streaks, especially beneath them.



Mountain Wave Turbulence

- Strong prevailing winds blowing orthogonal to higher elevations in a stable atmosphere will create waves in the “river” of air aloft.
- These atmospheric waves move up and down vertically in the lee of the topography, resulting in turbulence.
- Clouds form in rows along the ridgeline of the waves as the ascending air reaches the dewpoint at the peak of the wave, forming clouds.
- These standing wave clouds are easy to spot on satellite imagery.

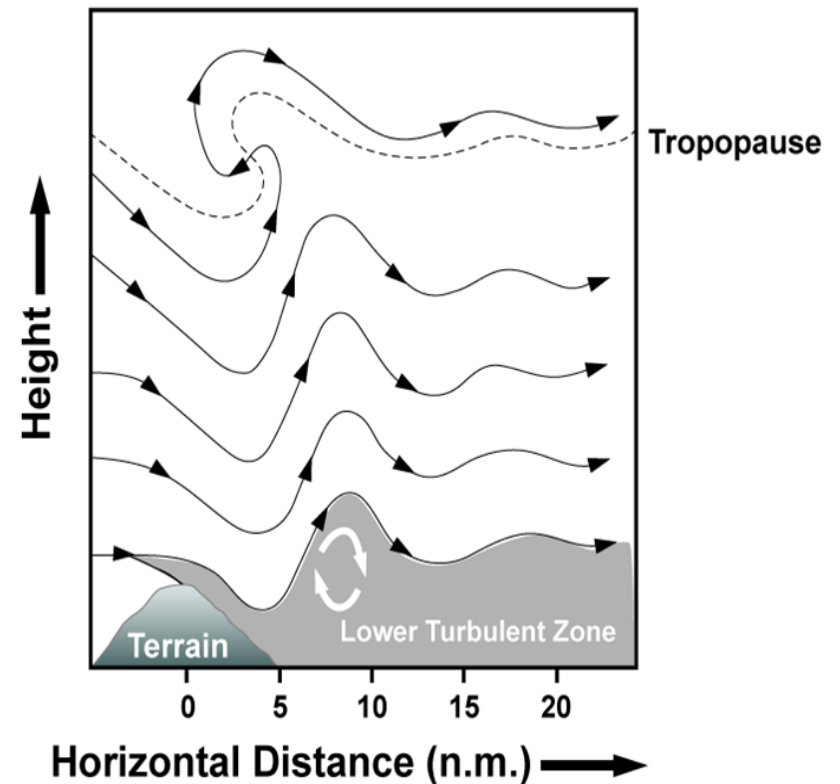




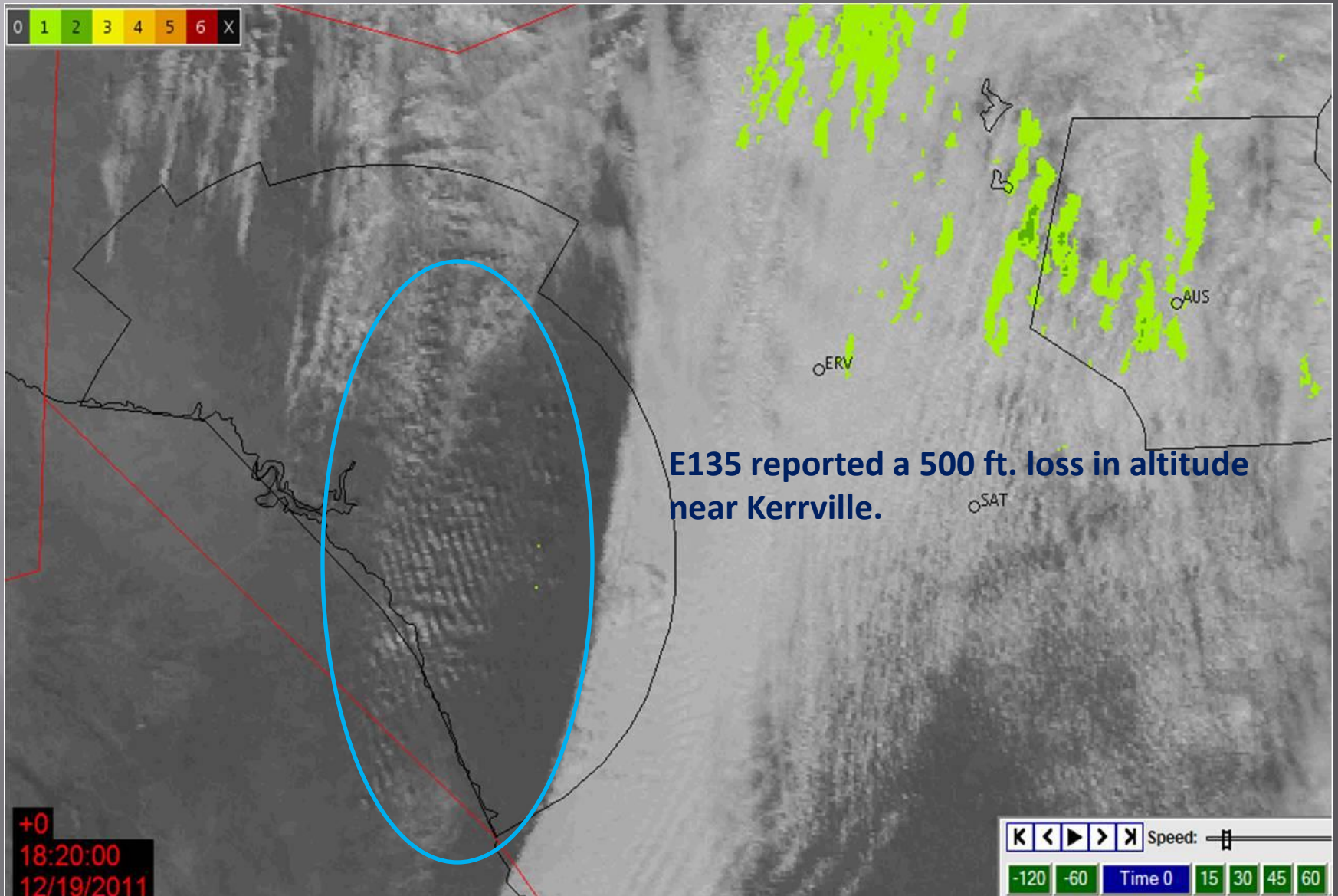
Mountain Wave Turbulence

- **Two favored areas for turbulence:**
 - Lower turbulent zone/rotor layer
 - Tropopause layer
- Effects can extend well beyond 100 miles of the topographical barrier.
- ZHU examples:
 - Davis Mountains
 - Serranias del Burro Range

Figure 5-1 Cross-Section of a Mountain Wave.



Example: December 19, 2011



Effects of Clear Air Turbulence

- **Loss/gain of altitude.**
- **Potential for aircraft stall.**
- **Aircraft damage.**
- **Injuries to passengers and crewmembers.**



Thank you for your time.



Let us know if you have any questions.