Satellite Applications in Delta Meteorology

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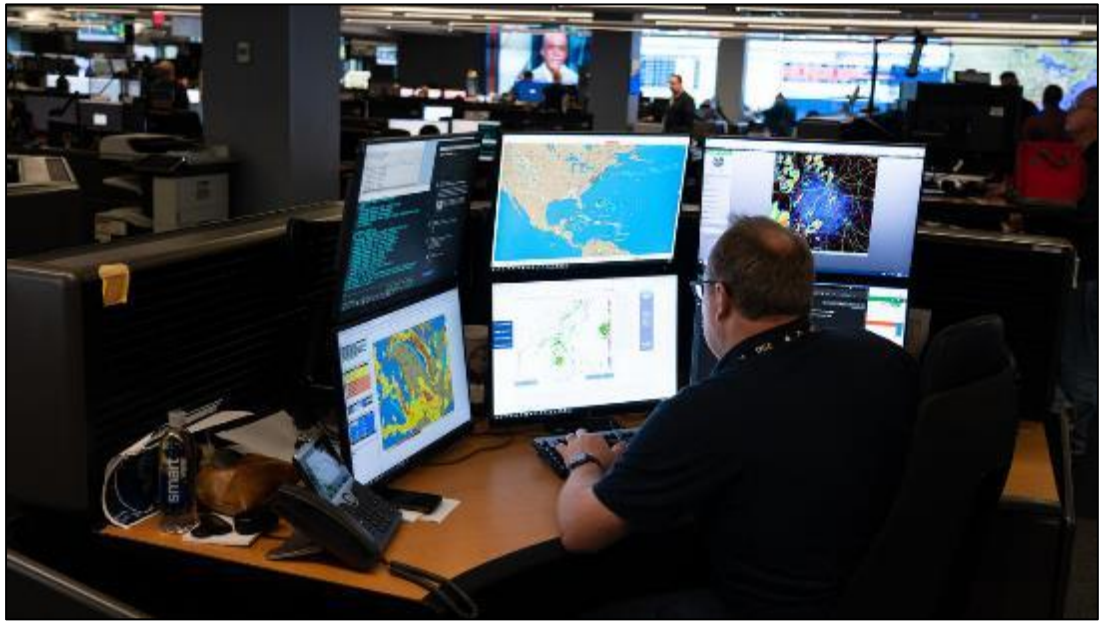
Delta Air Lines, Inc.

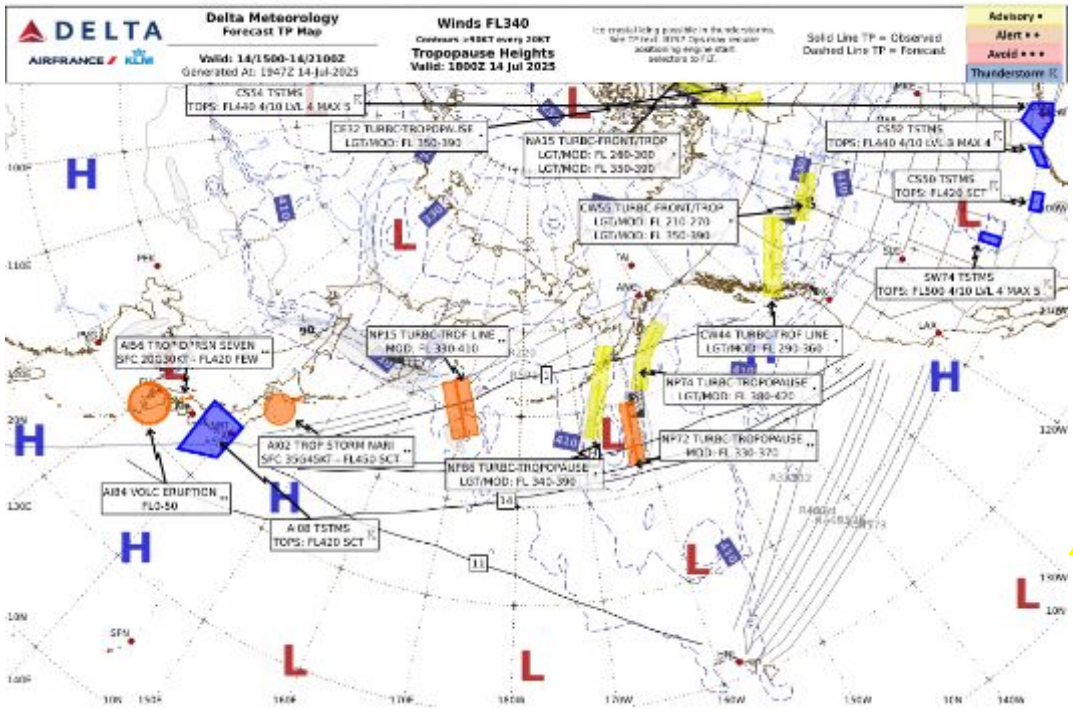


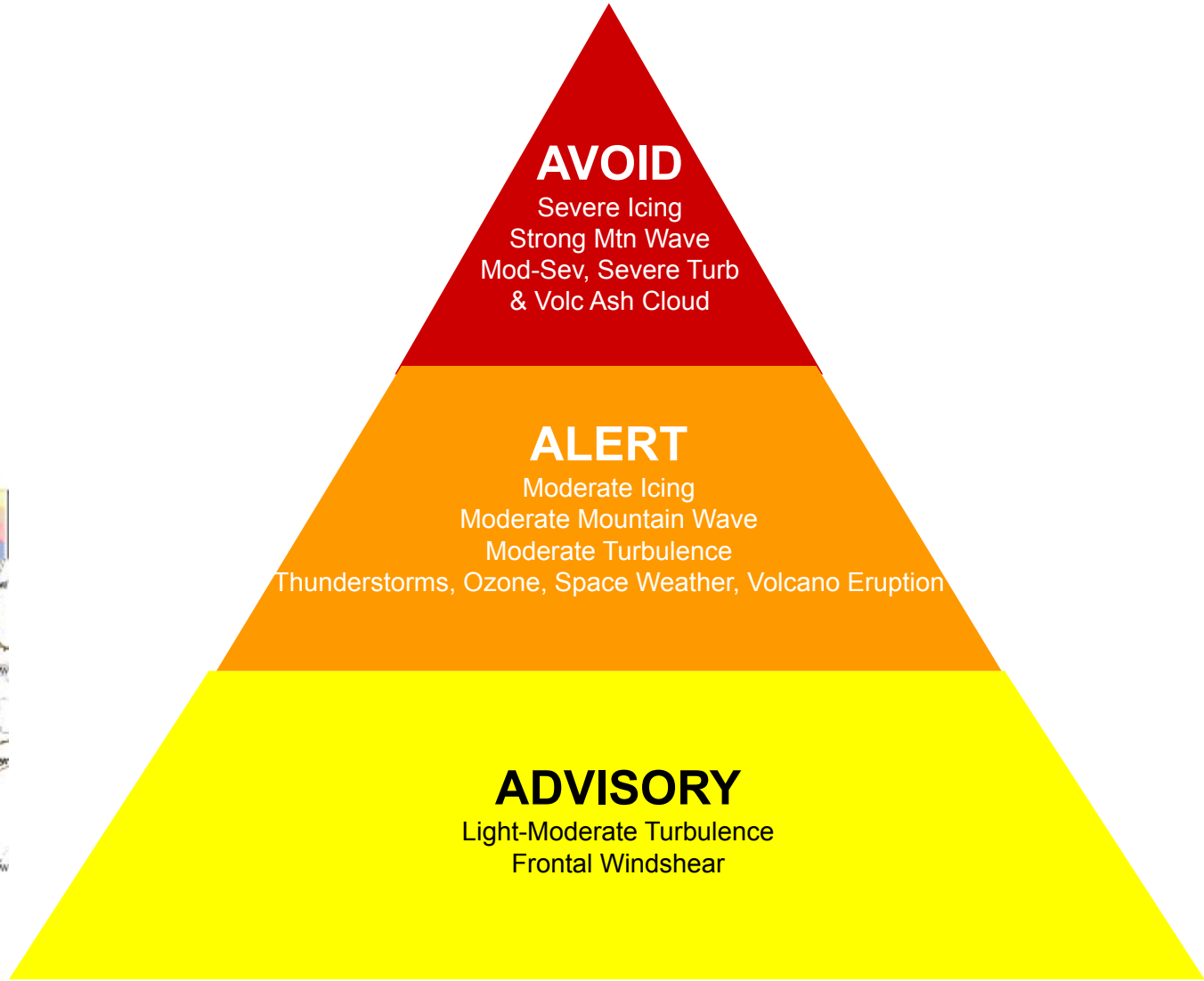
About Delta Meteorology

- 29 Meteorologists in the department
- 24/7 staffing and support
- Worldwide coverage:
  - 2 CONUS “surface” desks
  - 3 “upper-air” desks
    - CONUS/Canada/Latin and South America
    - Atlantic/Europe/Africa/Mid-East
    - Pacific/Asia/Alaska/Hawaii
- FAA approval allows us to overwrite gov’t products.

Upper-Air Meteorology

- Hazards are relayed through Threat Plots (TPs)
  - Turbulence
  - Thunderstorms
  - Volcanic Ash
  - Space Weather



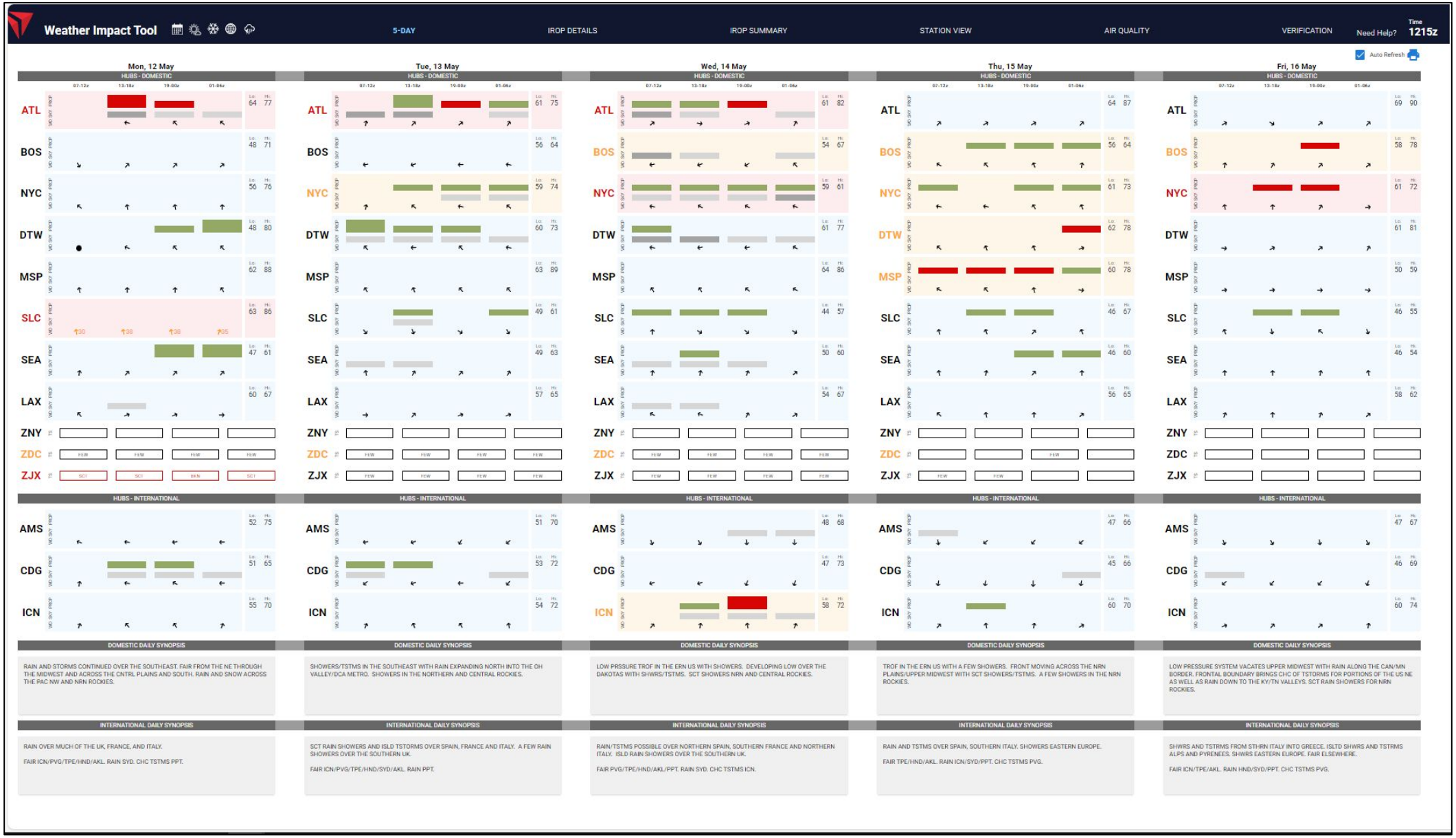


Surface Meteorology - TAFs

- Delta Terminal Aerodrome Forecasts (TAFs) are written 4 times per day for our 9 hubs.

- National Weather Service (NWS) TAFs are used for non-hubs
    - TAFs can be written by Delta Meteorology for non-hub stations upon request, domestically and internationally

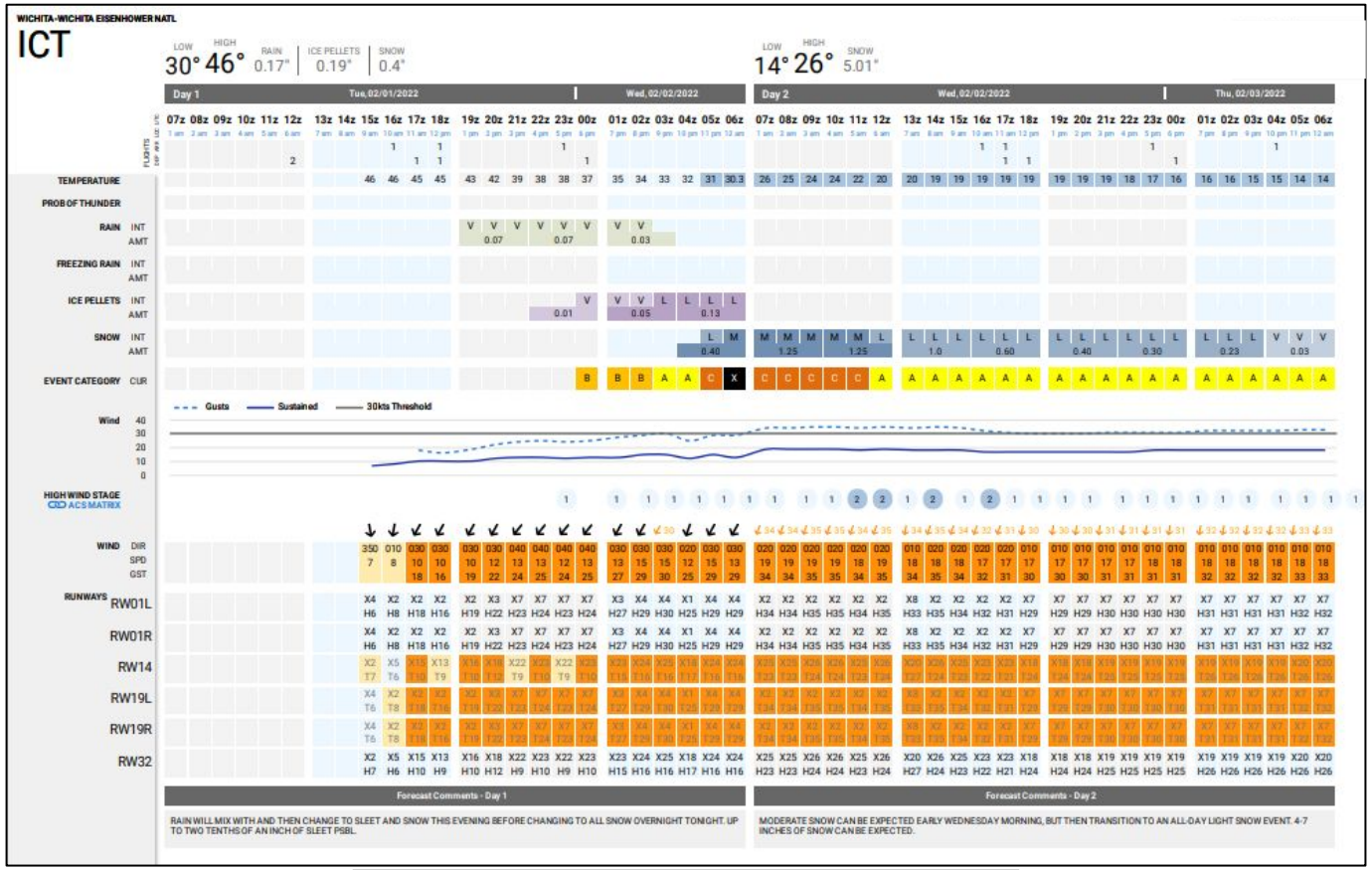
Surface Meteorology – Weather Impact Tool (WIT)

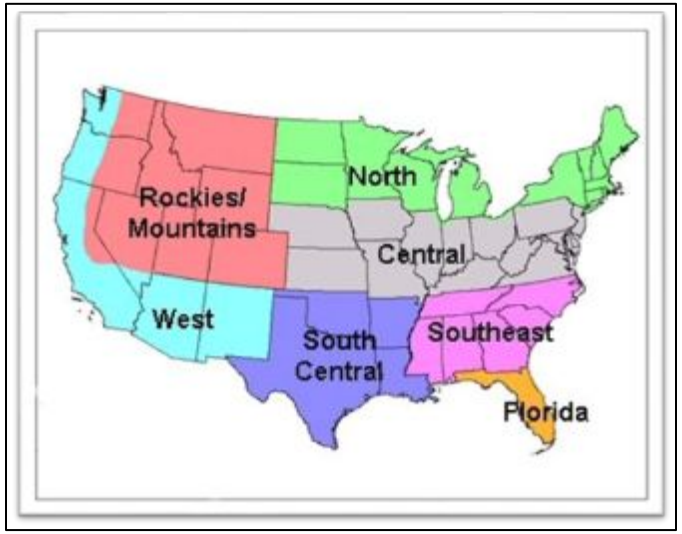


Surface Meteorology – IRregular OPerations (IROPs)

- Meteorologists issue hourly forecasts for any station reaching Weather IROP thresholds. This is common during large winter events or hurricanes.

- IROP thresholds:
  - Region-specific for snow
  - ANY ice pellets or freezing rain
  - Winds sustained >= 30kt or gusting >= 40kt



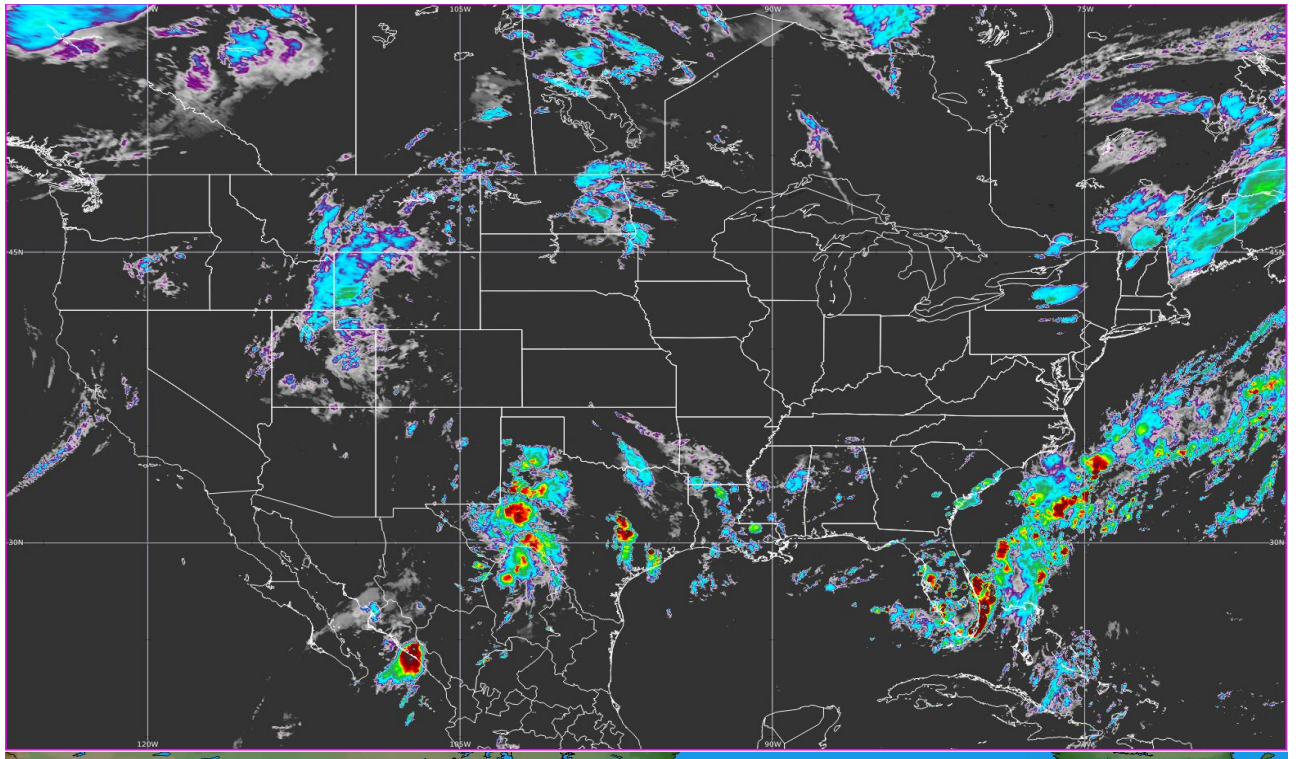


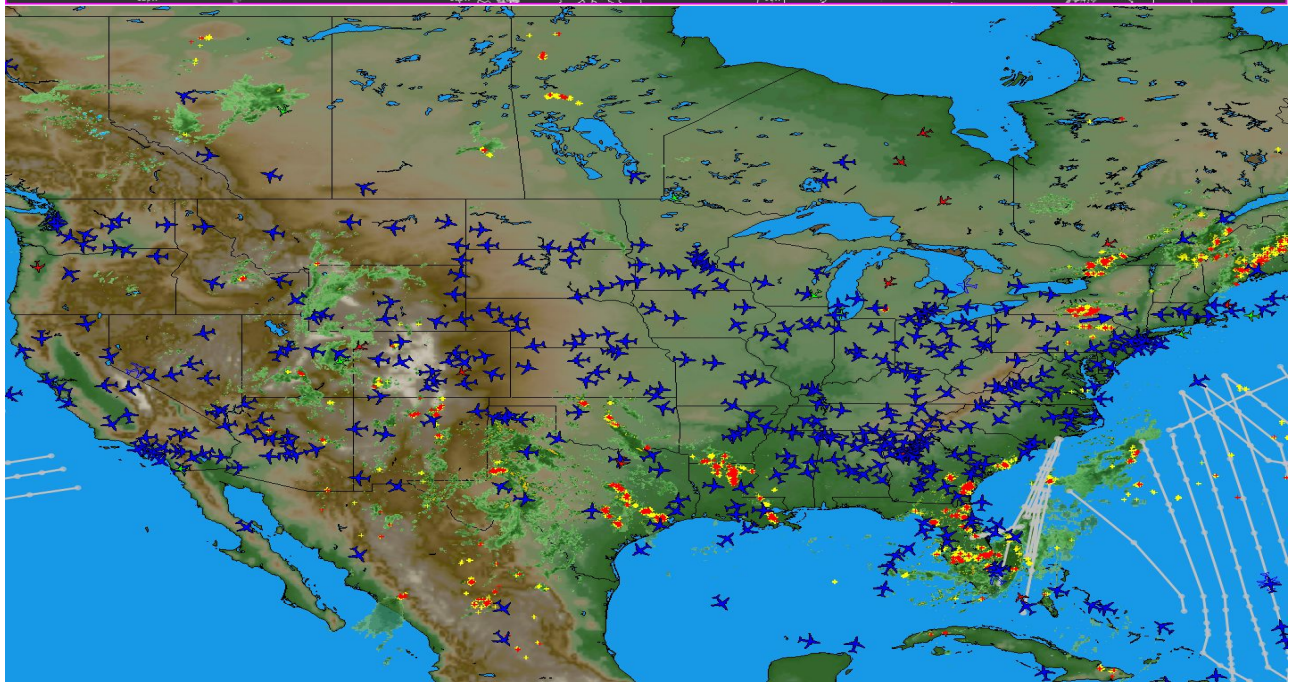
Satellite Applications for Aviation Hazards

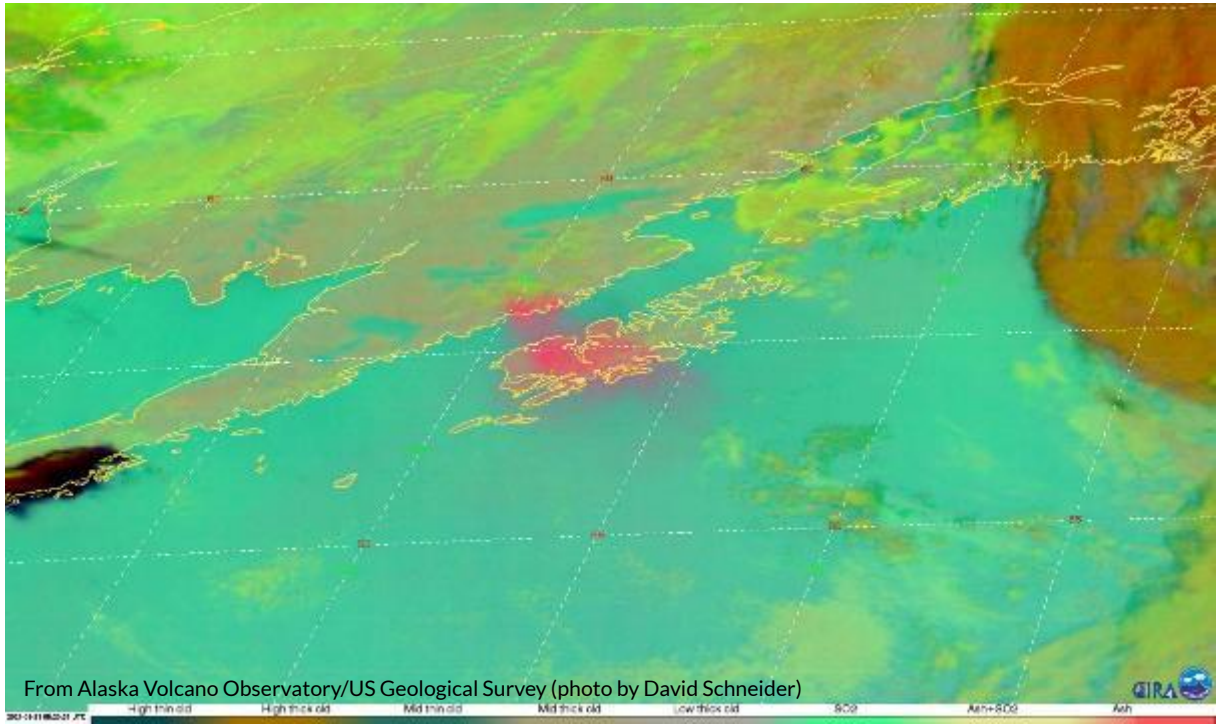
Thunderstorms

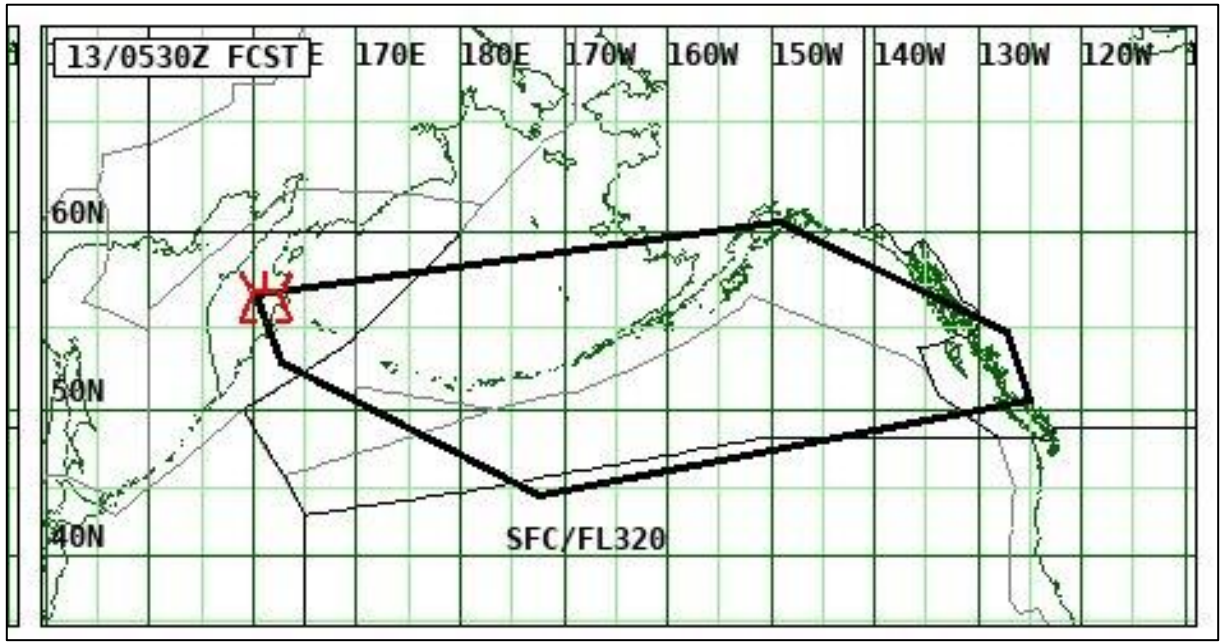
- Satellite is used to determine the vertical and areal extent of thunderstorms which can help with route and altitude avoidance.

- Geostationary Lightning Mapper.



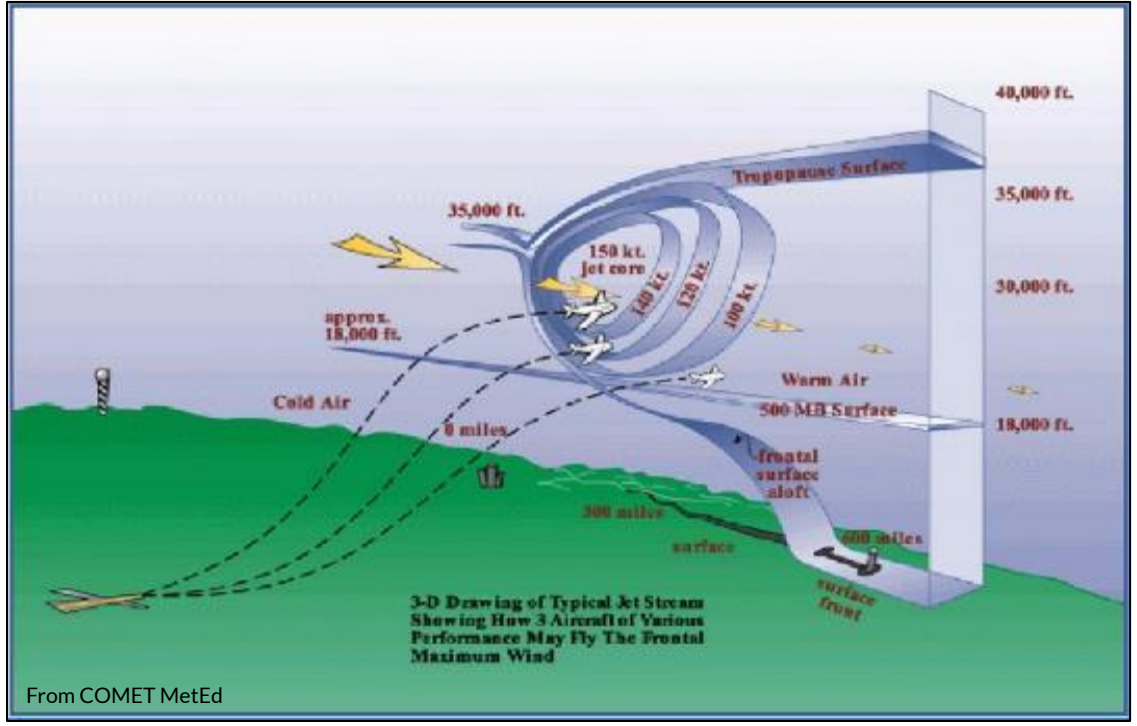






Volcanic Ash

- Volcanic ash is hazardous to aircraft.
- Satellite is used for real-time ash coverage for route and altitude avoidance.
- Approximation of eruption height.



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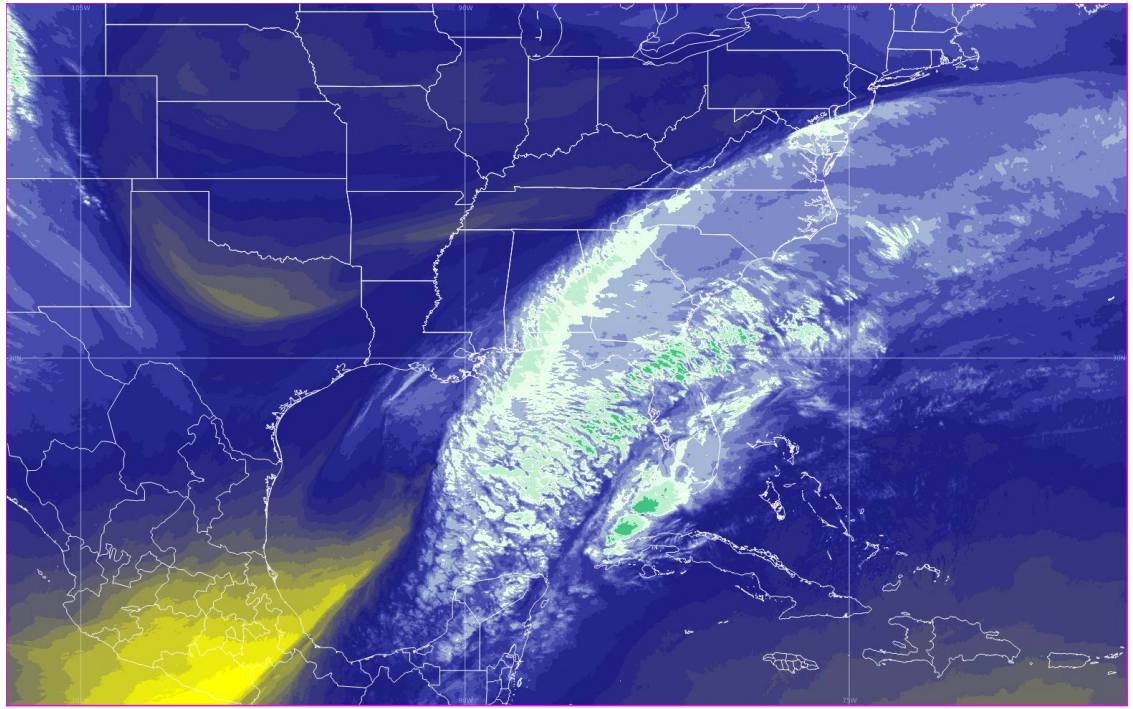


Jet Stream Turbulence

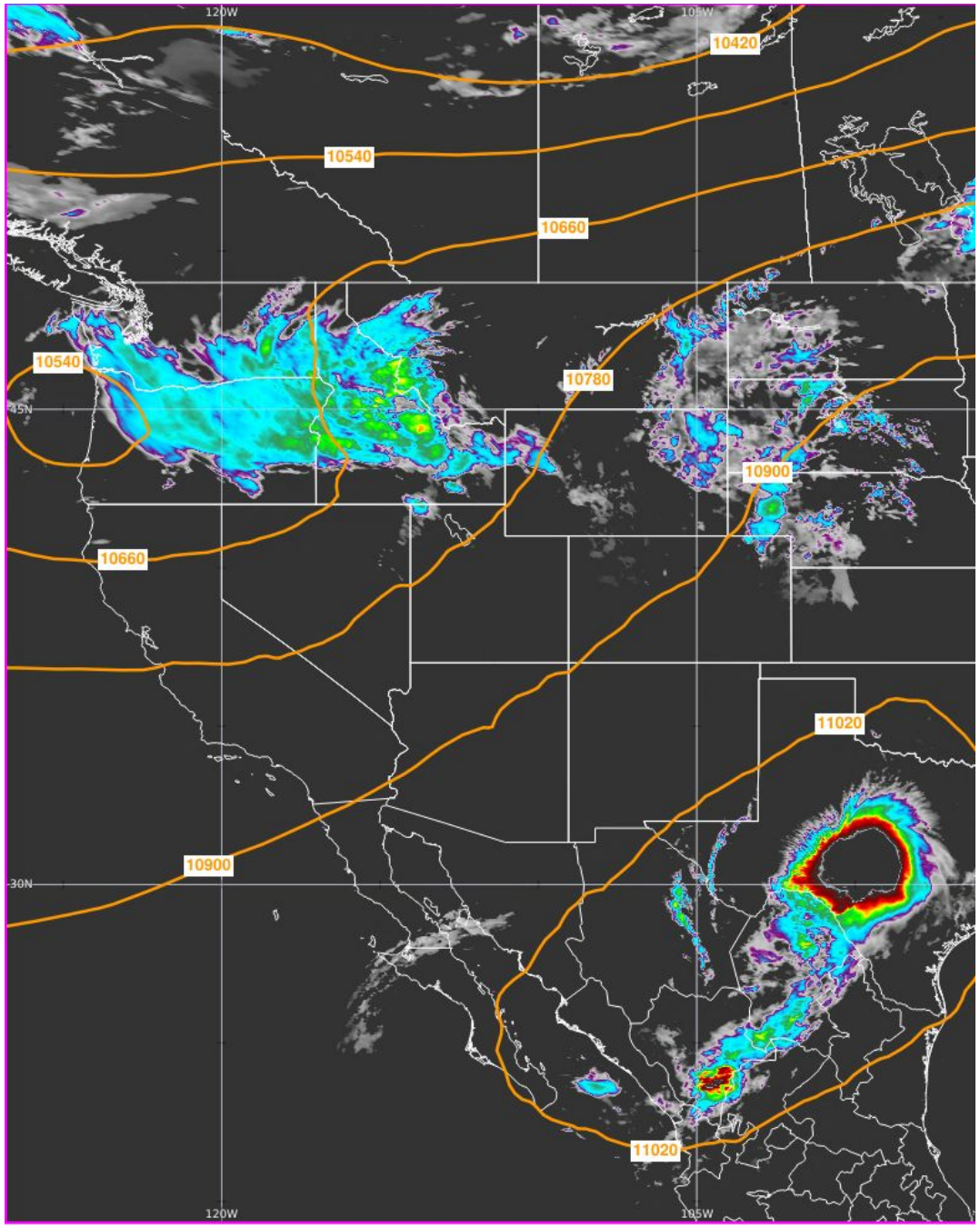
- Turbulence in the jet stream can be found both below and above the jet max.

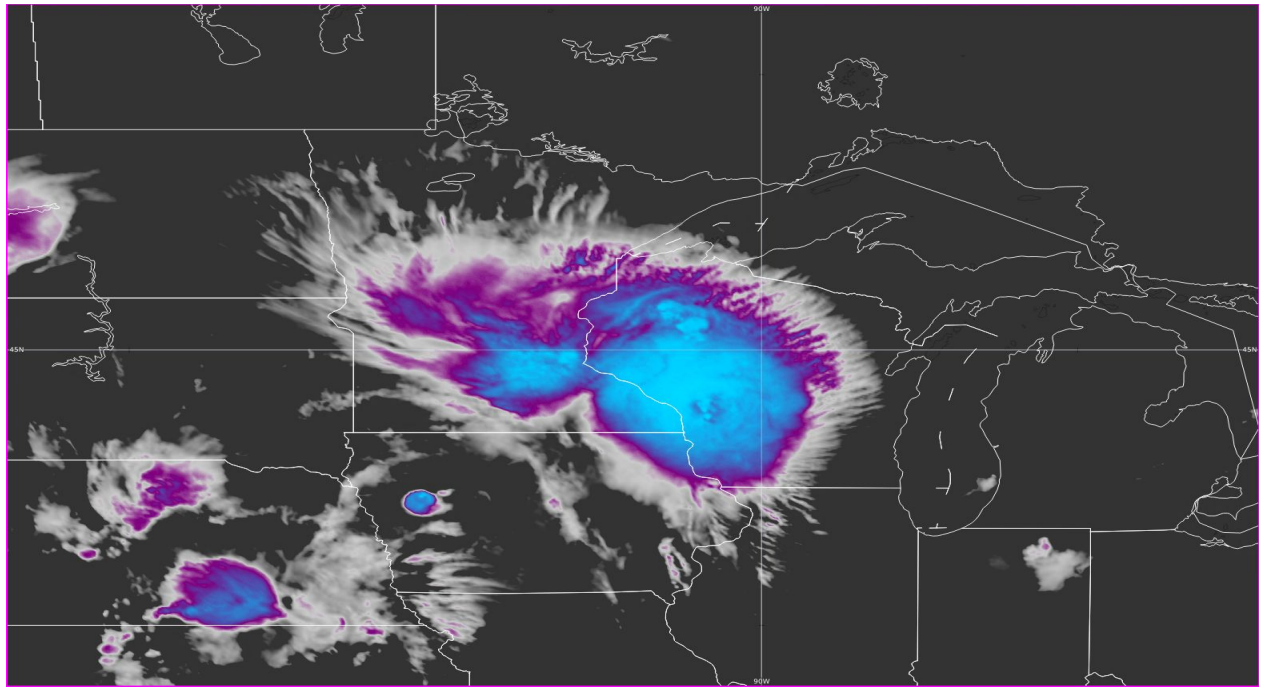
- Satellite is used to find areas showing sharp cloud bands along the warm side of the jet stream, which can be a proxy for turbulent areas.

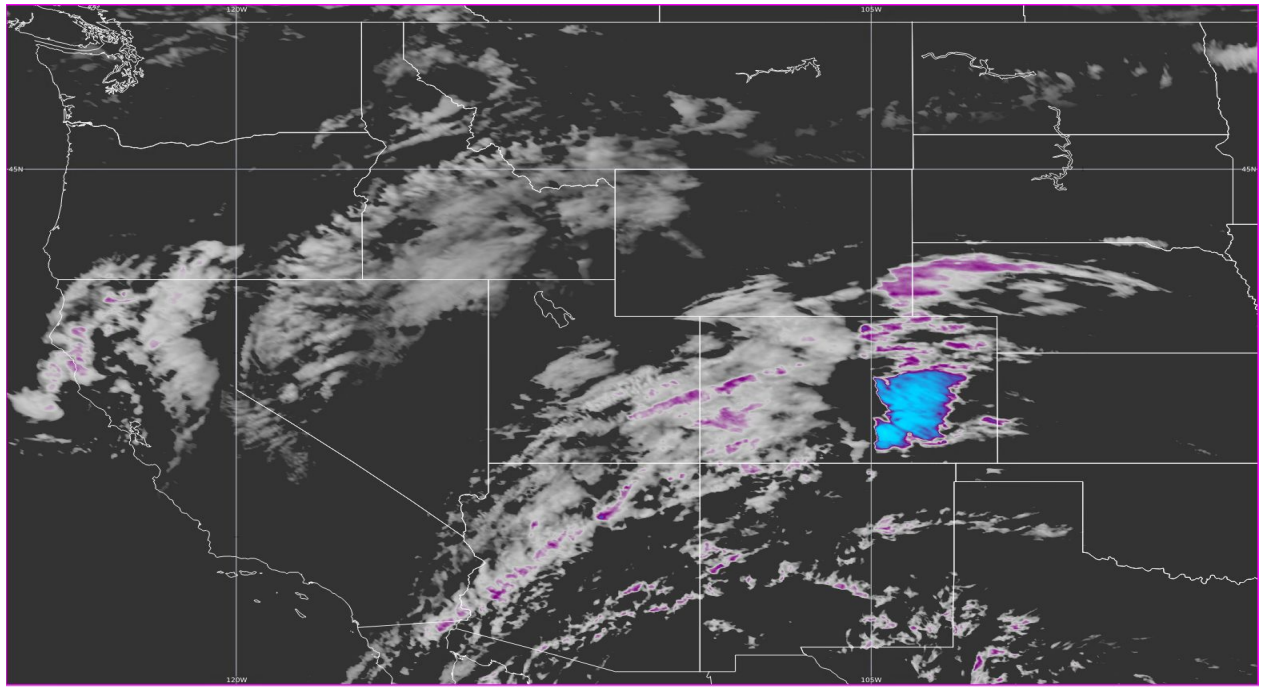
Trof Line and Convergence Turbulence

- Turbulence is common in trof lines and convergence due to associated shear.

- Satellite is used to find areas of convergence or trough lines where there is a significant areal change in moist vs dry air.







Transverse Banding and Mountain Wave Turbulence

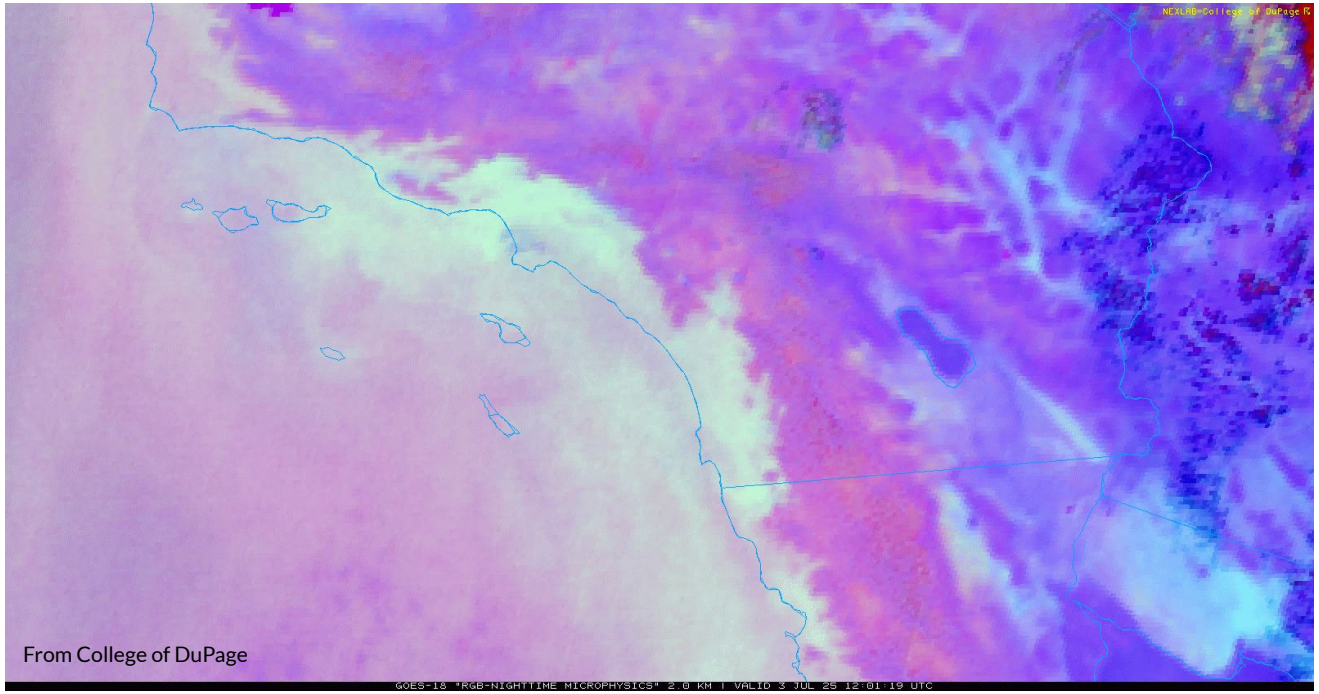
- Transverse banding turbulence is common in cloud areas near anticyclonic flow or jet maxes and can be seen on satellite with presence of banded cirrus clouds perpendicular to the flow.

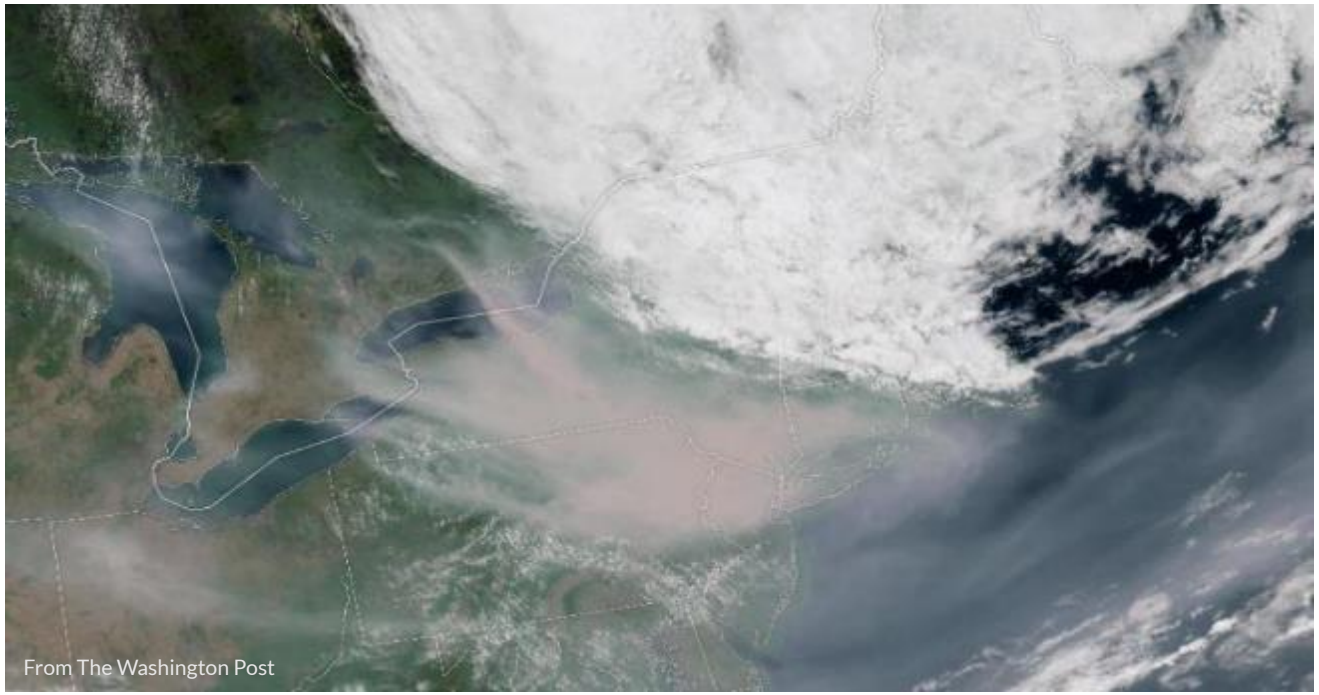
- Mountain waves and rotor can be seen on satellite with the presence of lenticular clouds or rotor clouds parallel to significant terrain.

Fog/Low Clouds and Air Quality

- Satellite is frequently used to see the movement and development or decay of low clouds or fog.

- Satellite is used to monitor air quality risks to crew and customers as well as workers outside.





Uses for Accident Documentation

- Delta Meteorology collaborates with Delta safety teams for severe turbulence analyses and turbulence injuries to crew and/or customers.

- Satellite can be used to determine if turbulence would be meteorologically plausible, especially in unique cases.

Applicable Features on GeoXO Sounder

- The possibility of a Sounder on GeoXO would help with forecasts and analyses in the aviation sector.
- More frequent and better examination of:
  - Turbulent layers, especially in data sparse areas.
  - Fog/low clouds when obscured by higher cloud decks or in areas with limited surface observations.
  - Cloud top heights in thunderstorms for route or altitude avoidance.
  - Higher resolution vertical profiles for forecasts of surface hazards.

Thank you!

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