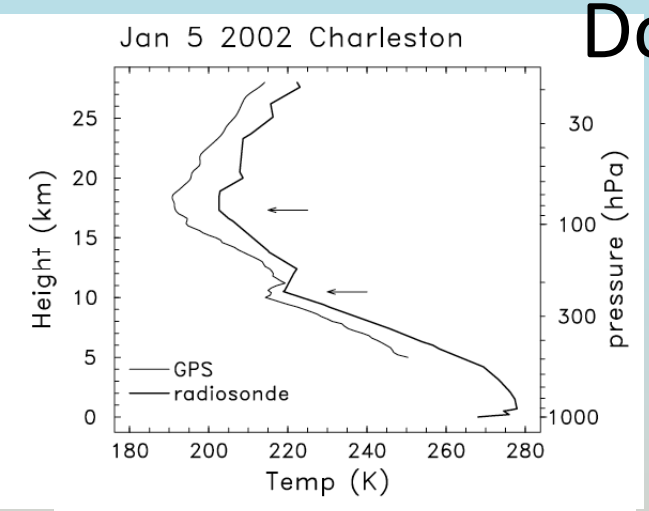
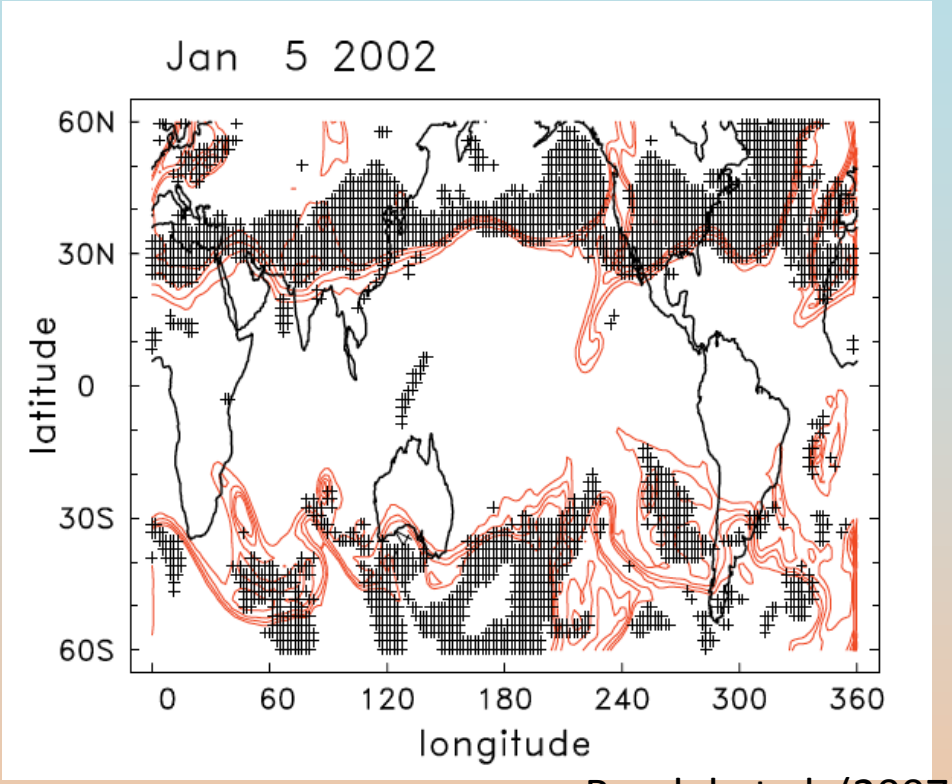
MTP-related MPEX Research

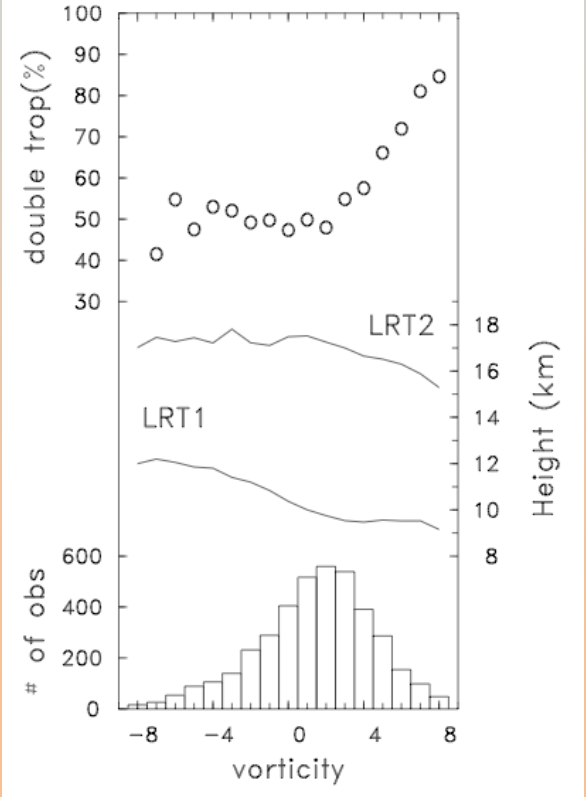
1. Double tropopause
2. Water vapor
3. Gravity Waves

Double Tropopause

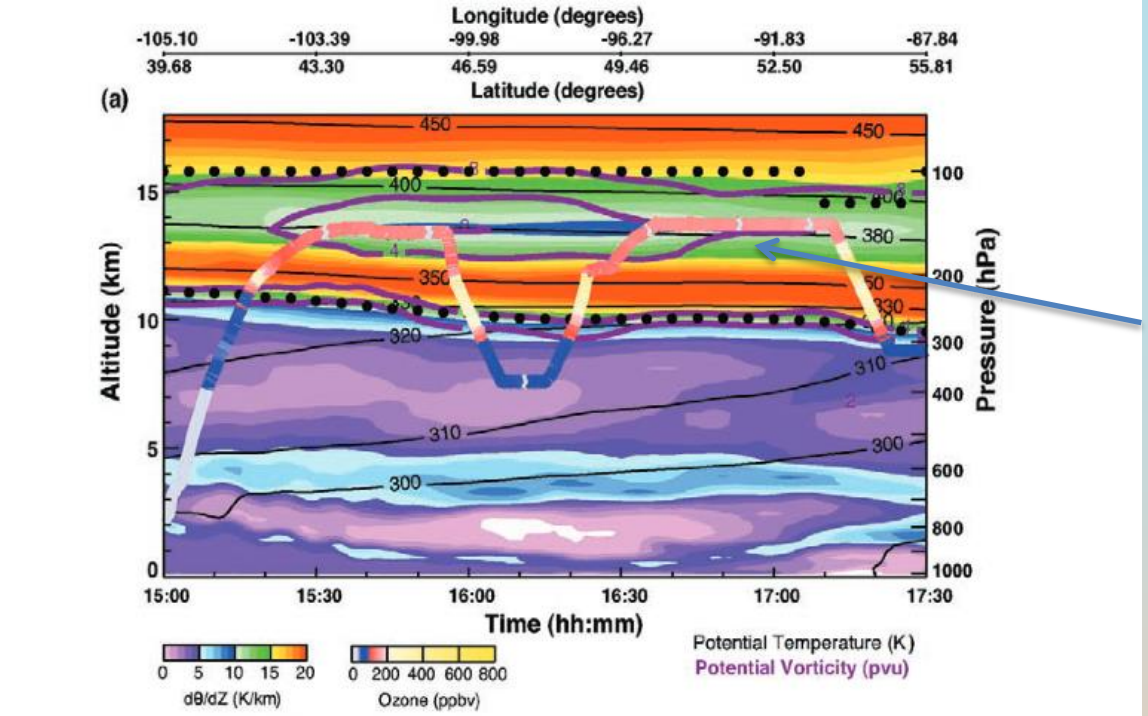


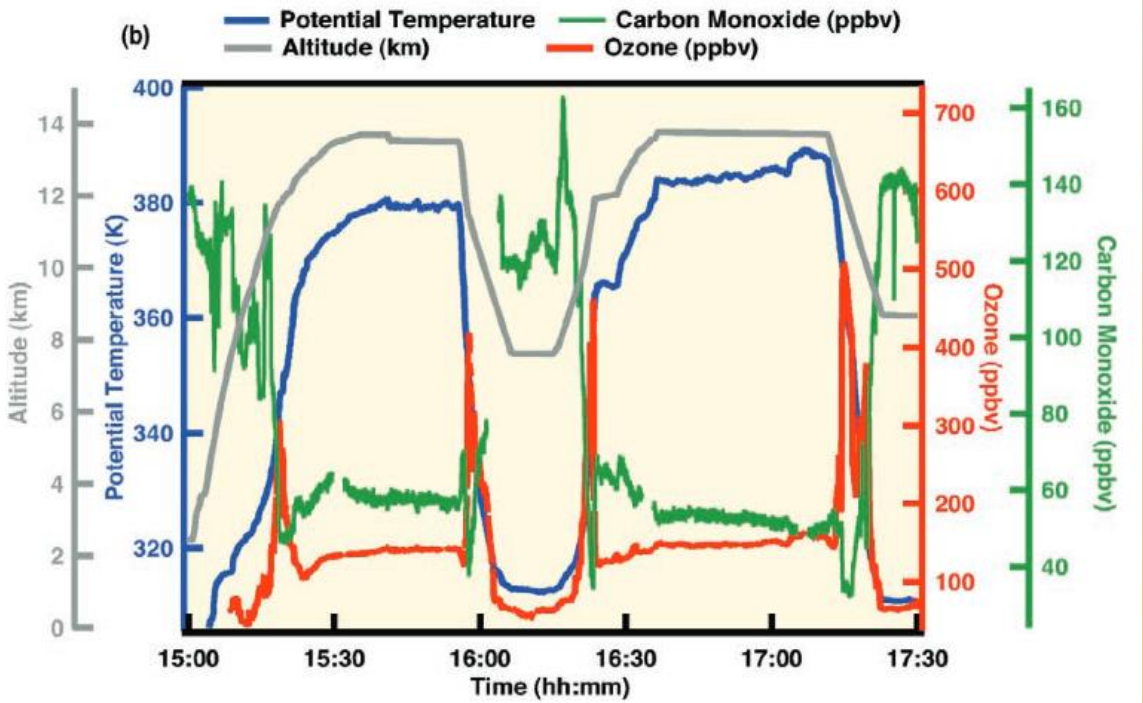


Randel et al. (2007), JGR



Lapse-rate tropopause could be indicative of cyclonic vorticity anomaly or poleward transport above the subtropical jet.

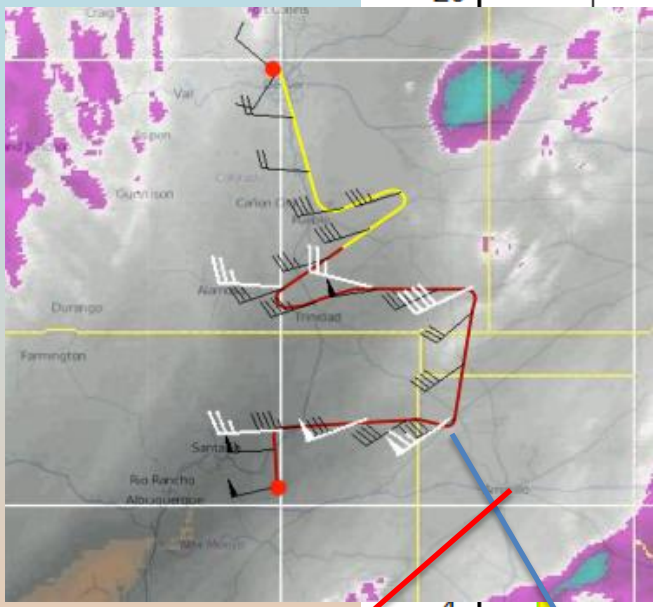


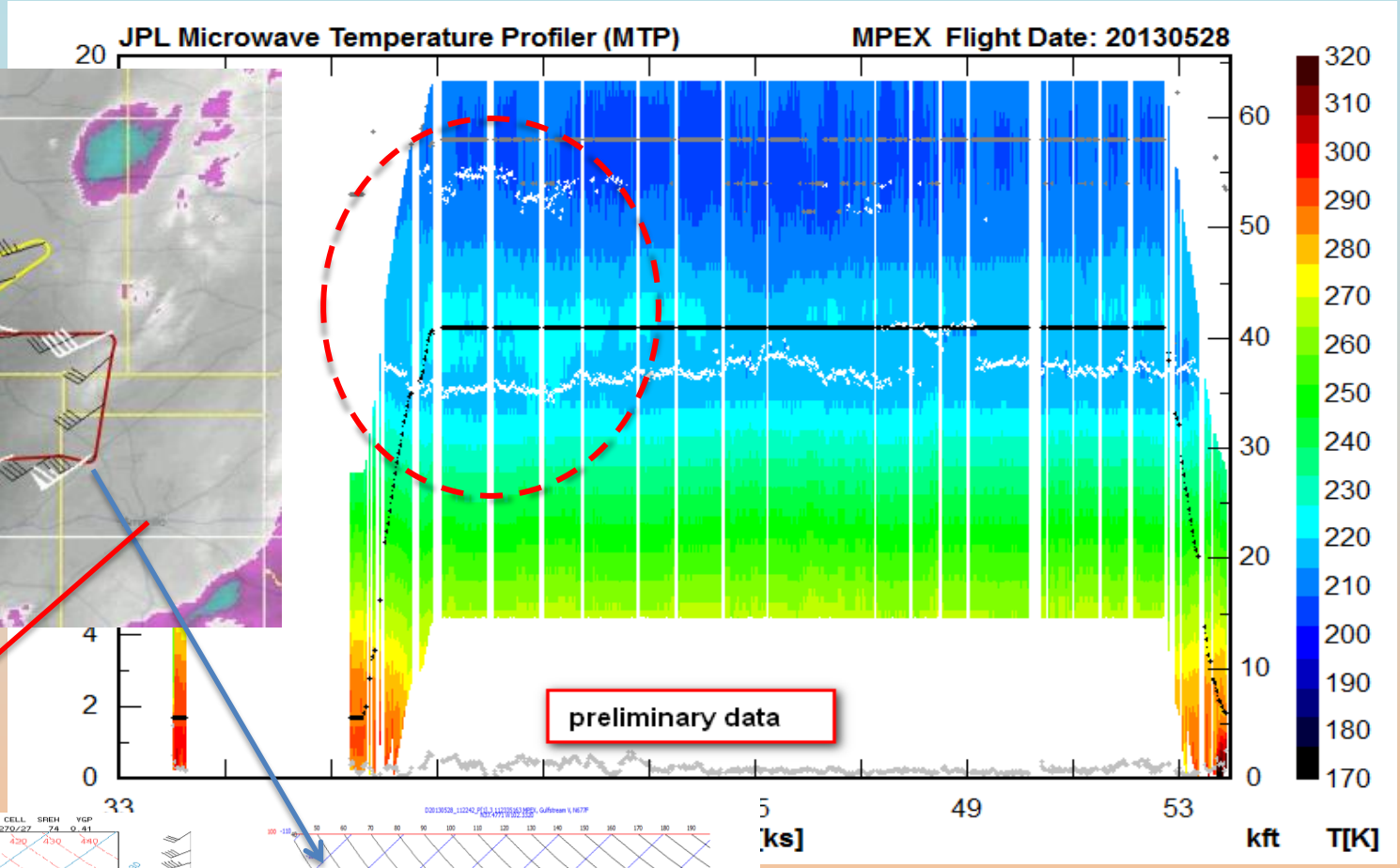


Layer of intermediate character between the two tropopauses

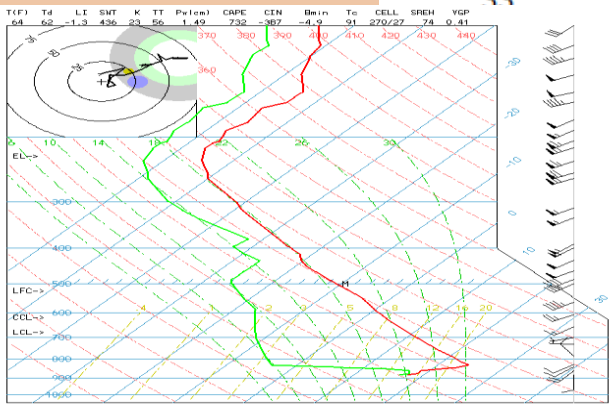
Pan et al. (2010)

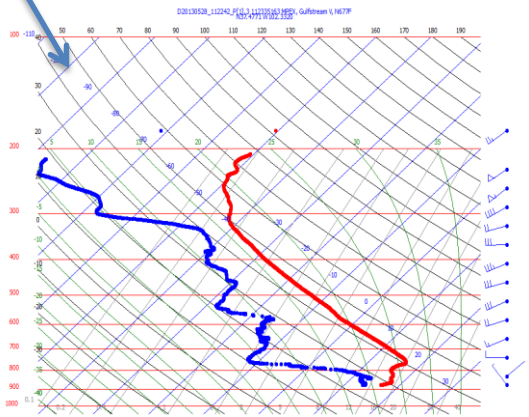
Double Tropopause



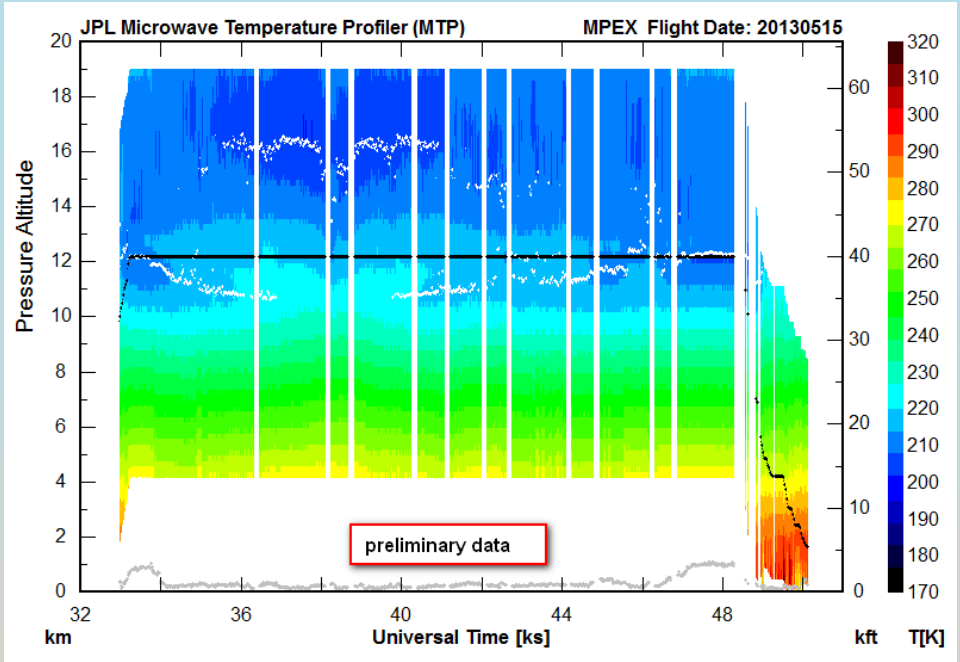


AMA, 12Z 28 May





Why do we care?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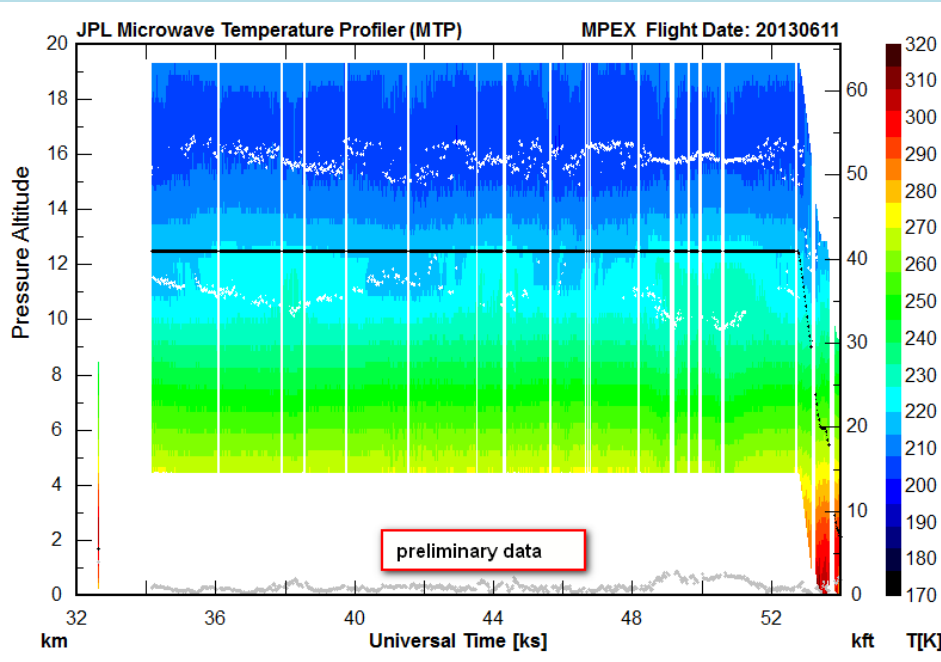
MPEX Flight Date: 20130515
Pressure Altitude
km
kft
Universal Time [ks]
T[K]
preliminary data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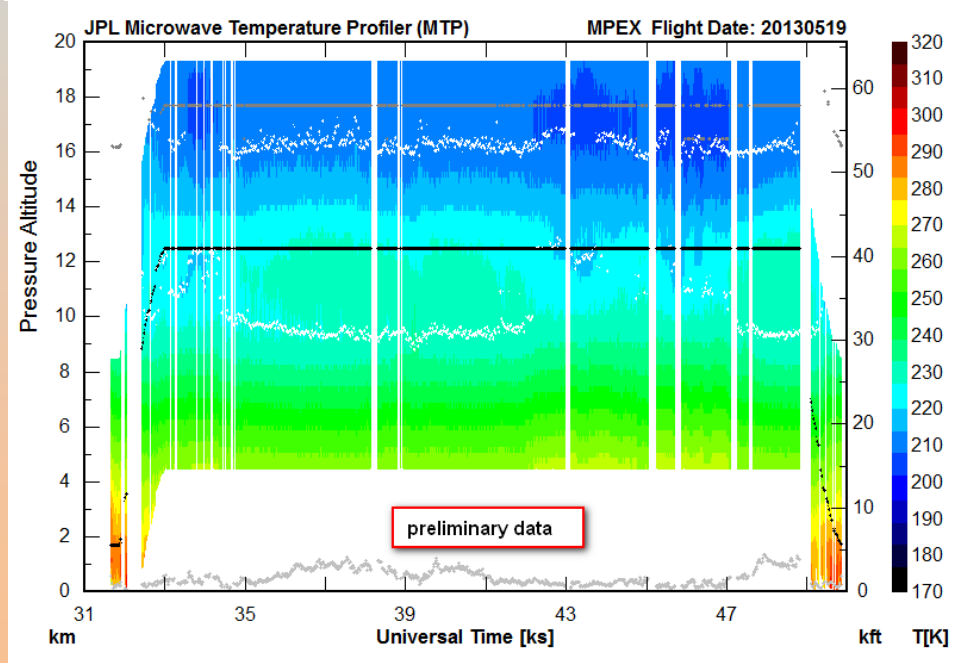
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km
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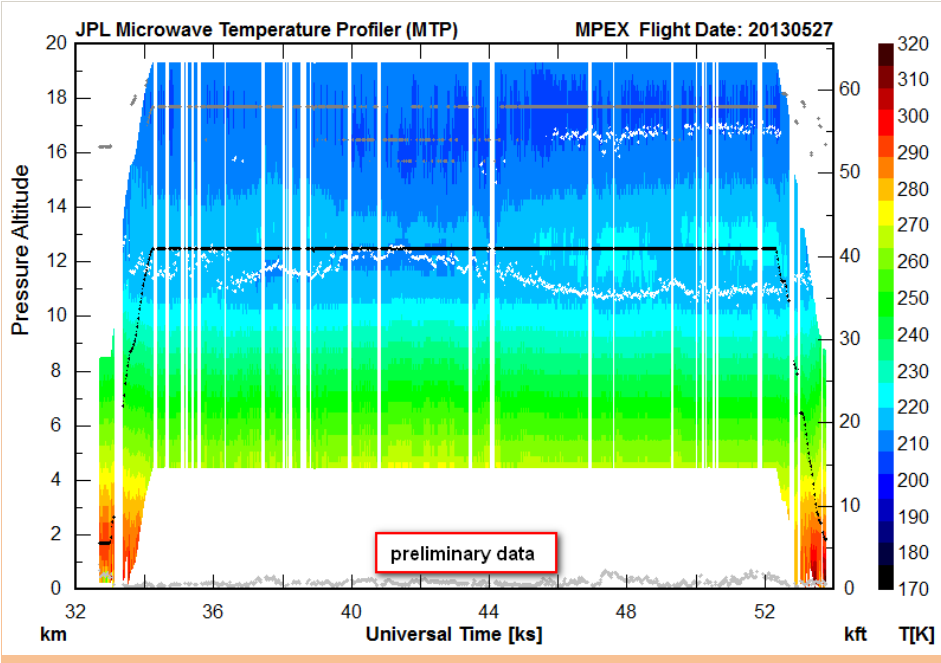
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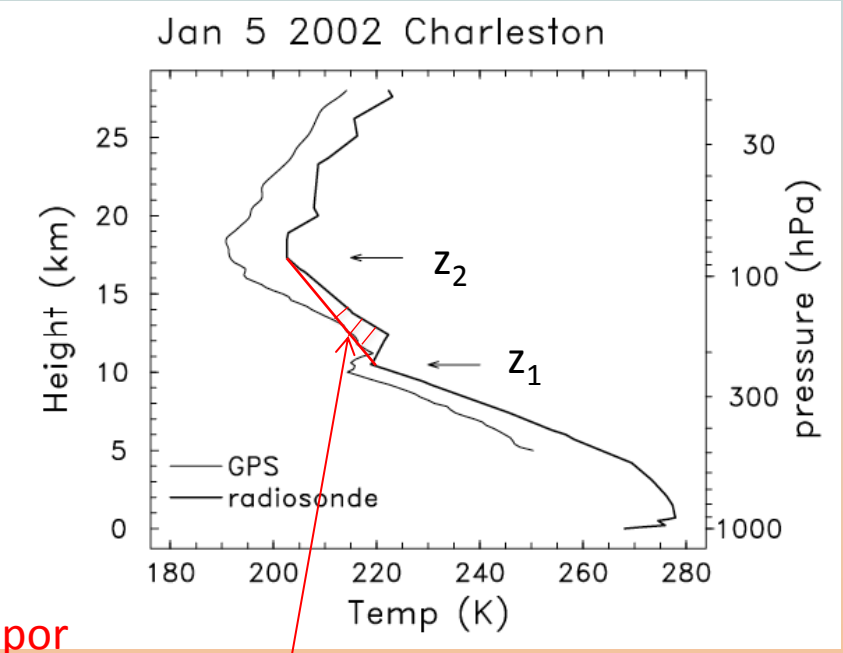
Pressure Altitude
km
kft
Universal Time [ks]
T[K]
preliminary data

Water Vapor and Temperature Anomalies

- Double tropopause related to cyclonic vorticity features (folds, etc.)
- Vorticity features should be related to mid-tropospheric moisture
- GV flew in lower stratosphere: what was moisture content?
  - Evidence of subsidence
  - Tropical water vapor intrusions



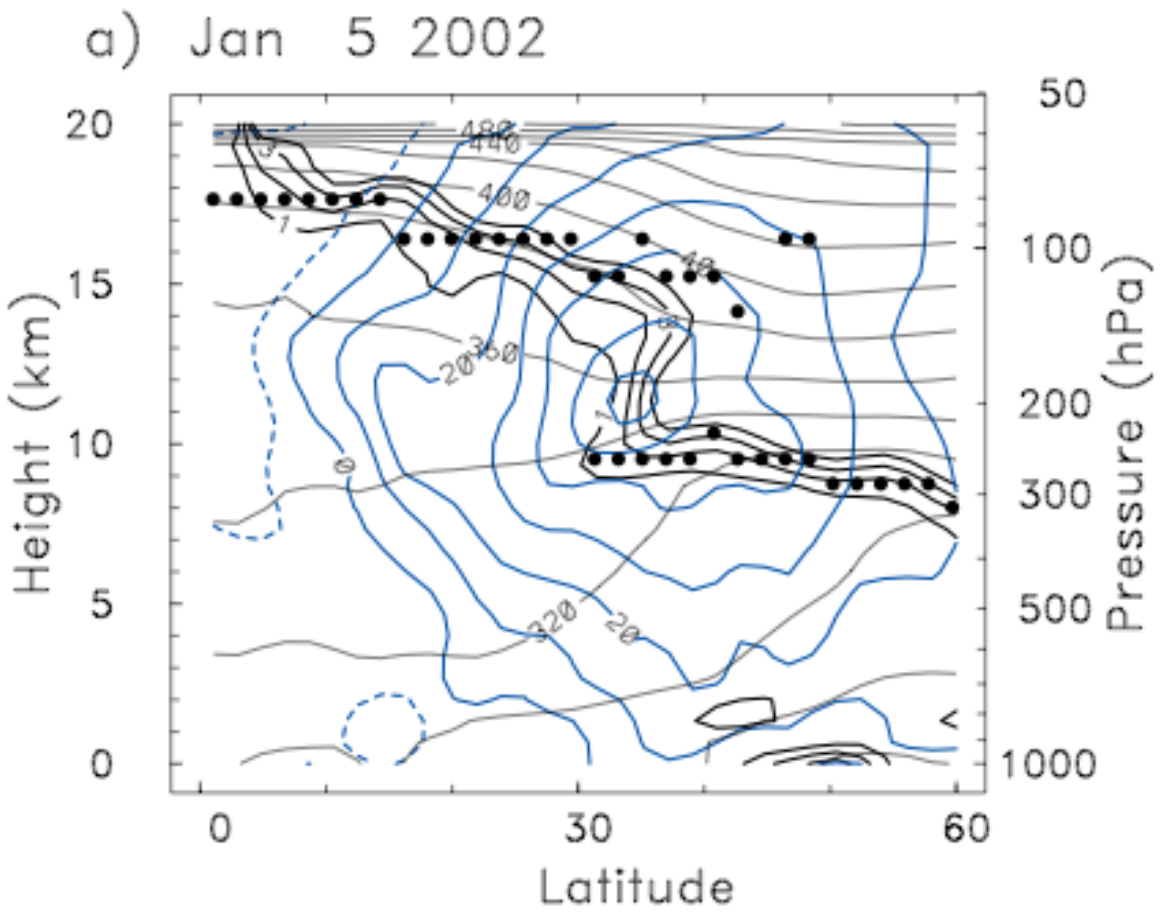
Work Concept:

- Define a double-tropopause parameter:

$$B = \int_{z_1}^{z_2} (T - T_0)\,dz$$

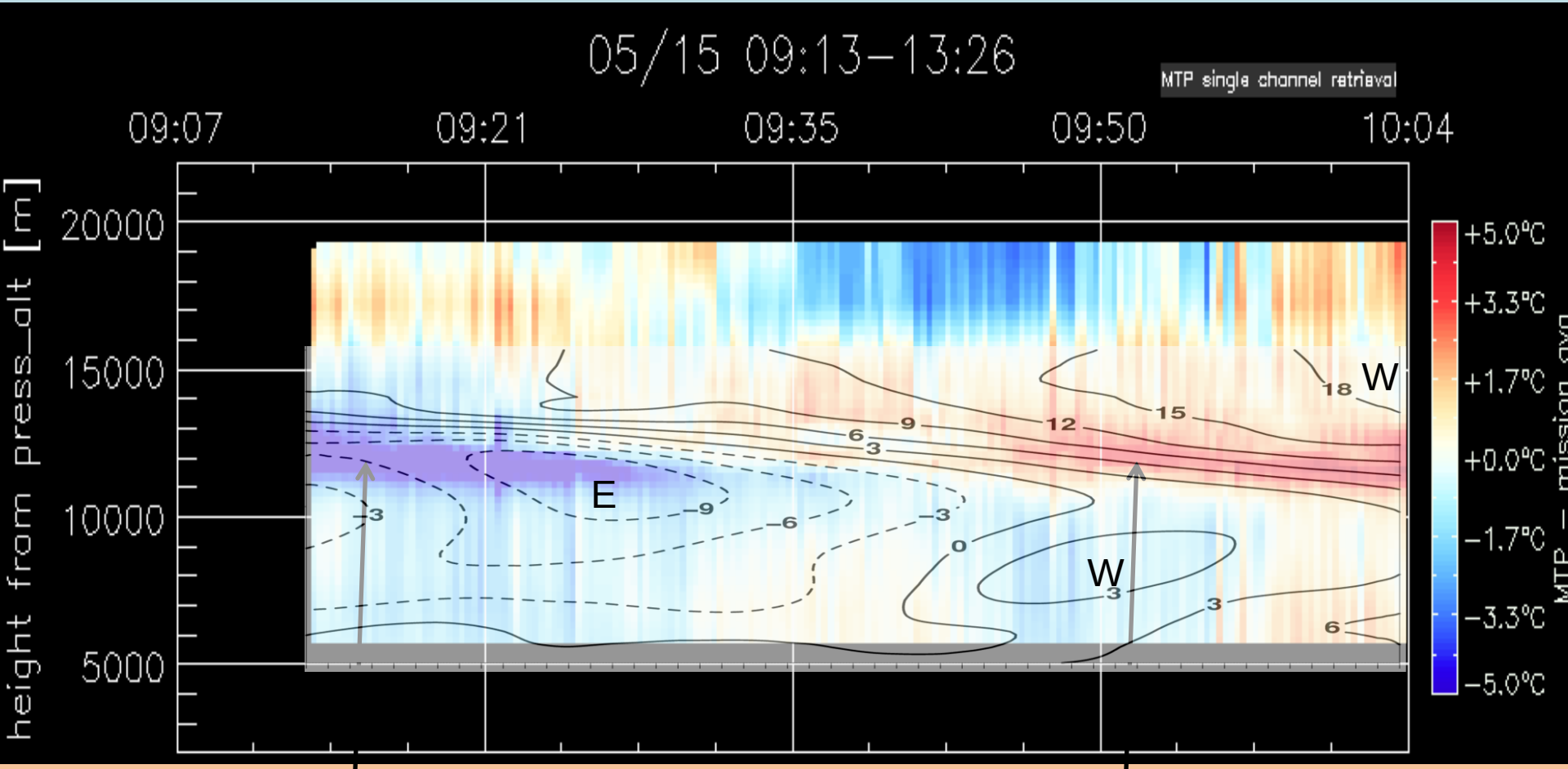
- Plot along flight track
- Also plot VCSEL water vapor and water vapor channel radiance anomaly along flight track
- What is the interrelationship of these?

Mechanisms of Mixing/Transport



- Transverse circulation
- Large-scale meridional motion
- Turbulence

Evidence of Vertically Propagating Waves?



Tropopause elevated
In anticyclonic flow

Upper-tropospheric front