Identifying Boundary Layer Turbulent Structure Using Water Vapor Mixing Ratios Retrieved from the SGP Raman Lidar

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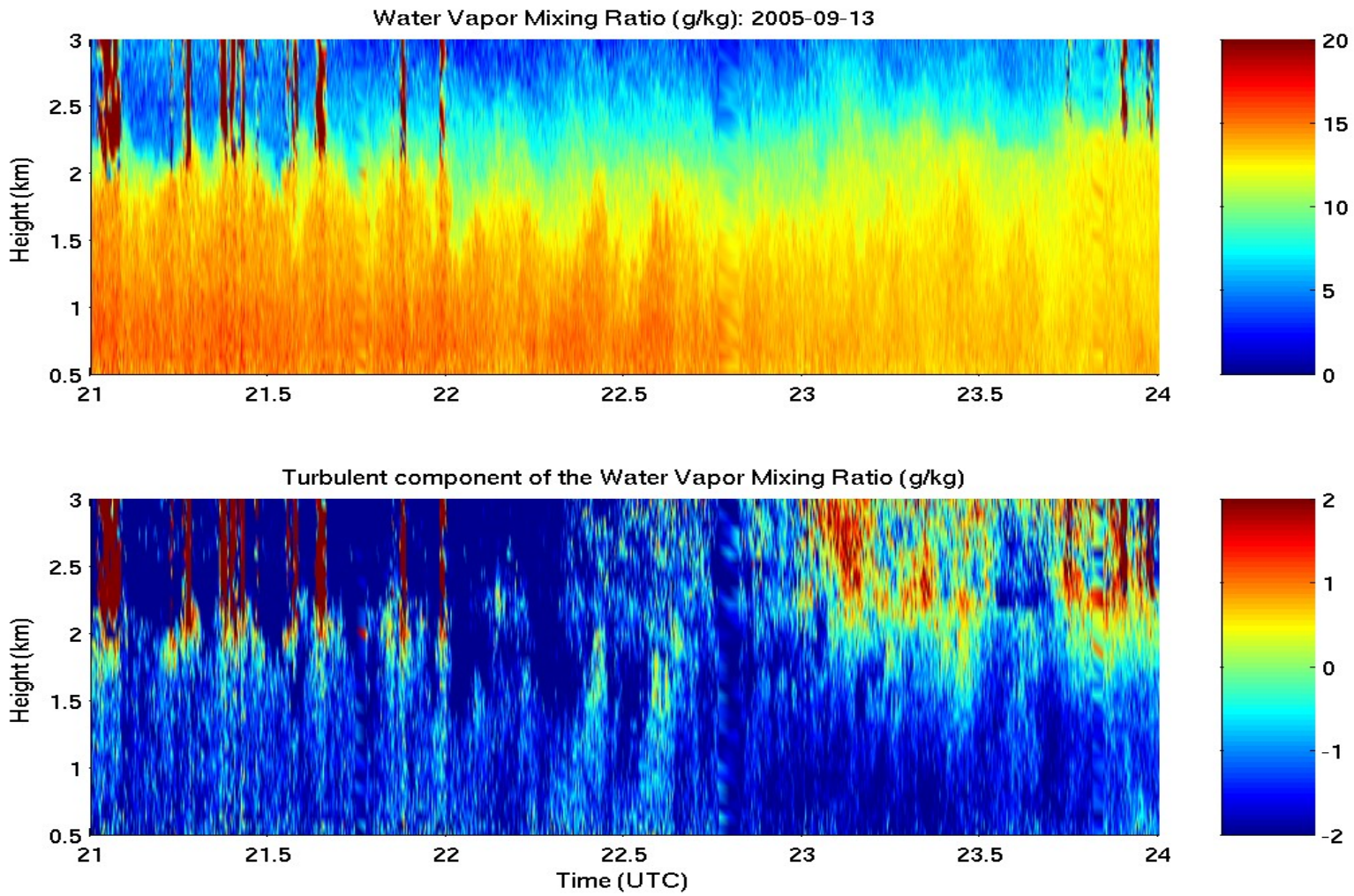
Thanks to Volker Wulfmeyer, Sandip Pal, and Rob Newsom

High-resolution boundary layer climatology

- Long-term, high-resolution measurements lacking
- Water vapor variance used in small-scale model parameterizations
- Climate models rely on boundary layer height estimations
- Entrainment rates are uncertain

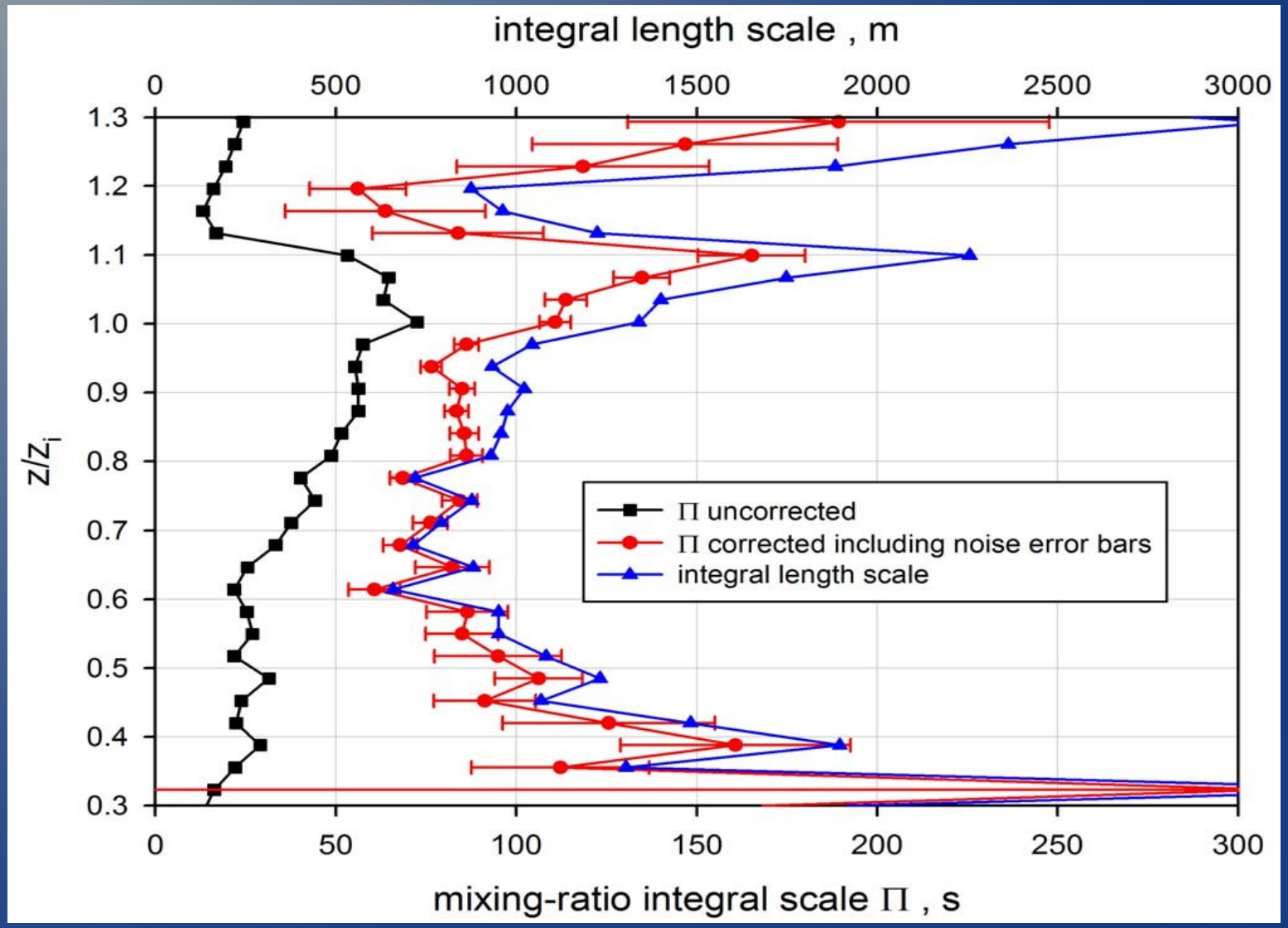
Raman lidar

- Water vapor mixing ratio retrievals
- Nearly 4 years at 10-sec resolution
- 75 meter vertical resolution



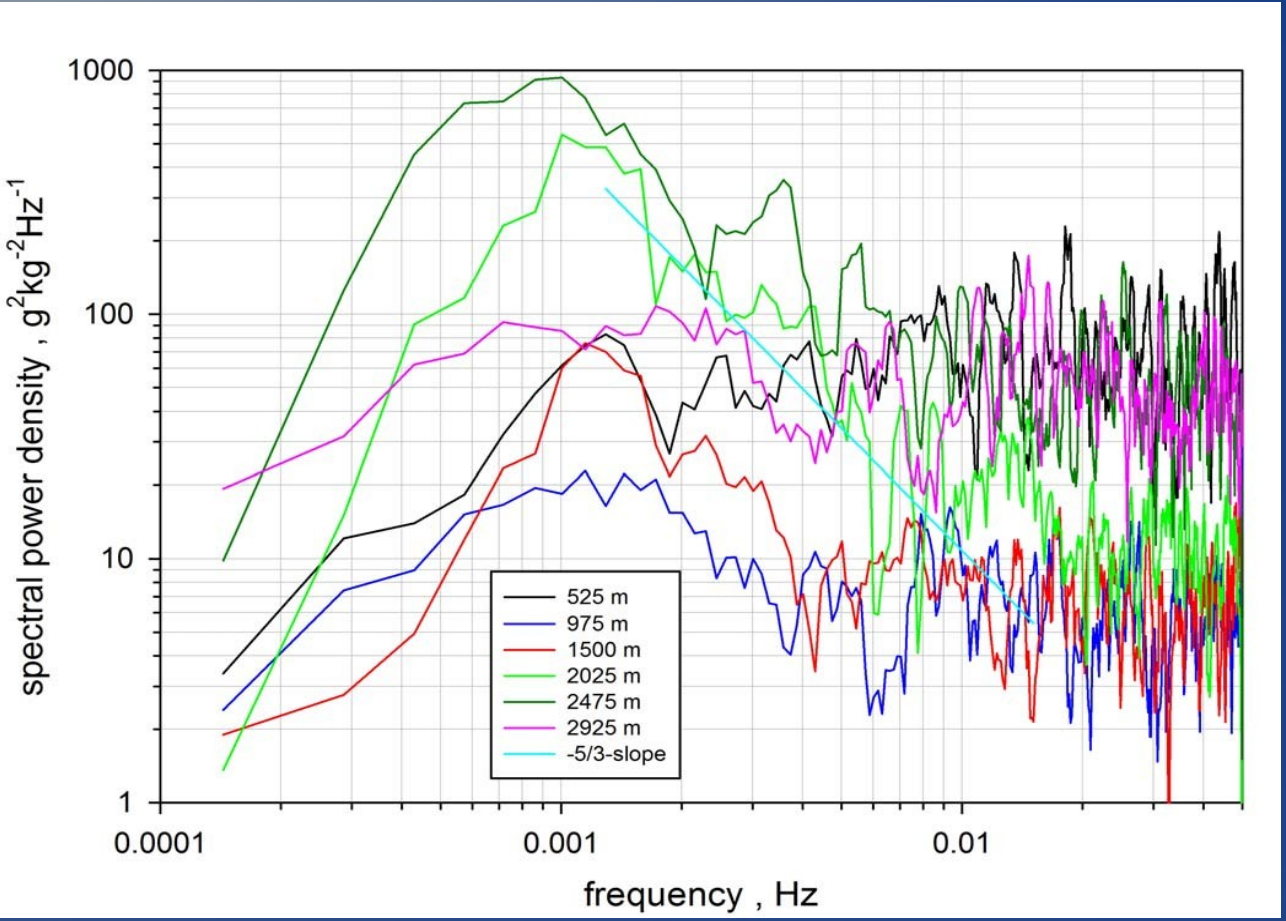
- Water vapor mixing ratios conserved in the absence of precipitation and condensation

Adequate resolution?

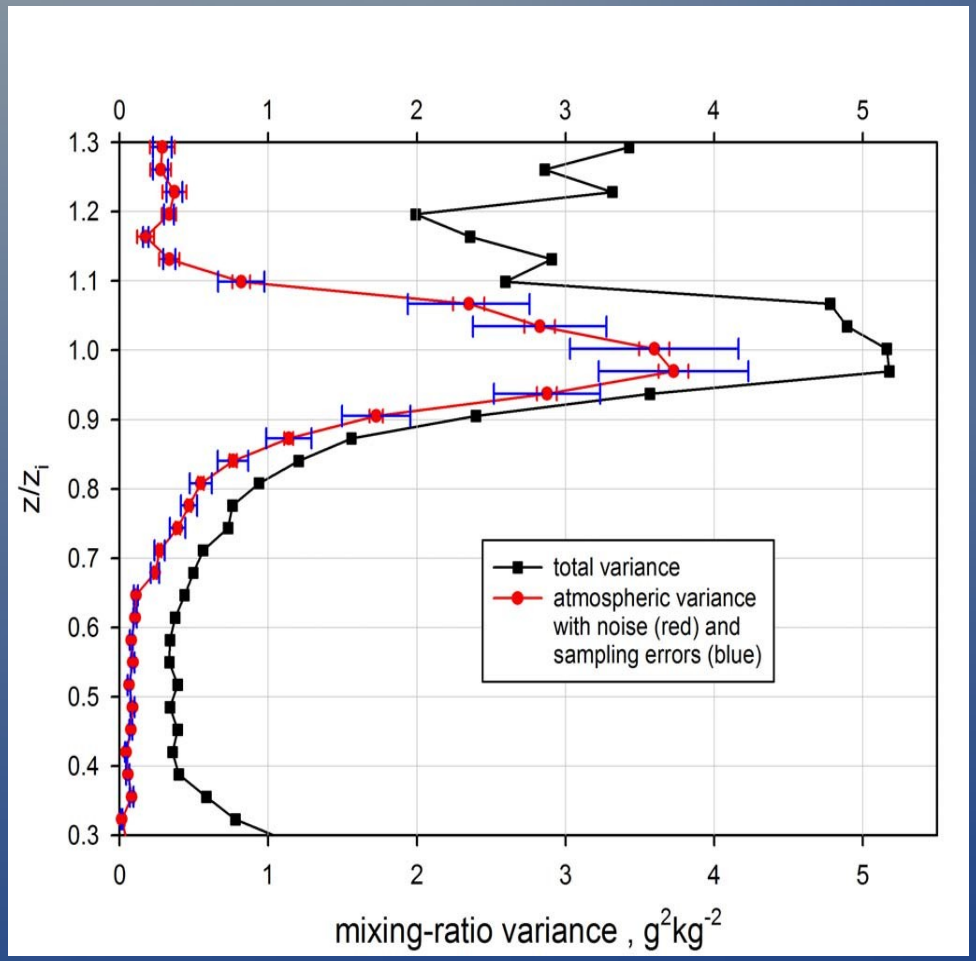


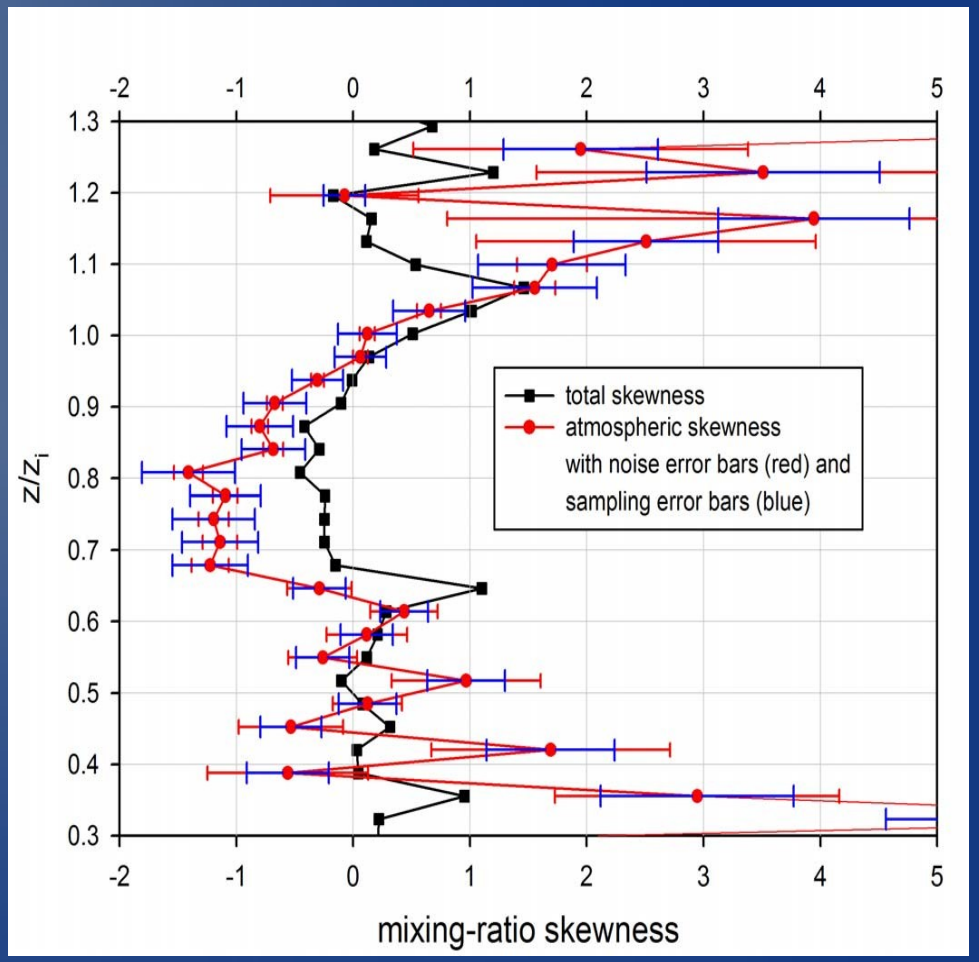
Wulfmeyer et al submitted July 2009

Spectral analysis

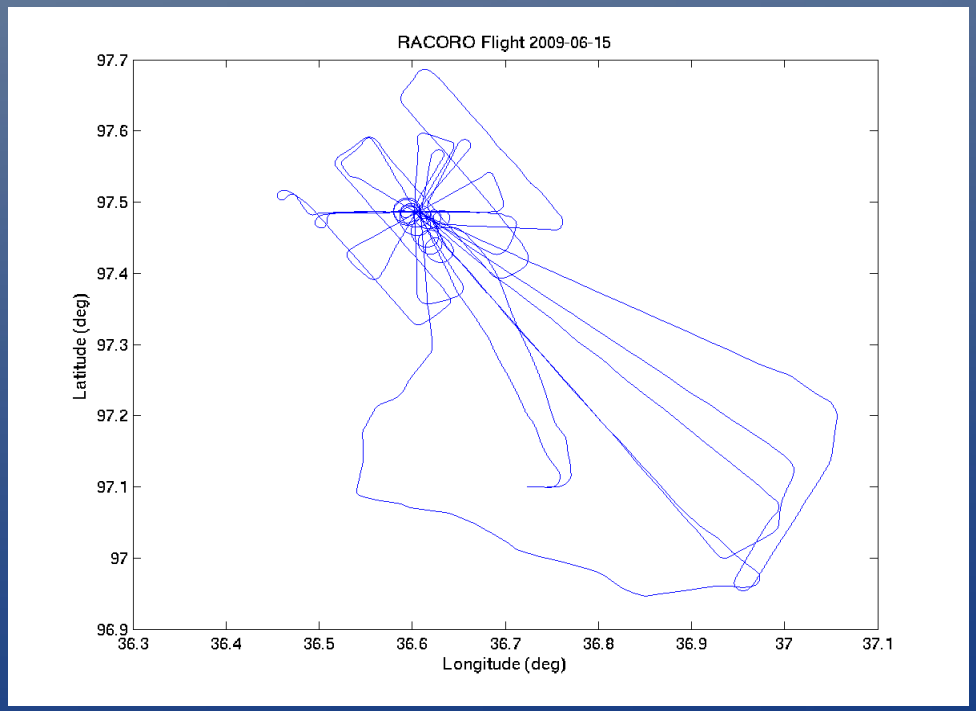


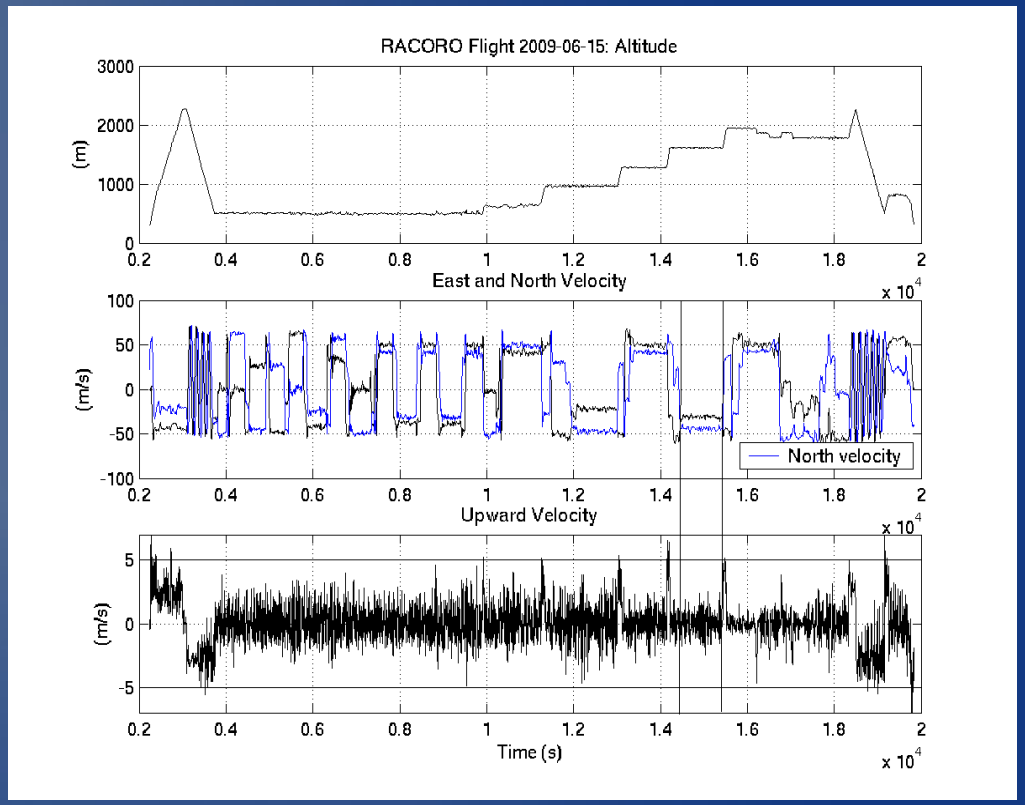
Variance and Skewness





RACORO turbulence flights





Ultimate Goals

- Climatology of
  - Boundary layer heights
  - Variance and skewness
  - Entrainment
- Boundary layer evolution