Climatology of saturation at the tropical tropopause

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Composition and Transport in the Tropical Troposphere and Lower Stratosphere Meeting
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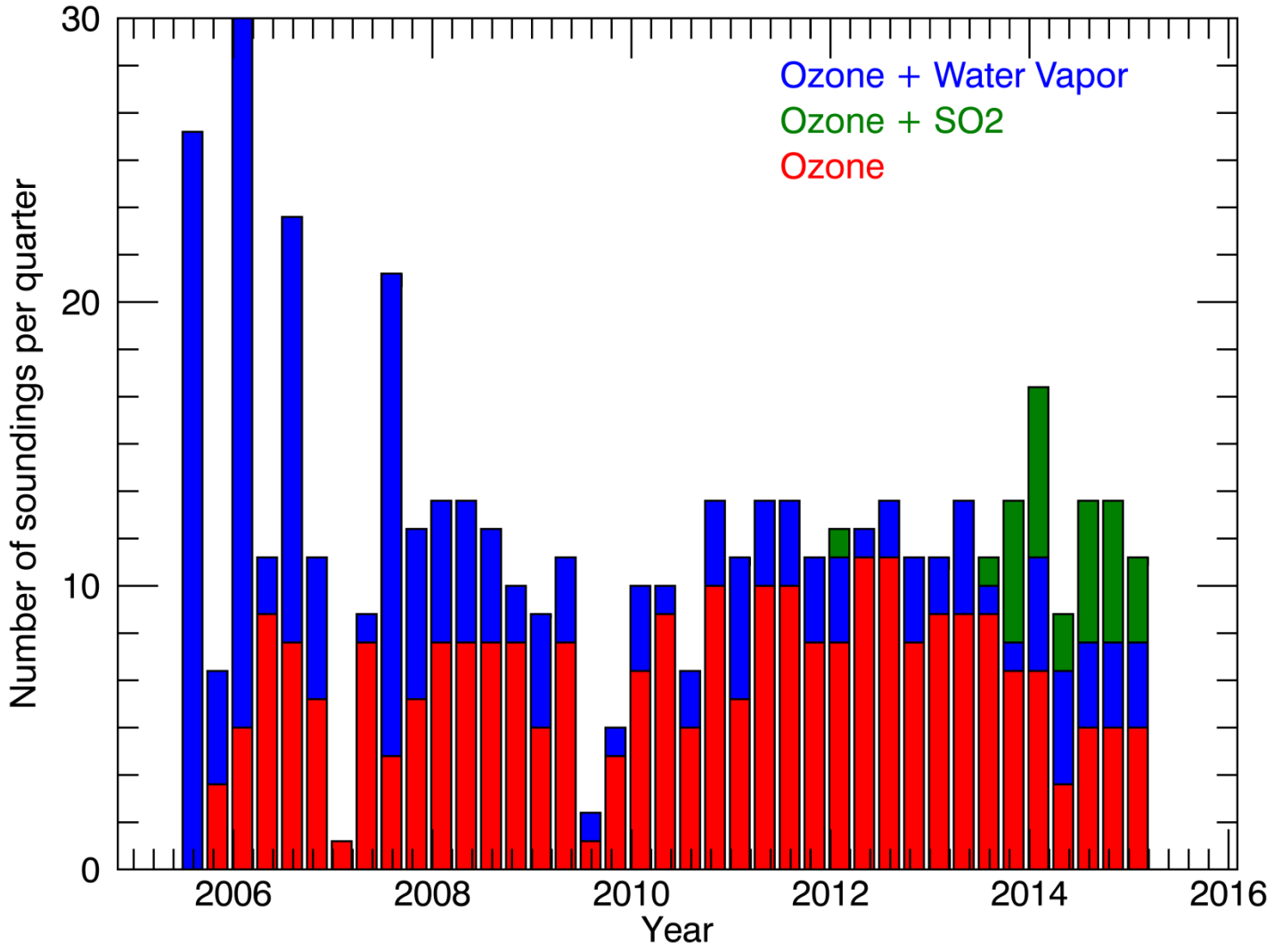
Data

- In situ soundings using CFH water vapor and ECC ozone sondes at San Jose, Costa Rica
- Soundings started in 2005 and are ongoing

➔ 10 Years of Ticosonde !!!

- 187 water vapor soundings
  483 ozone soundings
- High vertical resolution
- High accuracy

Launch statistics at Costa Rica



Water Vapor and Ozone Sounding (Costa Rica)

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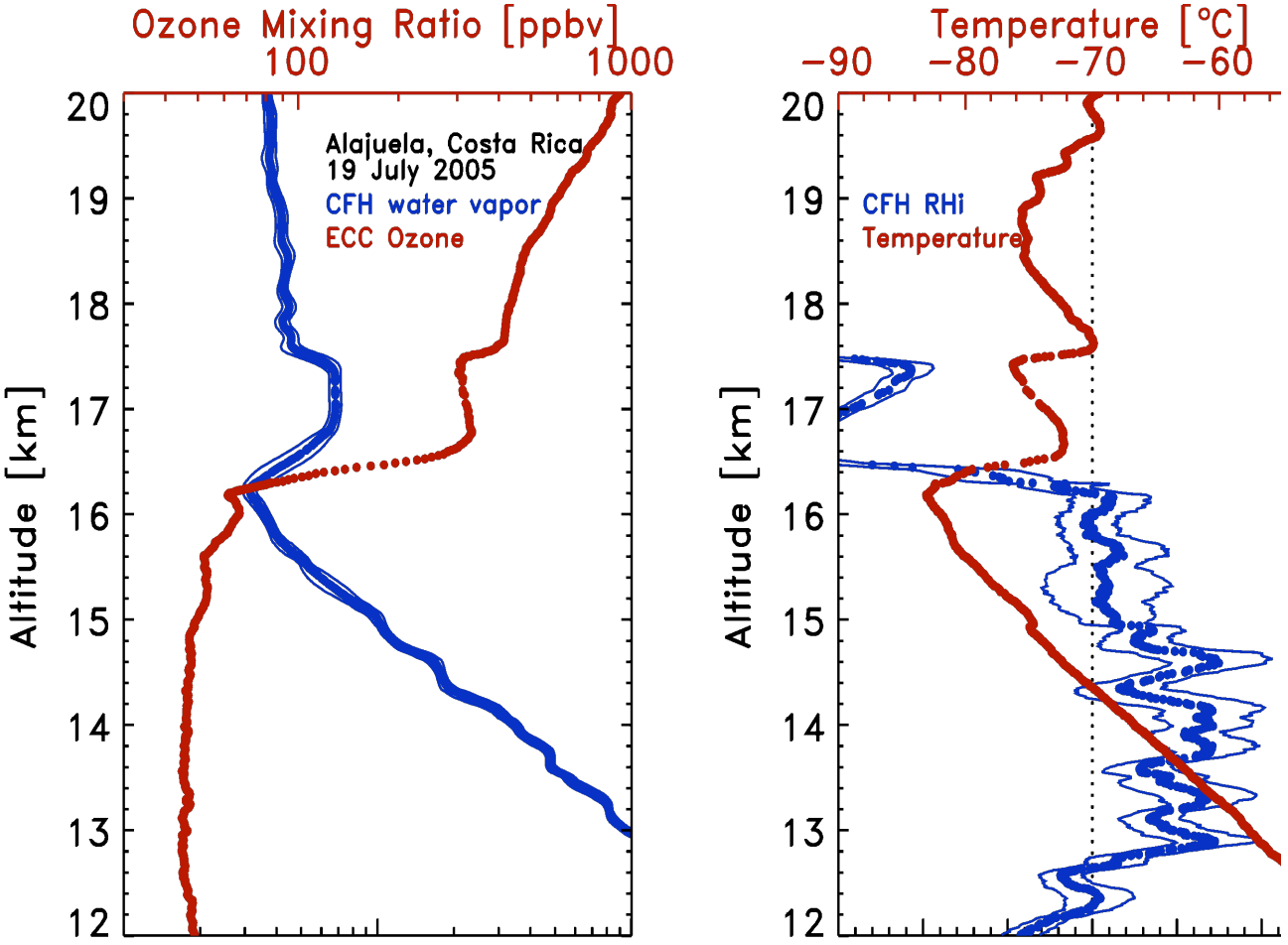


Uncertainties

Frostpoint uncertainty (at 2 sigma):

- Random: 4% - 10% (depending on instrument performance and vertical resolution, i.e. 50 m to 250 m)
- Systematic component: 2% - 4%

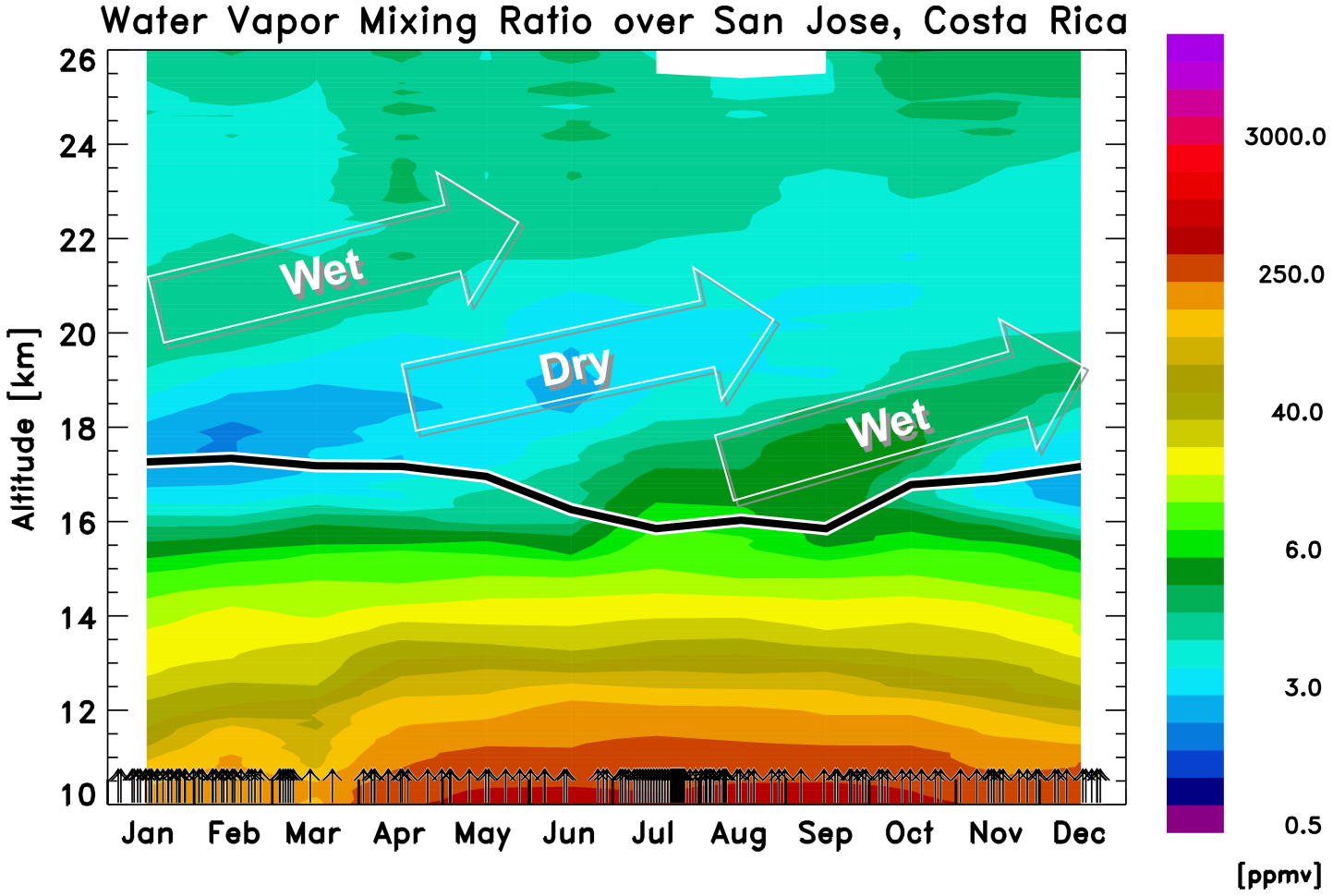
Air temperature uncertainty (at 2 sigma):

- Systematic component: 4% - 5%

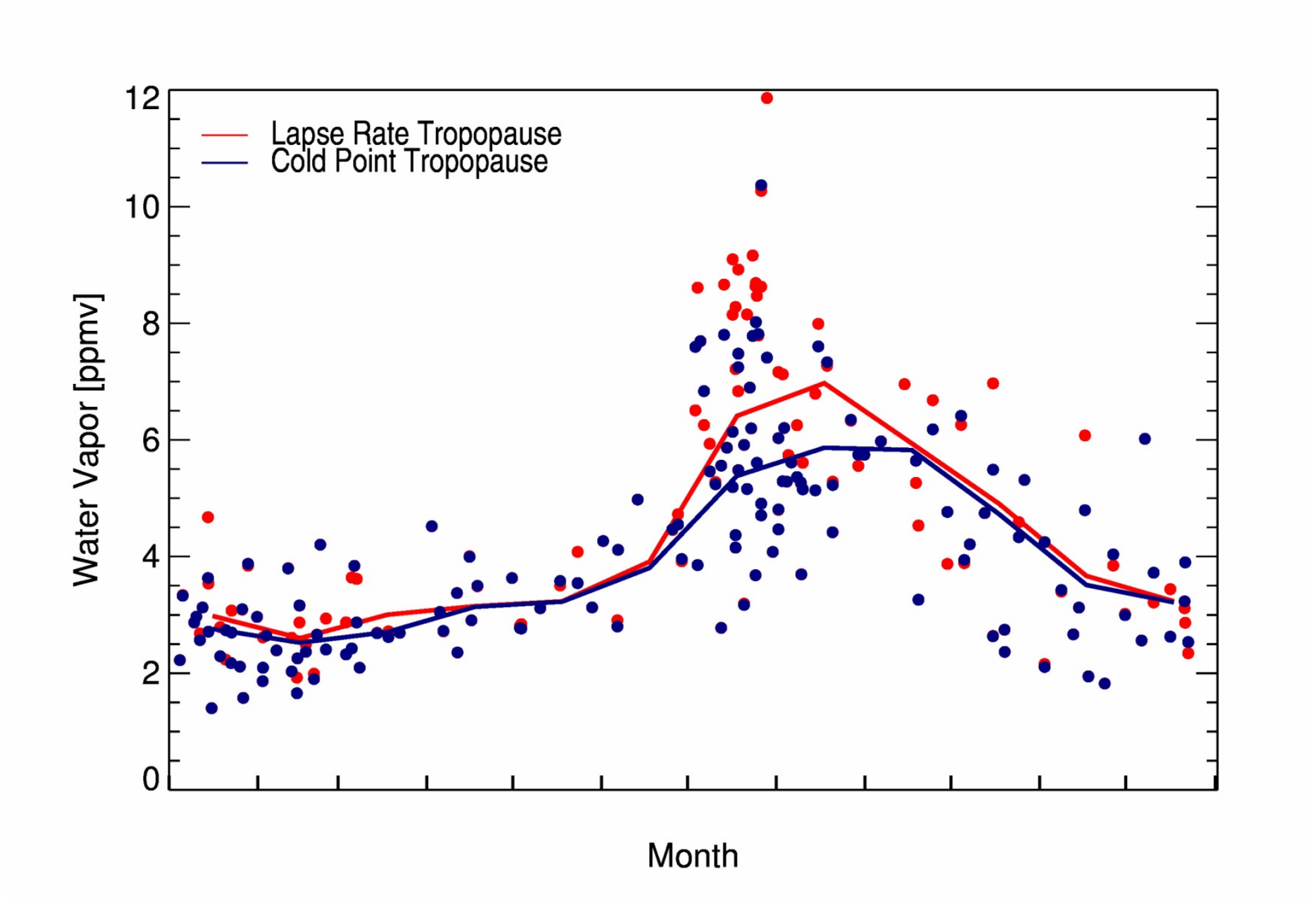
RH over ice uncertainty (at 2 sigma):

- Random component: 4% - 17%
- Systematic component: 5% - 6%

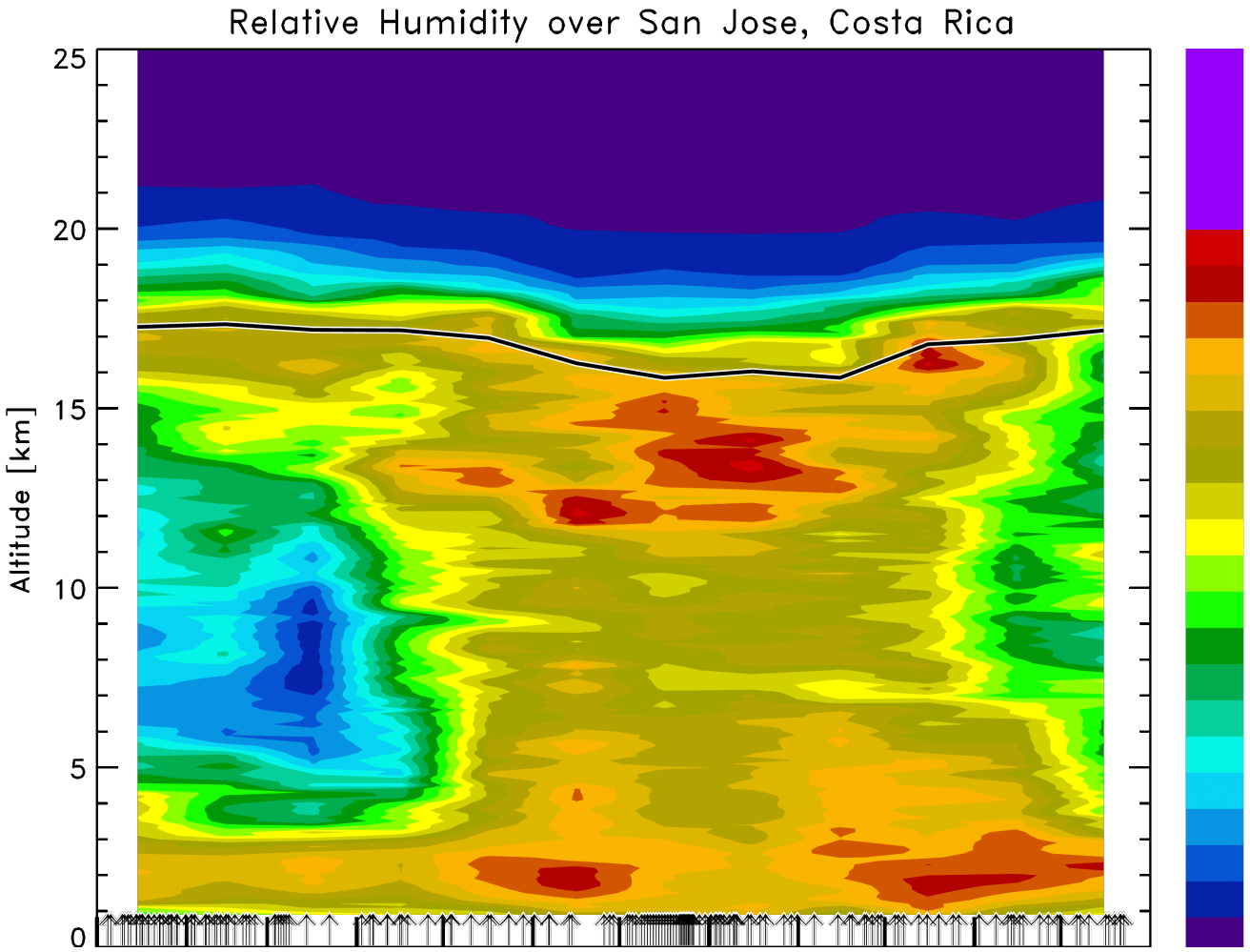
Water Vapor Climatology at Costa Rica



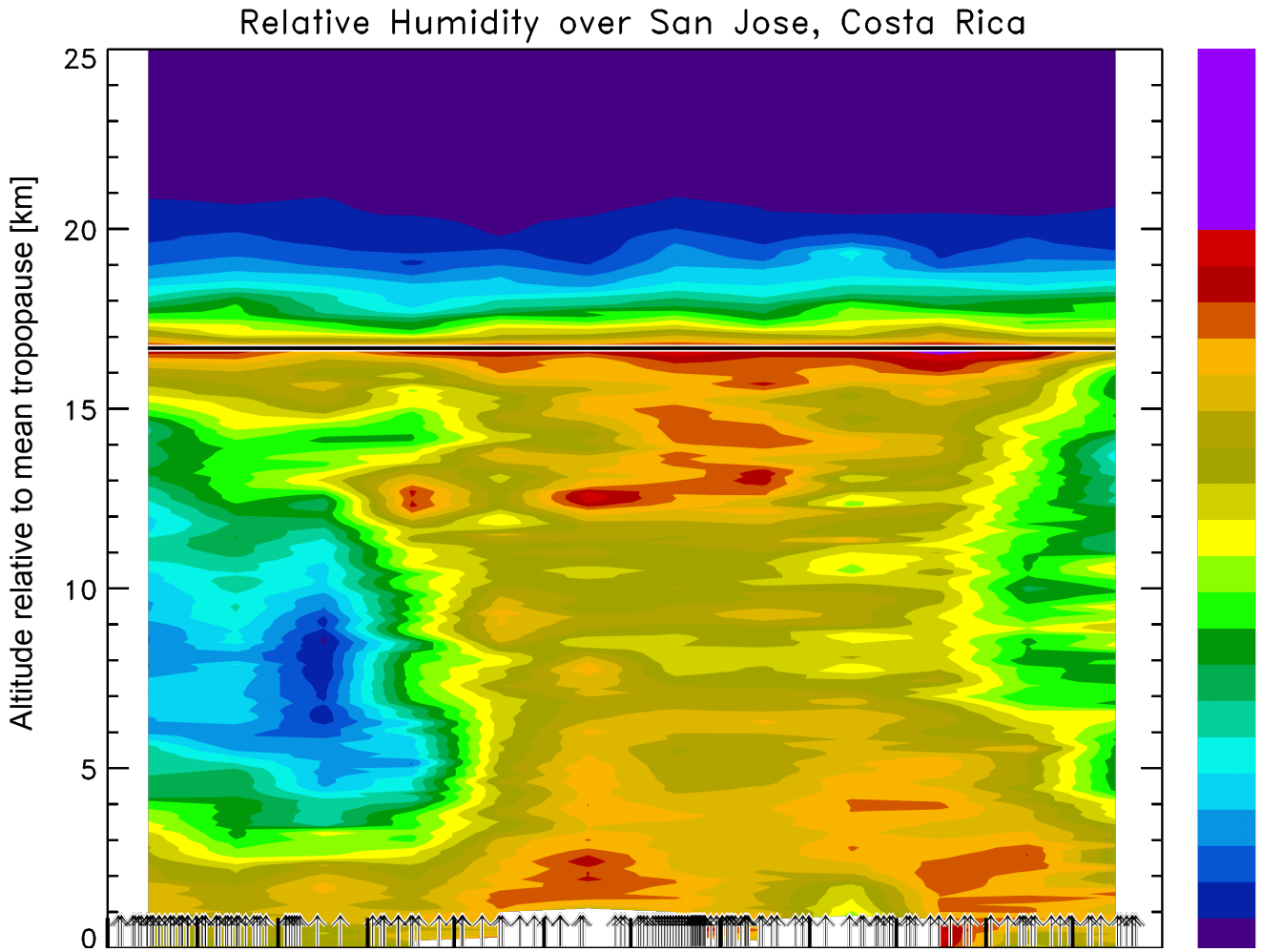
Water Vapor Climatology at Costa Rica at local tropopause



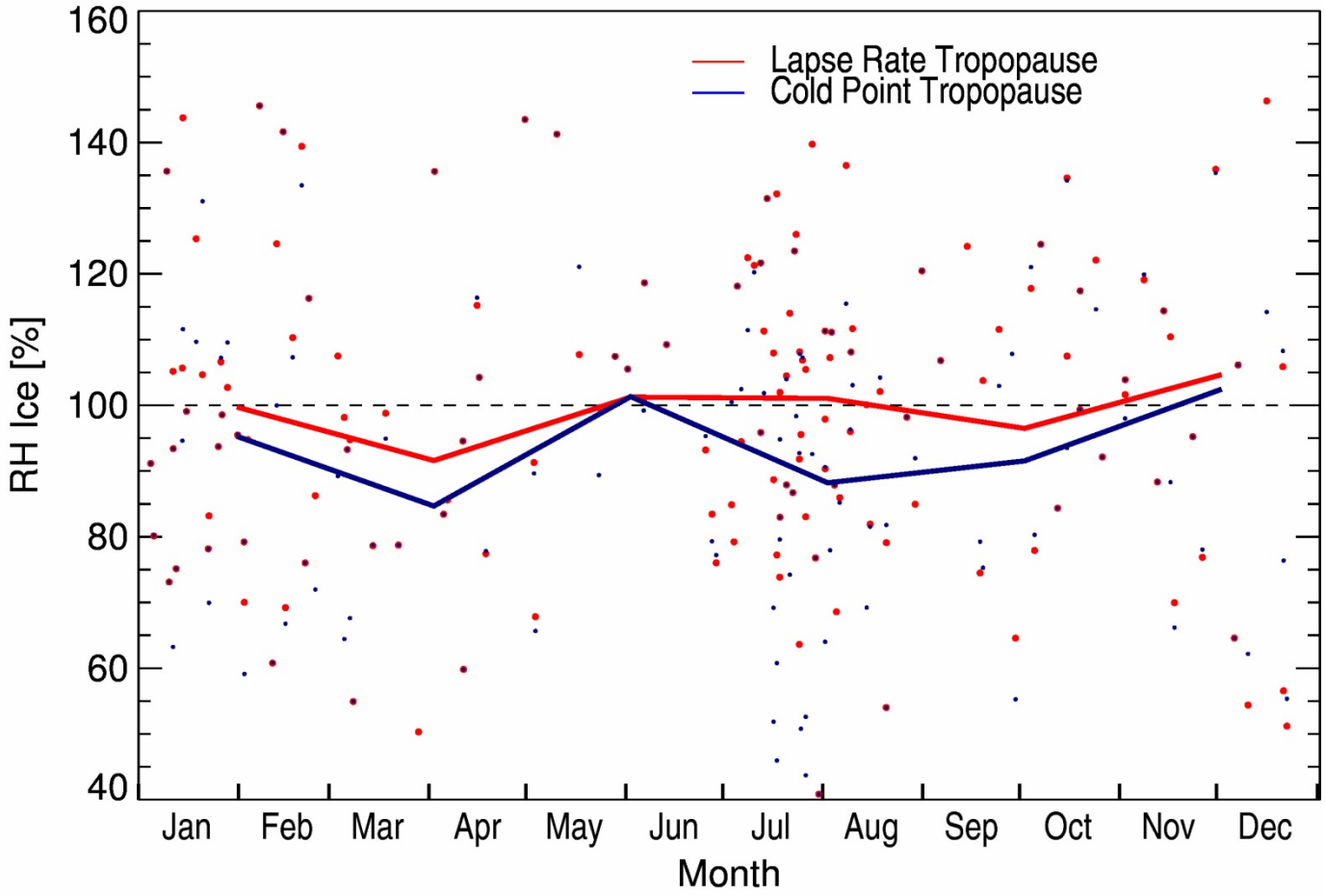
RH (ice) Climatology at Costa Rica



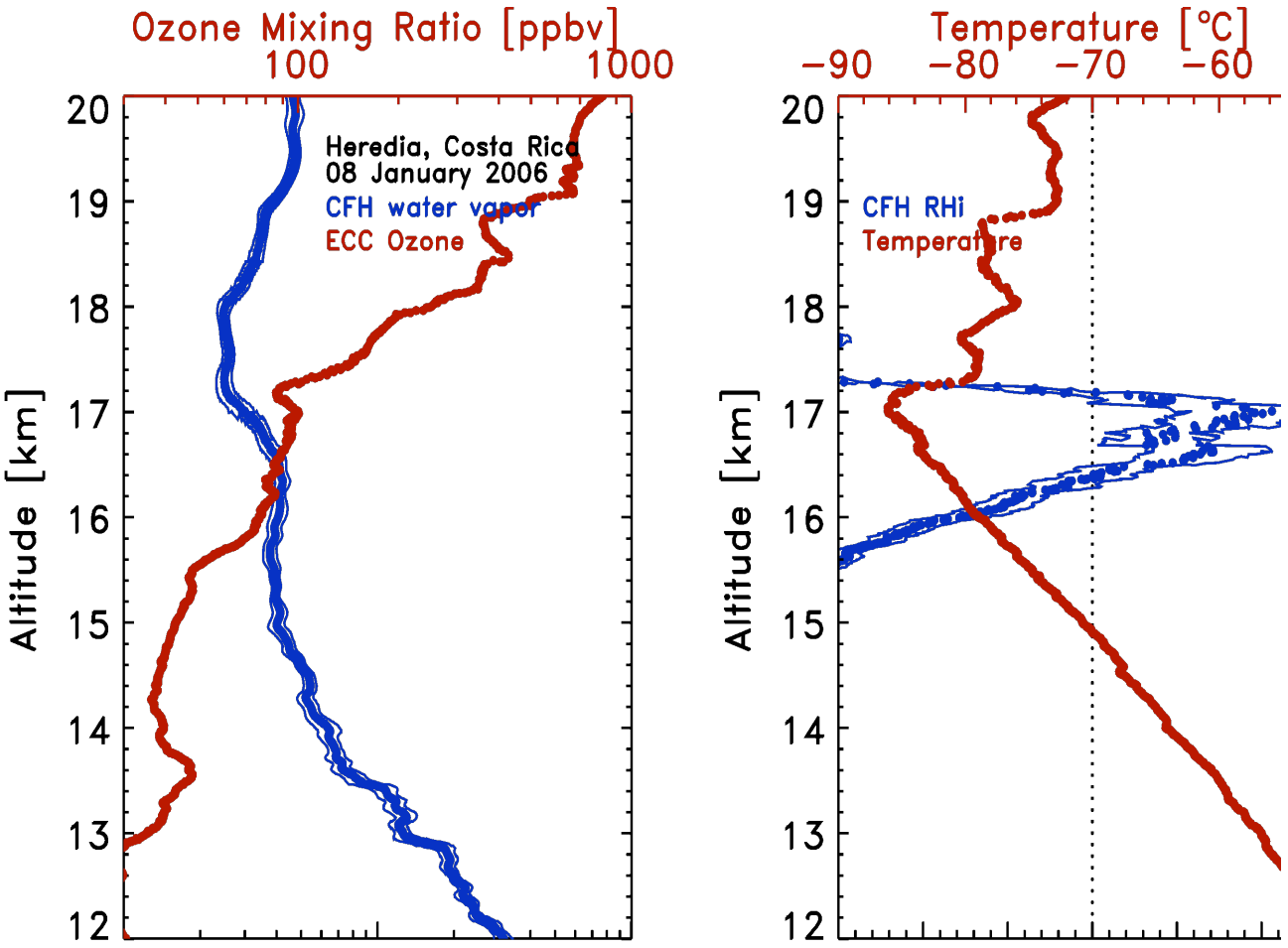
RH (ice) Climatology at Costa Rica Relative to Tropopause



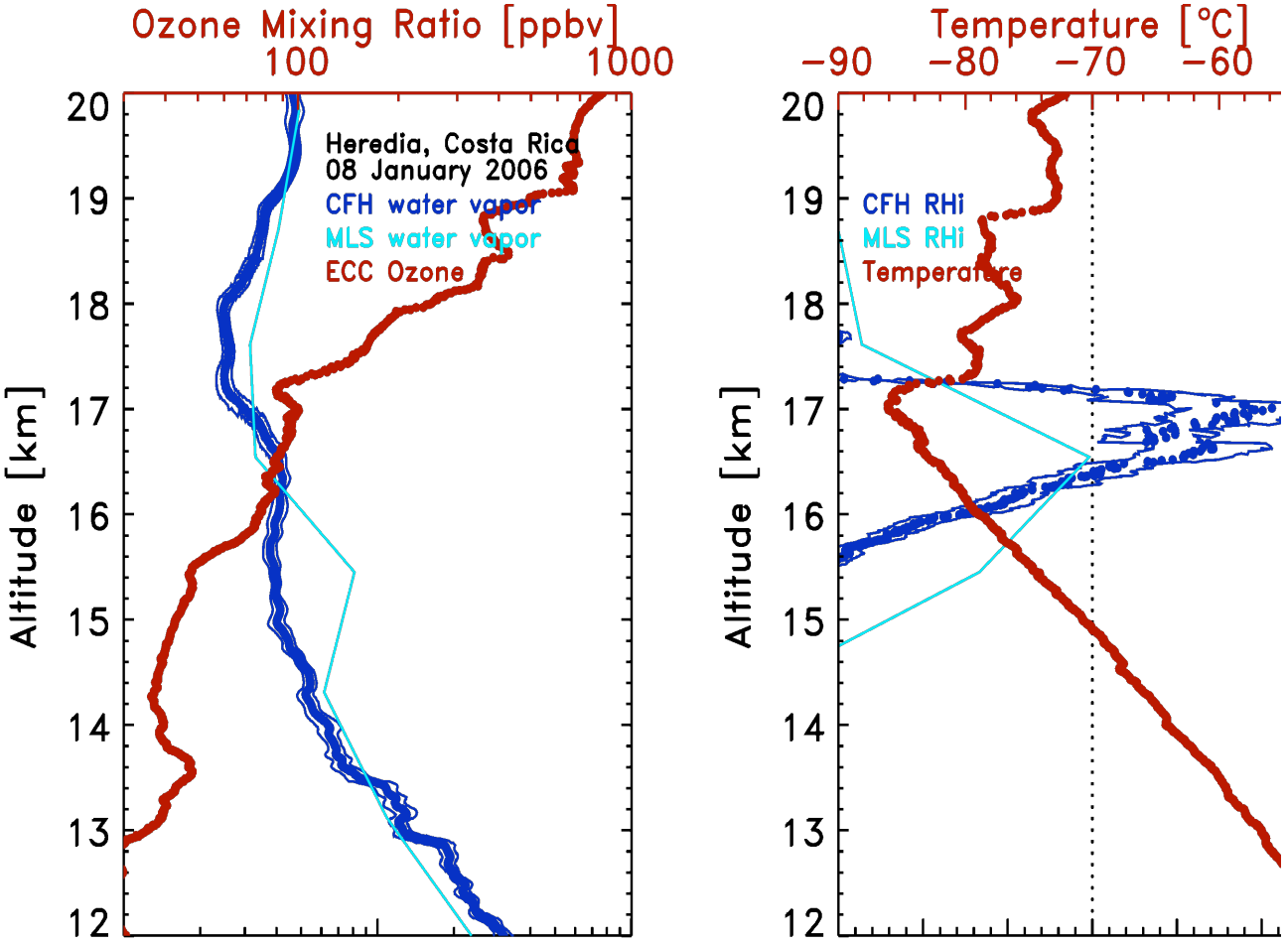
RH (ice) Tropopause



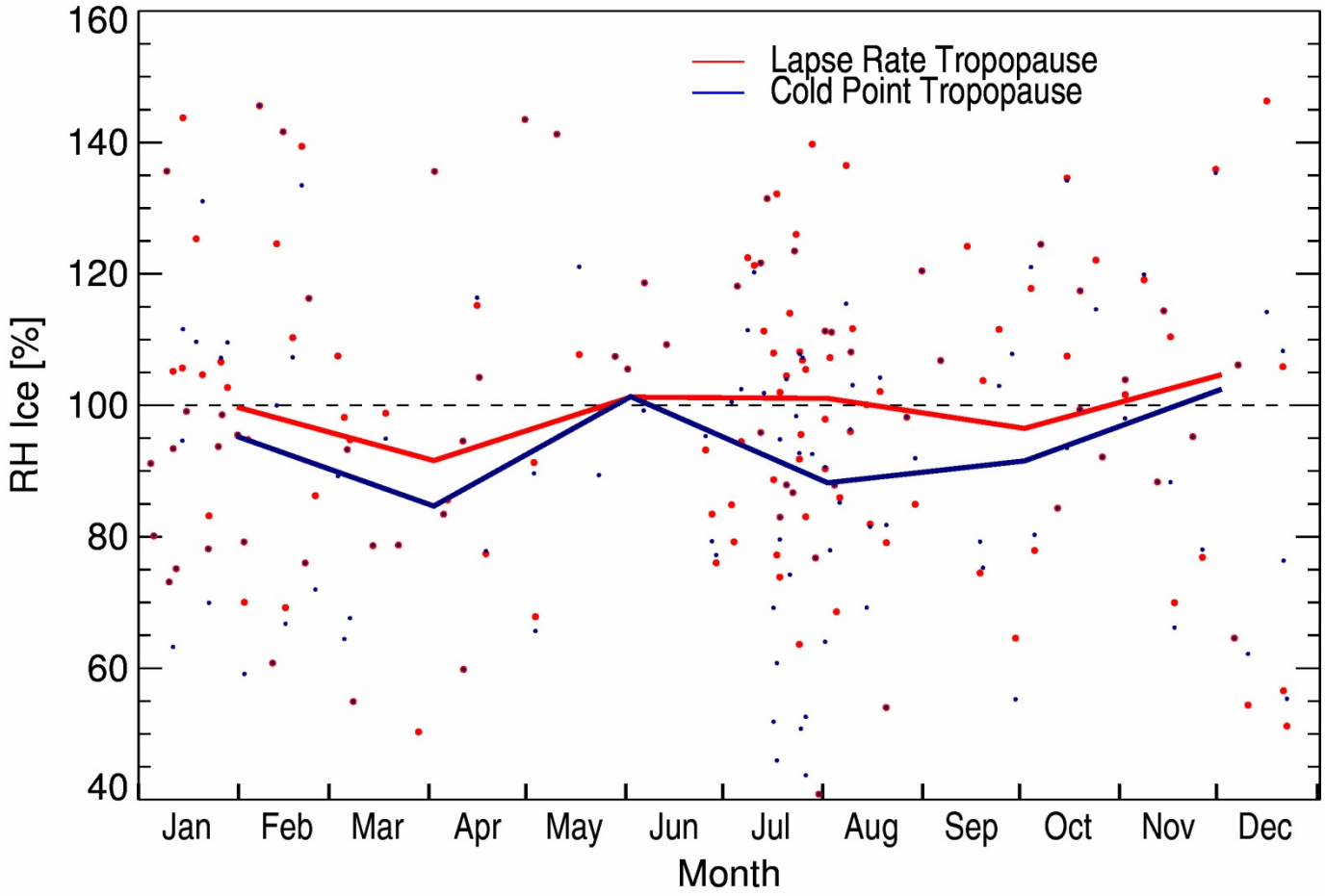
RH (ice) Tropopause (January example)



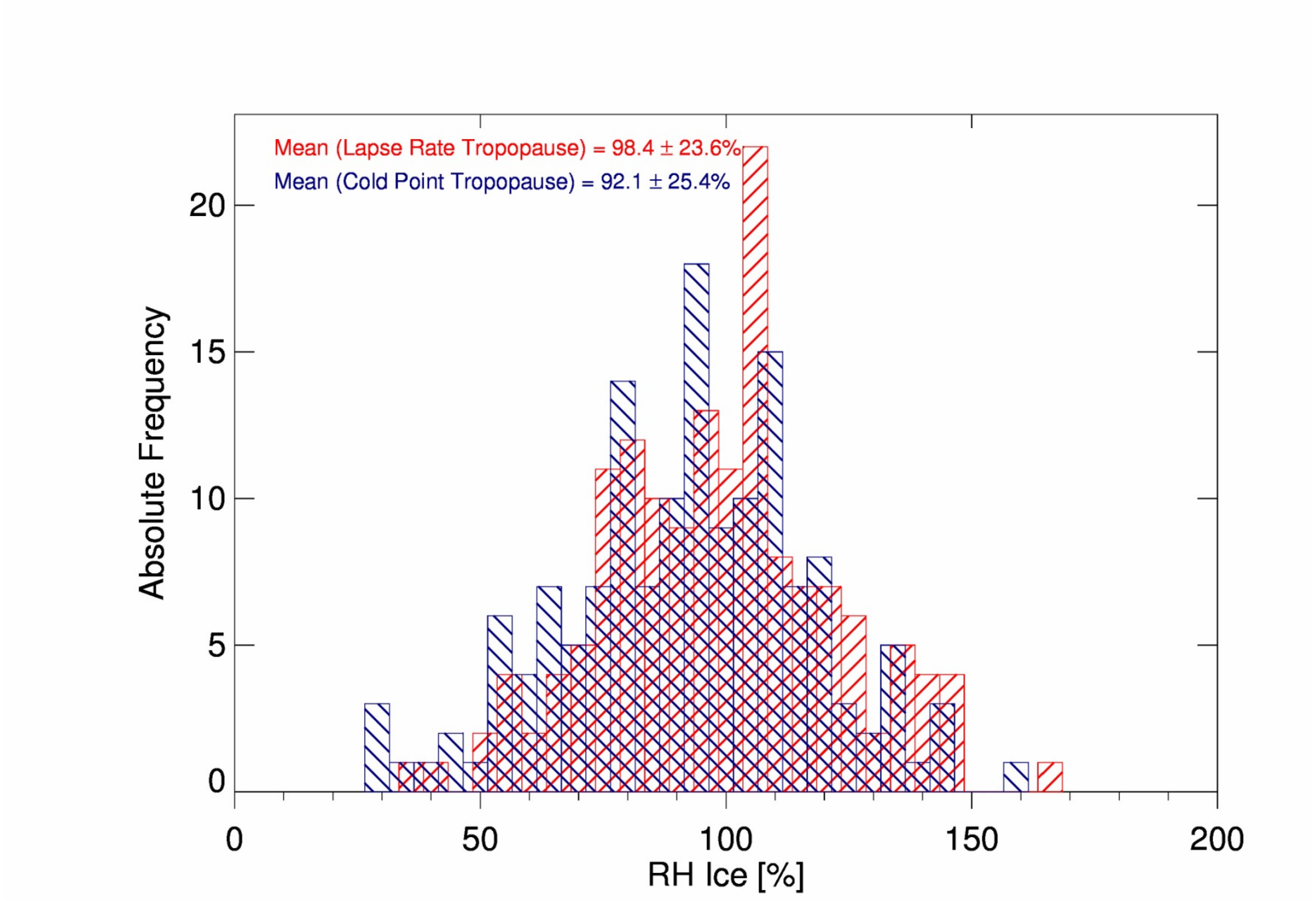
RH (ice) Tropopause (January example)



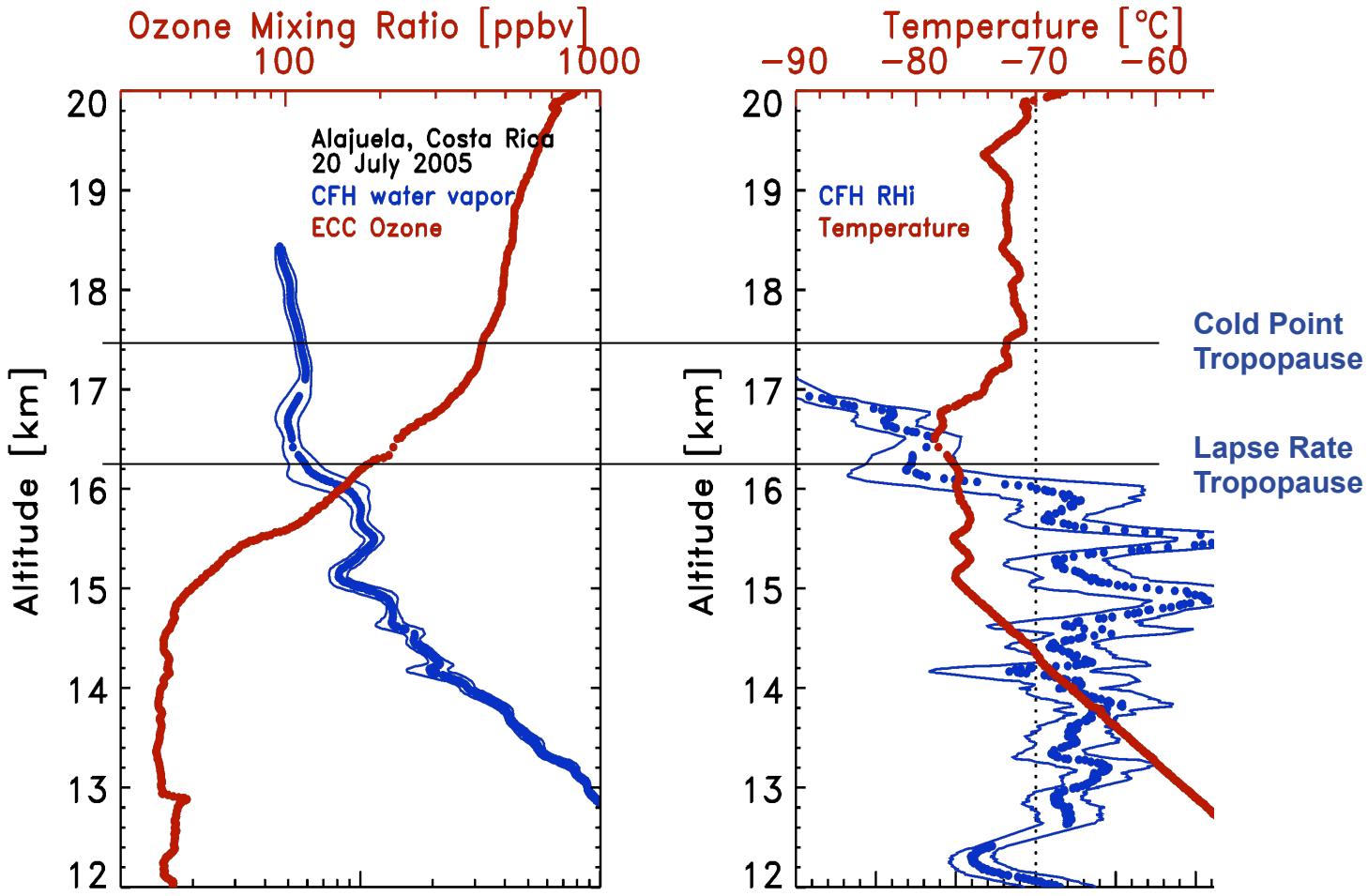
RH (ice) Tropopause



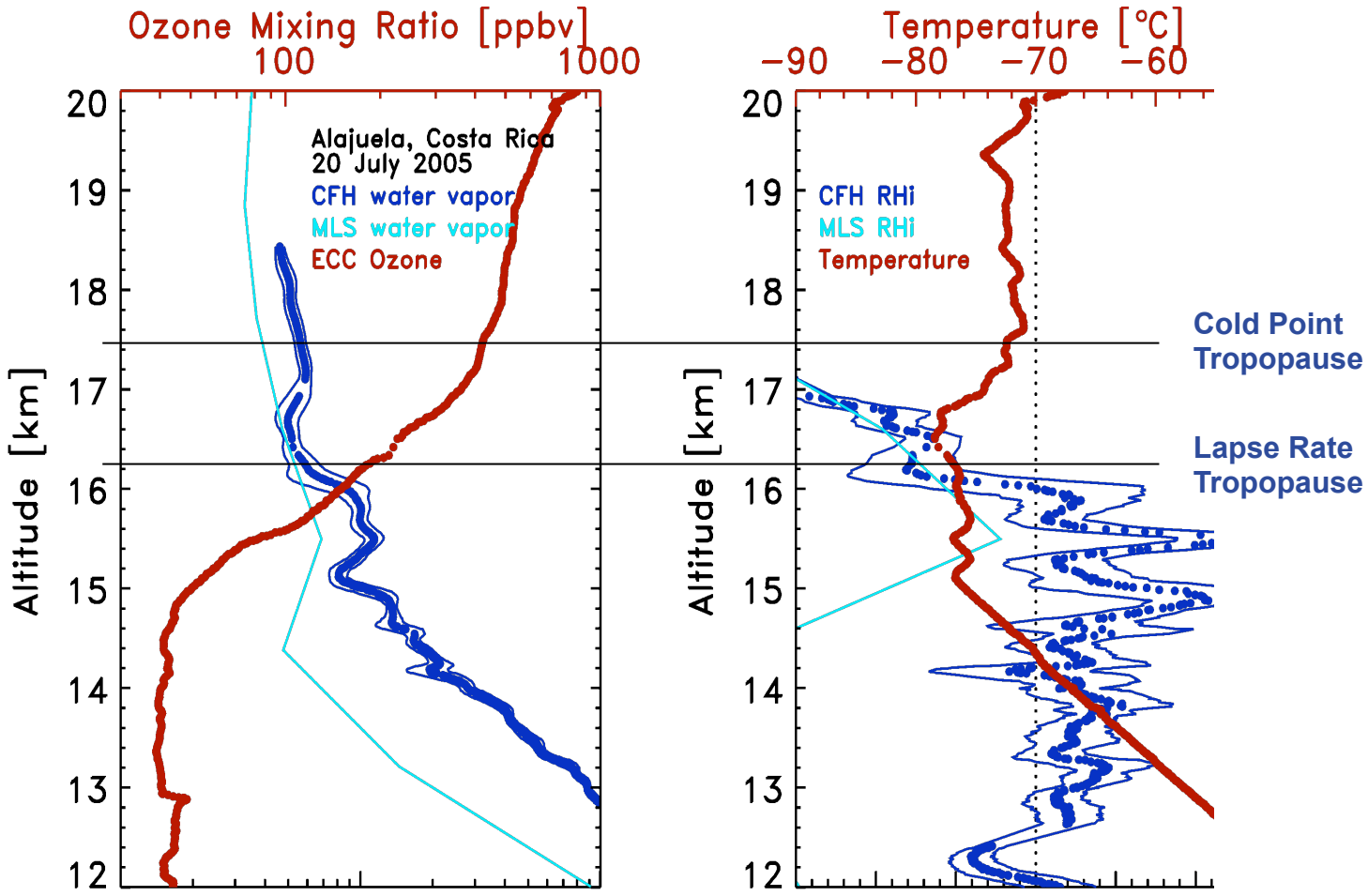
Distribution of tropopause RHi



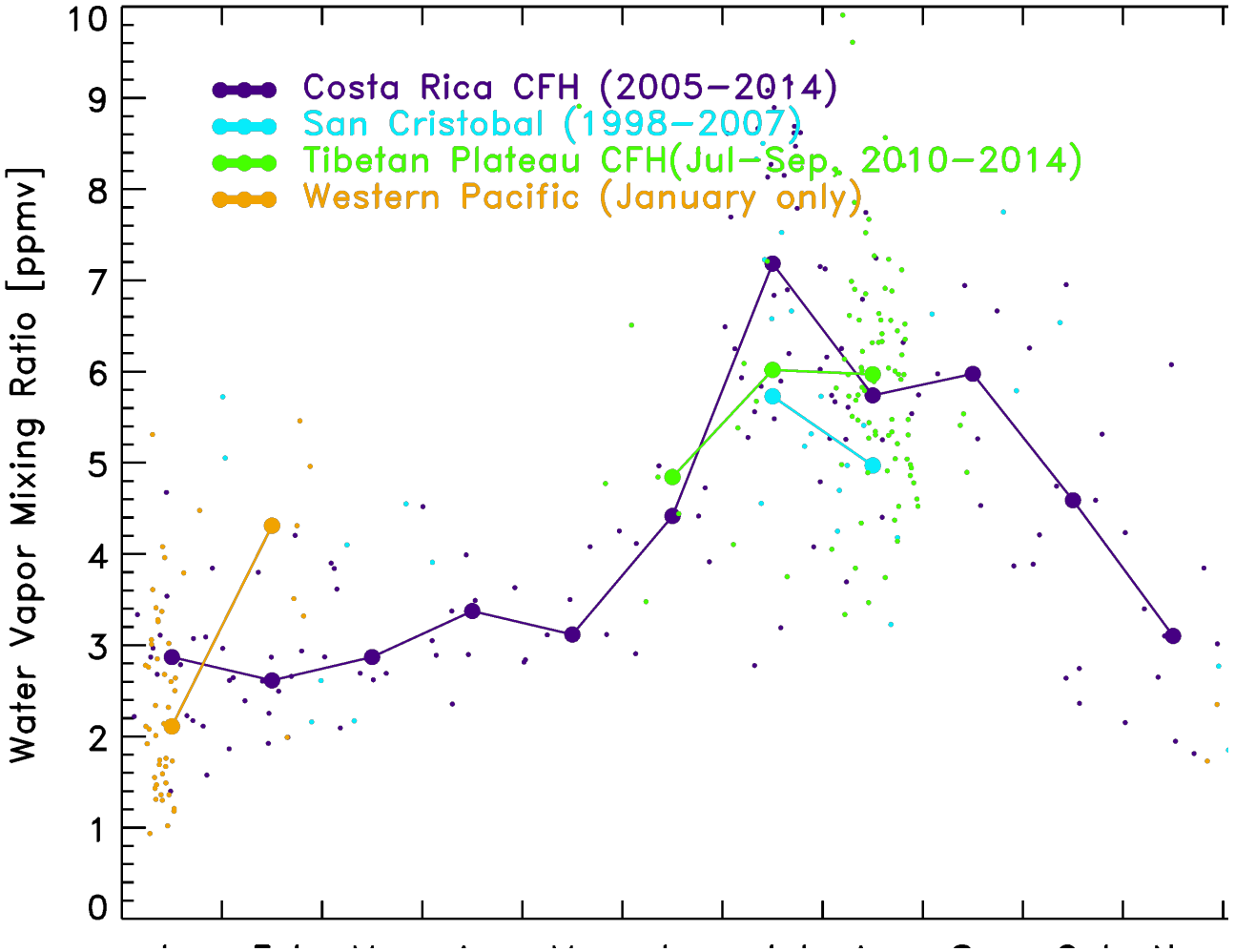
RH (ice) Tropopause (July example)



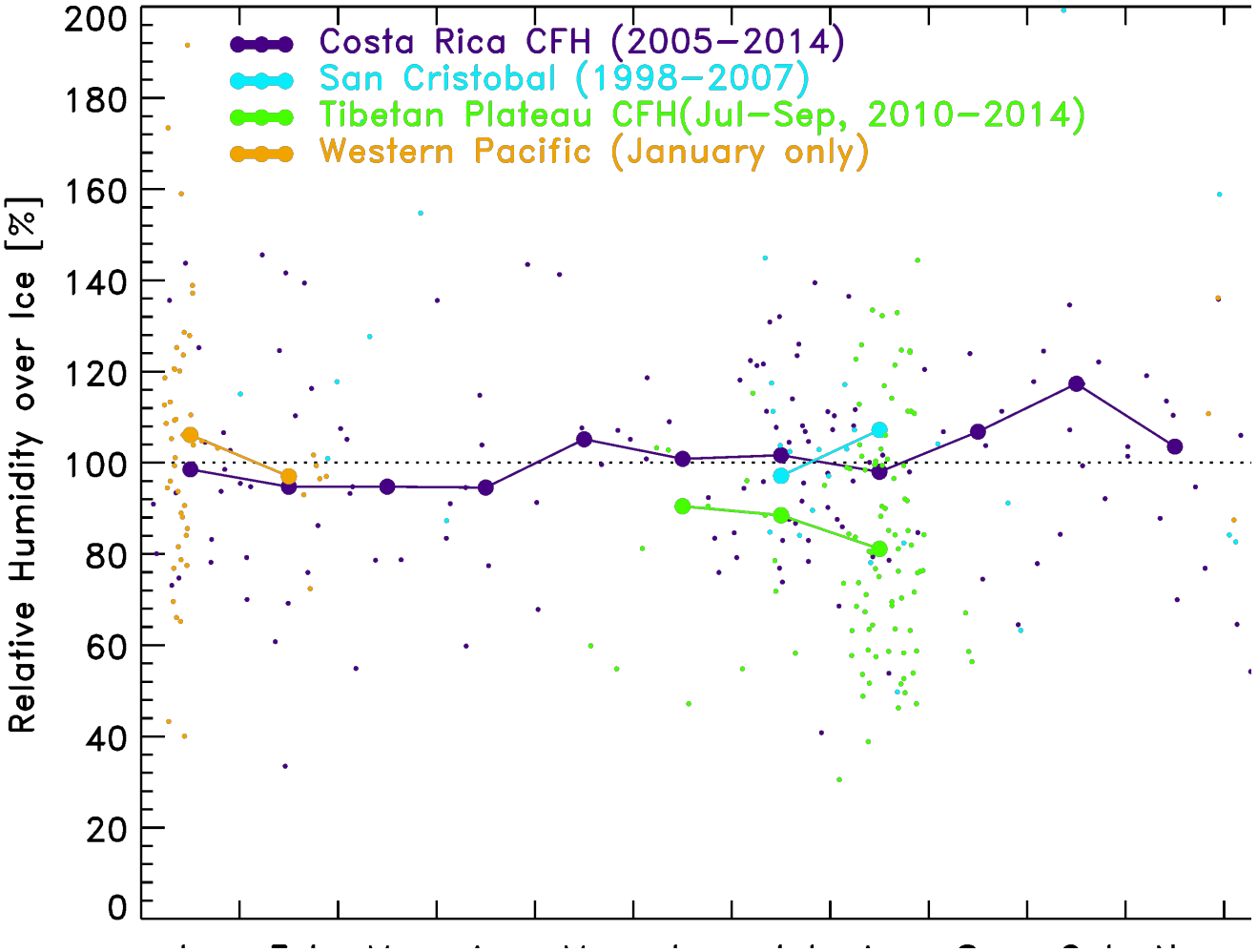
RH (ice) Tropopause (July example)



Seasonal Cycle: Water Vapor
Comparison to other tropical sites



Seasonal Cycle: RH Ice
Comparison to other tropical sites



Summary

- 10 years of stratospheric soundings over Costa Rica:
  187 water vapor profiles
  483 ozone profiles
- Tropopause water vapor mixing ratio
  Monthly mean shows strong seasonal cycle (tape recorder)
- Tropopause relative humidity over ice
  Monthly mean nearly constant at 100% within measurement uncertainty
- Need high vertical resolution data to study tropopause processes
- For large scale trajectory analysis: Need to get temperature right