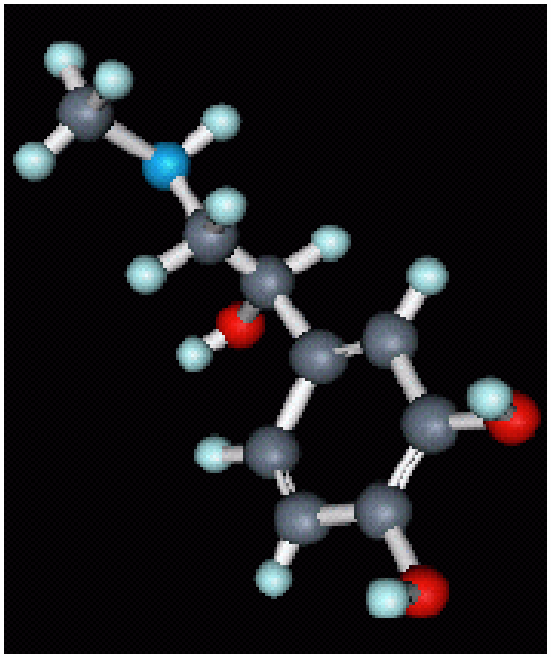
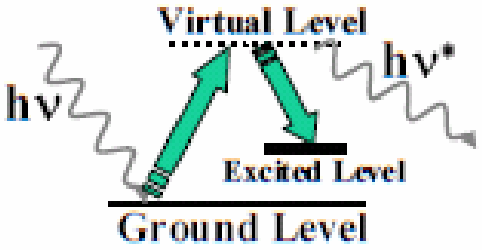
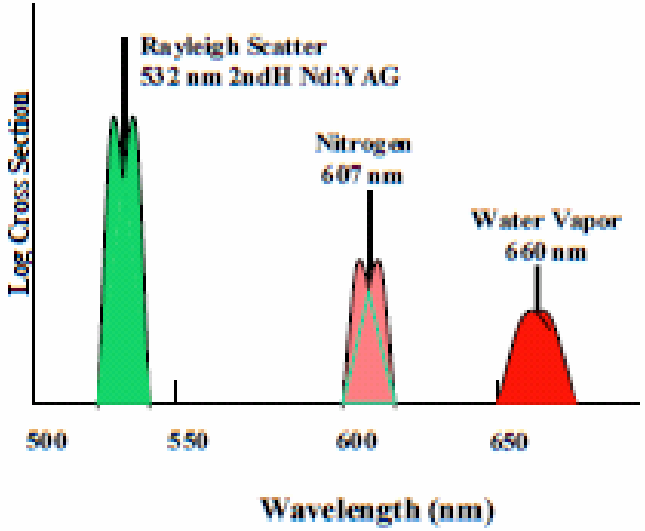
RAMAN SCATTER LIDARS

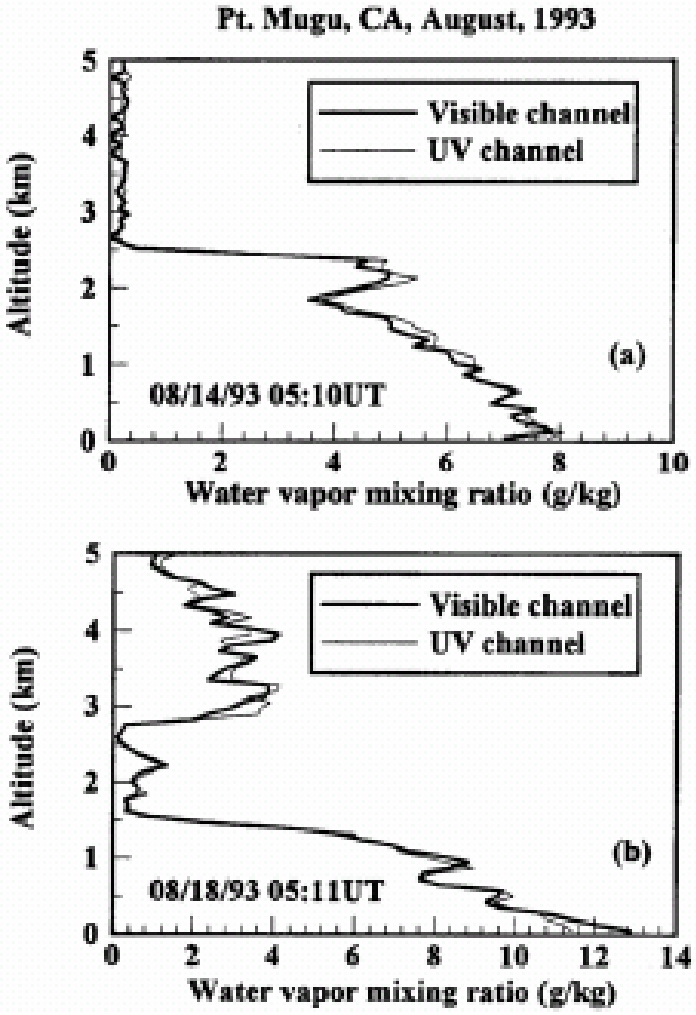


Raman

- any λ_T
- Trace species
- Fairly Weak



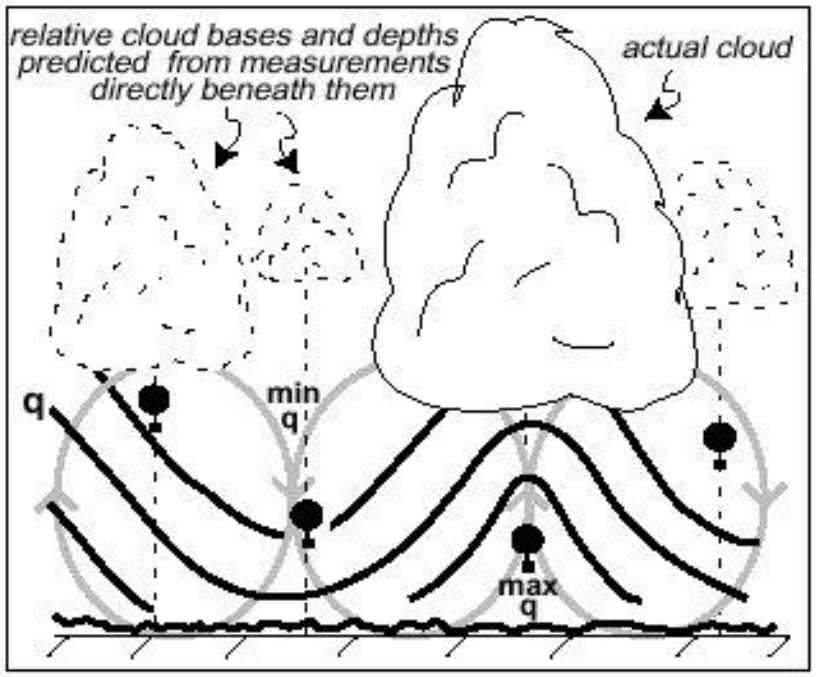




Water Vapor: Motivation

- Mesoscale /convective scale variability is linked to the initiation of convection *(Weckwerth et al. 1996).*

- Accurate characterization of water vapor profiles within and just above the BL required *(e.g., Crook 1996).*

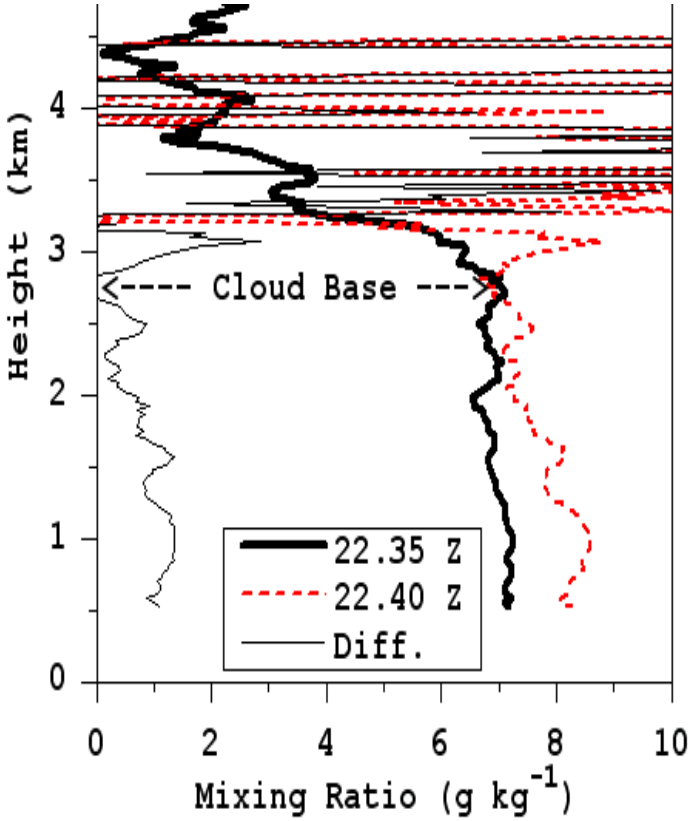


Raman lidars advantage:

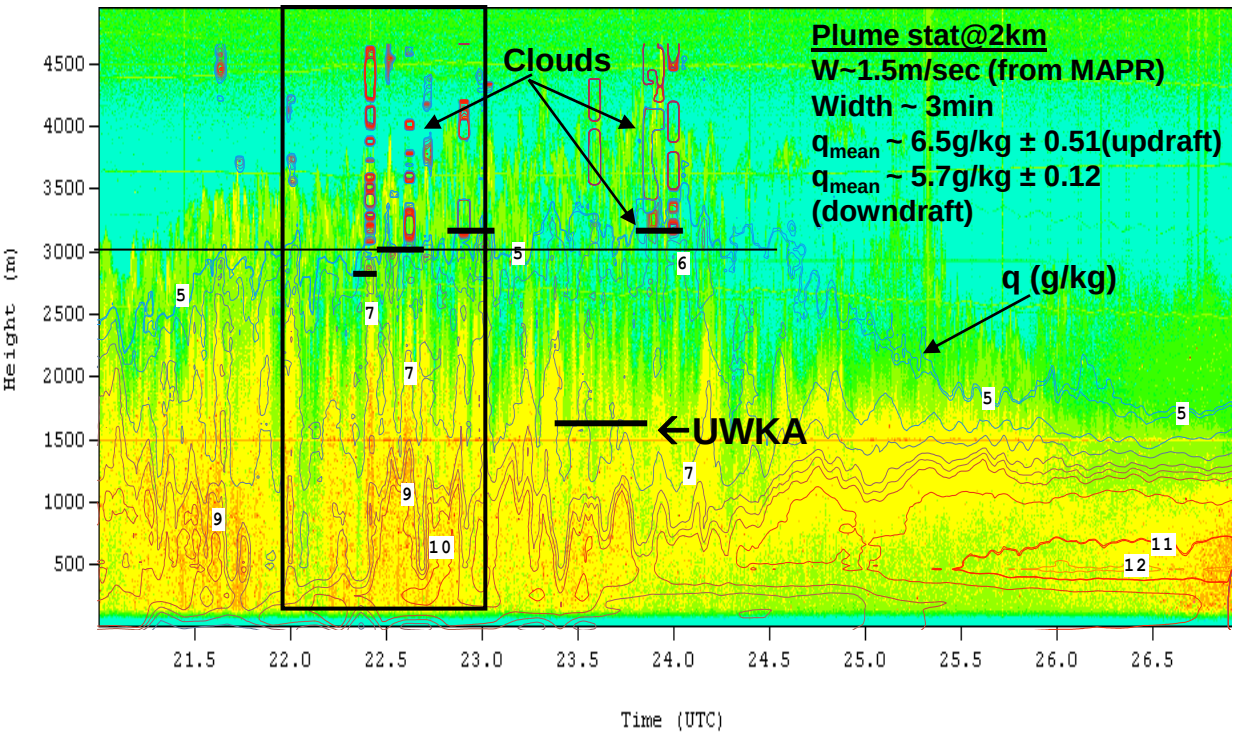
- A profile of mixing ratio (g/kg) every minute
- up to 3-4km in the day time
- up to 8km at night

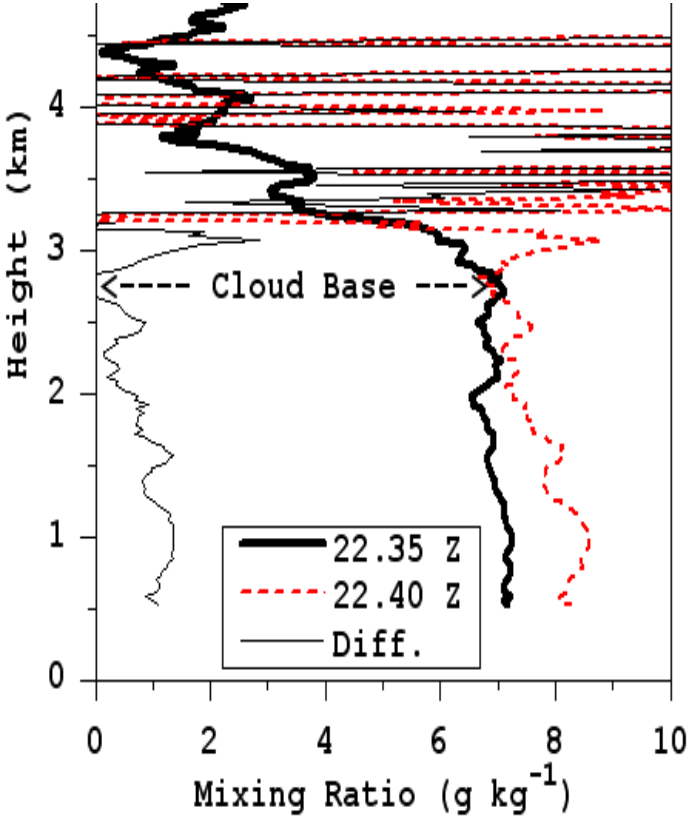
DIAL – lidars:

- Potentially much frequent profiles
- a bit “complicated” than Raman lidars



Raman (g/kg - contour) + FMCW Radar(2.8GHz)
FMCW: a profile every ~2.5 sec and Raman (1min)



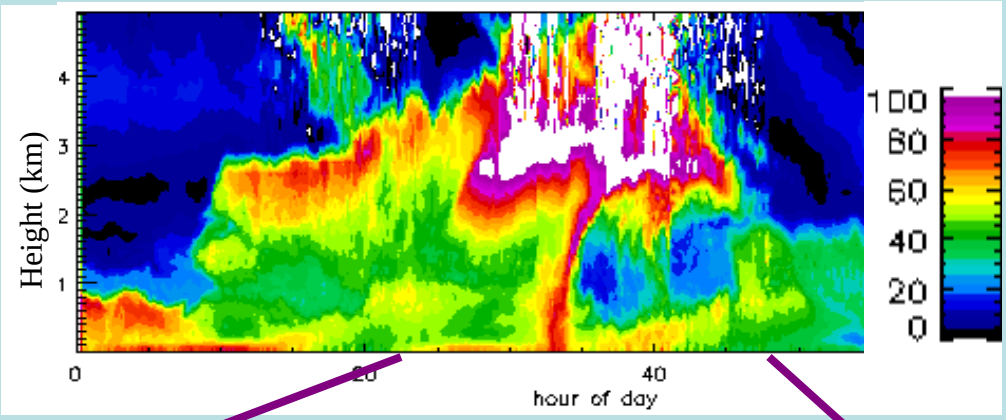


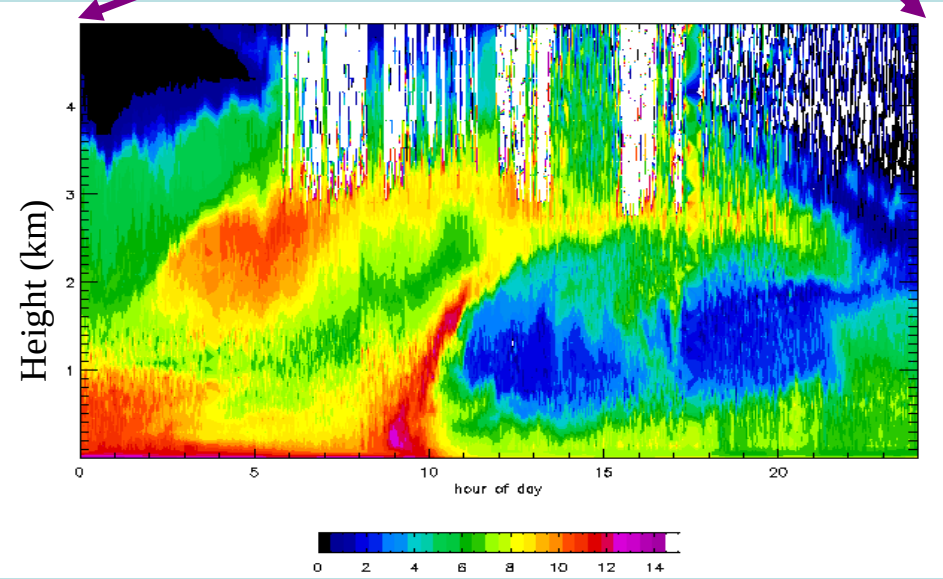
Summary

- Clouds have roots – moisture roots!
- Sub-cloud and non-cloud bases can have as much as 1g/kg difference
- Sonde will not be able to catch this change – trajectory is slanted and not frequent enough.
- 1g/kg deficit in input value could mean the difference between simulating a thunderstorm or not (Crook, 1996).

Mesoscale Application (DOE/SGP-CART):

Symmetric convergence case, 28 Sept. 1997





Convergence dynamics visualized!

← 60hr continuous RH profile

Profiler winds were about 10m/sec in opposing directions

Moisture "lifting" detailed because we had a continuous operation.

Note the narrow convergence line!

Cold-front structure revealed

Options for DYNAMO

NASA/GSFC Raman lidar

- Capable group/instrument
- Interested and exploring funding from NASA/NSF as in IHOP2002
- Costly – large trailer transport.

Howard University System:

- Small and capable
- Interested in packaging it into a trailer
- Funding (piecemeal) could affect timing

Commercial systems:

LEOSPHERE:

- Keen on participating.
- Very small system but limited performance (2 to 3km at night with 30mn accumulation) and day the range would fall below 1km at this point of the development

Raymetrics (through Kip/Zonnen):

- Waiting to hear from them but do have a system