

# GOAmazon and Cloud Life Cycles

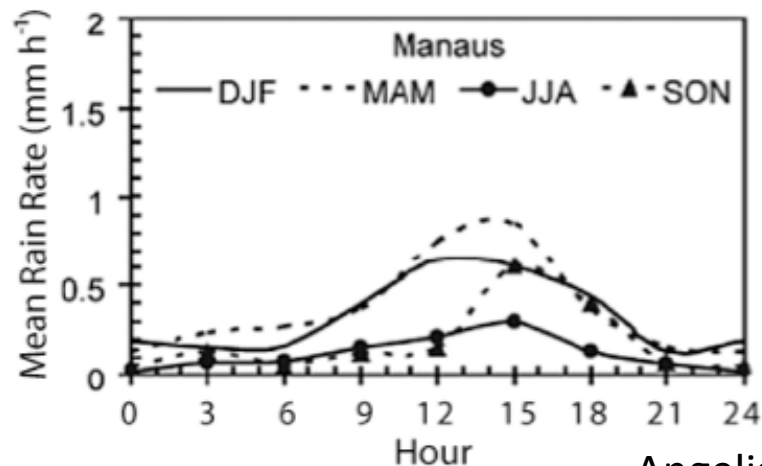
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# Cloud life cycle working group foci

1. Transition of convection from shallow to mid-level to deep over land and ocean
2. Mesoscale convective organization and persistence of stratiform rain and anvil
- ~~3. Formation, persistence, and evolution of cumulus, stratocumulus, and stratus clouds in warm and cold climates~~
4. Partition of phase in mixed-phase clouds (including nimbostratus and deep convection)
5. Temporal evolution and vertical distribution of ice particle size distribution (PSD)

# Shallow-to-deep transition

- This question is especially relevant to the **diurnal cycle** over the Amazon, which varies seasonally
- Diurnal cycle over land is challenge for many GCMs
- Determine sensitivities to temperature and humidity profiles and links to entrainment and detrainment
- Compare to transition over ocean (e.g., AMIE) and other distinct land regions (e.g., AMMA)



Angelis et al. (2004)

# Mesoscale organization

- Convection is most organized in the wet season of MAM and less organized but more intense in the transition season of SON
- Most GCMs don't consider mesoscale organization
- Natural extension of convective-stratiform-anvil transition group
- Consider role of what organizes convection (e.g., BL conditions, low-level wind shear, cold pools, gravity waves) and persistence of stratiform rain regions and anvil (e.g., mid and upper level humidity and shear, convective sustainability, radiative feedbacks)

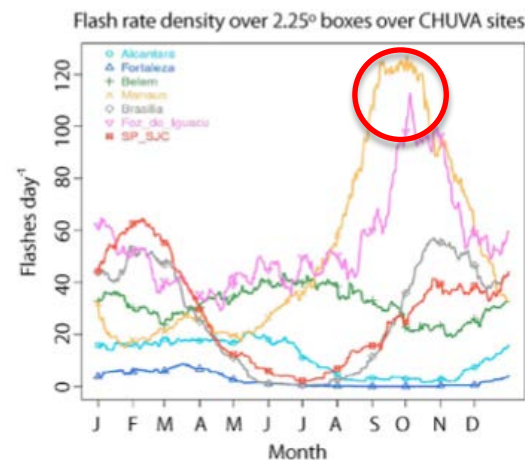
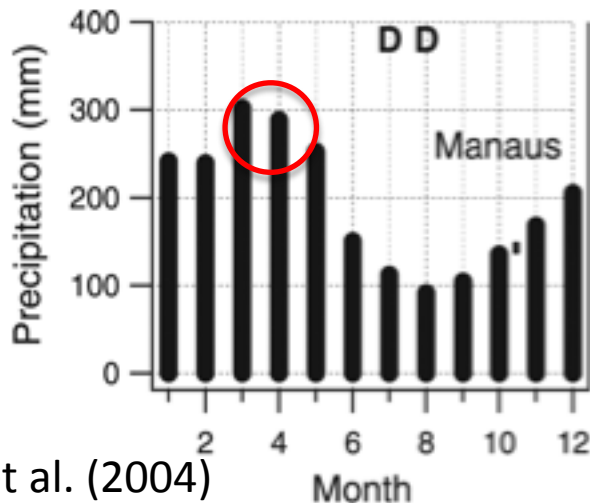


Figure courtesy of R. Albrecht

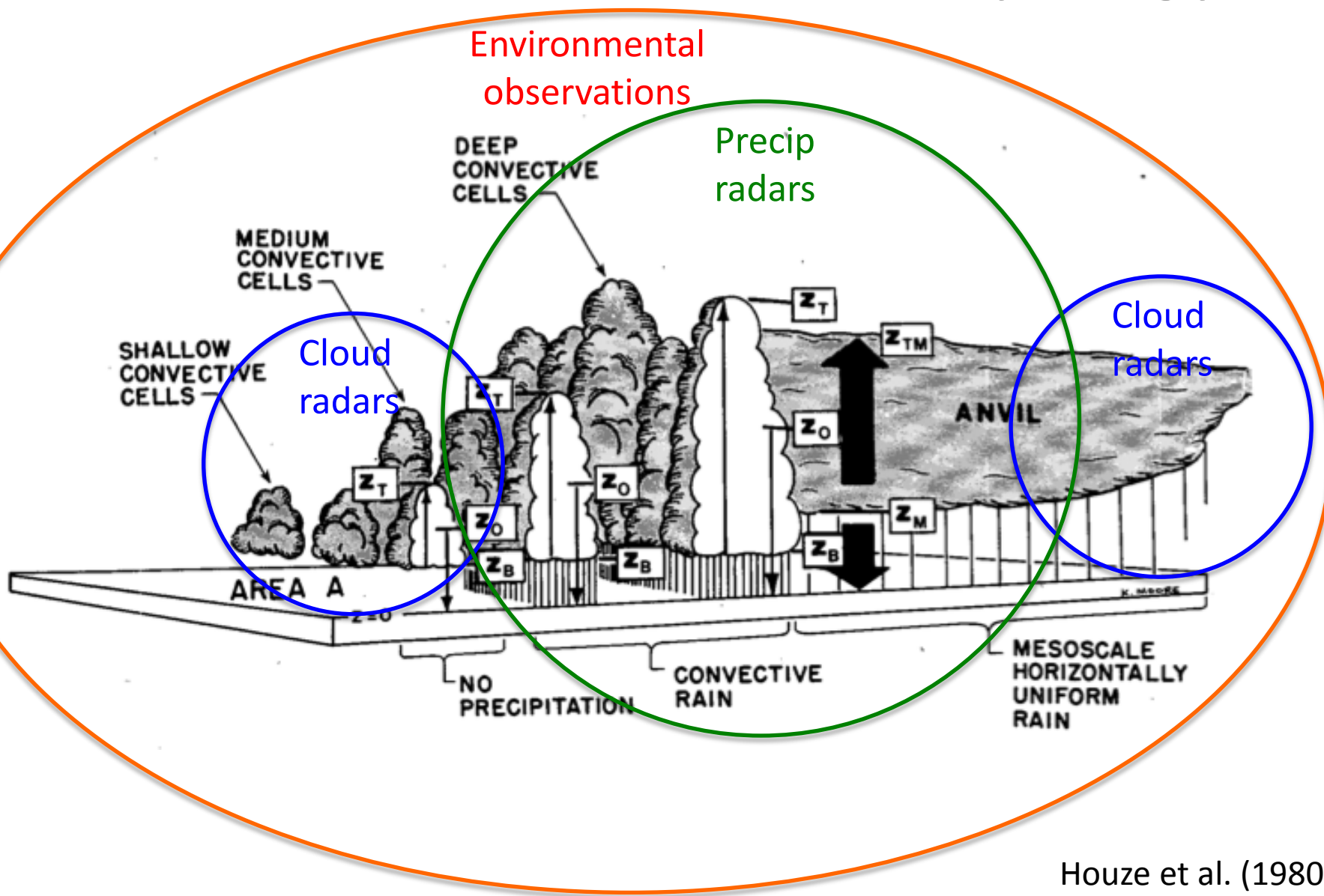
# Mixed phase partition and ice PSD

- Large amounts of deep convection, nimbostratus, non-precipitating anvil, and cirrus will be observed during GOAmazon throughout the year
- In situ measurements in the mixed phase ( $\sim 5-7$  km) and ice ( $>5$  km) regions will be possible during aircraft IOPs
- Polarimetric radar retrievals provide hydrometeor info aloft in addition to vertically pointing cloud radar retrievals
- Study lightning's link to mixed phase partition

# Observations/Models

- Radars: KAZR, W- and  $K_a$ -SACR, X-Pol, operational S-band, S-Pol (in review)
- Other sensors: lidars, AERI, wind profilers, ceilometers, MW radiometers, disdrometers, gauges, lightning instruments
- Soundings: 4/day at AMF1, 2/day at Manaus, higher sampling during IOPs, sounding network and Lagrangian balloons (in review)
- Aircraft: DOE G1 and German HALO during select IOPs (note G1 maximum altitude is 7 km)
- Satellites: TRMM/GPM, CloudSat, Megha-Tropiques
- Modeling: *Forcing data set will be created*, a number of operational (e.g., CPTec) and research model runs (both cloud and regional scale) are planned

# GOAmazon observational synergy







# Potential S-Pol and sounding array sites

