Sensitivity of Cloud and Precipitation to Aerosol, Surface and Thermodynamics in Amazonas

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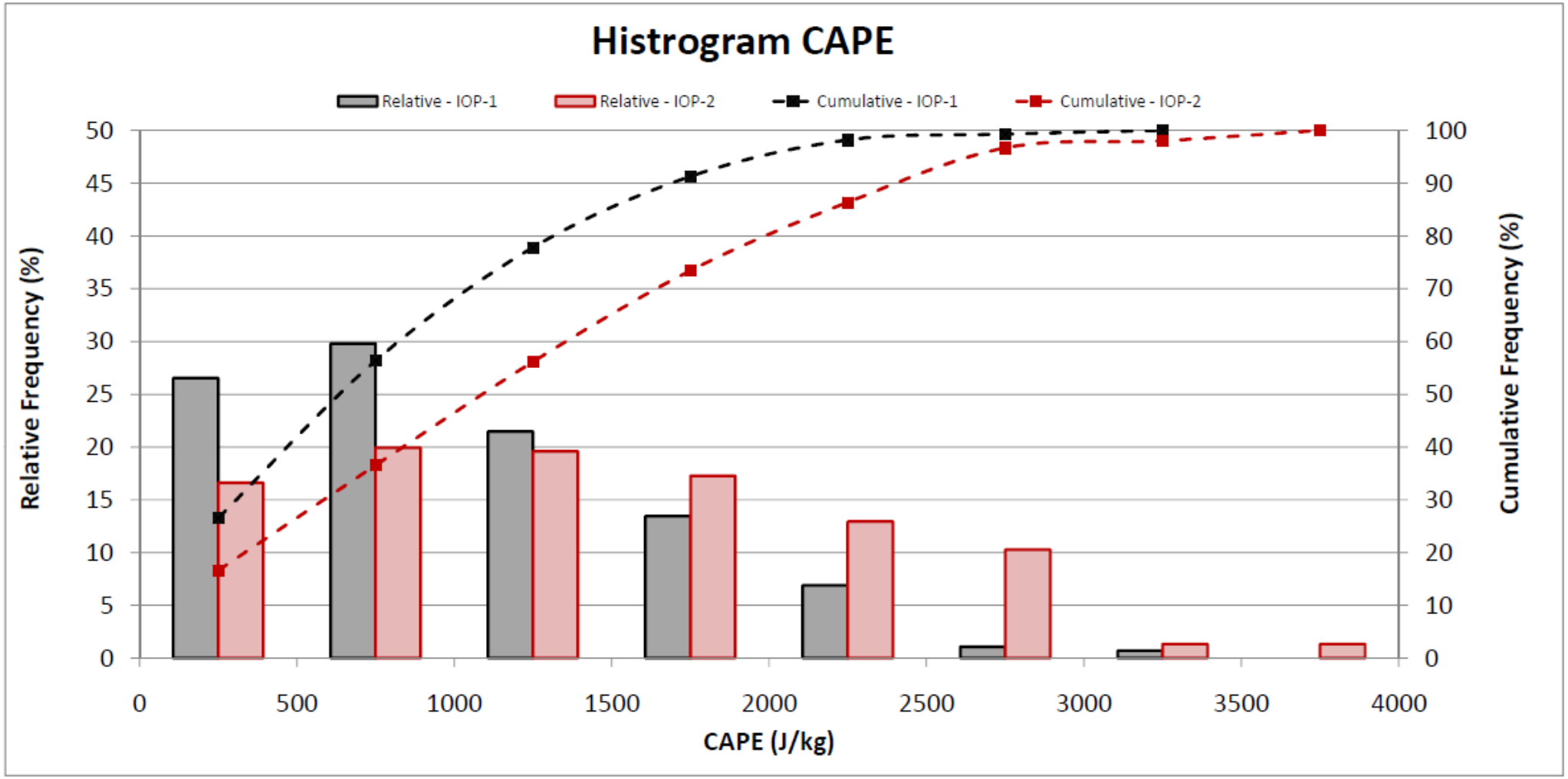
Outcome

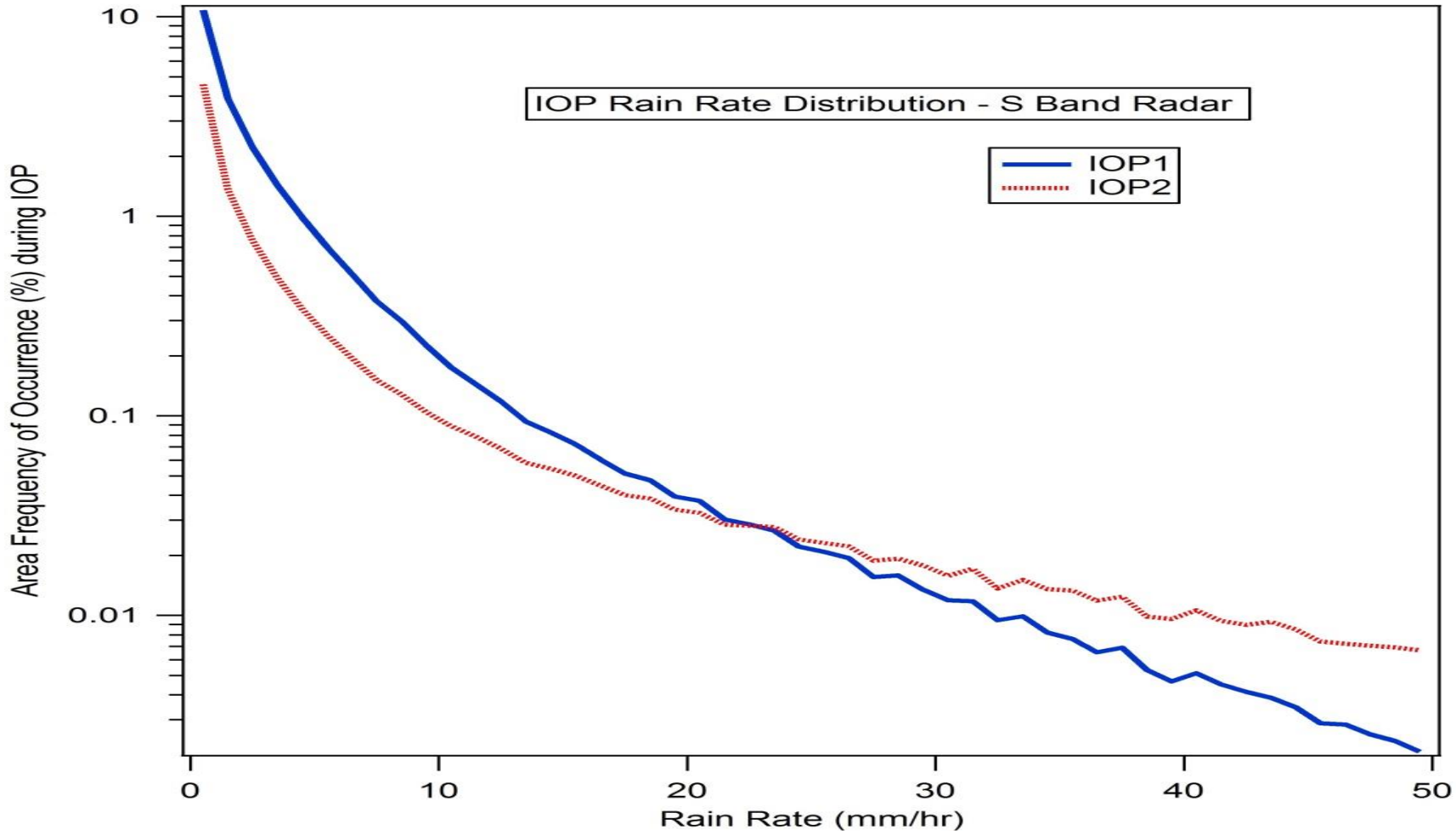
- *Rainfall and Cloud Characteristics for each IOP;*
- *Rainfall and Cloud as Function of Orography;*
- *Rainfall and Cloud Microphysics as Function of Vegetation type;*
- *Rainfall and Cloud Microphysics as Function of Aerosol.*

Rainfall and Clouds Characteristics for each IOP

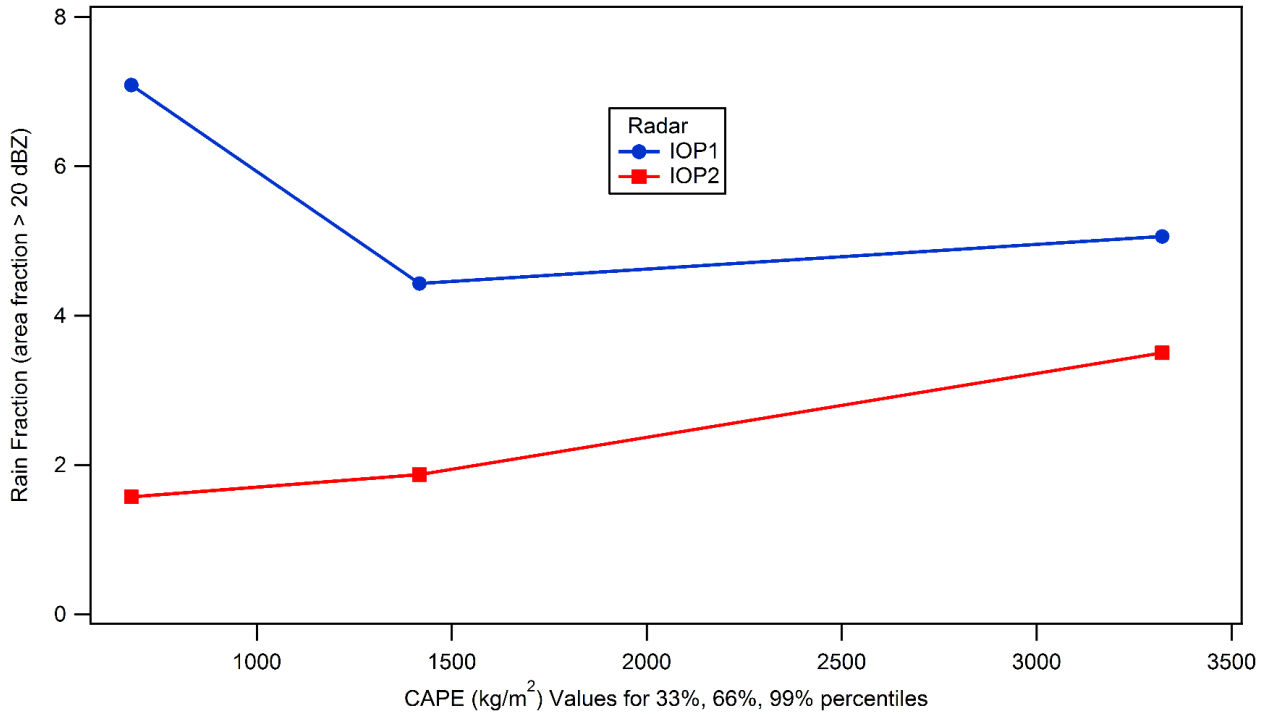
CAPE – Convective Available Potential Energy

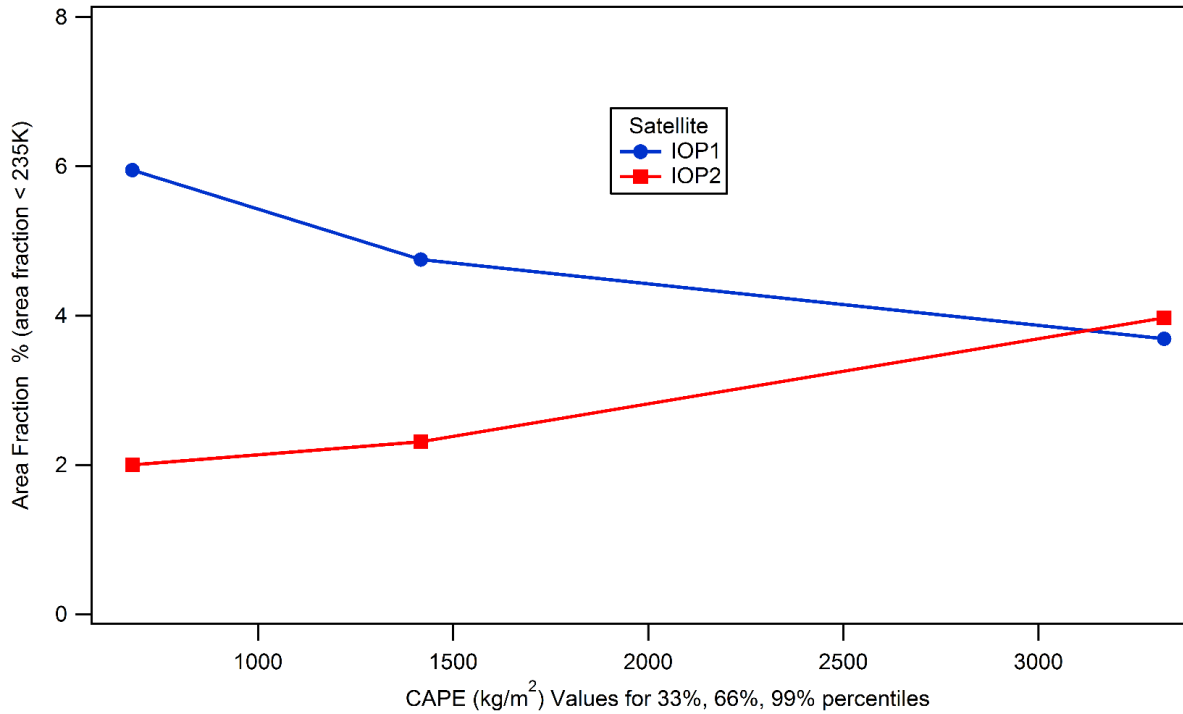


Rain Rate Distribution as Function of the IOPs

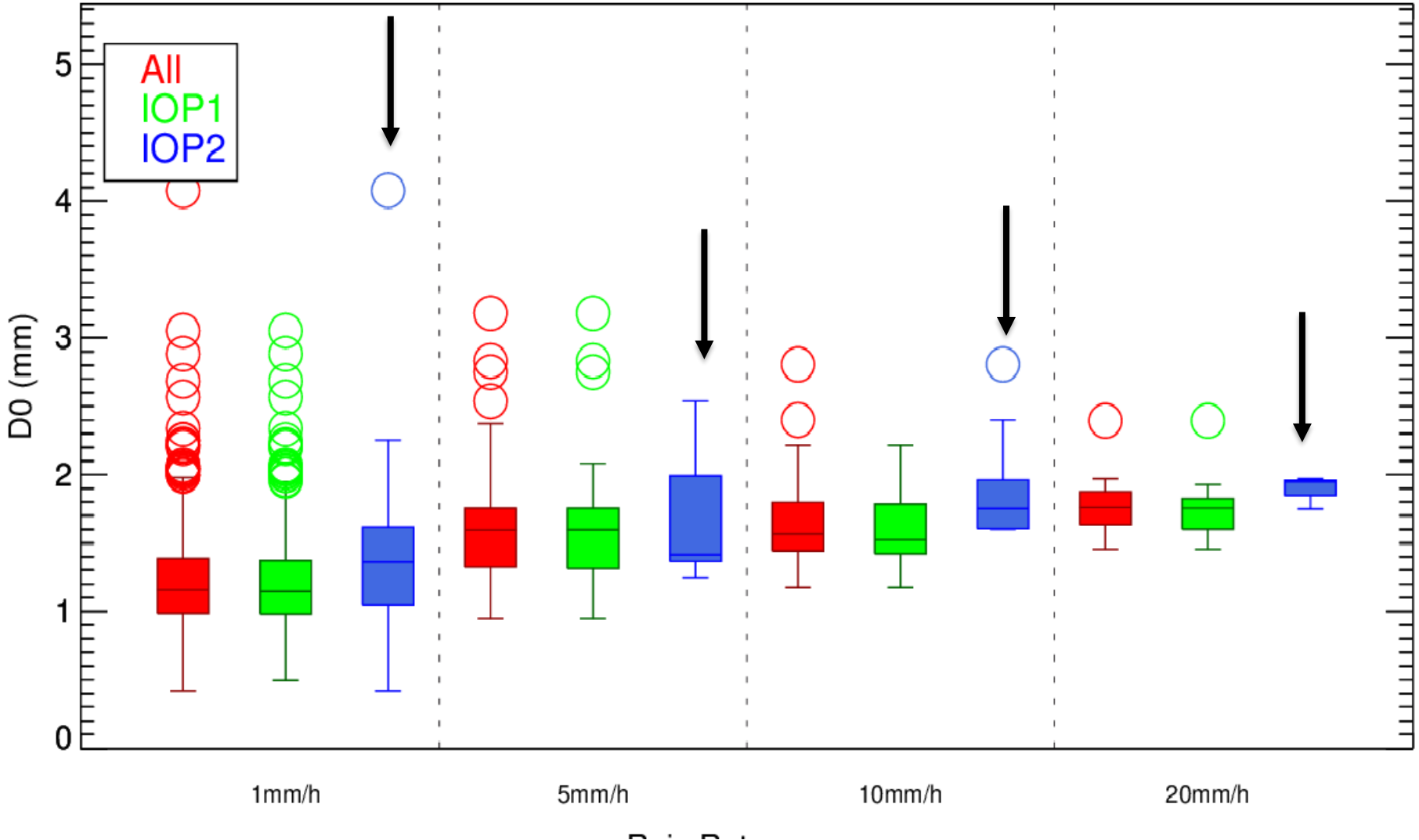


CAPE vs Rainfall and Cloud Cover

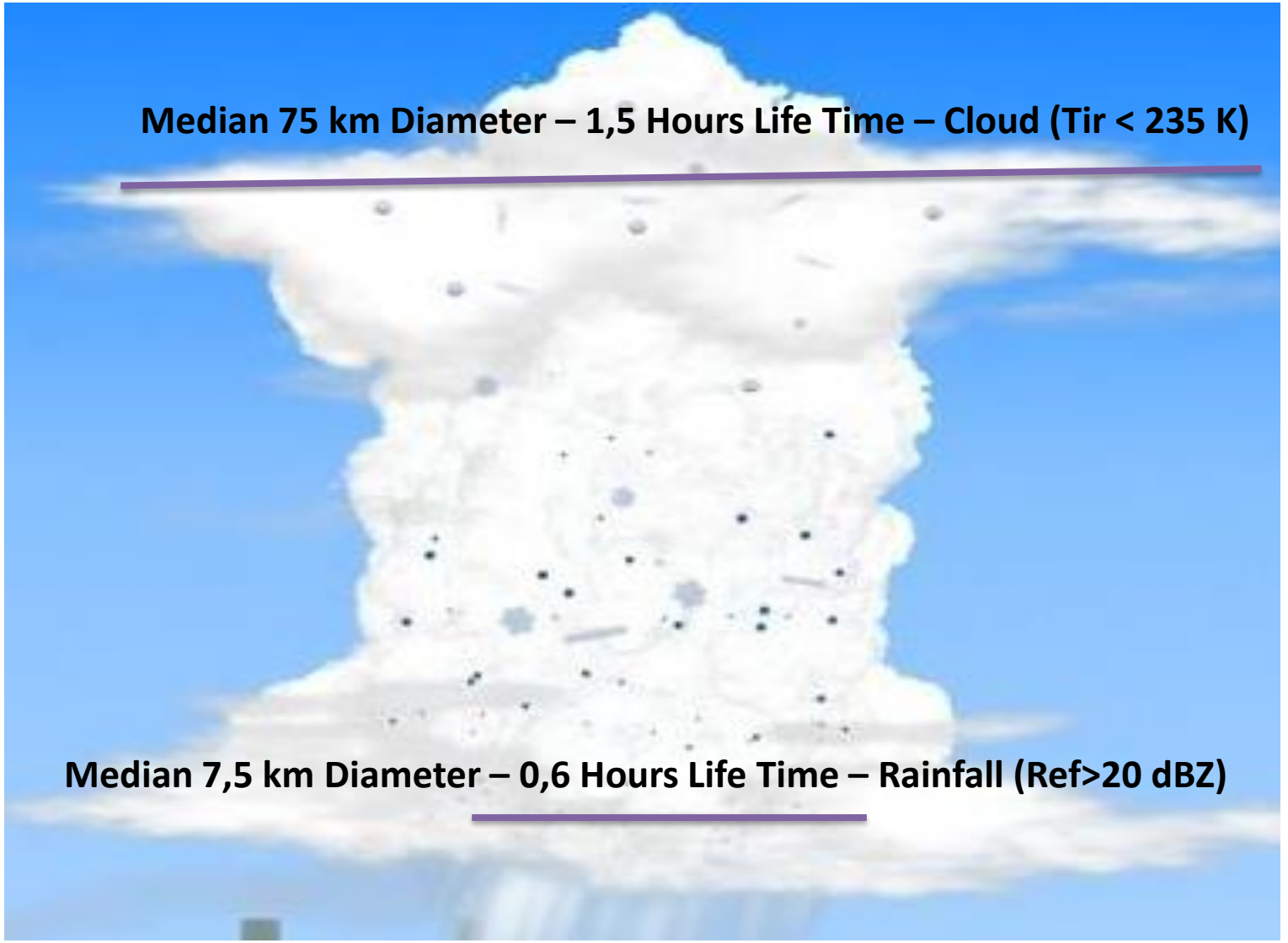




Droplet Size Distribution As Function of IOPs

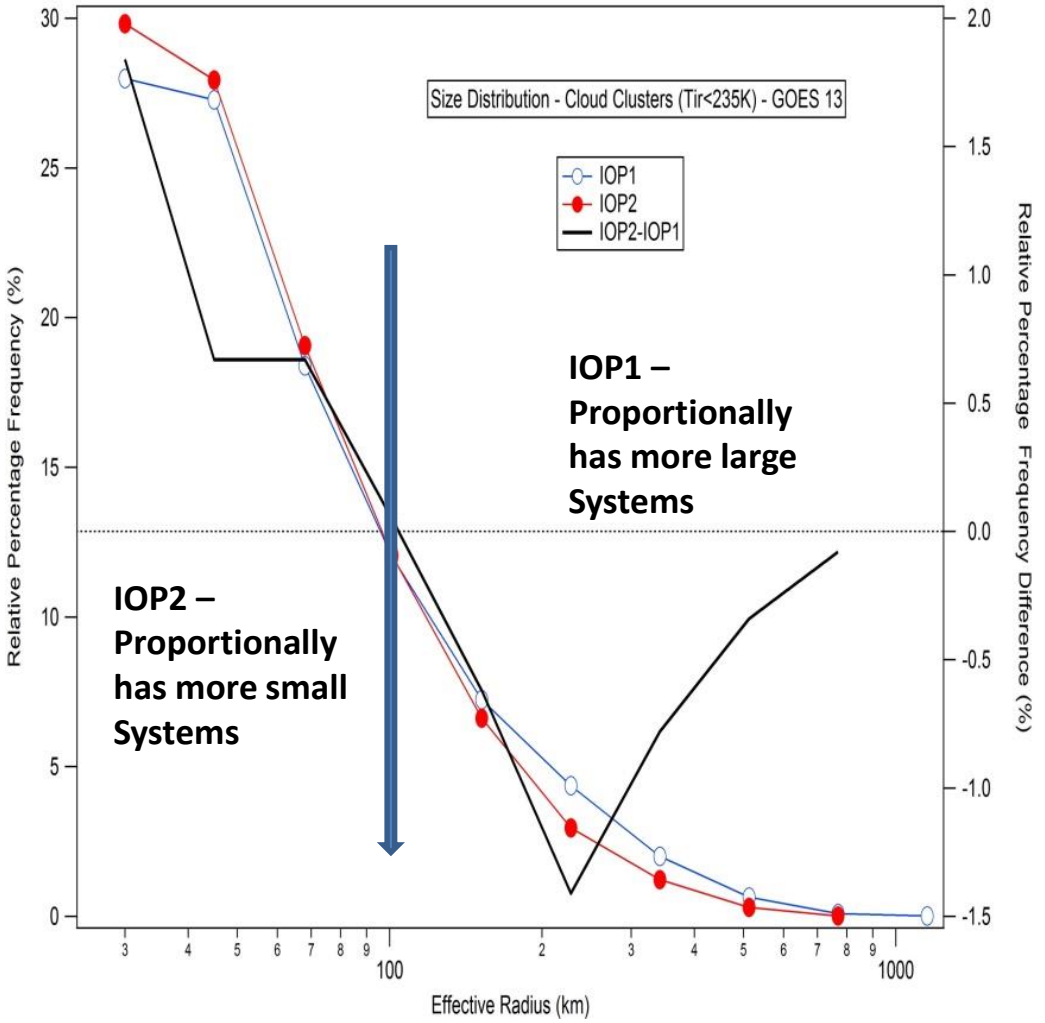


Cloud and Rainfall Space-Time Scale
Amazonian Typical Convective Cloud

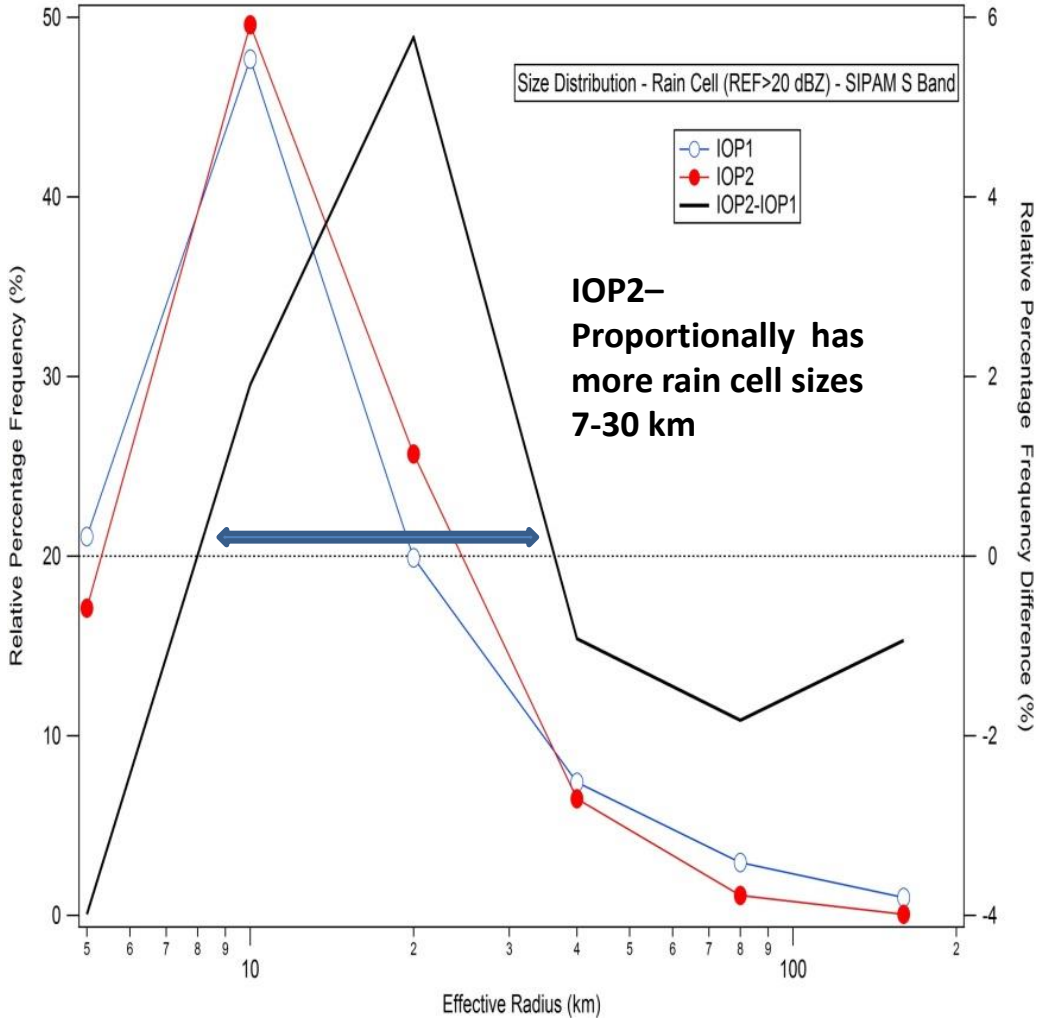


Cloud and Rainfall Organization – Space Scale
IOP1 and IOP2

CLOUD

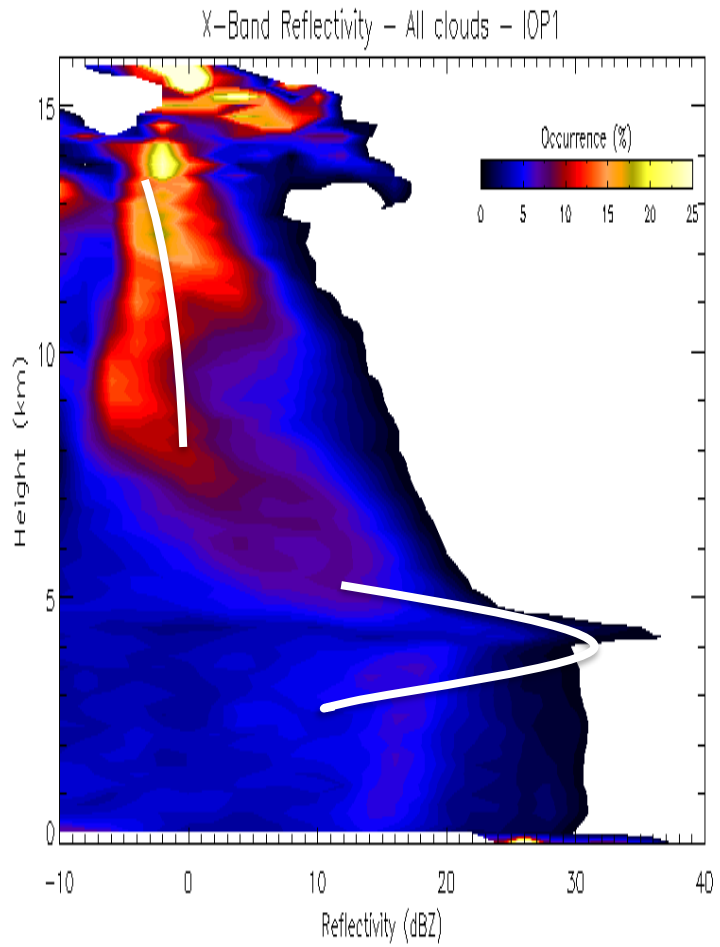


RAINFALL



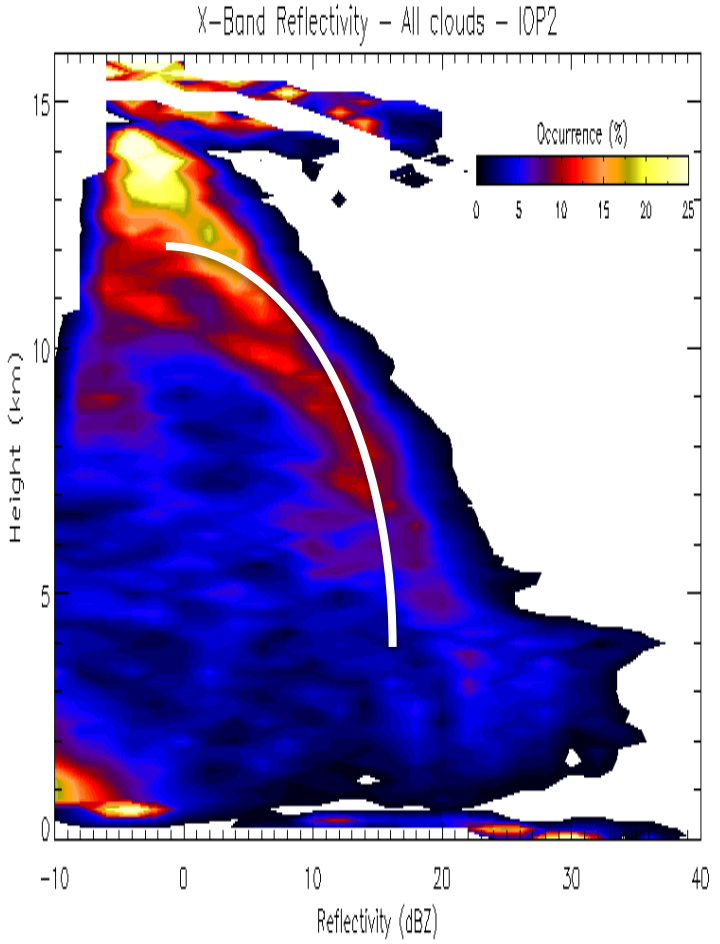
CFAD – Contour Frequency by Altitude Diagrams

IOP1



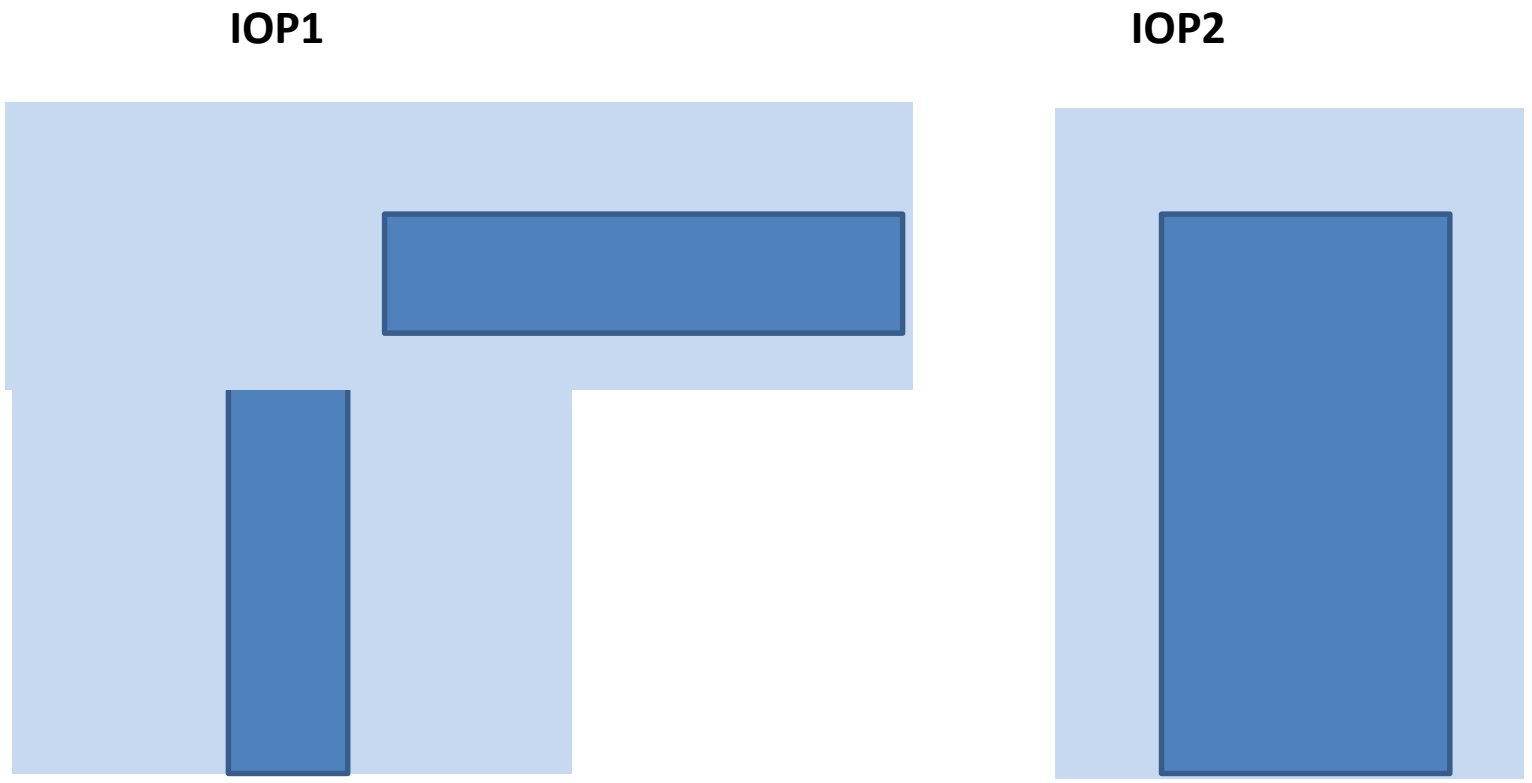
Average Behavior - Typical Stratiform

IOP2



Average Behavior - Typical Convective

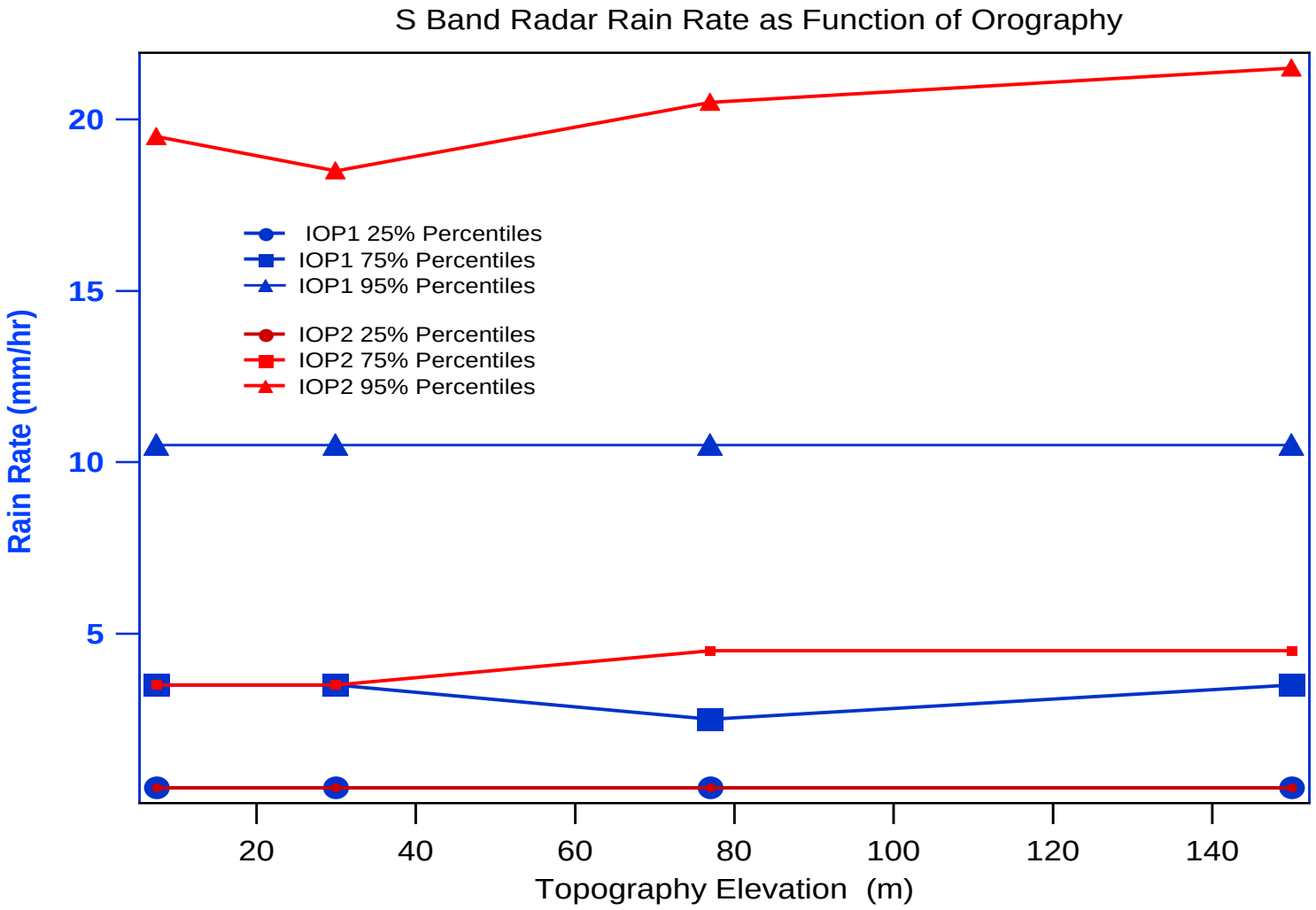
Cloud and Rainfall Organization
IOPs Difference (Wet and Dry Season)

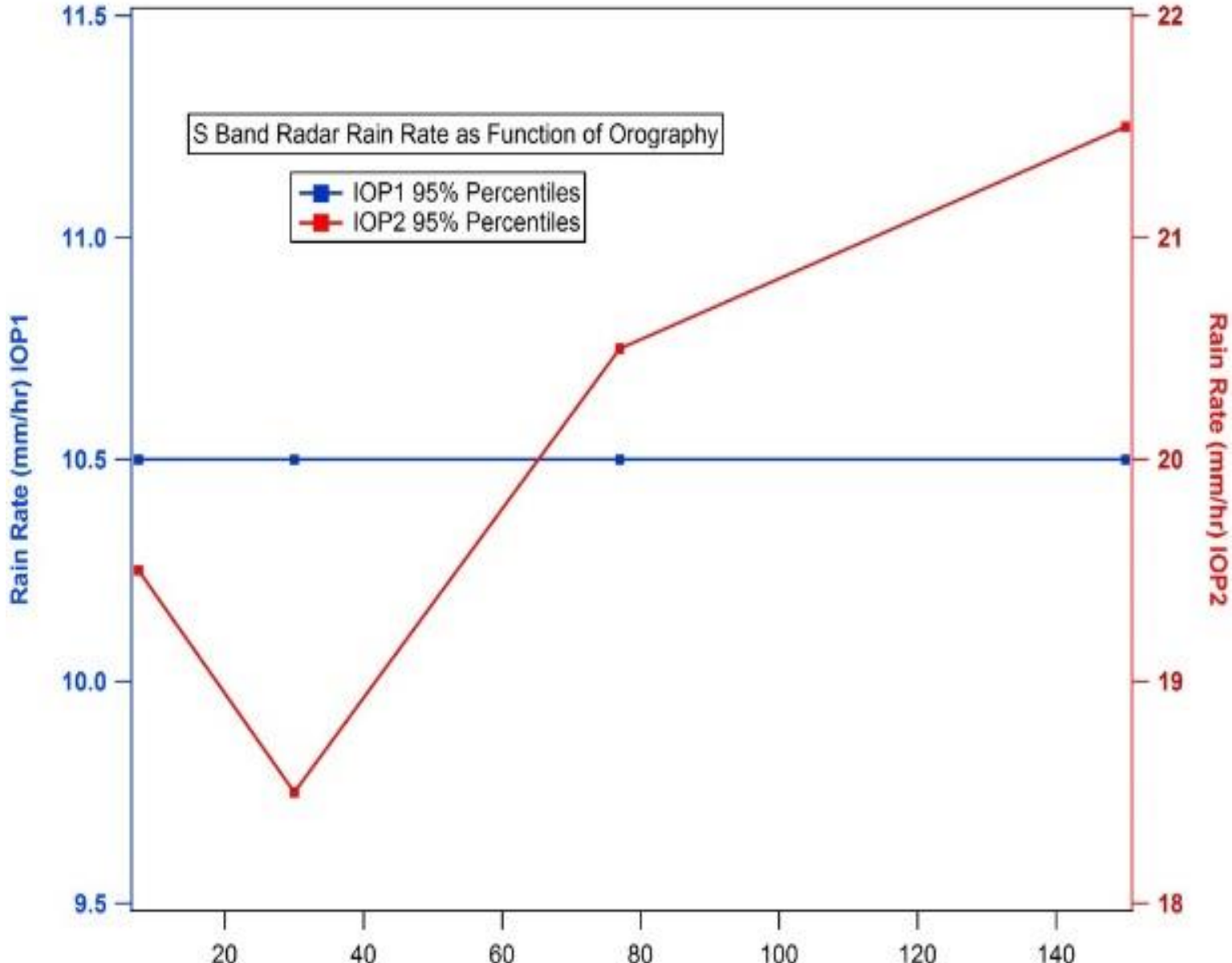


Life Time of clouds and rain cells $T_{iop1} > T_{iop2}$

Rainfall as Function of Orography

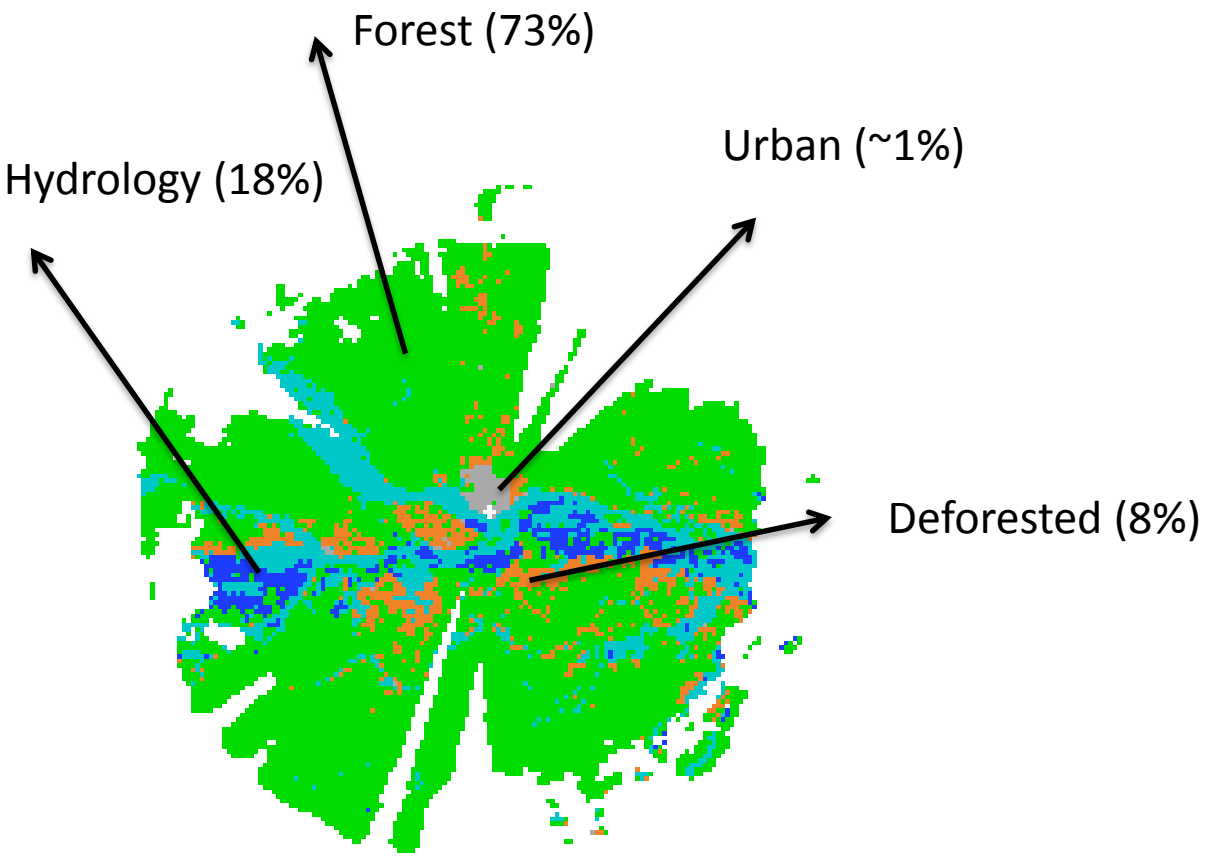
Rainfall as Function of Orography




S Band Radar Rain Rate as Function of Orography
IOP1 95% Percentiles
IOP2 95% Percentiles
Rain Rate (mm/hr) IOP1
Rain Rate (mm/hr) IOP2
11.5
11.0
10.5
10.0
9.5
22
21
20
19
18
20
40
60
80
100
120
140

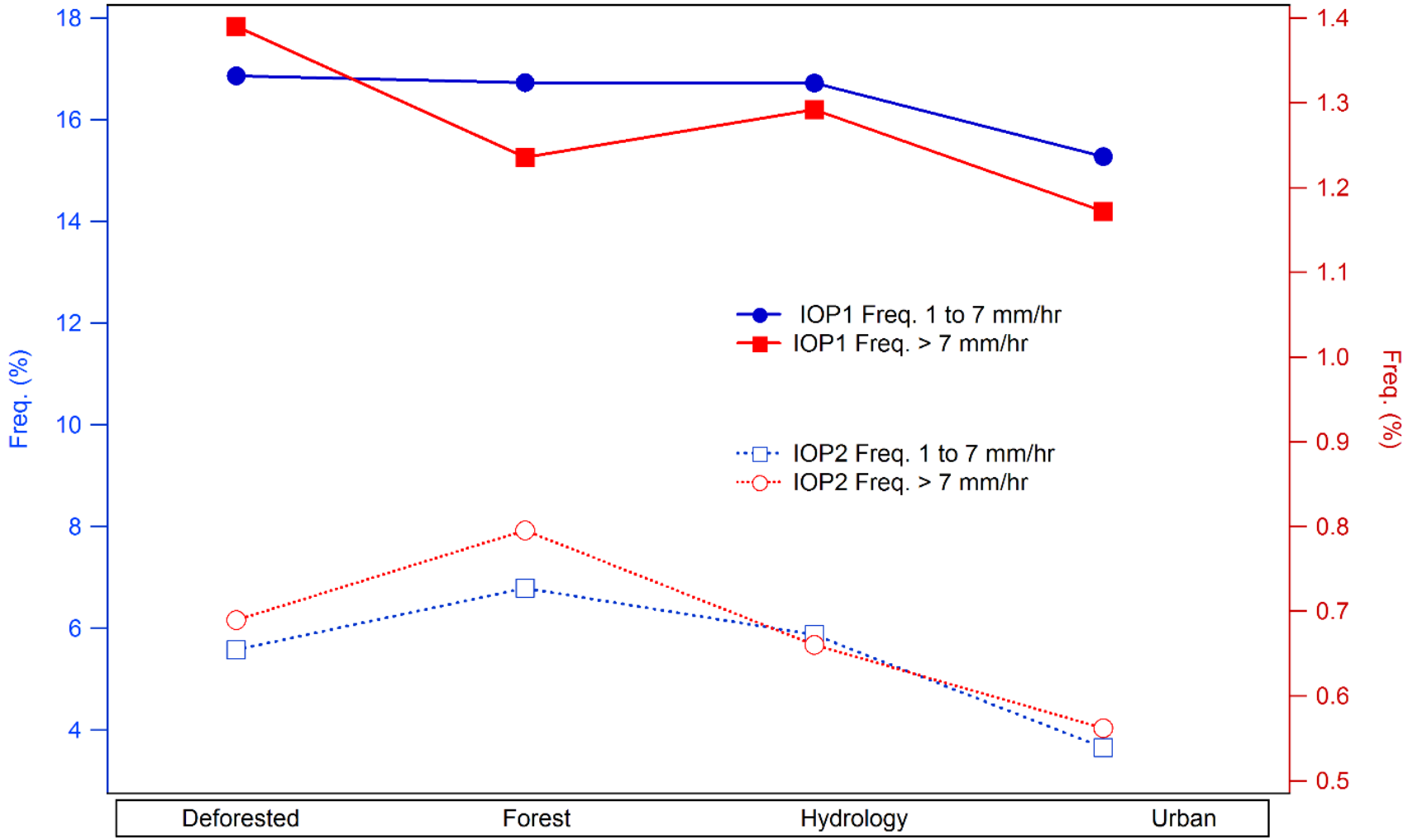
Rainfall, Cloud Microphysics and Thermodynamics as Function of Vegetation type

Rainfall and Surface Cover



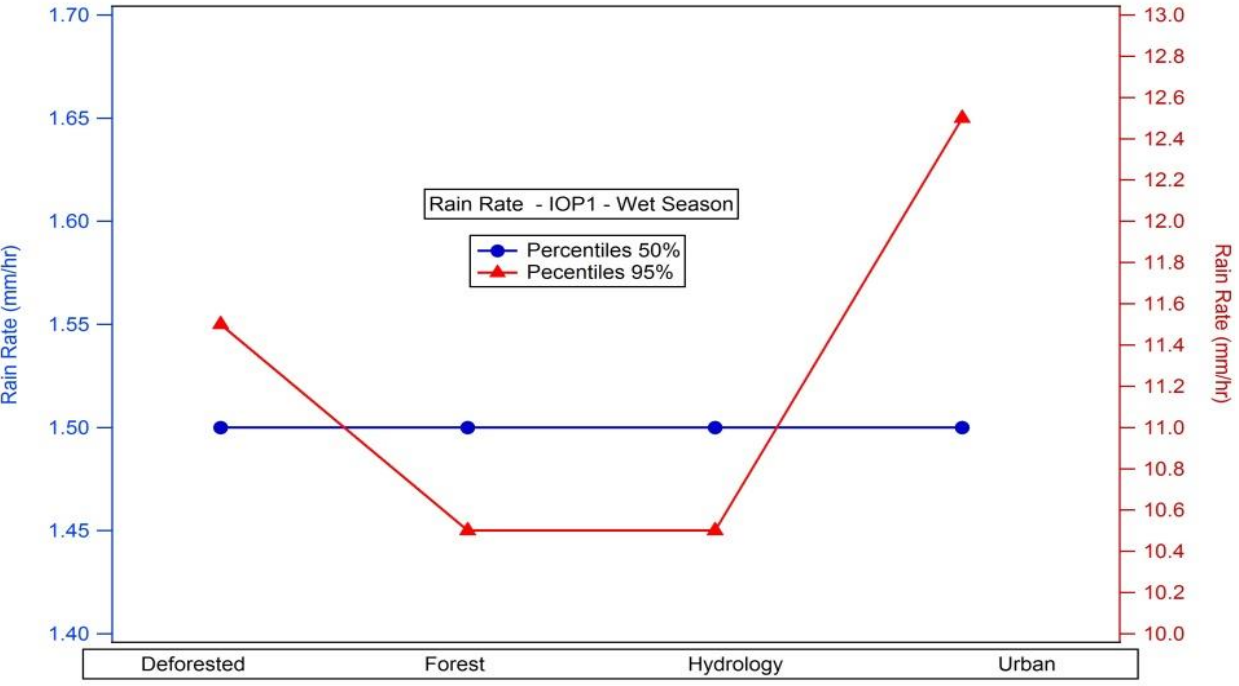
Rainfall and Surface Cover

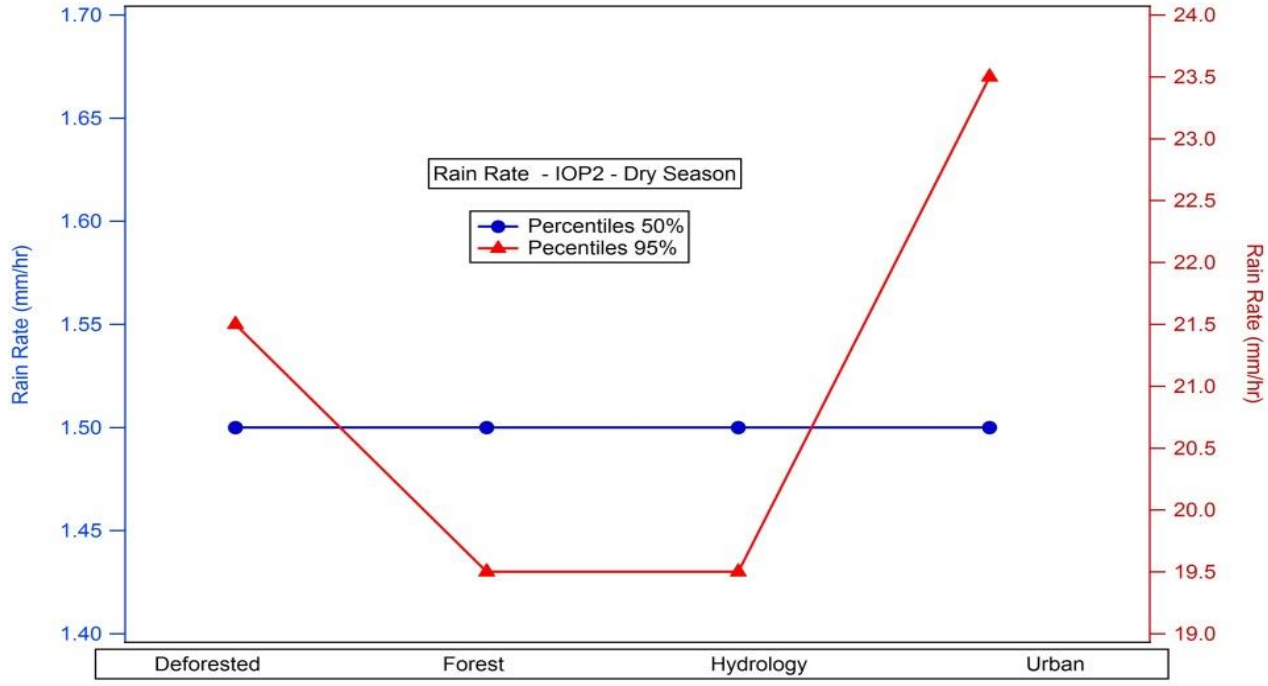
Average area covered (%) by Rain Rate



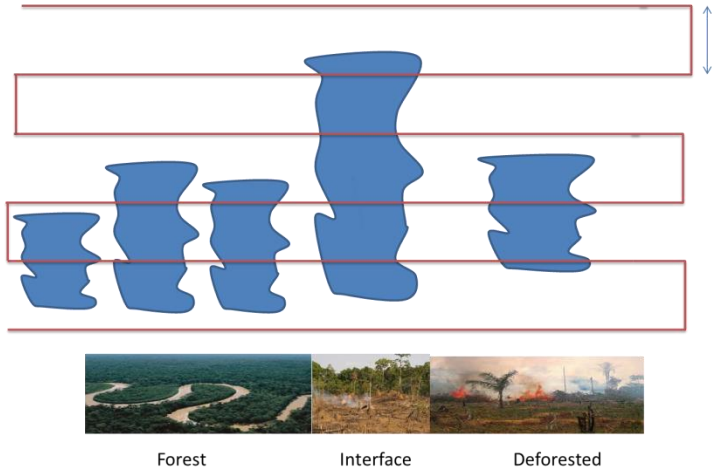
Rainfall and Surface Cover

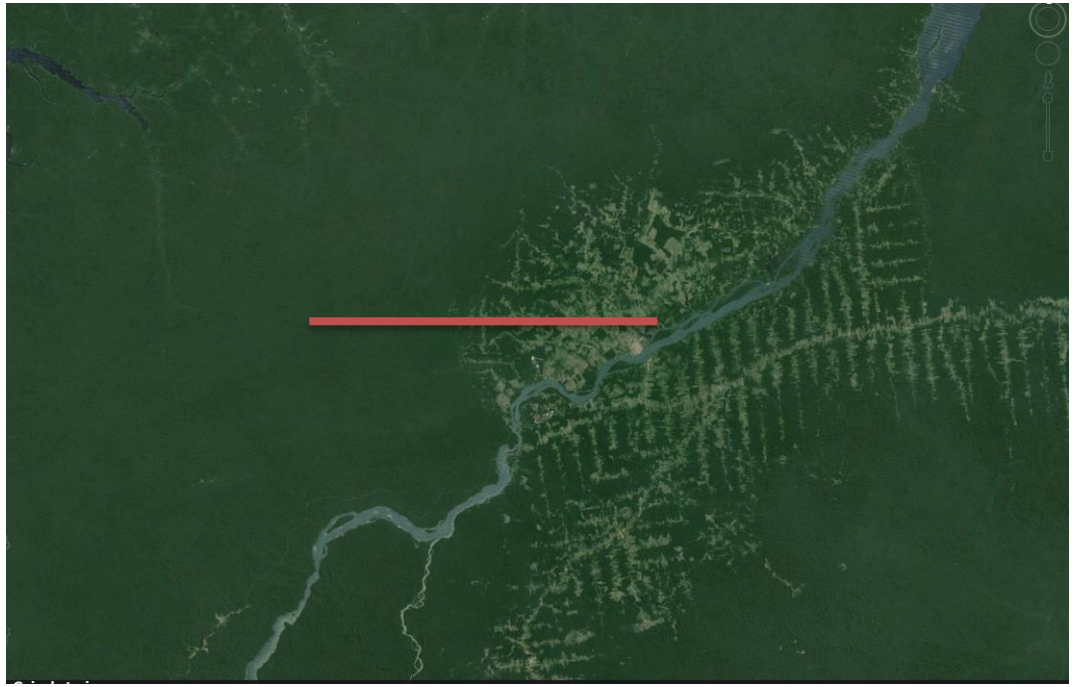
Rain Rate - Intensity

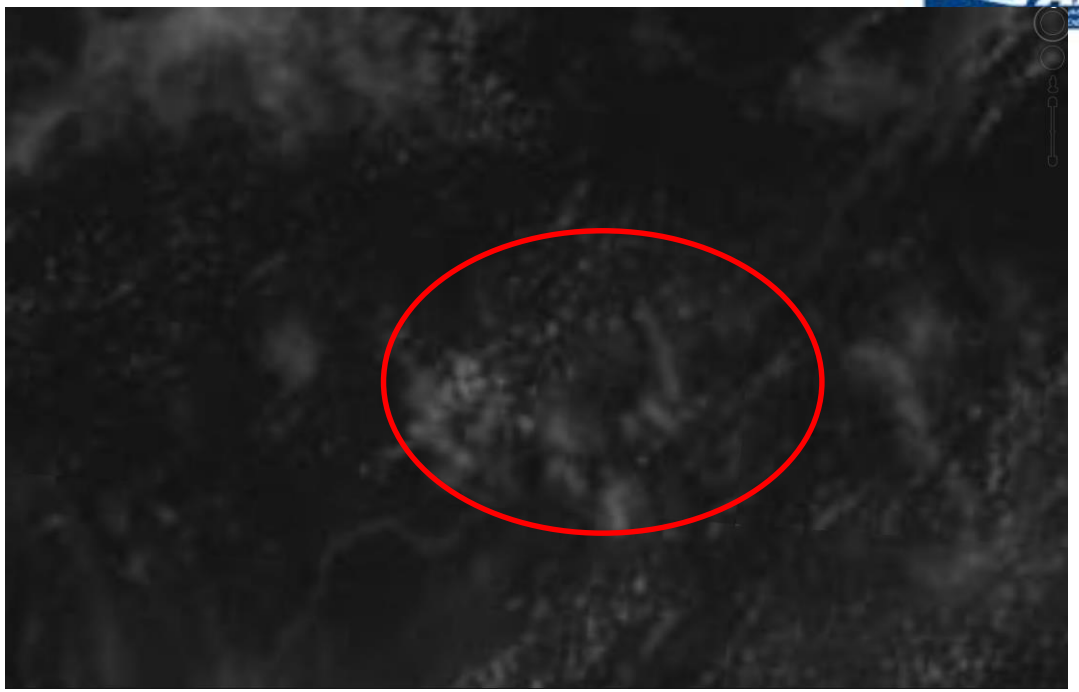


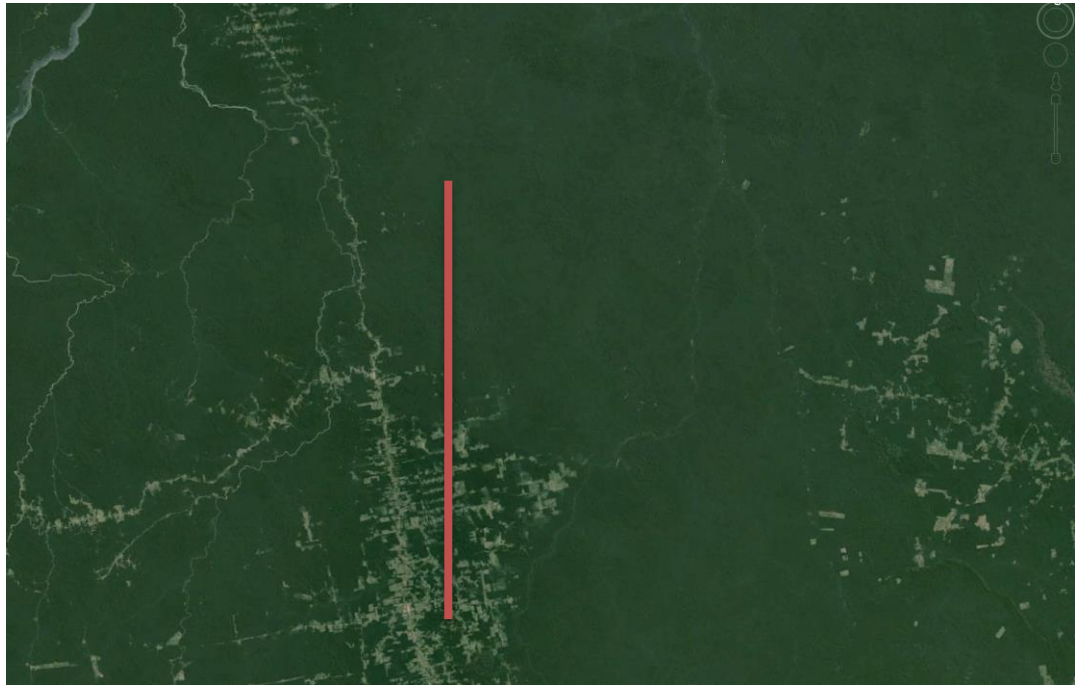


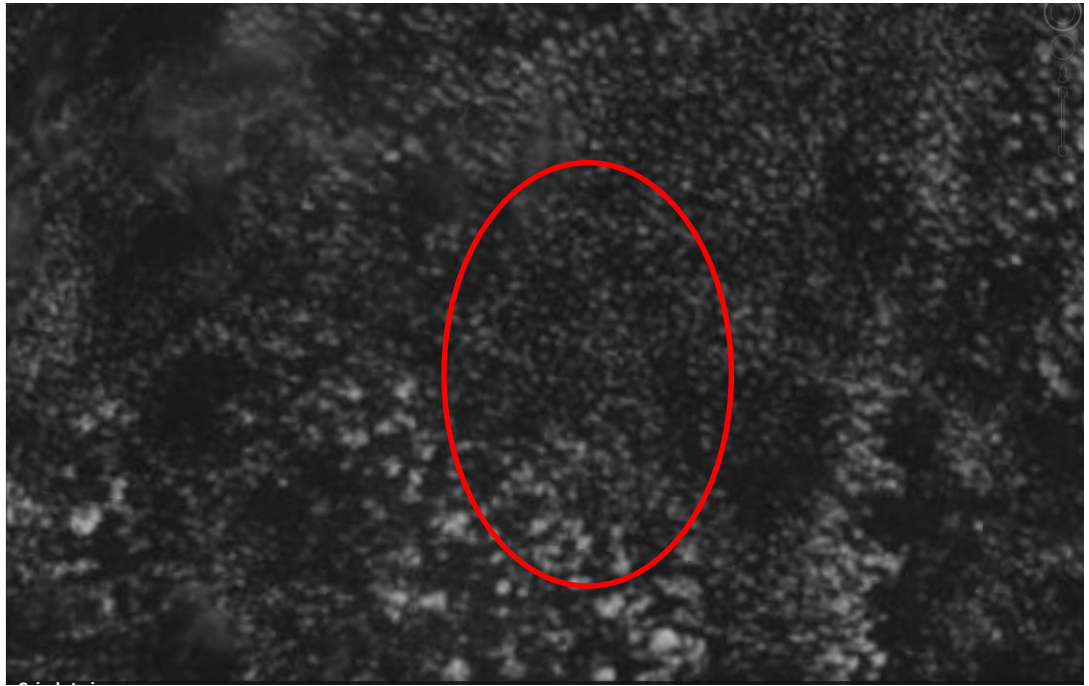
HALO – ACRIDICON CHUVA - AC17

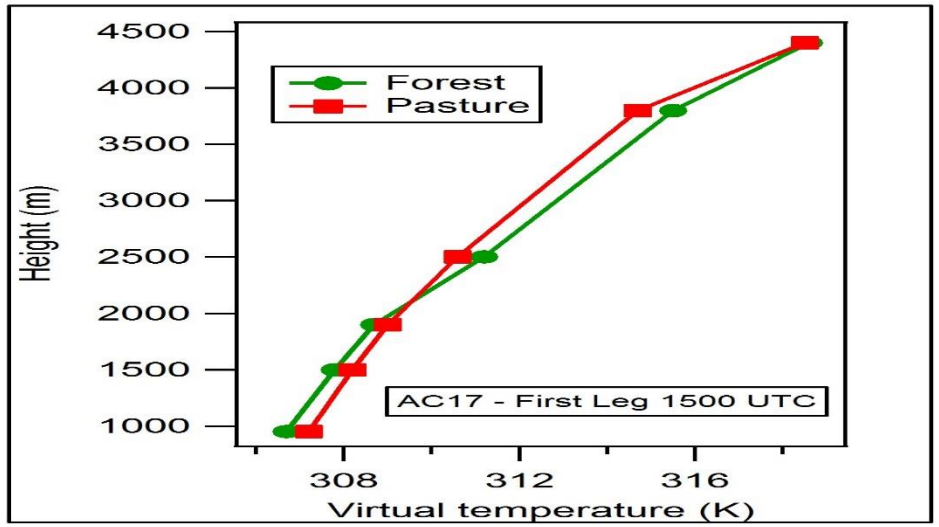


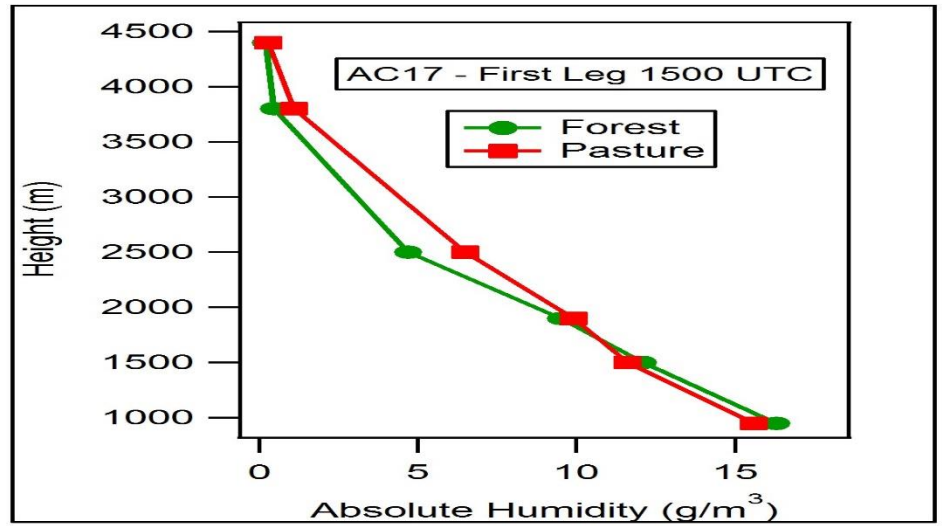


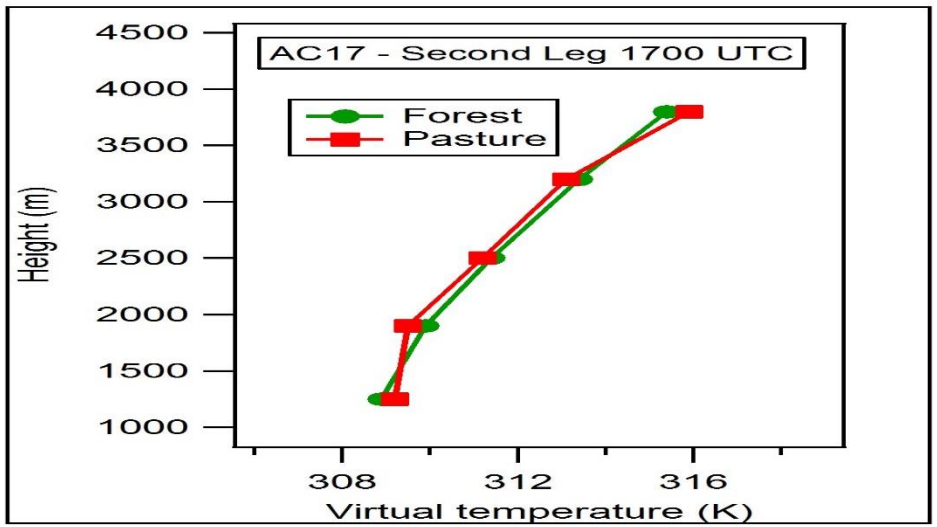


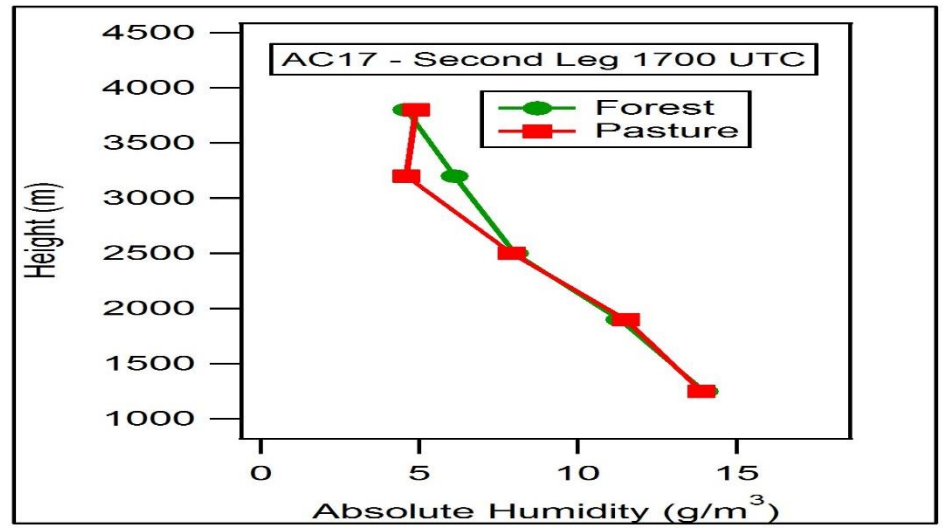


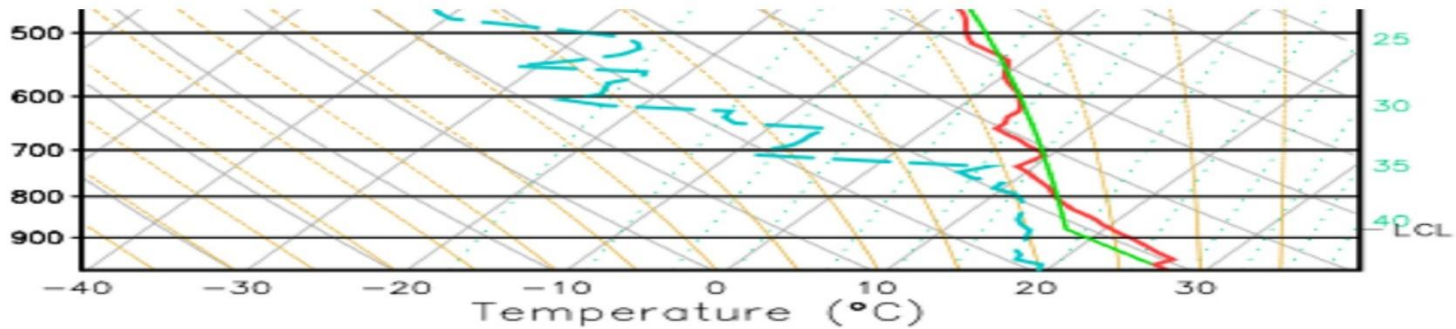



Forest
Pasture
AC17 - First Leg 1500 UTC
Height (m)
Virtual temperature (K)

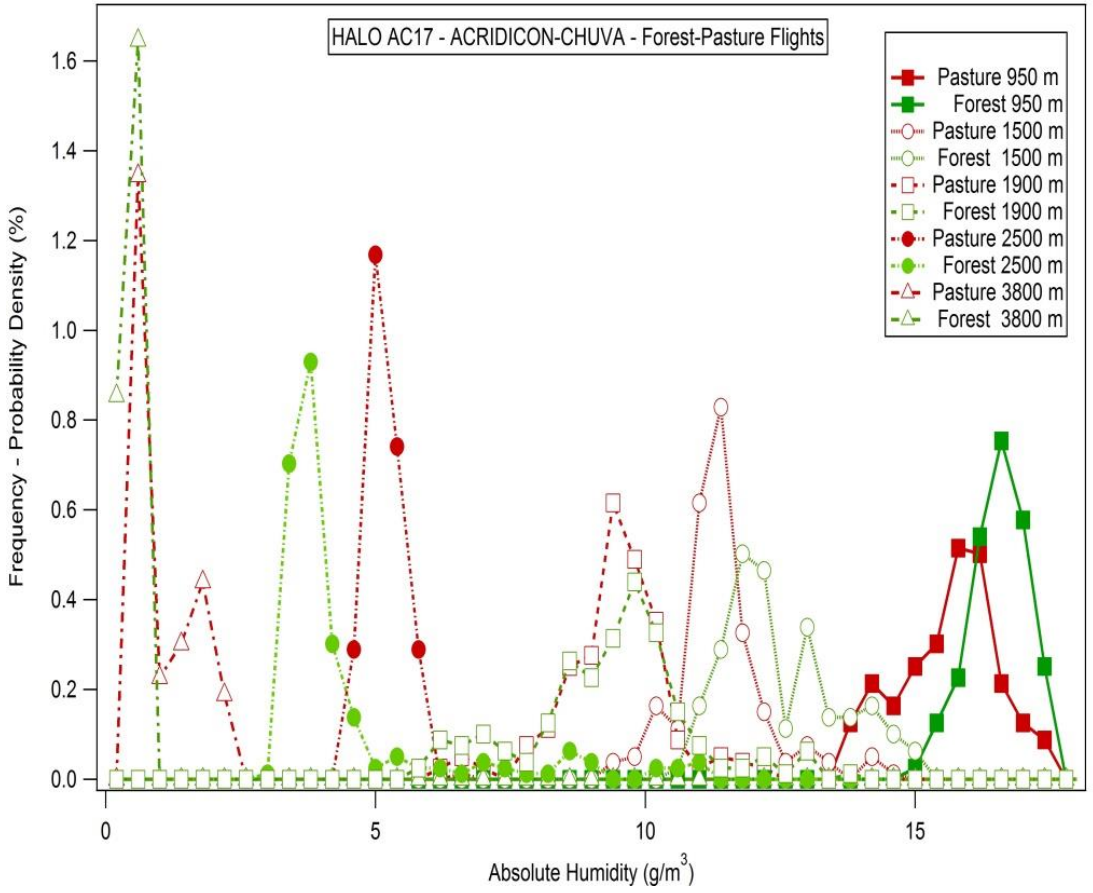

AC17 - First Leg 1500 UTC
Forest
Pasture
Height (m)
Absolute Humidity (g/m3)

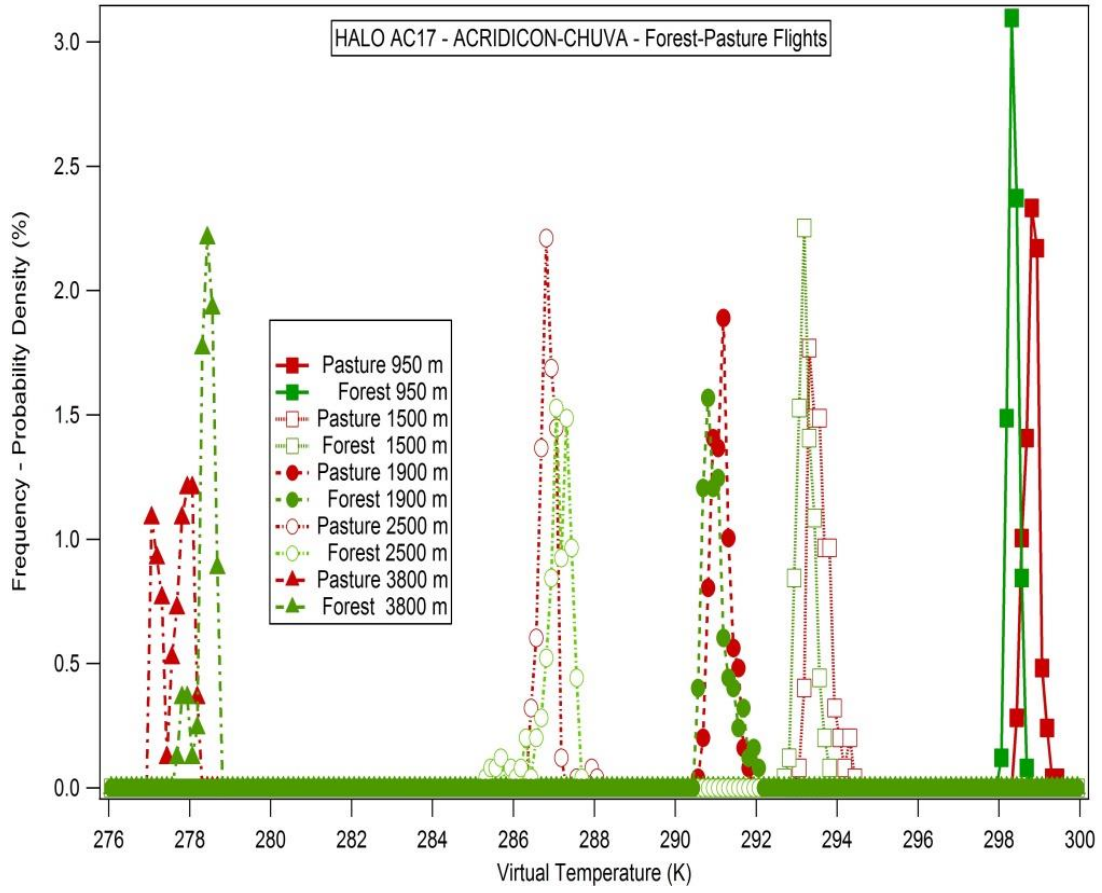

AC17 - Second Leg 1700 UTC
Forest
Pasture
Height (m)
Virtual temperature (K)


AC17 - Second Leg 1700 UTC
Forest
Pasture
Height (m)
Absolute Humidity (g/m3)

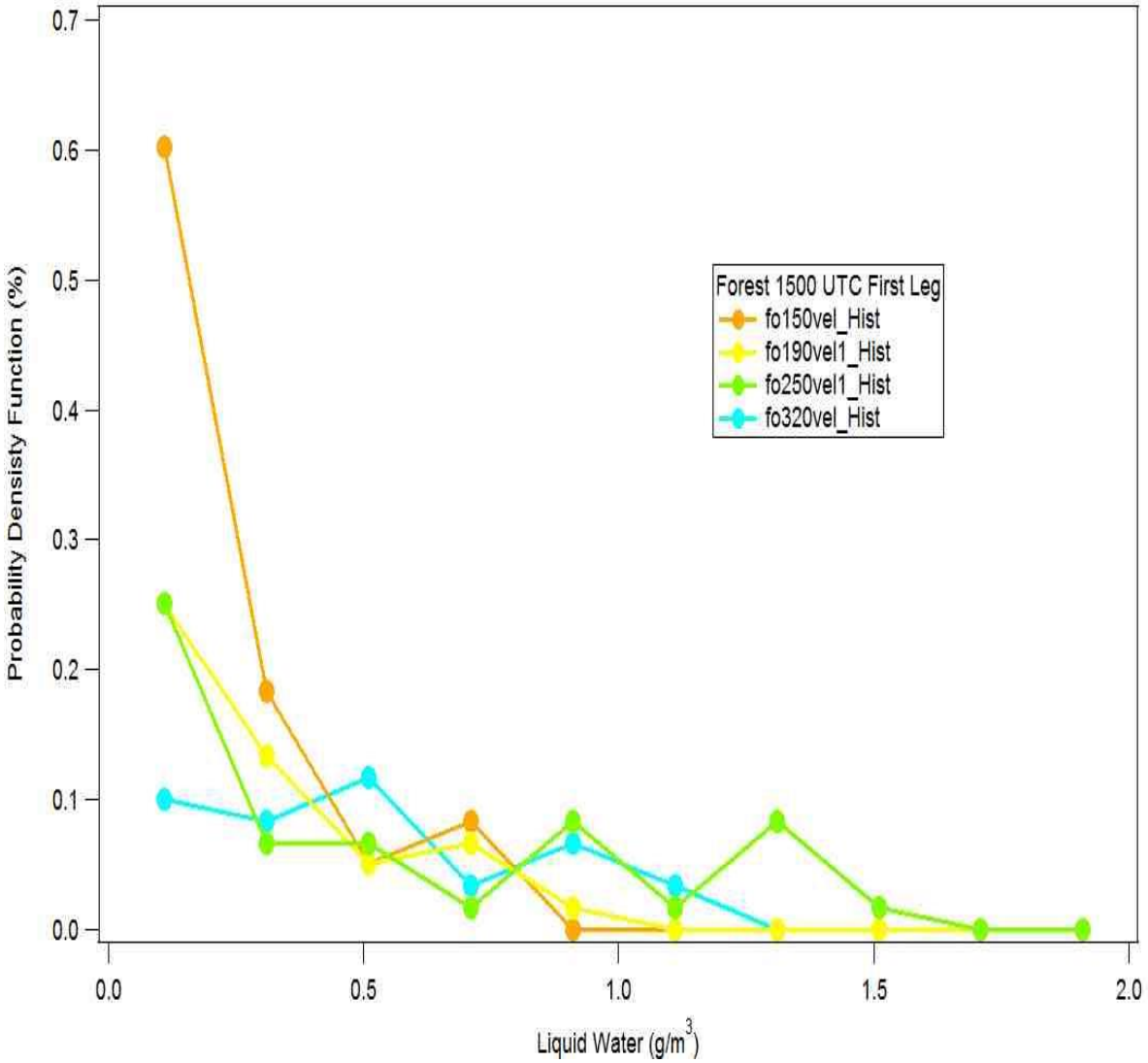

Temperature (°C)
LCL

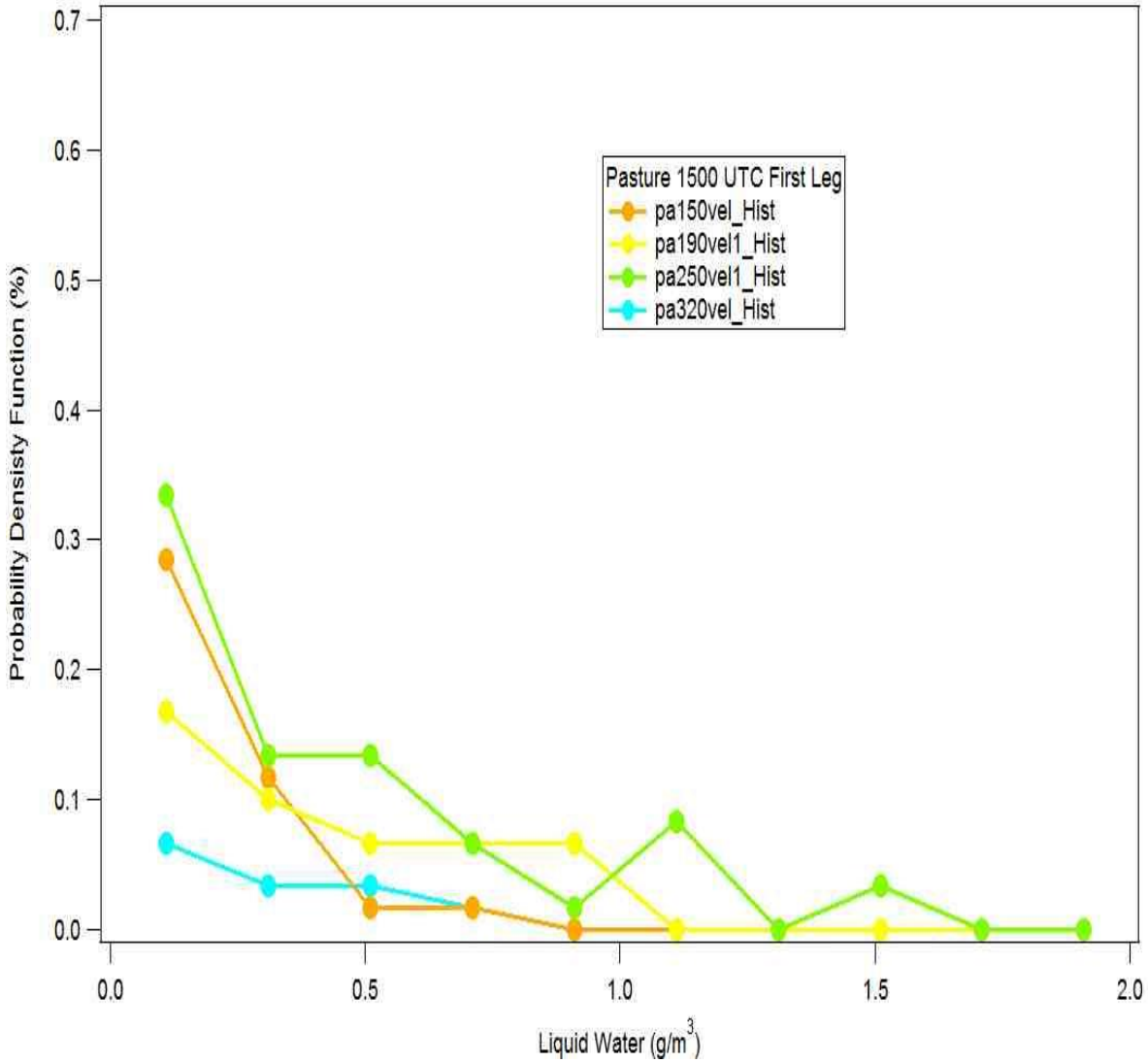
Halo Flight – Forest and Deforested 1500 UTC



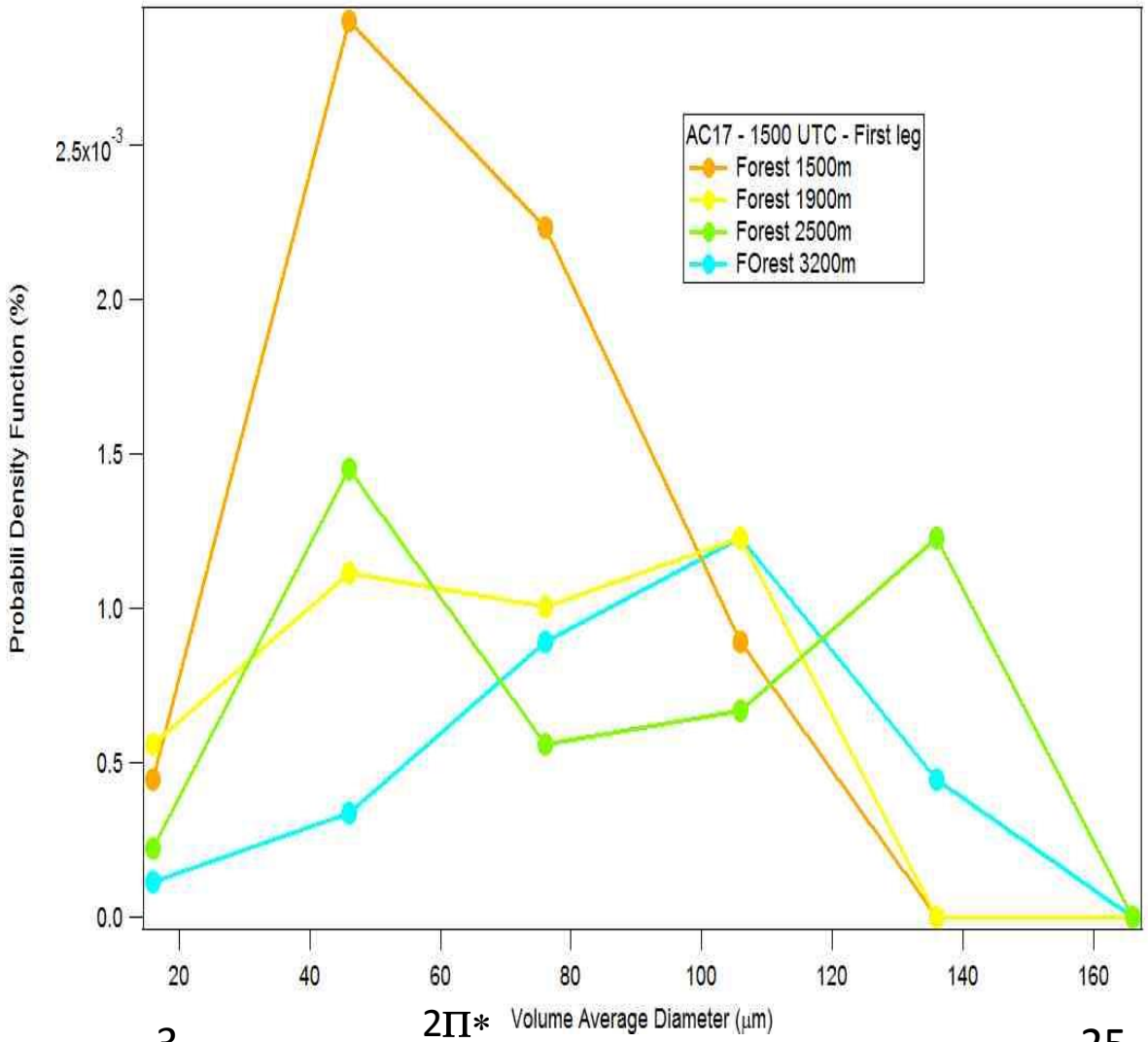


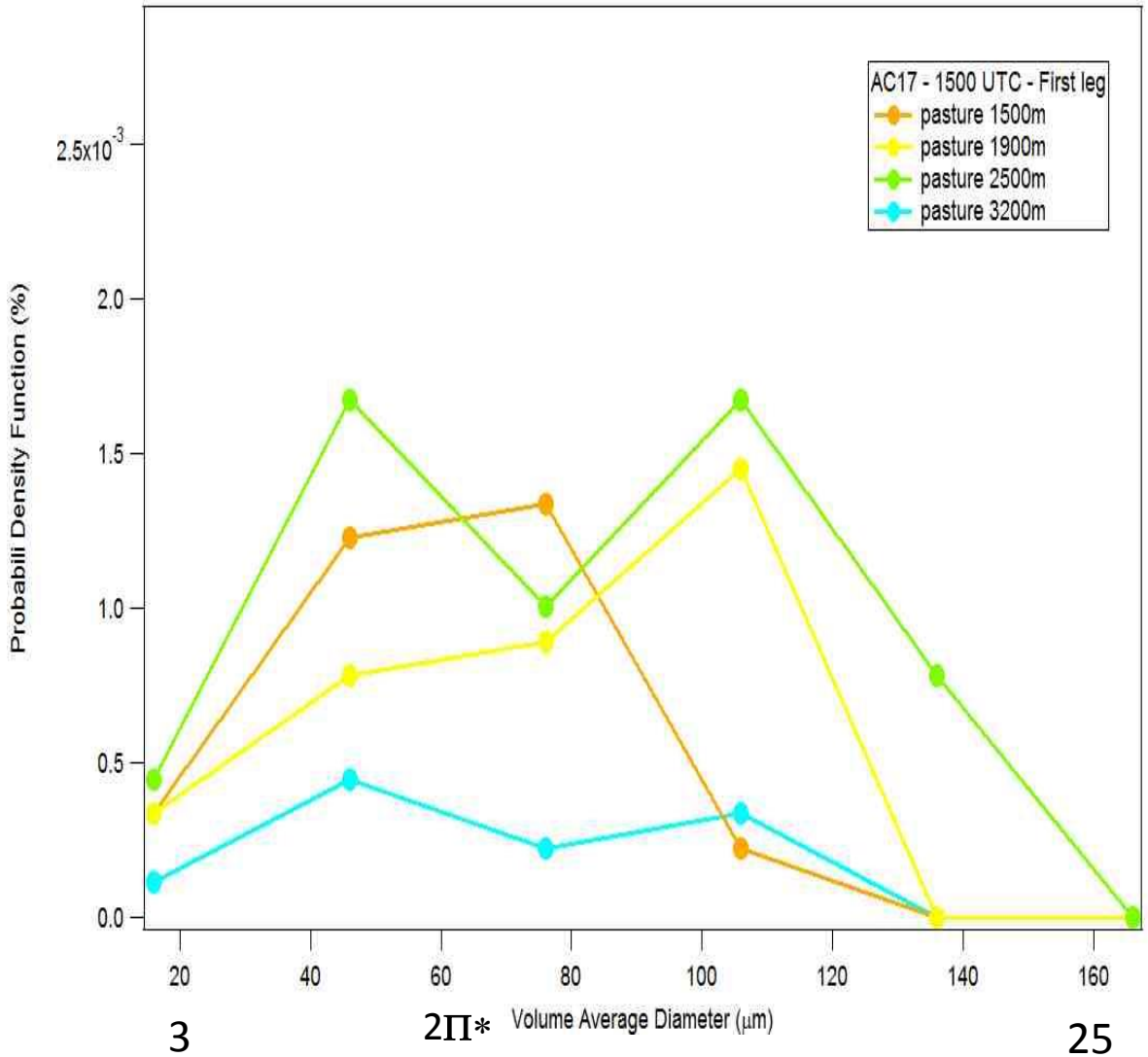
Cloud Liquid Water Distribution for Forest and Pasture



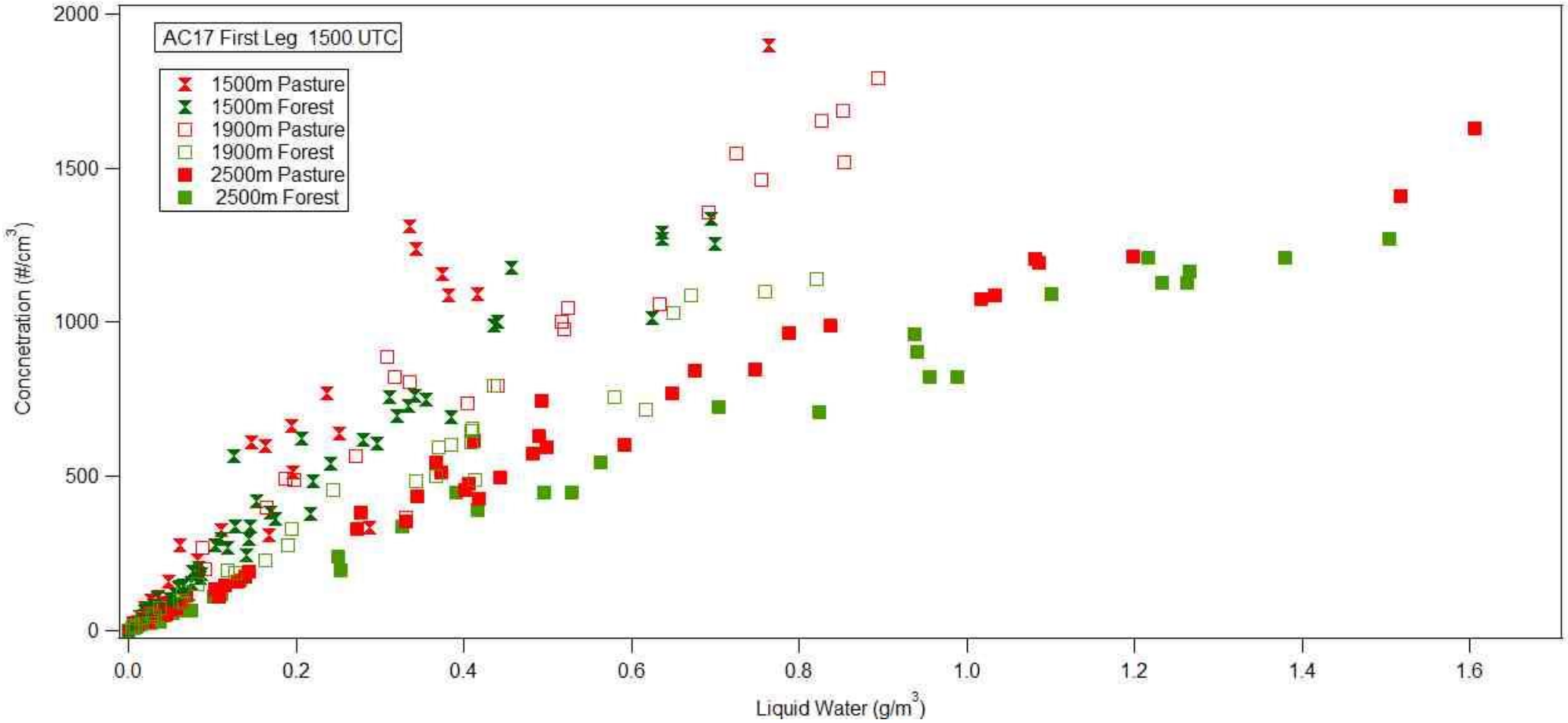


Cloud Droplets Distribution for Forest and Pasture

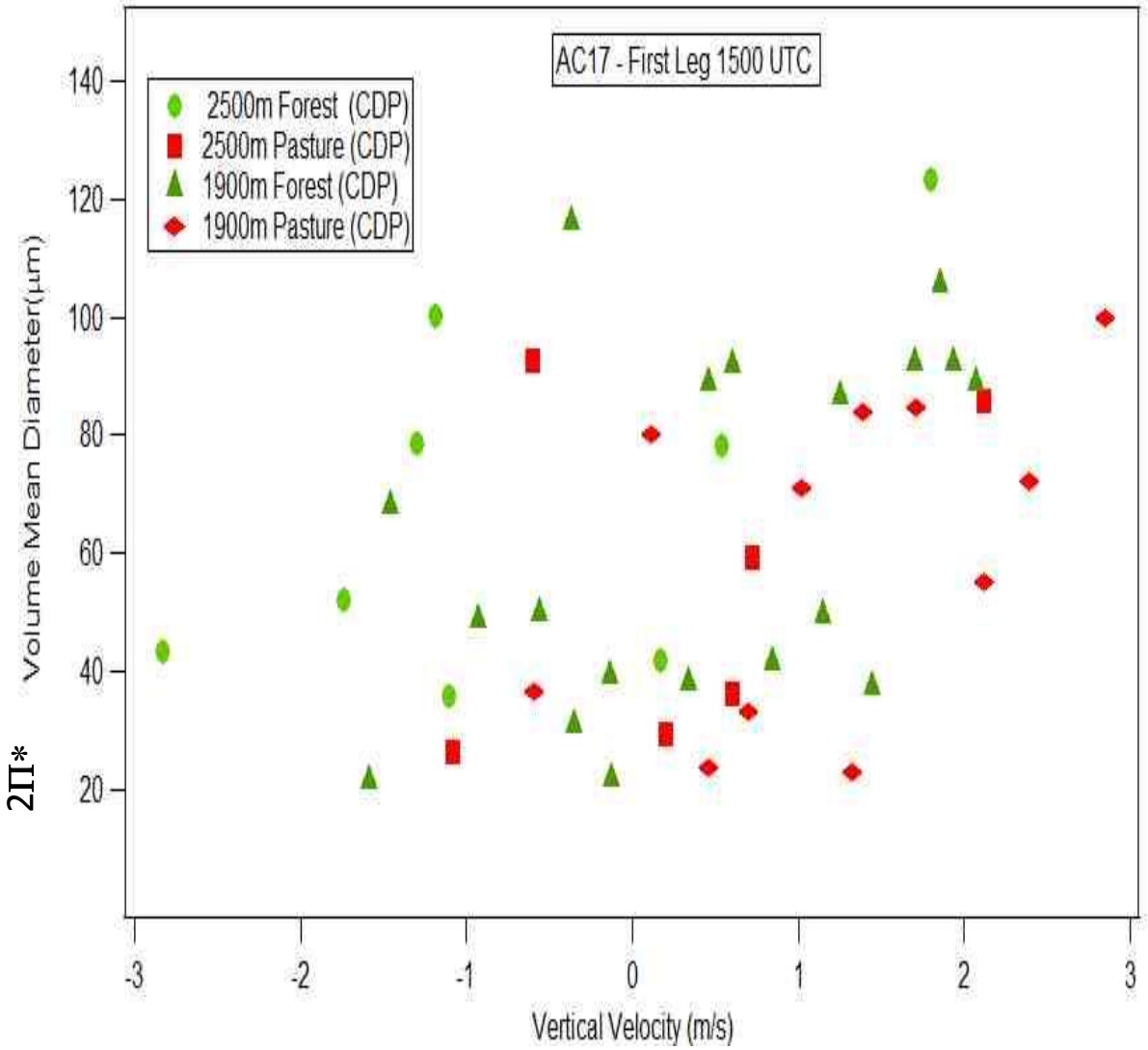


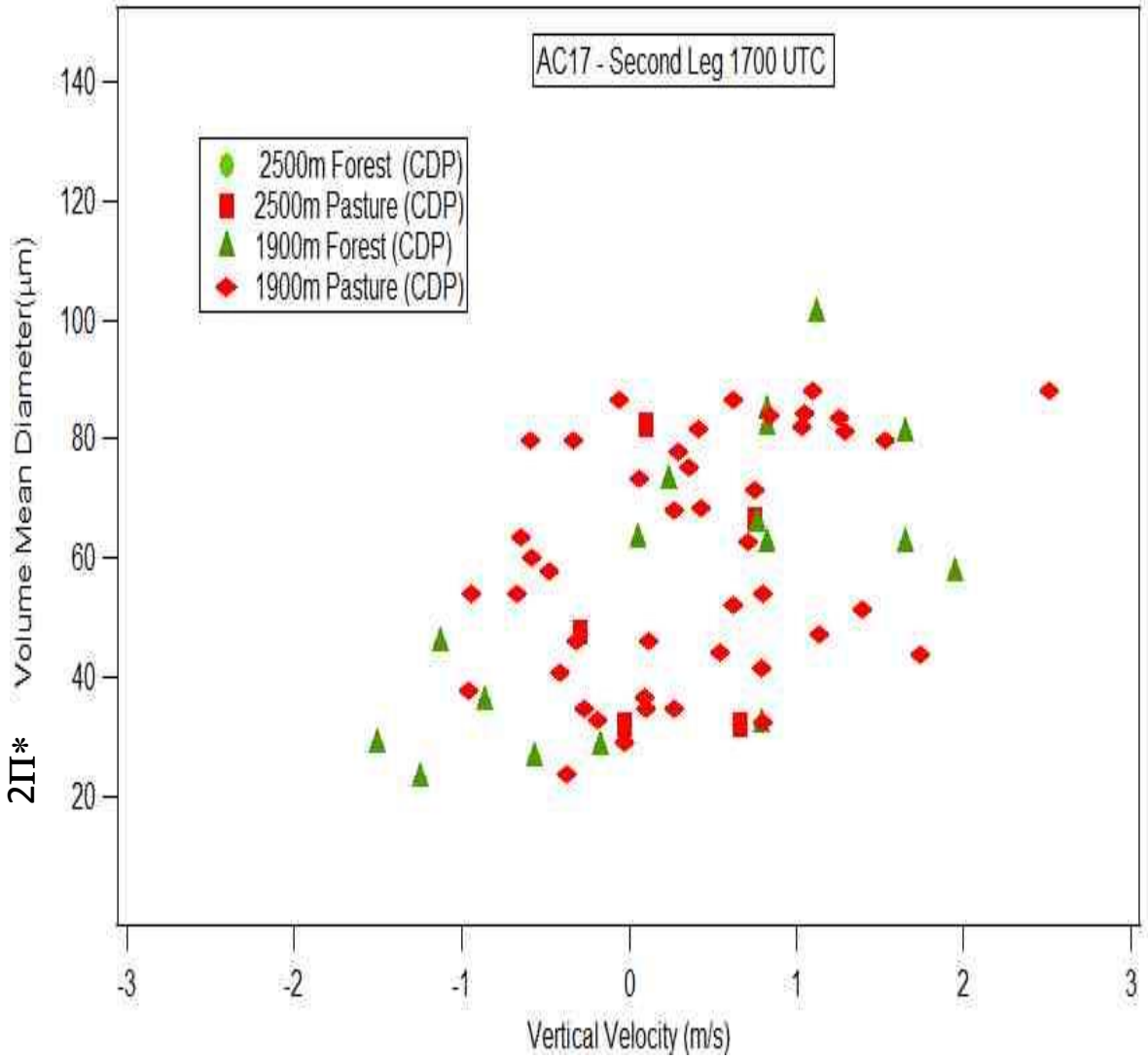


Cloud Liquid Water and Concentration for Forest and Pasture

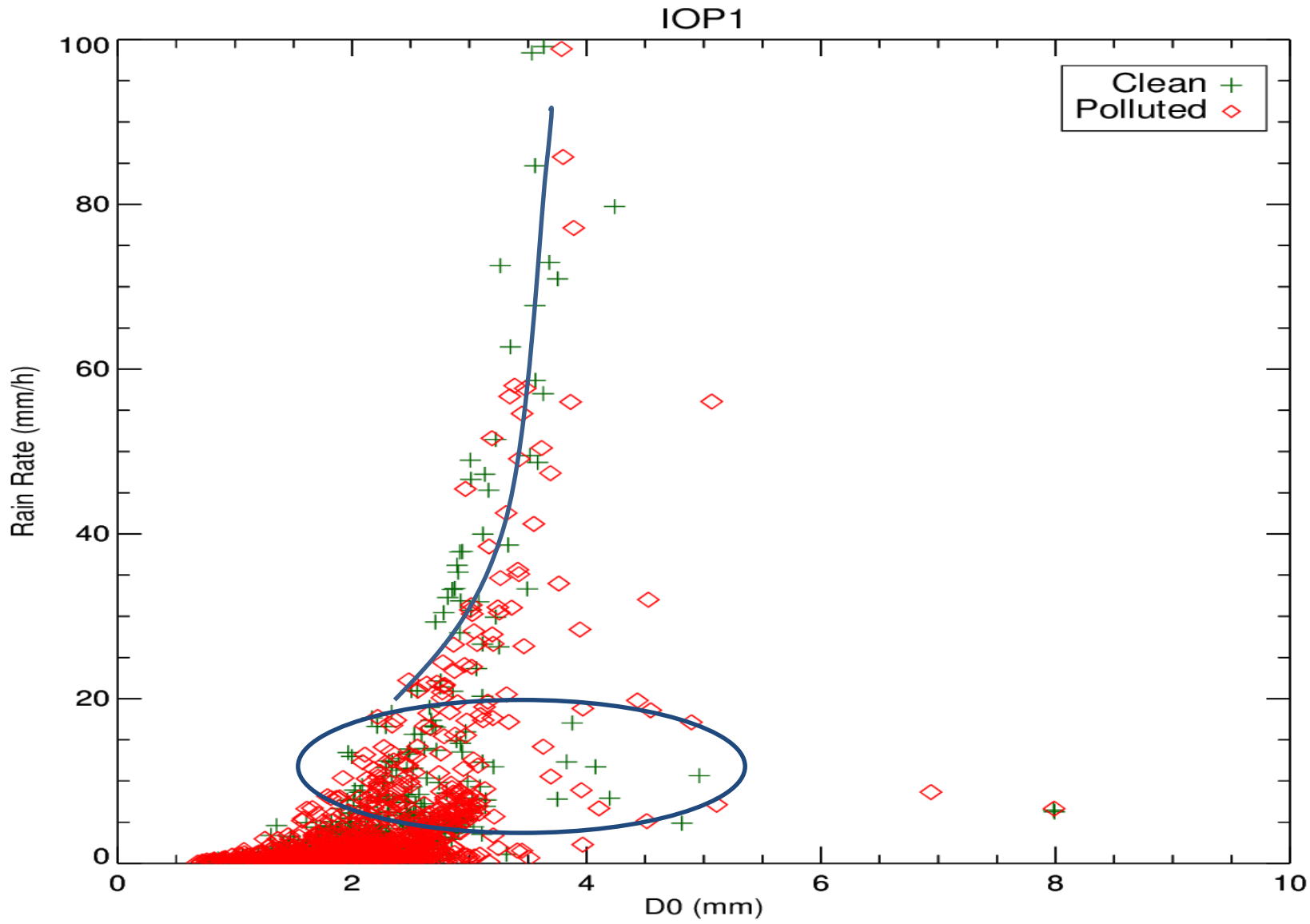


Vertical Velocity and Cloud Droplets for Forest and Pasture





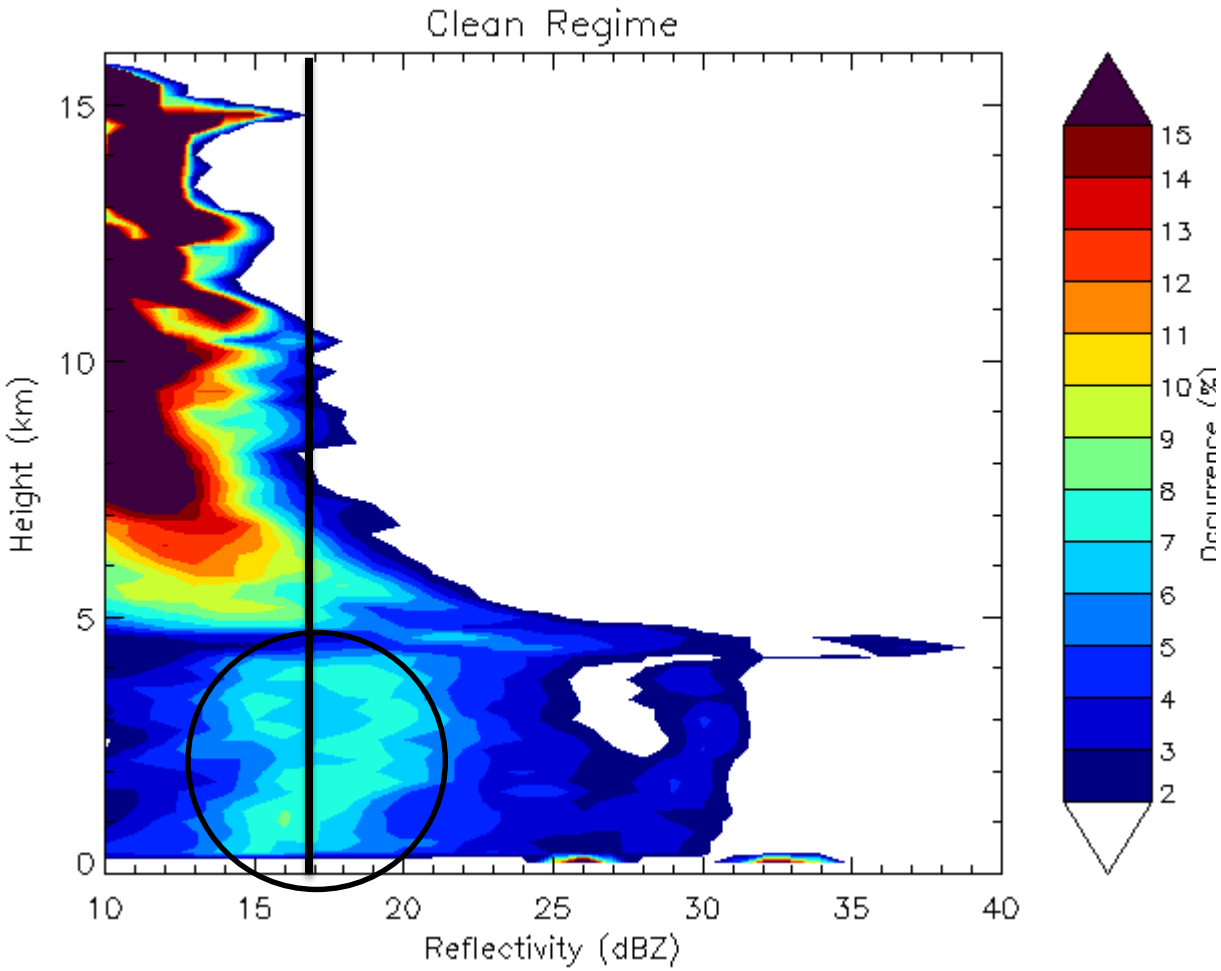
Rainfall - DSD - IOP1 Clean and Plume

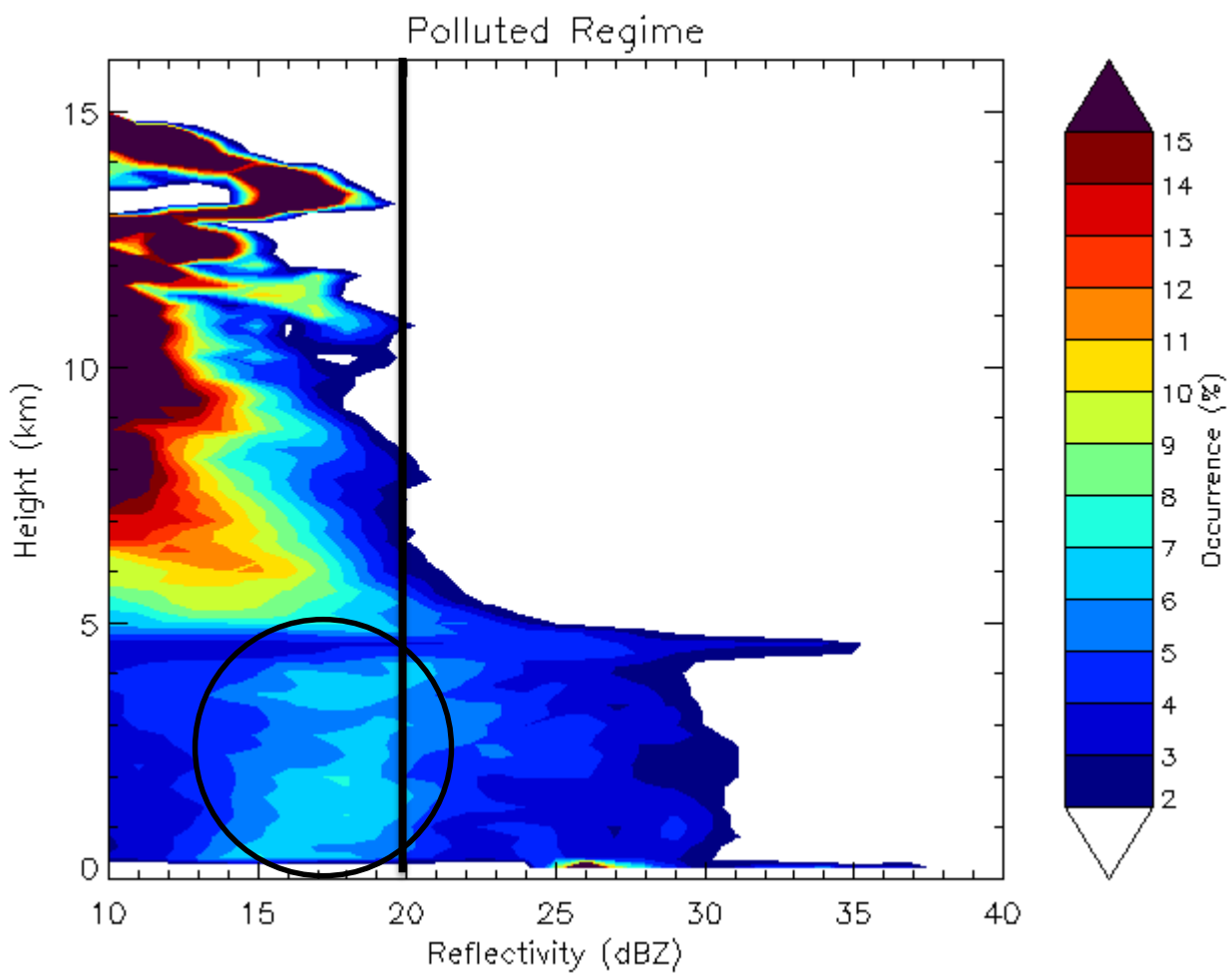


IOP1 - **CFAD**– Contour Frequency by Altitude Diagrams

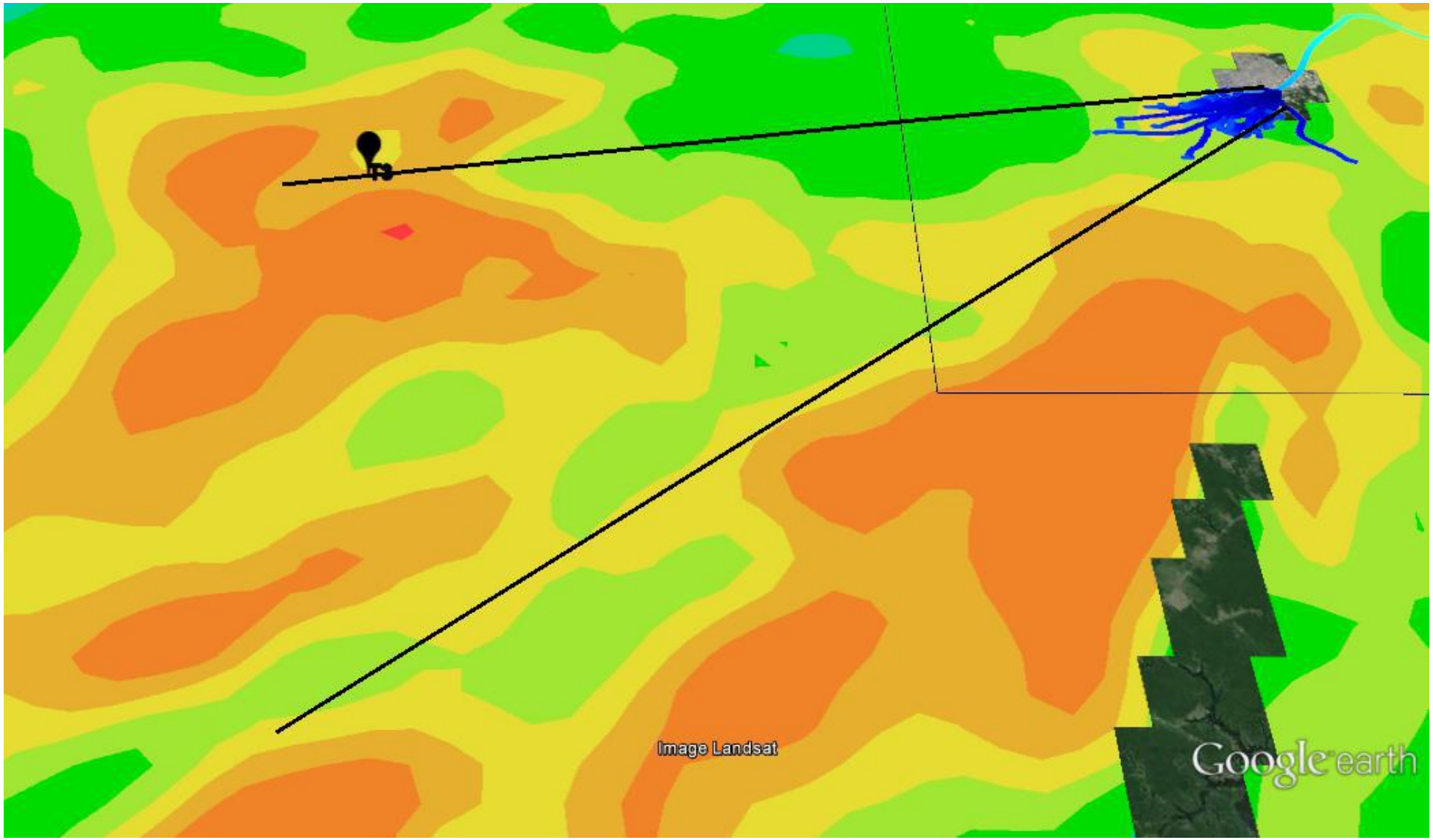
CLEAN

PLUME





IOP1 – Wet Season – Plume and Rainfall



Conclusions

- Very different thermodynamic and rainfall characteristics behavior between IOPs
- Typical convective spatial scale for each IOP
- Rainfall orography selection mainly for IOP2
- Influence of vegetation type on rain rate (urban-deforested) and in the total rainfall (IOP2 over forest)
- Complex Influence of forest-pasture on thermodynamics and cloud microphysics
- Influence of Manaus Plume on cloud process (IOP1)