

The DYNAMO/AMIE International Field Campaign: Cloud Population of the Madden-Julian Oscillation

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and

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Radar experiment goal

→ Characteristics and evolution of the MJO cloud population in the region where the disturbance builds up

→ Role of clouds in humidification of troposphere prior to MJO onset

Radar experiment goal

- Characteristics and evolution of the MJO cloud population in the region where the disturbance builds up
- **Role of clouds in humidification of troposphere prior to MJO onset**

DYNAMO Field Experiment (October 2011 – March 2012)



Falcon



S-PolKa



SMART-R

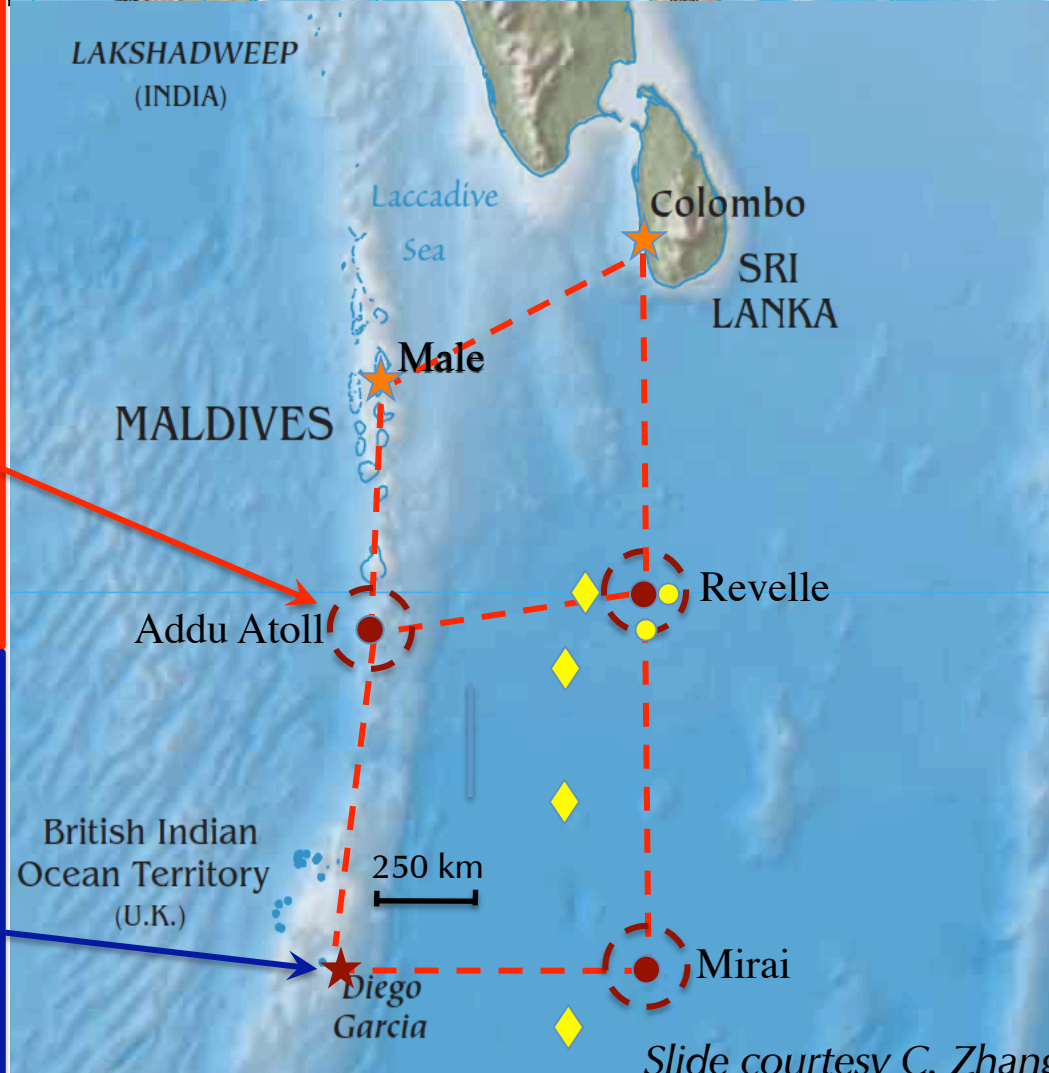


AMF2

ISS



P-3



R/V B. Jaya-III



R/V R. Revelle



R/V S. Kanya



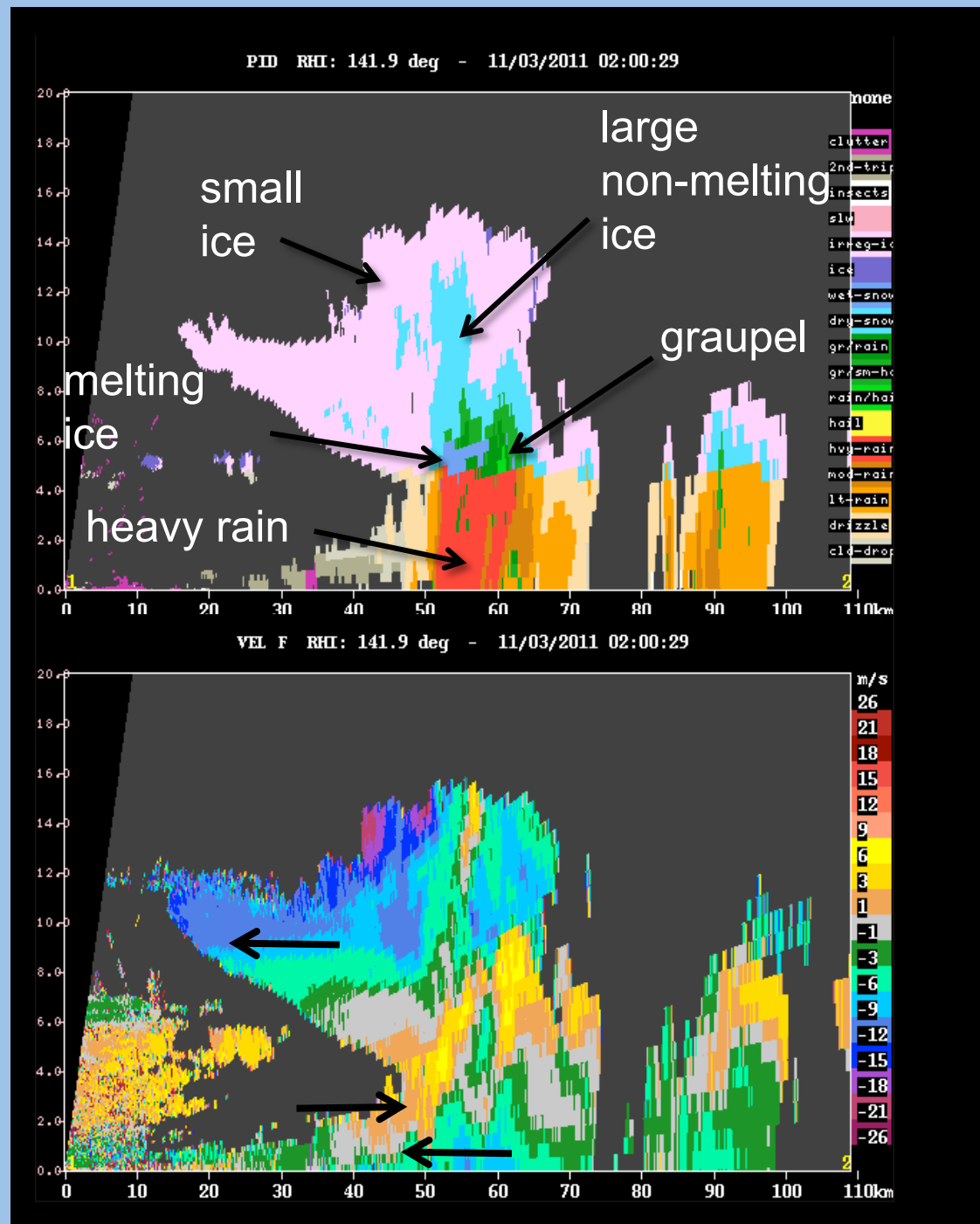
R/V Mirai



Slide courtesy C. Zhang

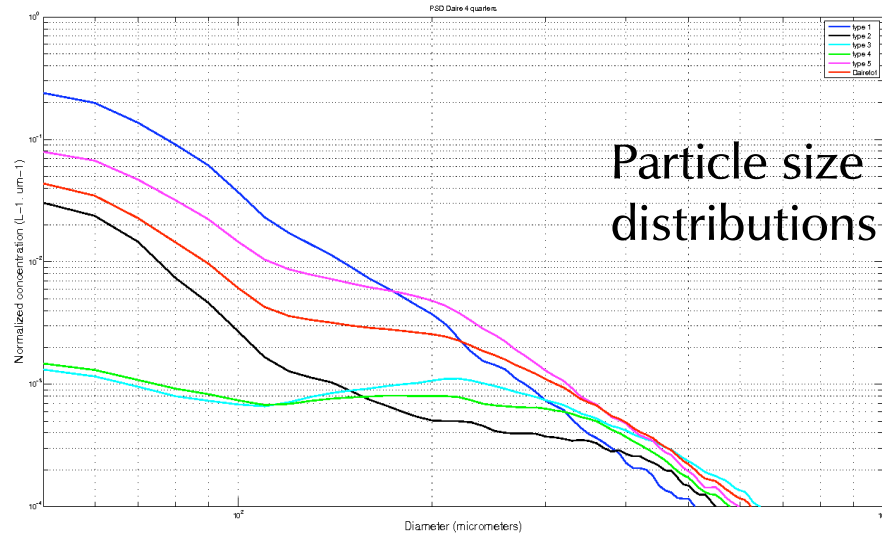
S-PolKa: Moderate cumulonimbus

Hydrometeor type

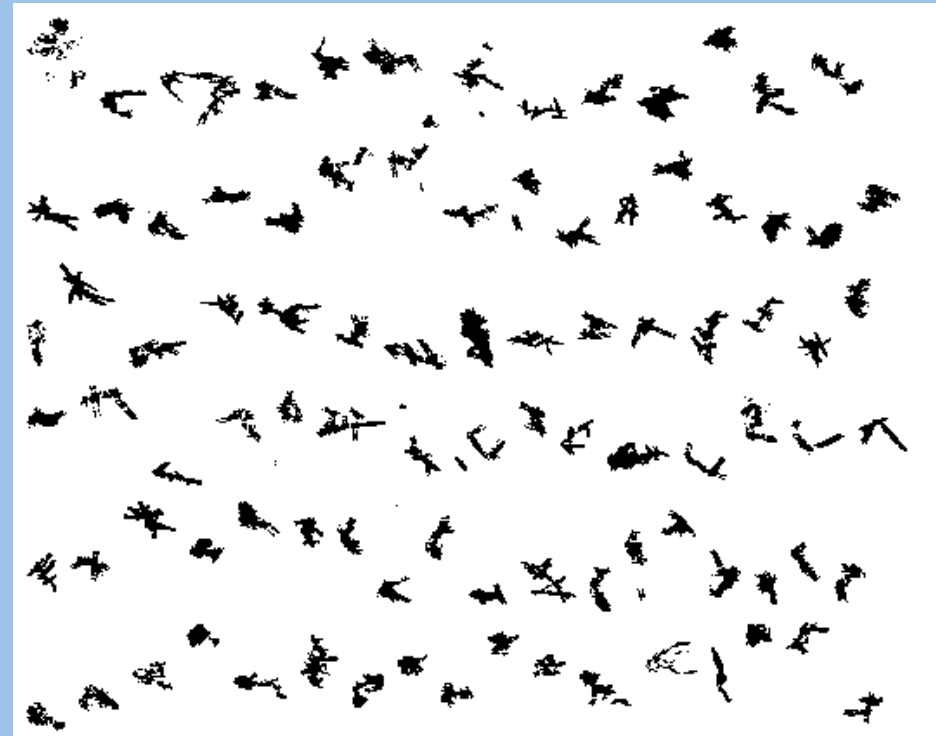


Doppler velocity:
range folding
corrected

Falcon (F-20) microphysical data

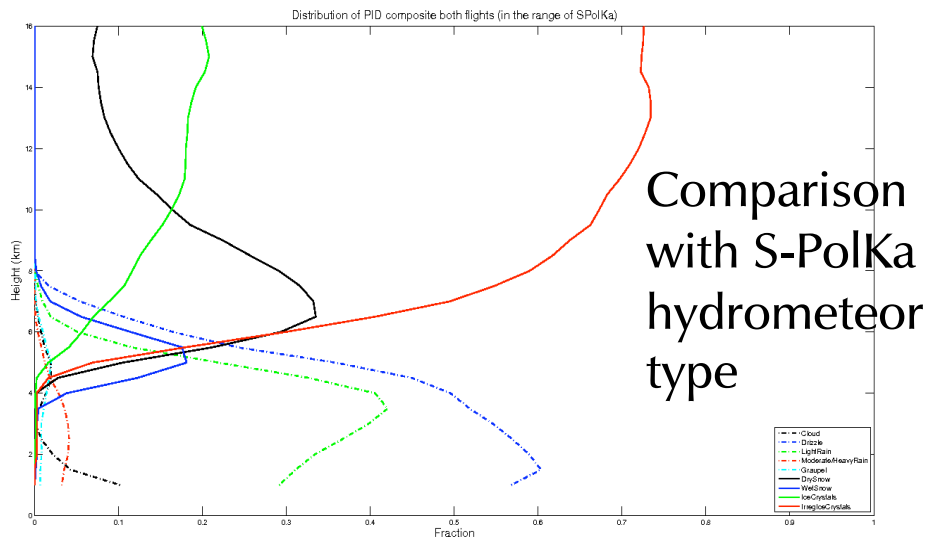


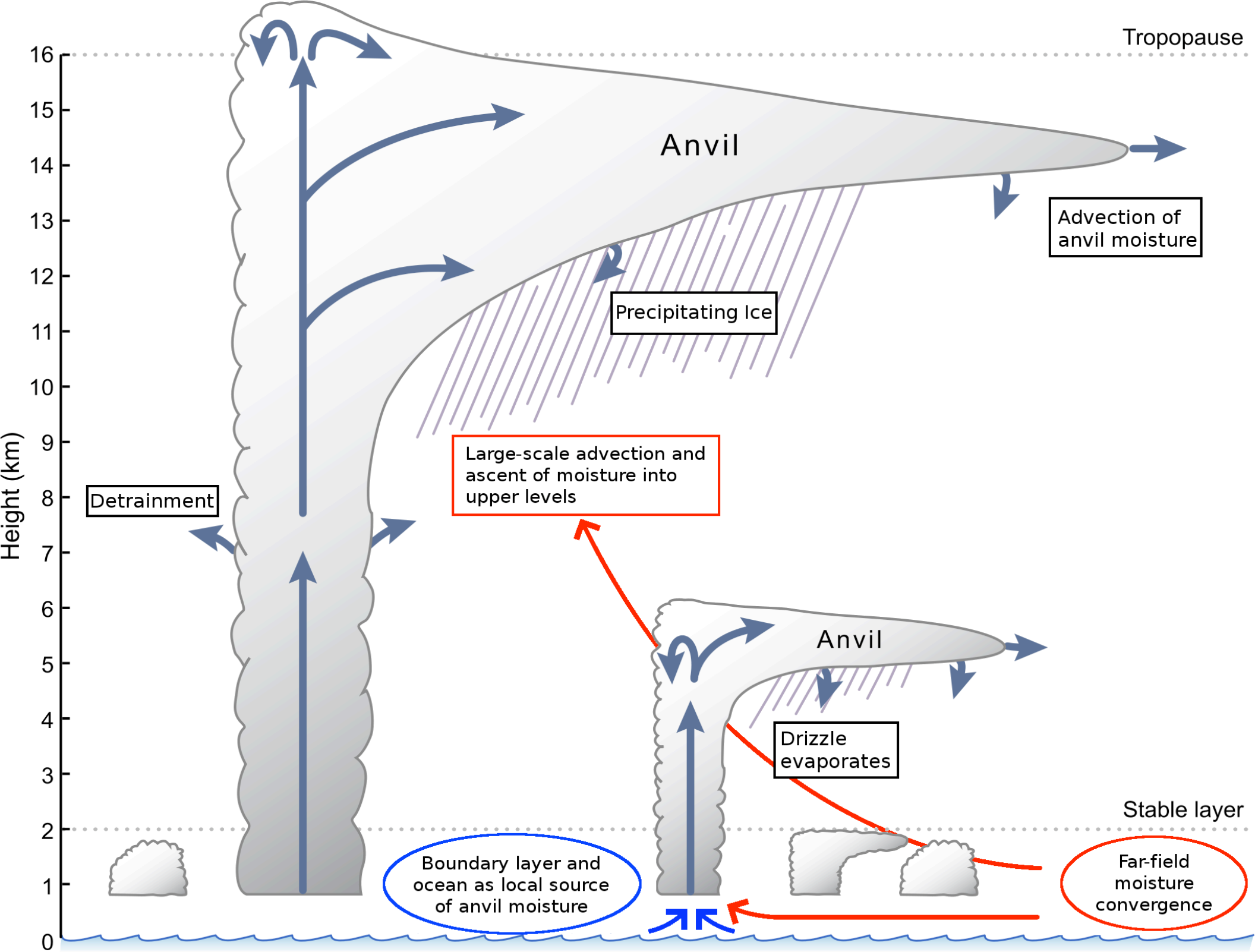
Particle Images



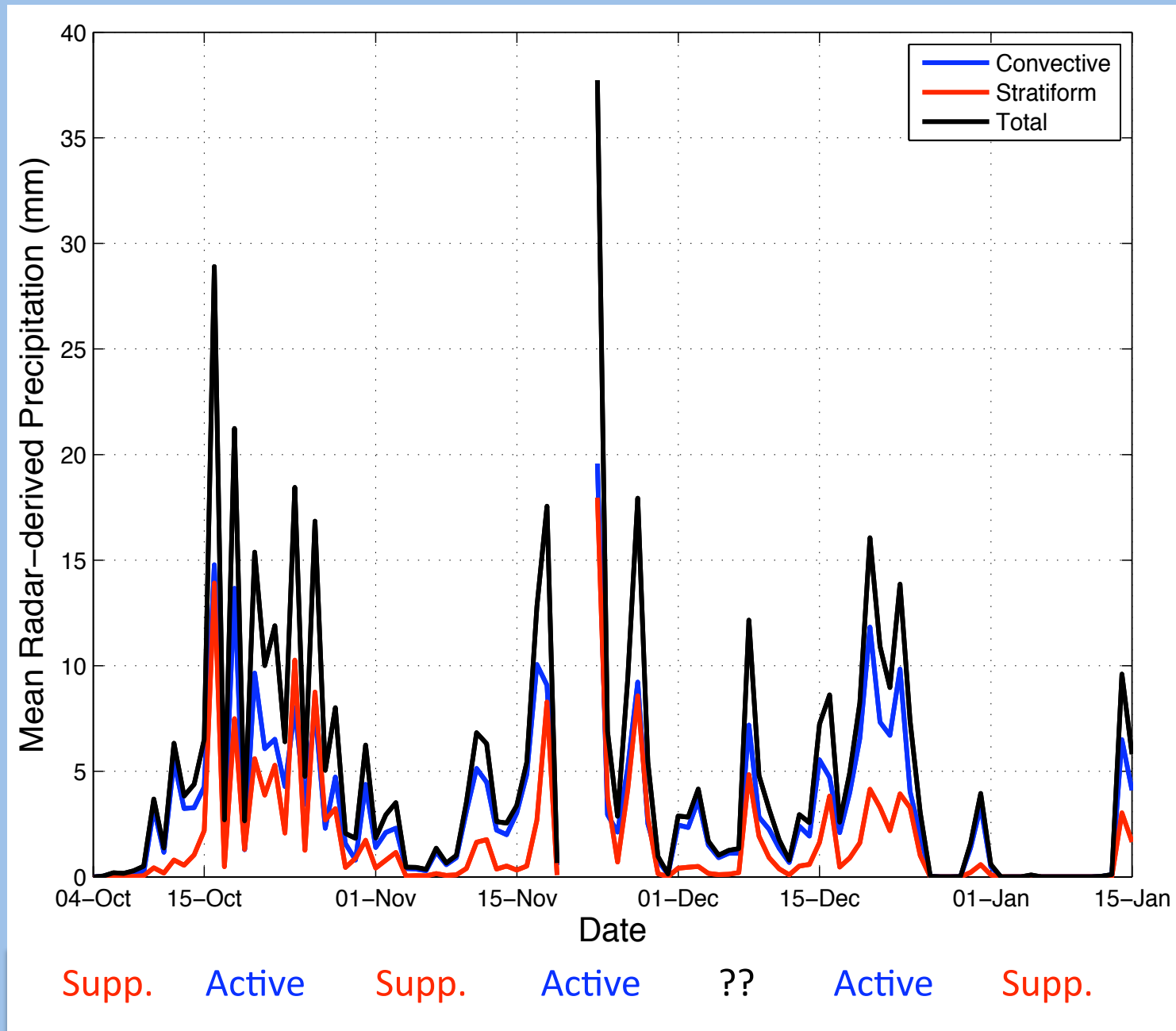
Figures courtesy D. Coppin

See Talks 3.1-6 (Friday, 9:45AM) and 3.2-5 (Friday at 11:30AM) in HS9.

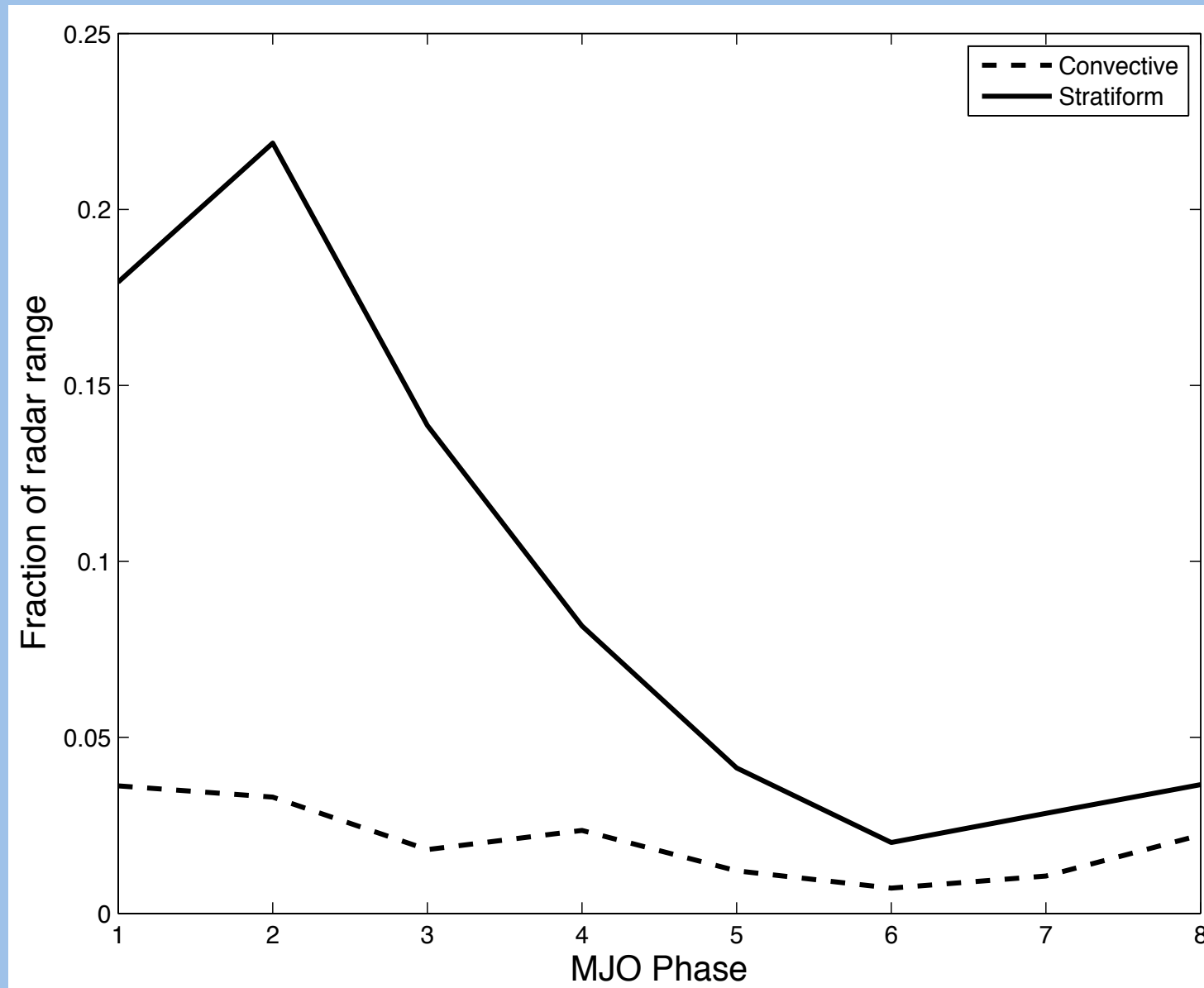


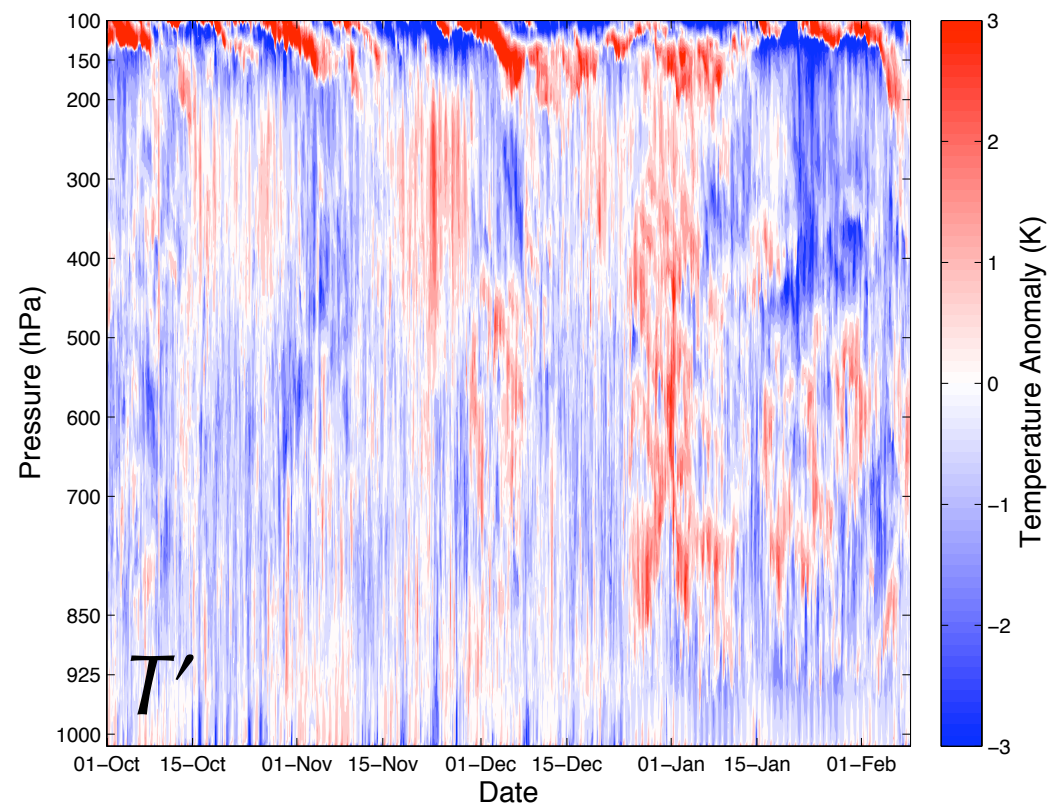
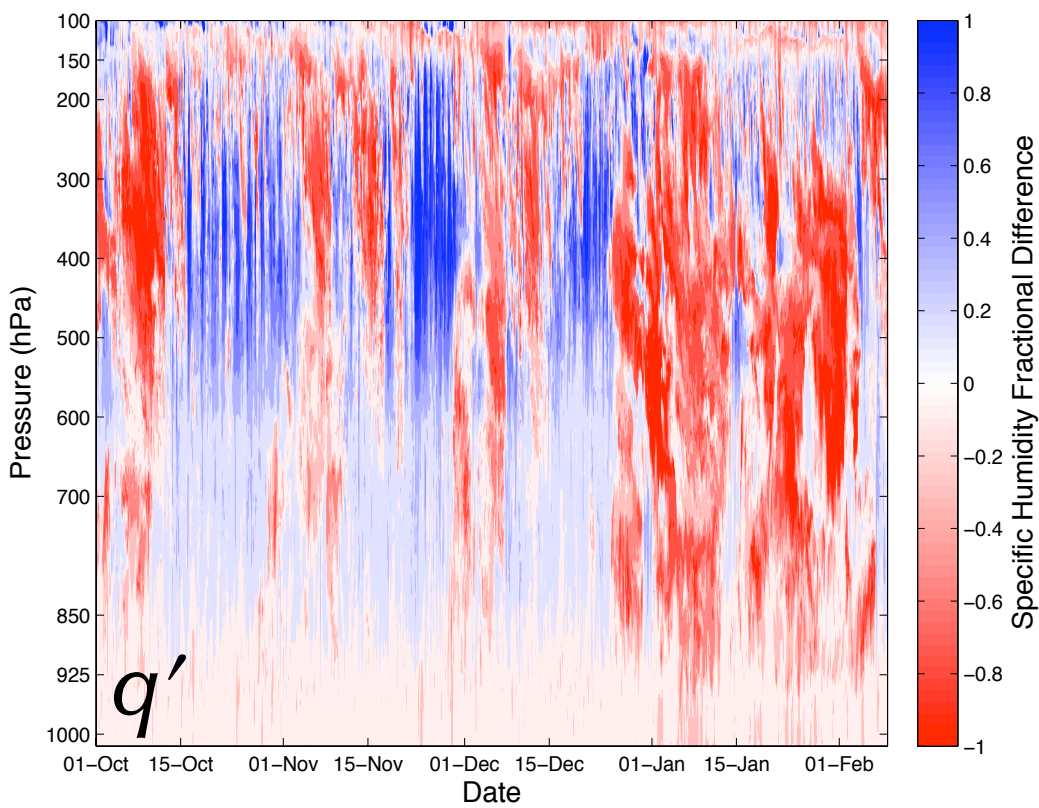
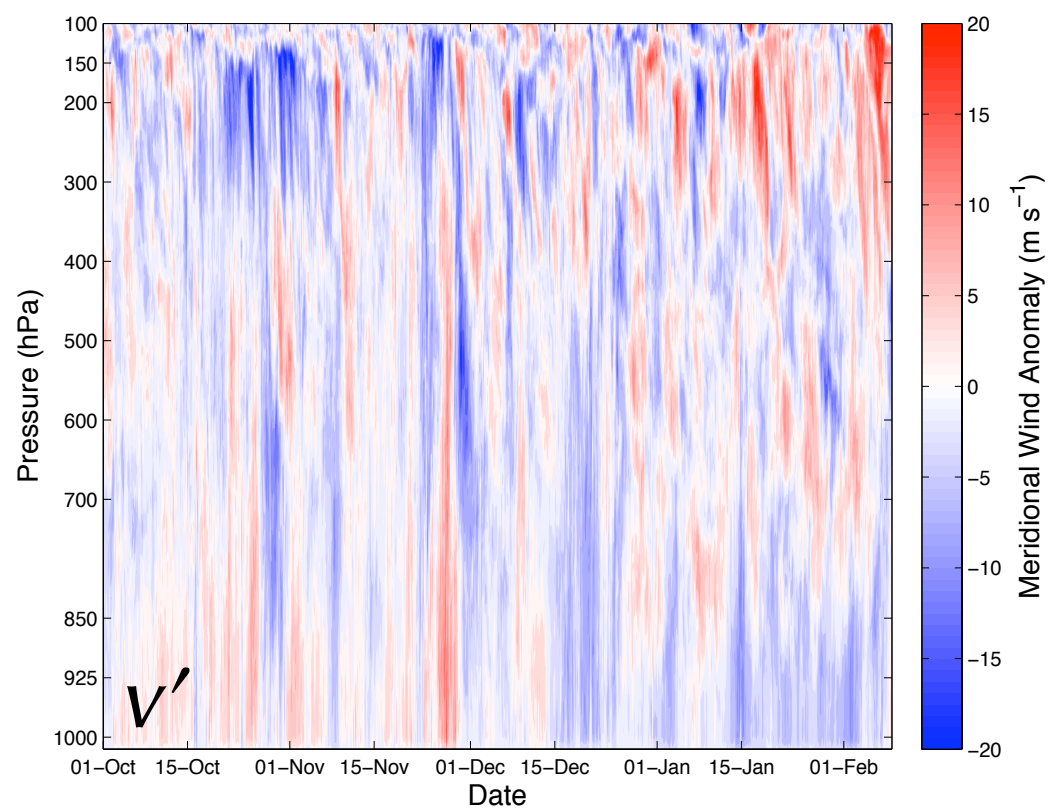
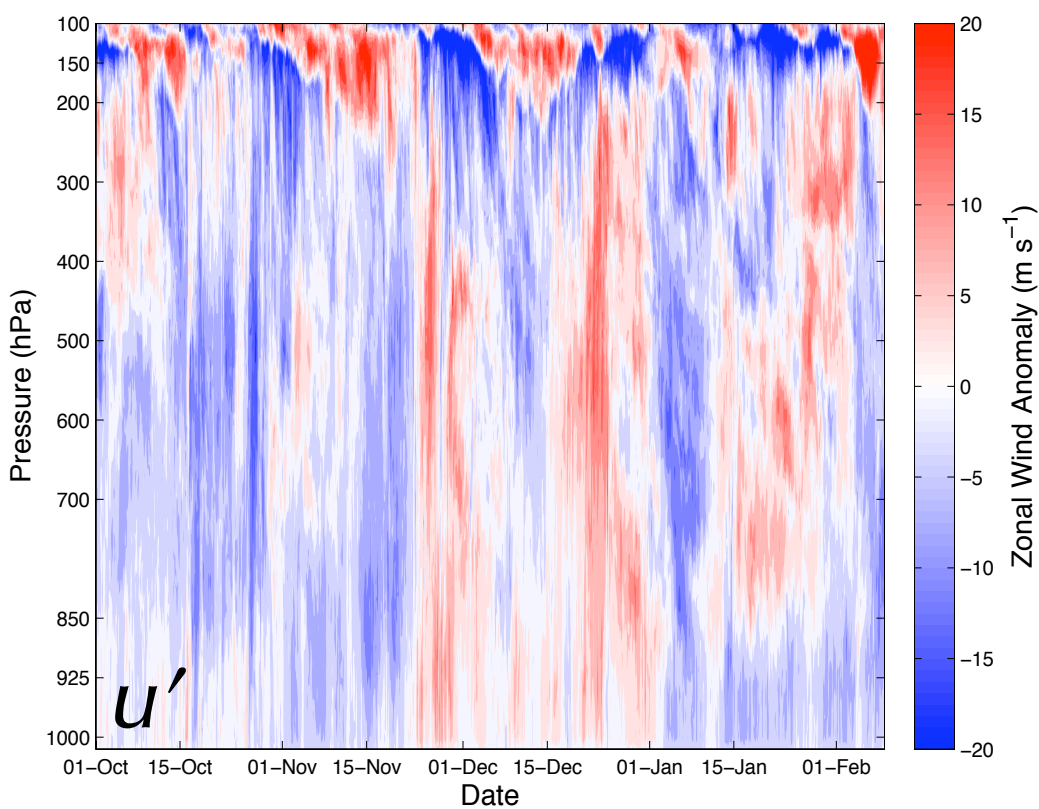


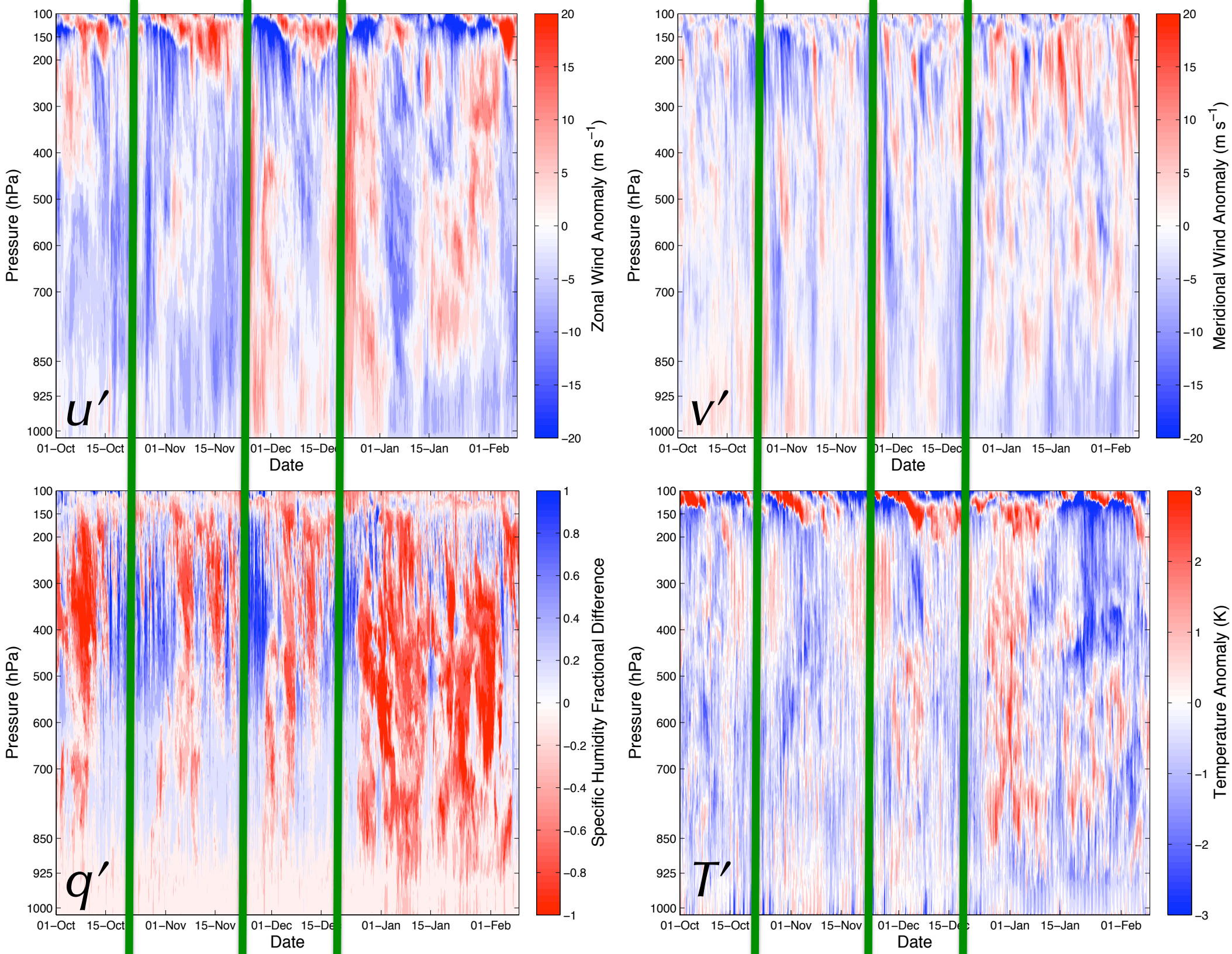
Precipitation at Addu



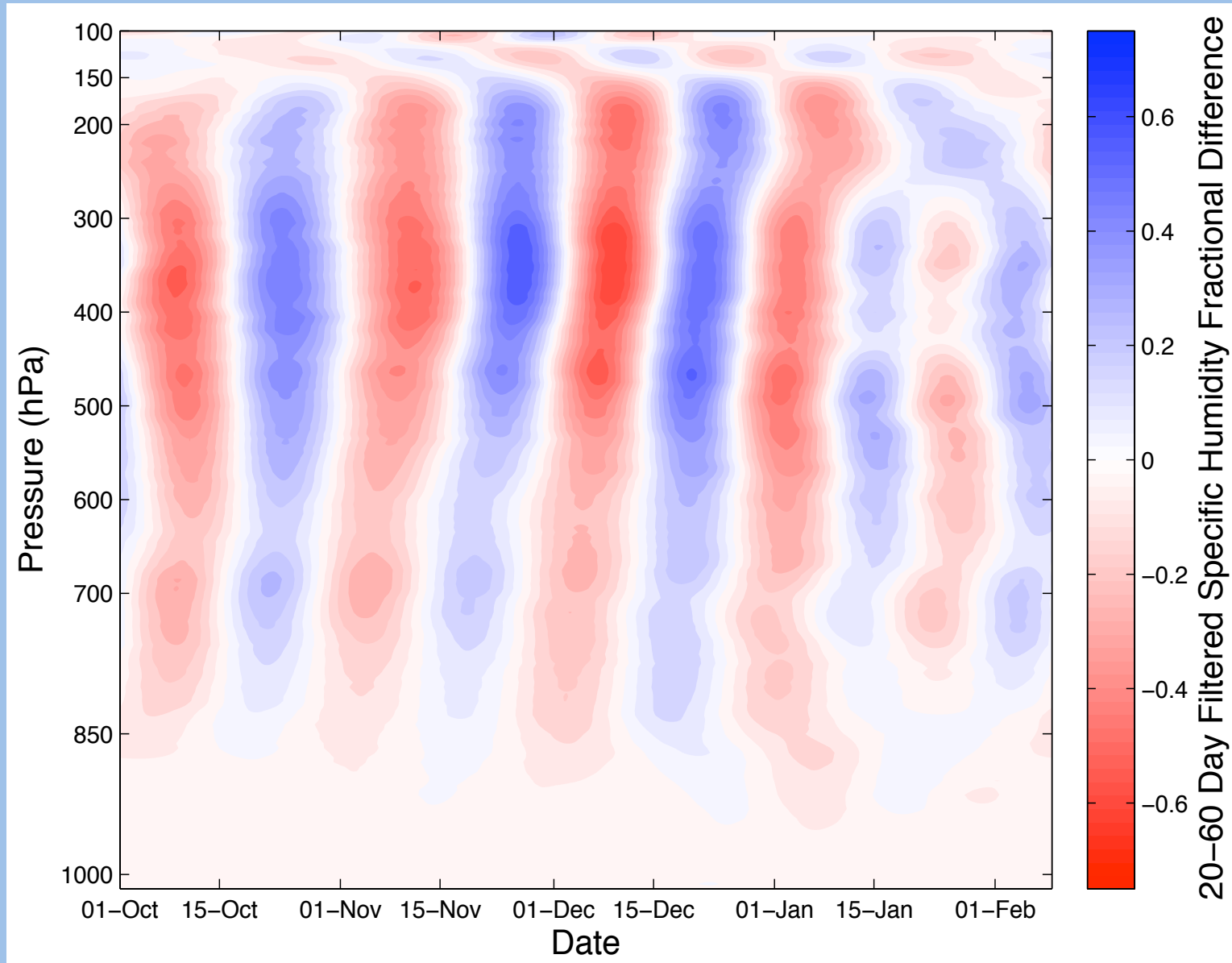
Convective and stratiform observed by S-PolKa



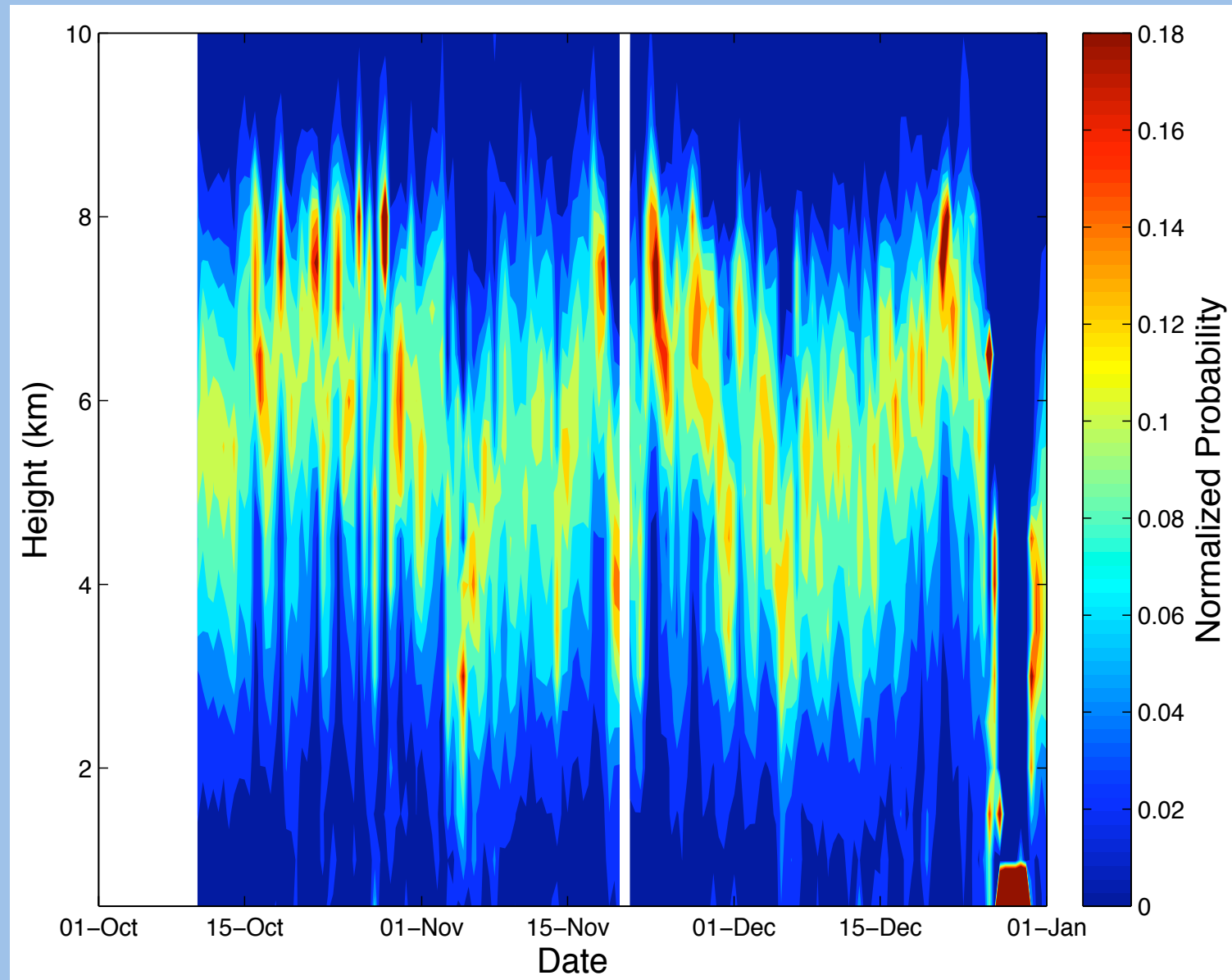




Filtered specific humidity anomalies

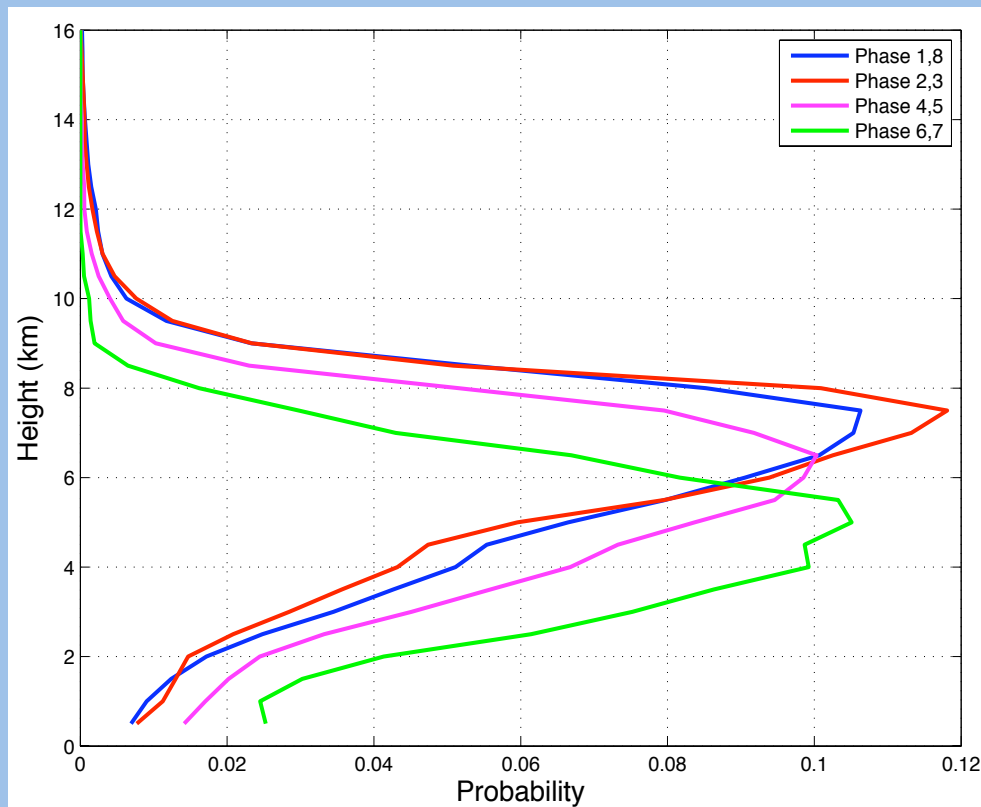


Convective echotops observed by S-PolKa

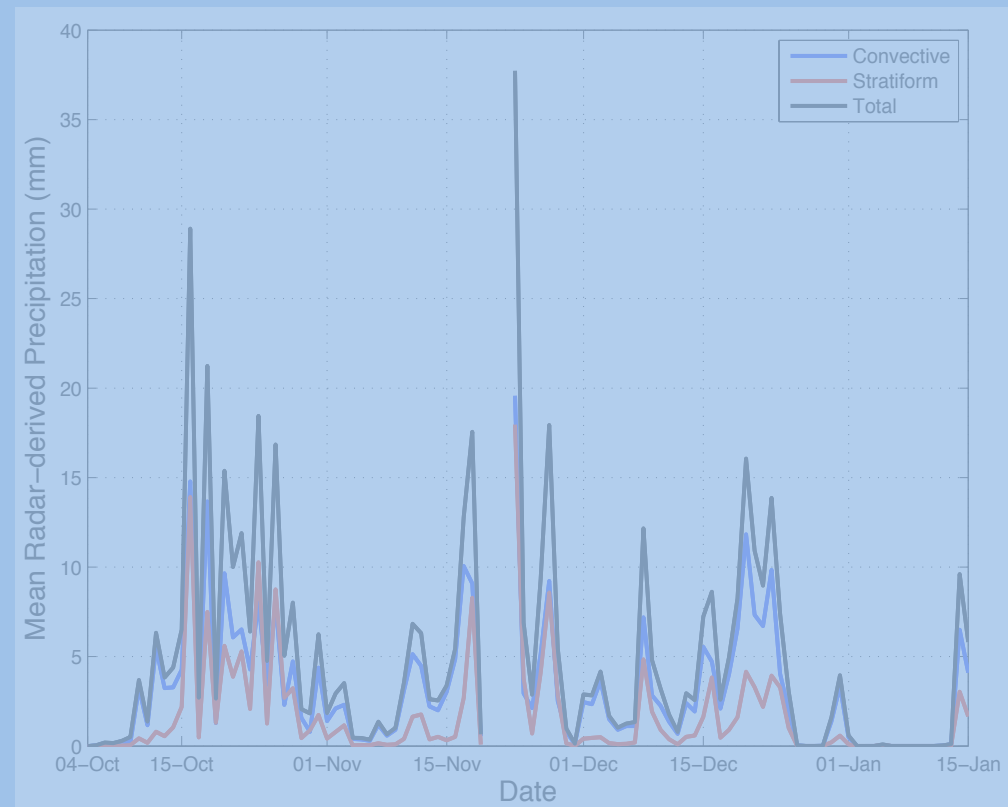


Convective echotops observed by S-PolKa

Echotop PDFs grouped by “bi-phase”

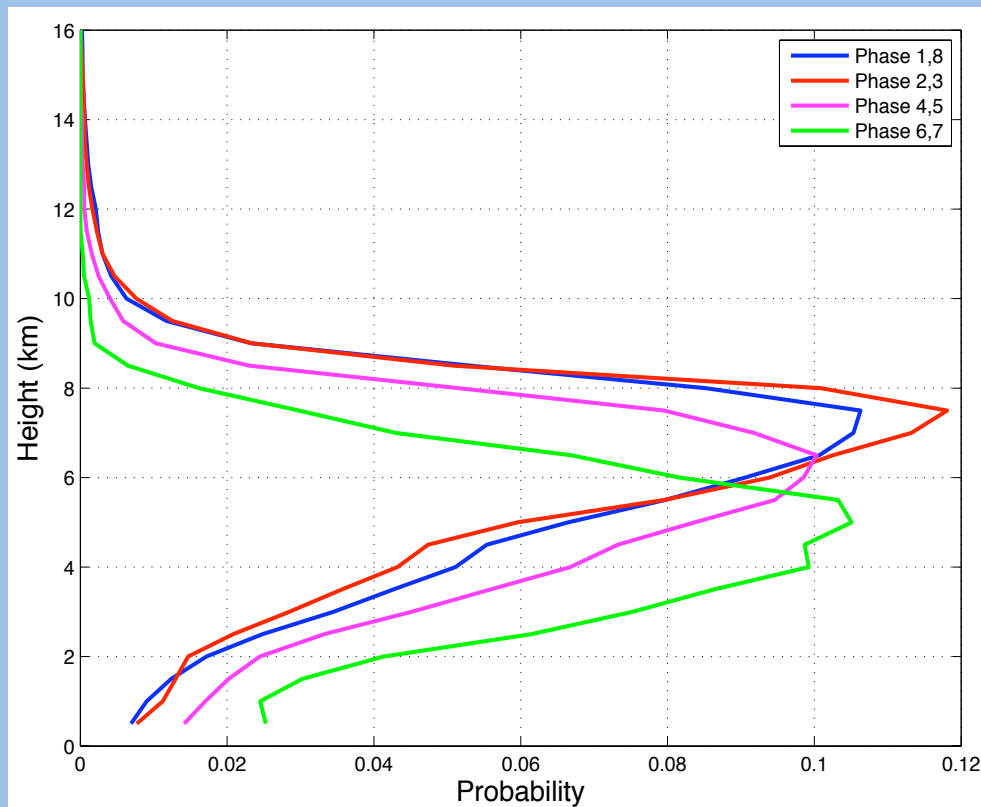


Echotop PDFs during “wet” and “dry” days of active phases

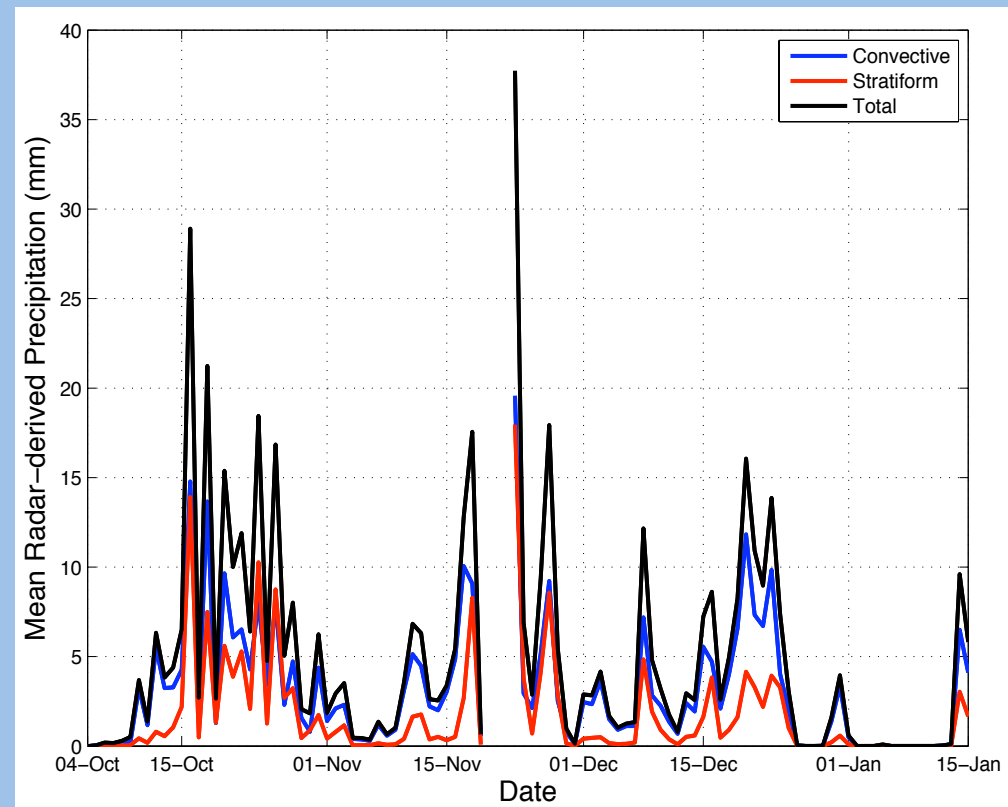


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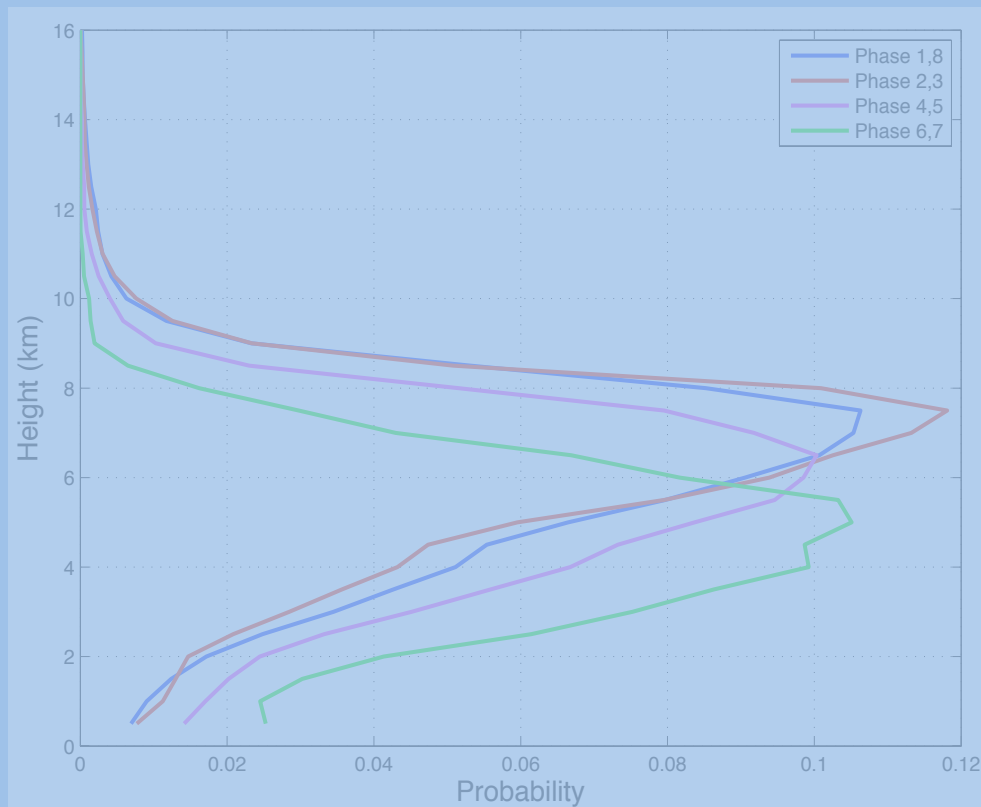


Echotop PDFs during “wet” and “dry” days of active phases

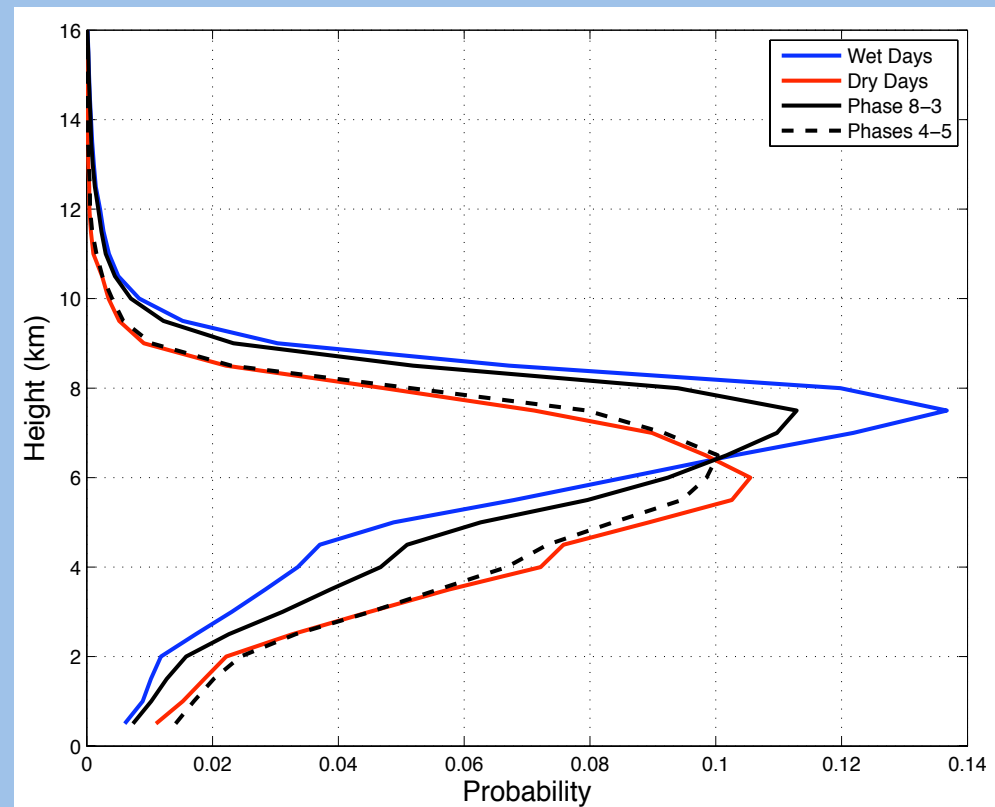


Convective echotops observed by S-PolKa

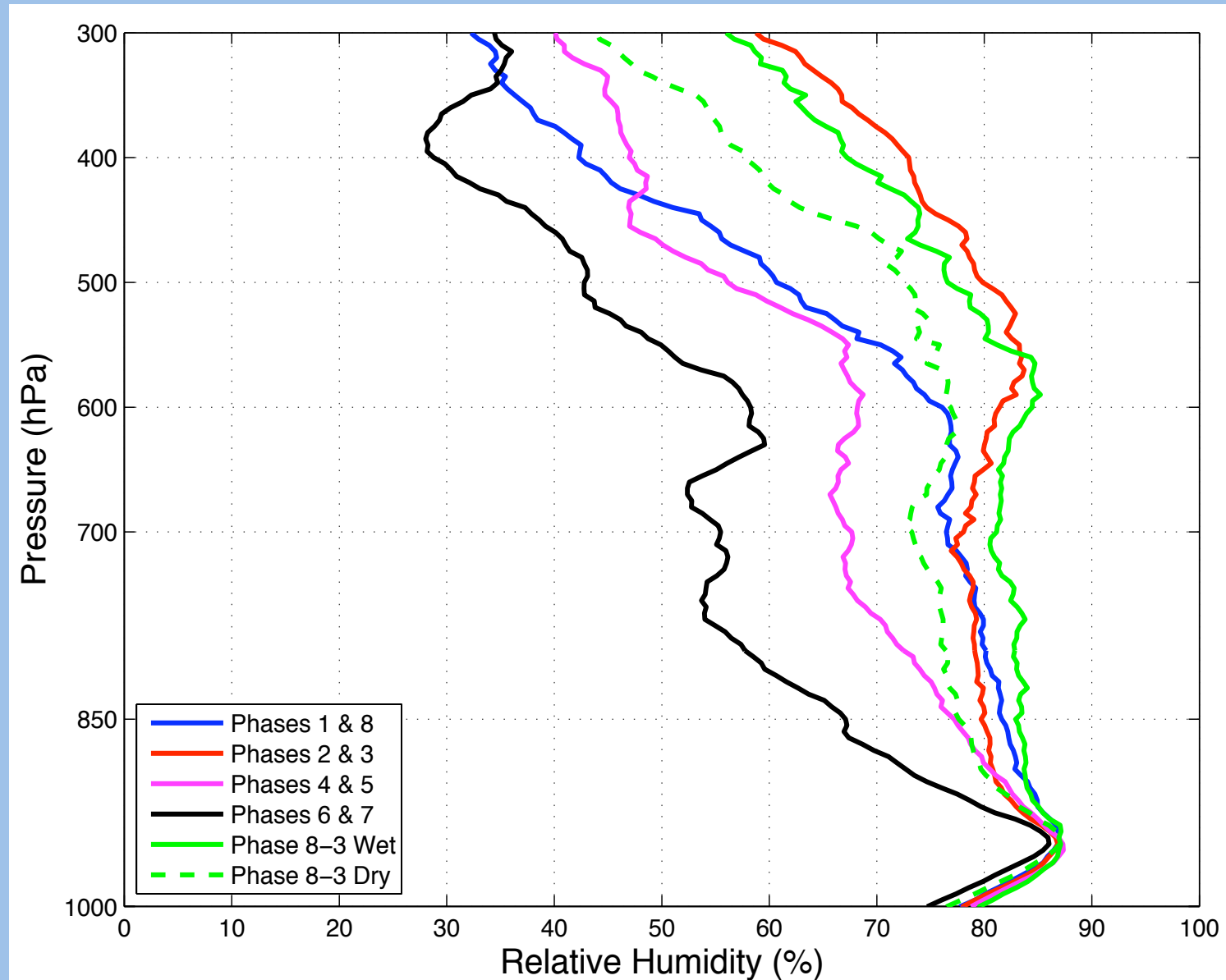
Echotop PDFs grouped by “bi-phase”



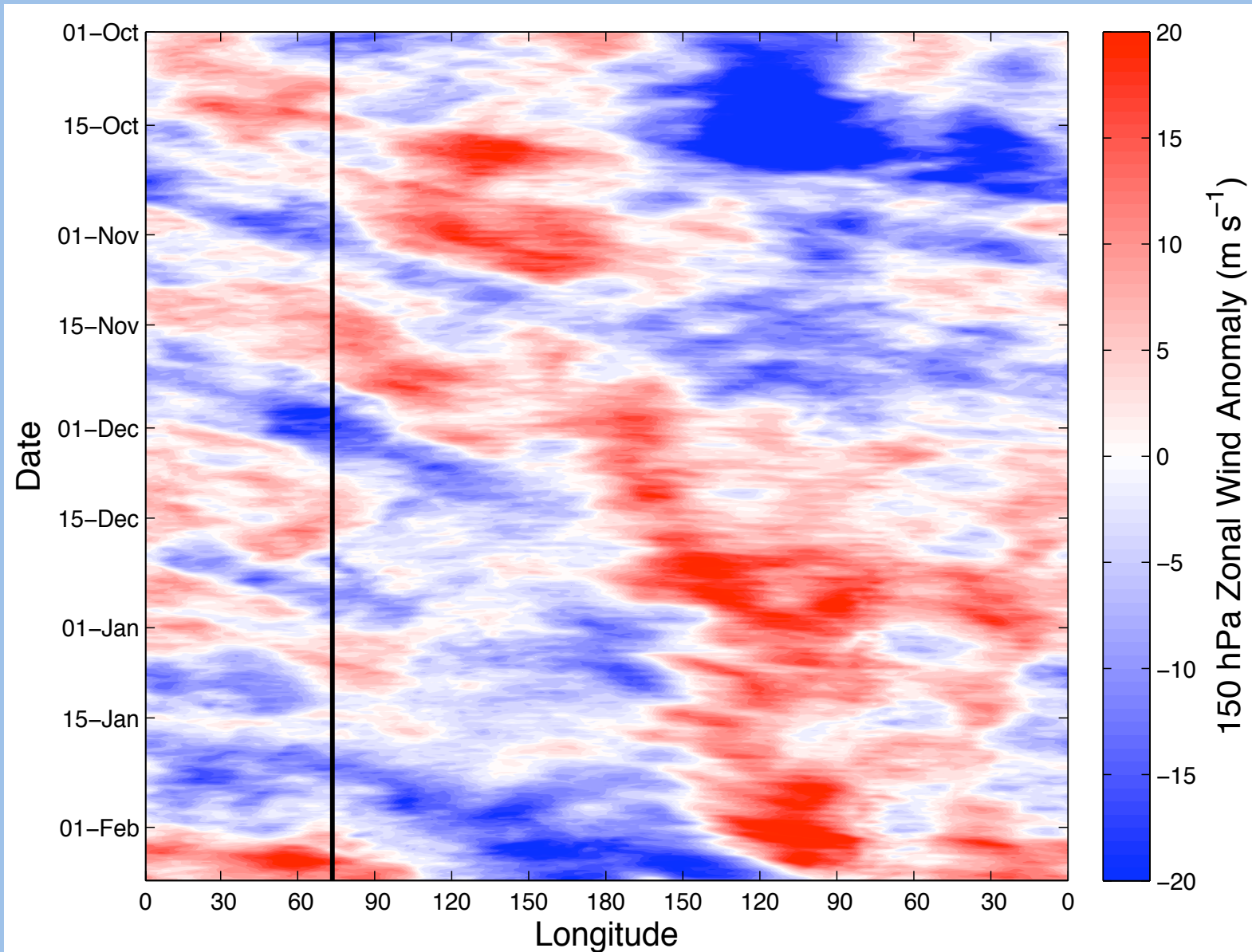
Echotop PDFs during “wet” and “dry” days of active phases



Relative Humidity profile comparison by phase



150 hPa zonal wind anomalies in ERA-I



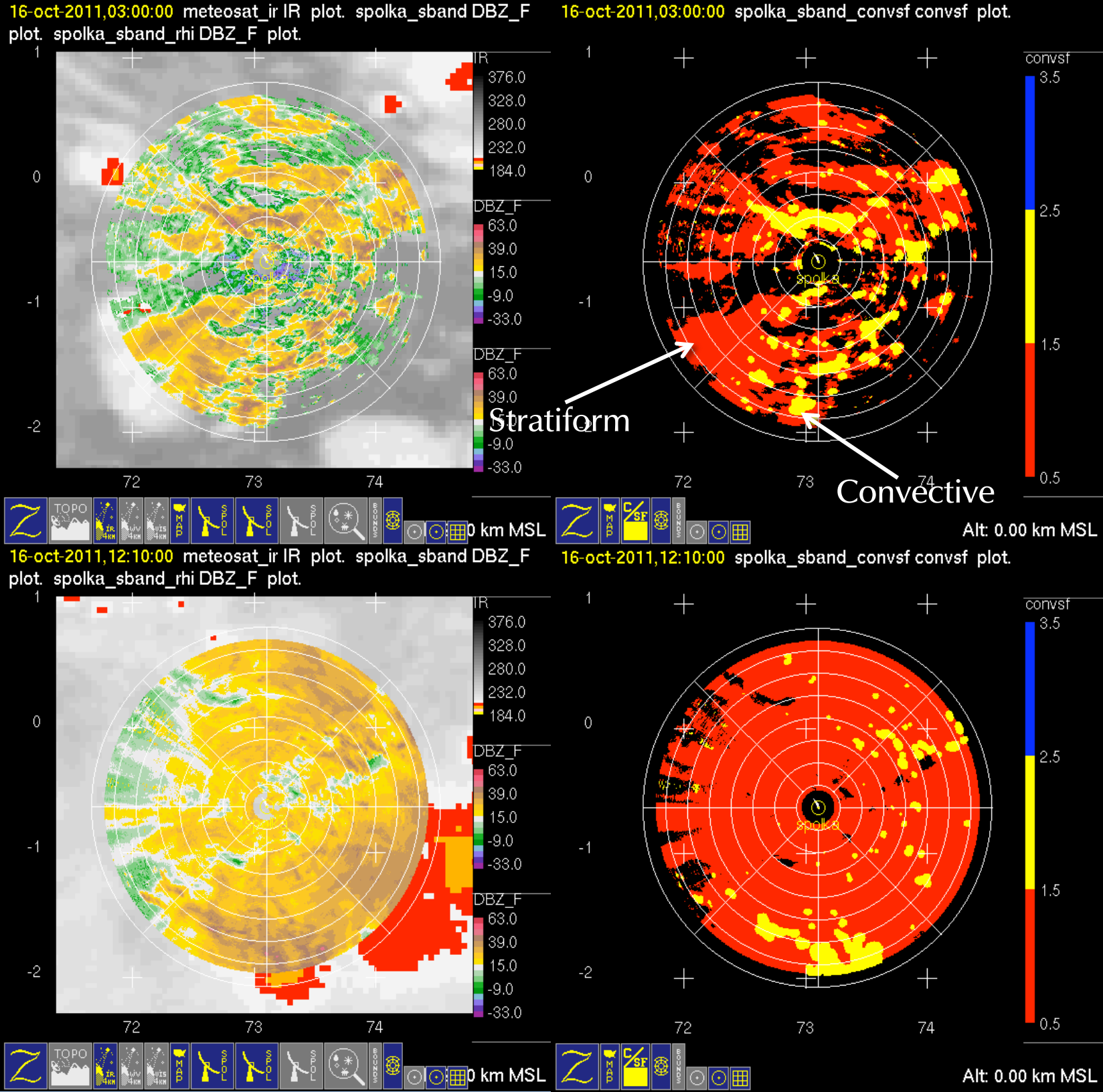
Conclusions

- Successful field campaign with an enormous radar and radiosonde dataset over the Indian Ocean
- Clouds of all depths are present during all MJO phases.
- Variability in MJO clouds dominated by changes in stratiform frequency
- Stratiform clouds likely contribute greatly to moistening prior to MJO onset.
- Environmental humidity is not the only factor that controls depth of convection.
- DYNAMO MJO cases strongly linked to 150 hPa zonal wind anomaly

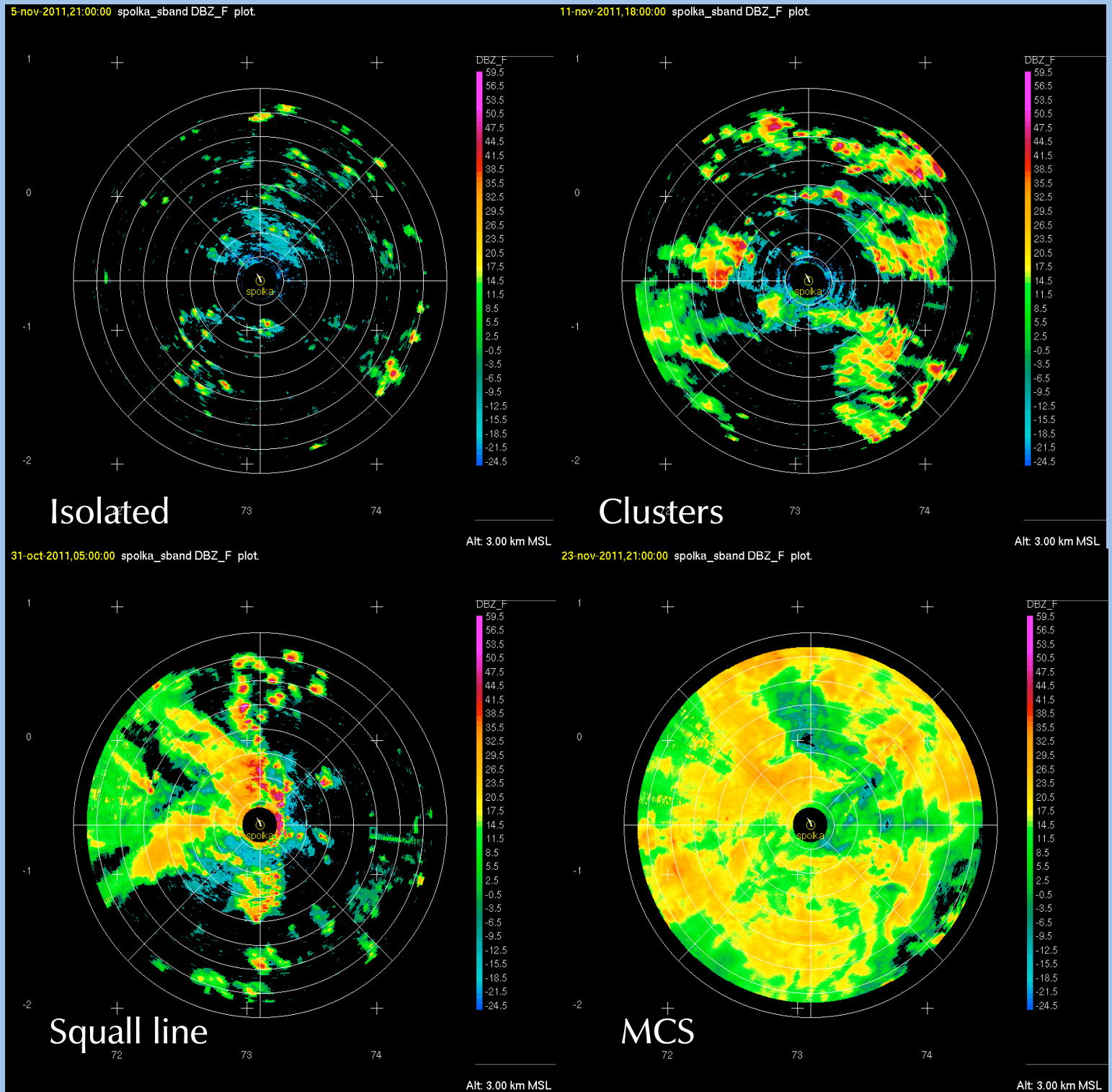


End
End

Large mesoscale system

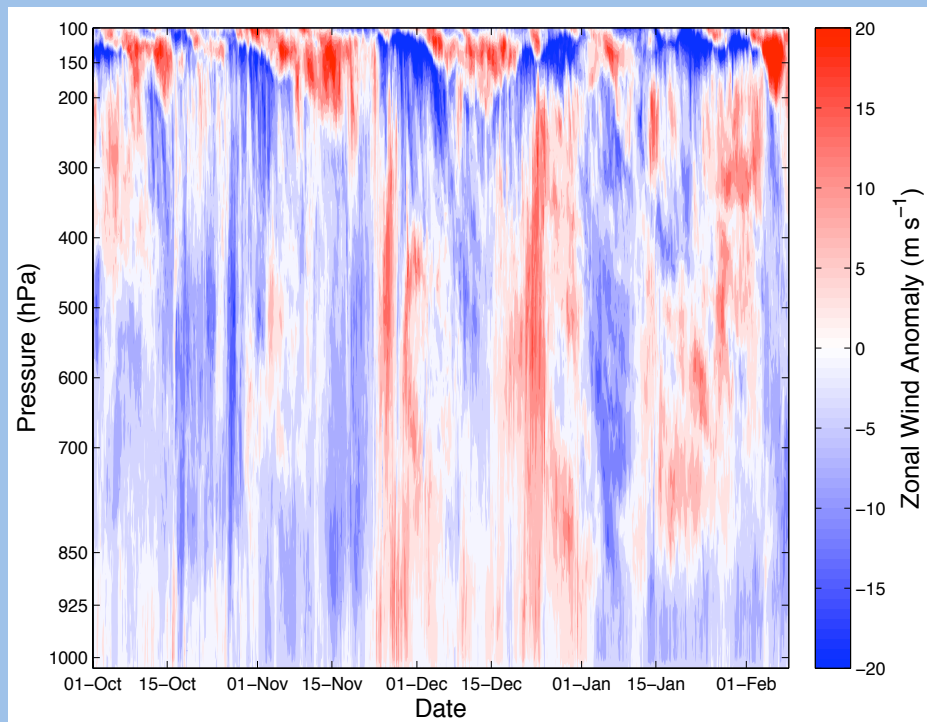


Organization of convection

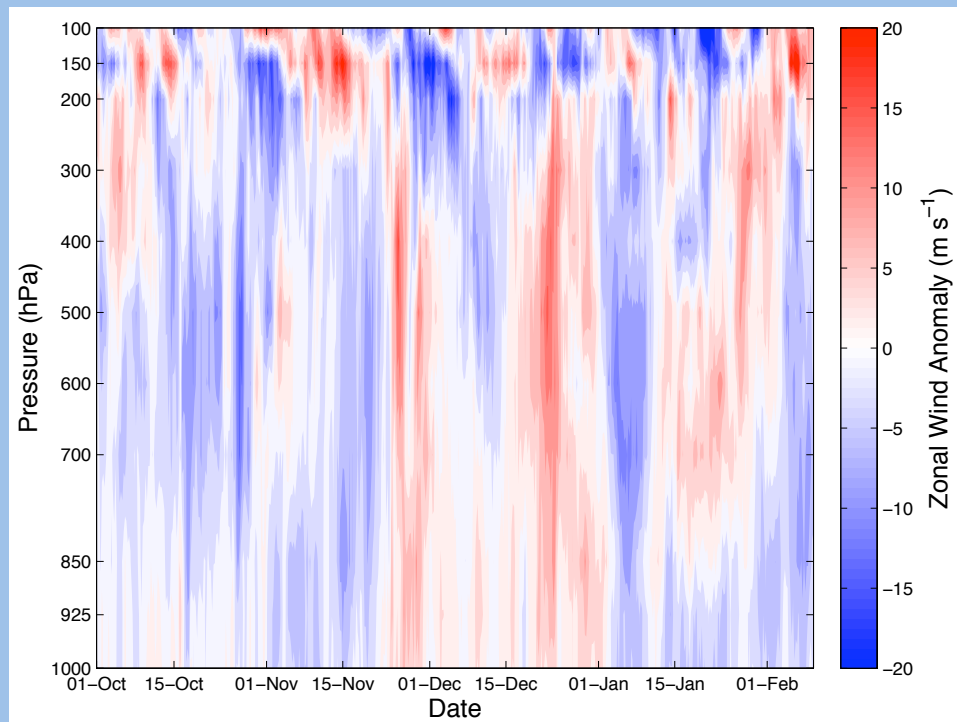


Radiosondes

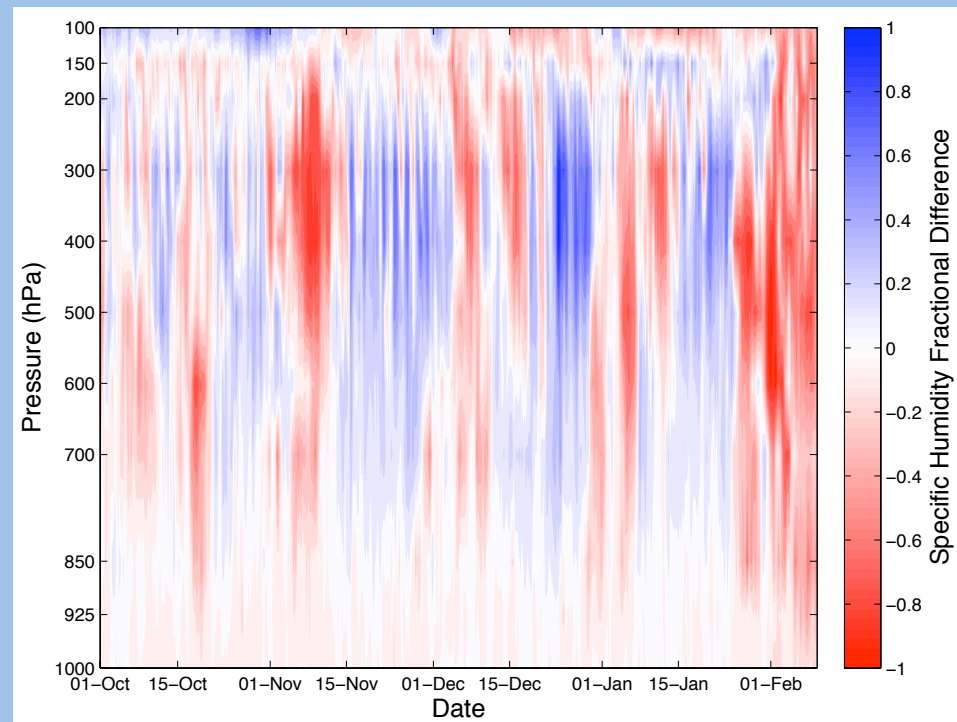
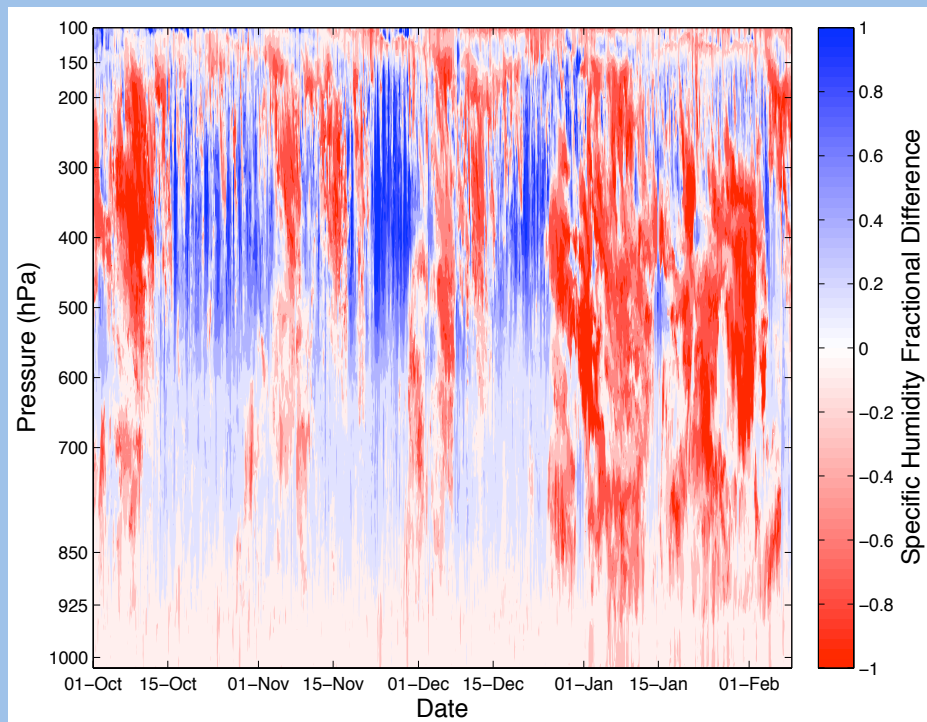
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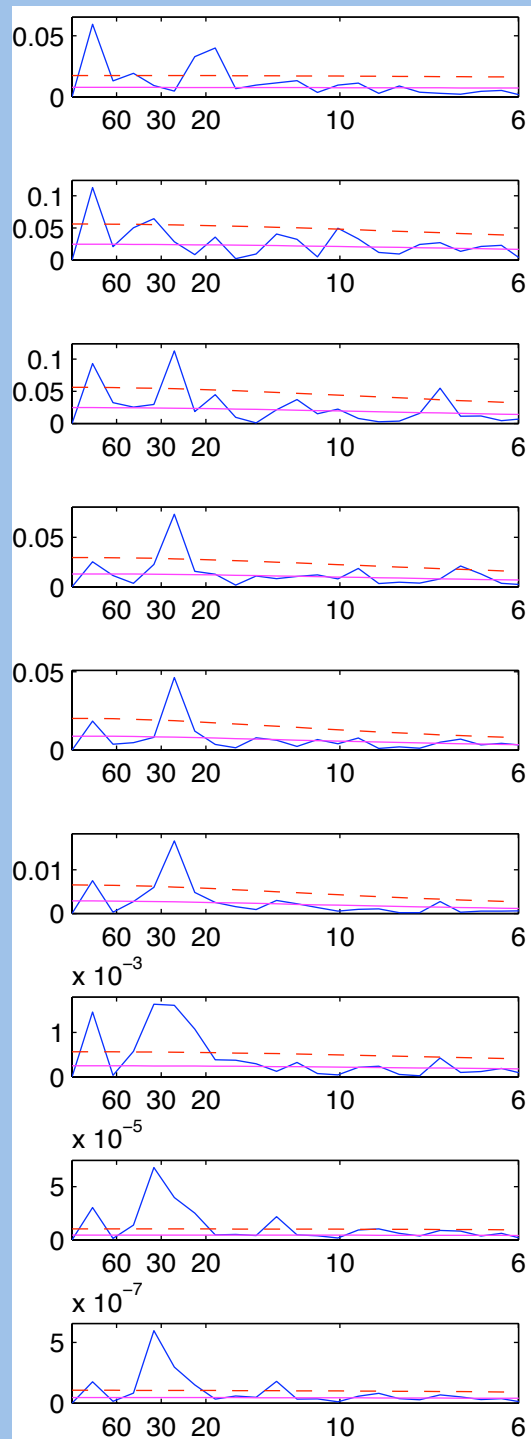


ERA-I

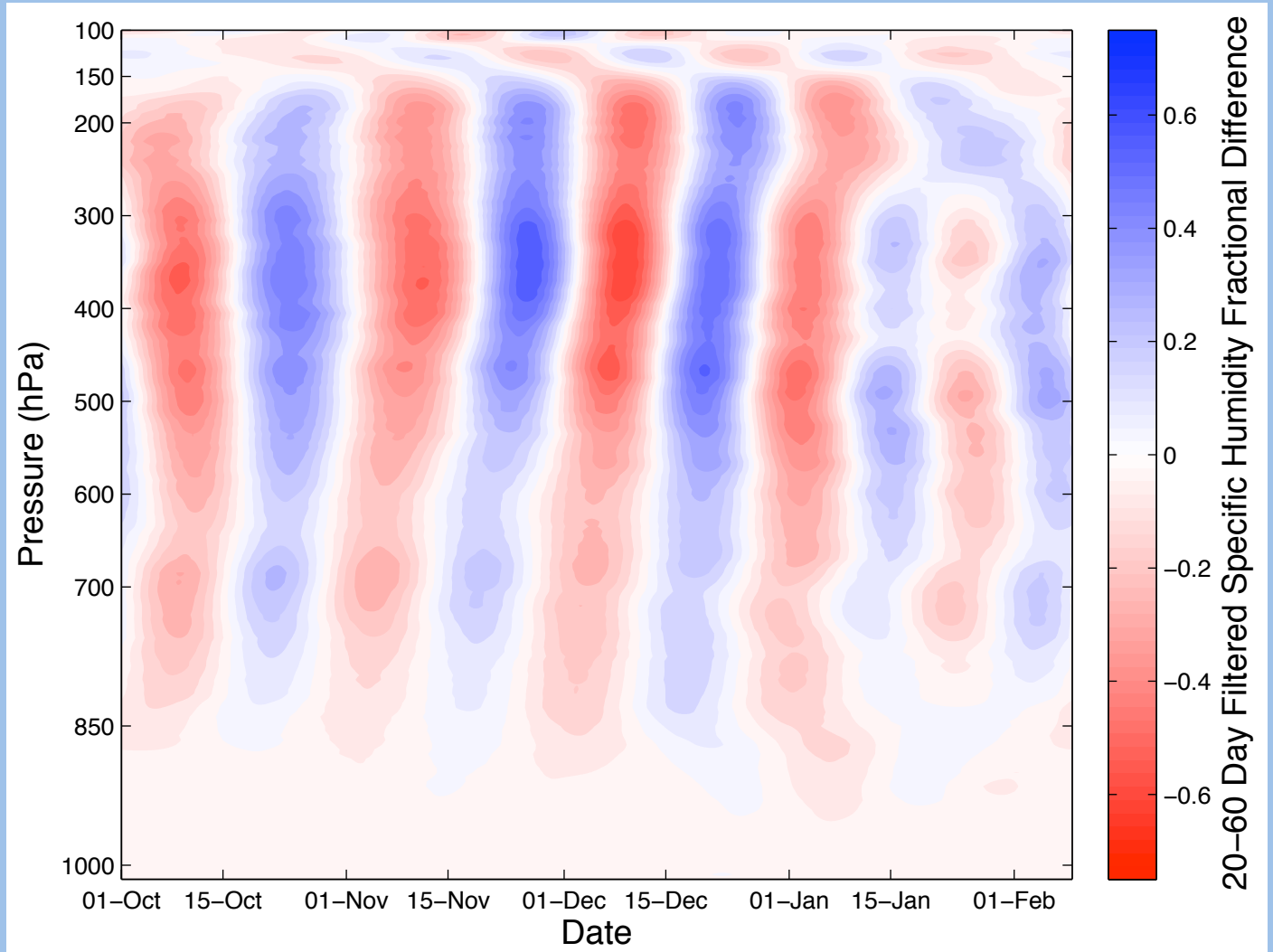


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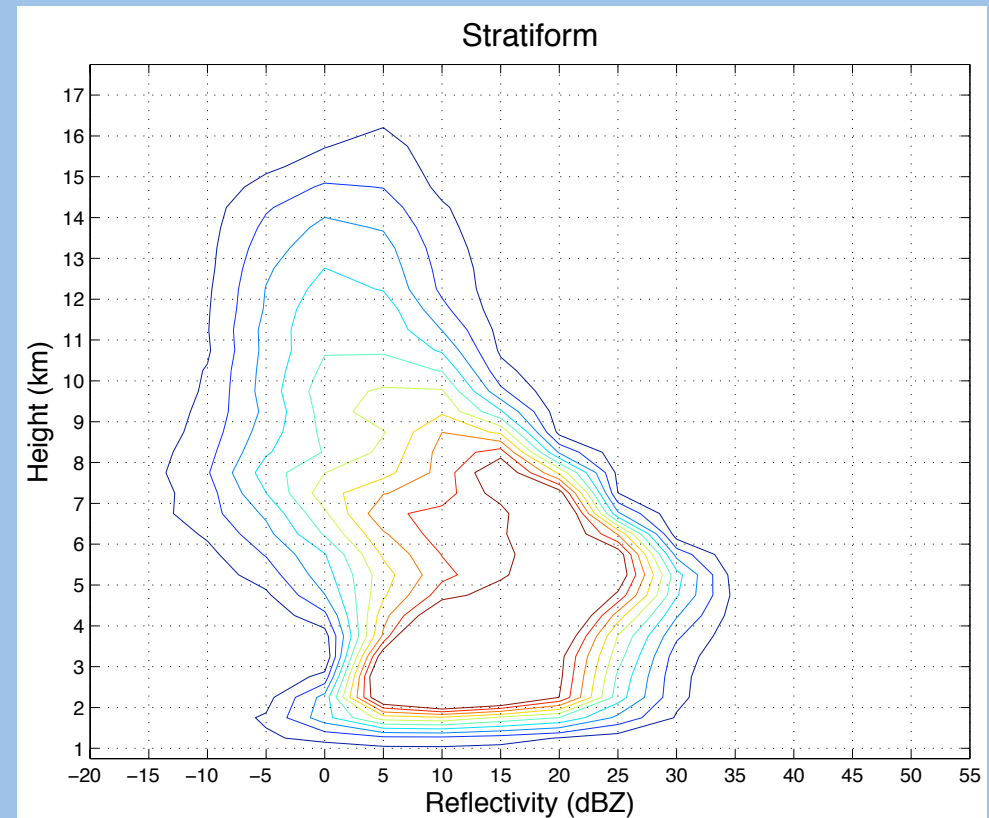
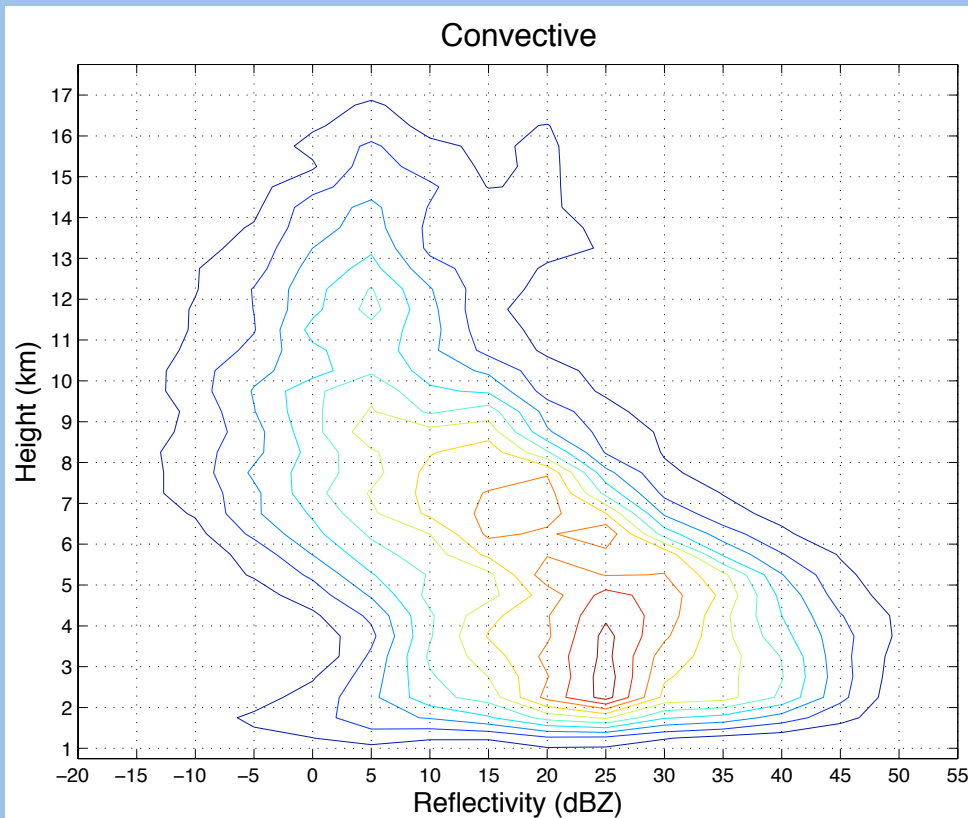
2 August 2012



S.W. Powell: Convection during DYNAMO

15

Reflectivity structure of precipitating clouds



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