Updraft Characteristics of Convection During TWP-ICE and Links to Microphysical Habits

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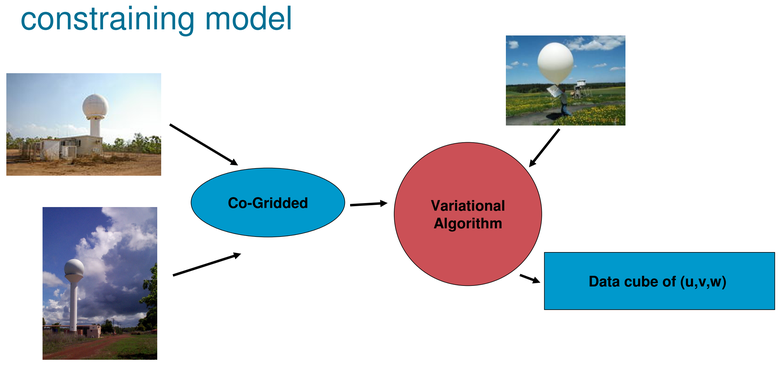
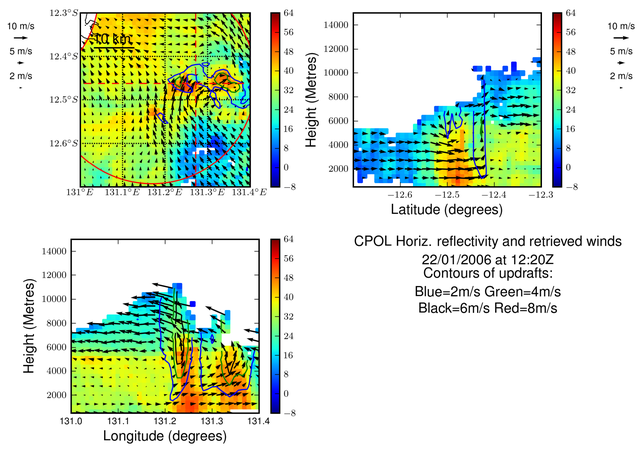
A partnership between CSIRO and the Bureau of Meteorology

Updraft retrievals

- Uses a variational method based on the work by Protat and Zawadzki [1]
- Essentially variational assimilation of radar data using the anelastic mass continuity equation as a constraining model





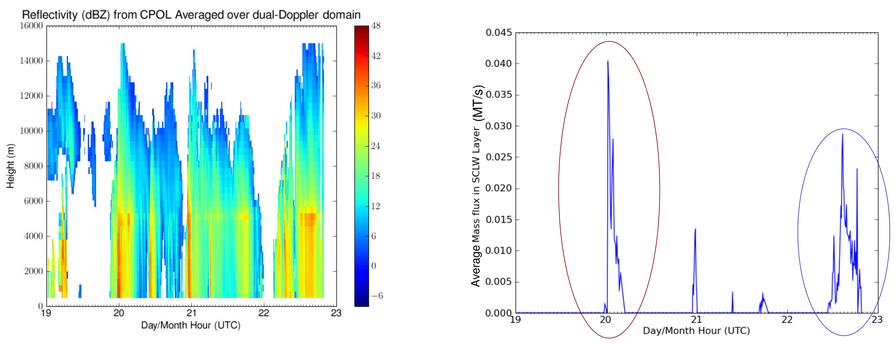
CPOL Horiz. reflectivity and retrieved winds
22/01/2006 at 12:20Z
Contours of updrafts:
Blue=2m/s Green=4m/s
Black=6m/s Red=8m/s

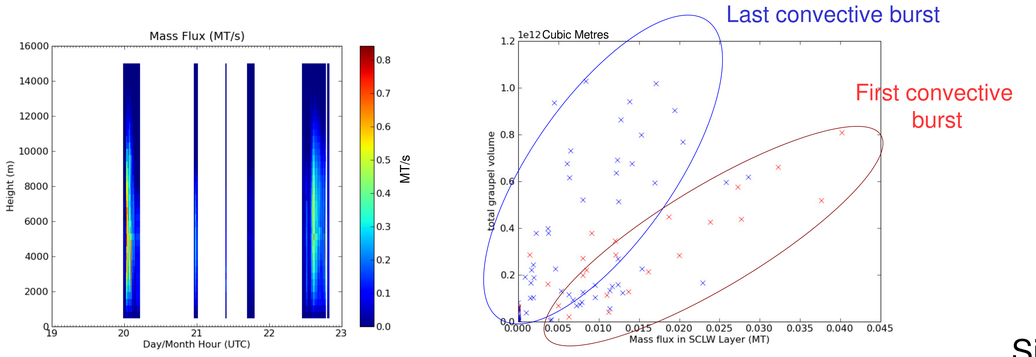
Take home message:

Radar derived reconstructions of the 3D wind field for two periods of TWP-ICE are now available. Statistics for direct comparison with cloud resolving and single column models have been derived in an effort to help improve convective parameterisation.

Links

Linking the intensity of the 95 percentile updraft in the 0 to -10 degree layer to the volume of graupel produced.

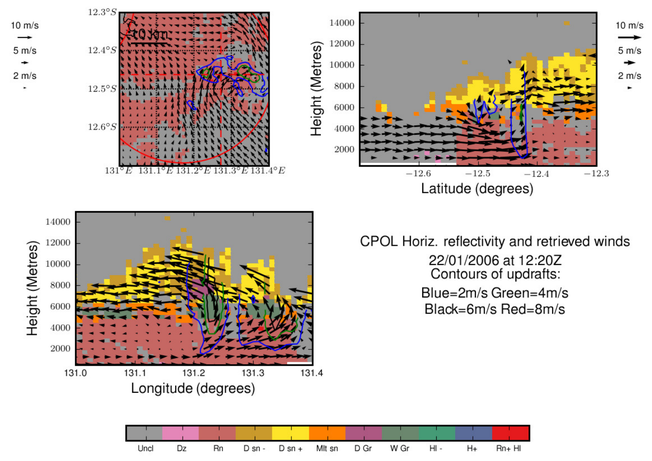




Each point represents a 10 minute volumetric scan

Microphysics

- Uses moments from the C-POL polarimetric radar.
- Classifies returns using a decision tree based on the work by Keenan [2]



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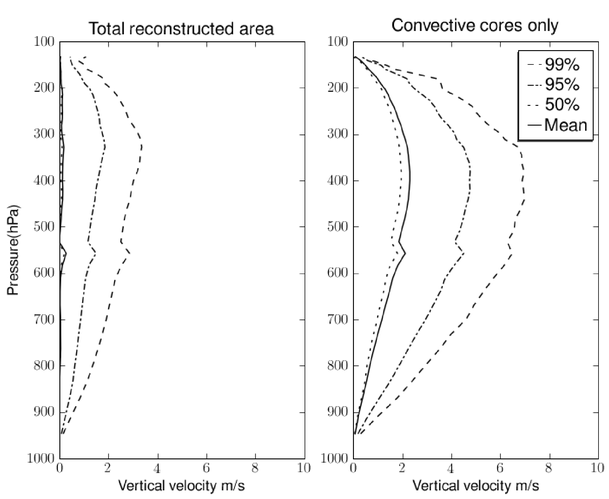
- *Graupel locations consistent with updrafts*

Monsoon Break

- Most convection occurring outside of the dual Doppler lobes plus issues with data rejection and intractable aliasing leading to lower than expected velocities
- may need more constraints

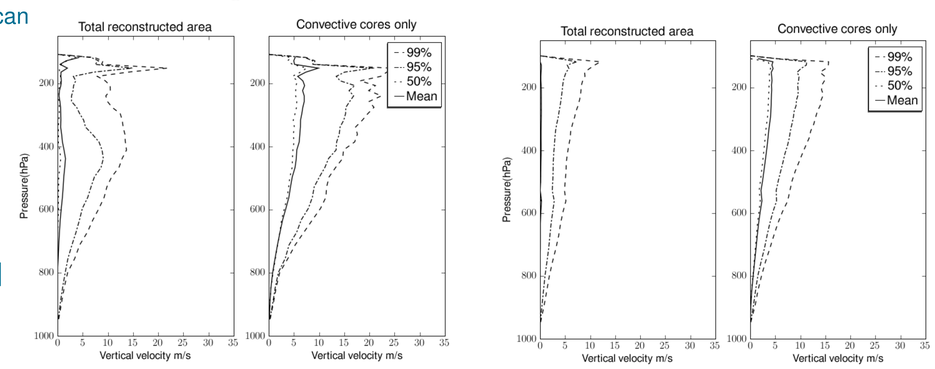
The Wet Monsoon

- Retrievals performed from 0Z on the 19th to 1950Z on the 22nd every 10 minutes. “Deep convective cores” defined as a column where w>1m/s for at least 5500m



- *Clear deceleration before the equilibrium level, possibly due to dry air entrainment.*

Single squall 9-14/2/2006



- *Clear difference in vertical structure to wet monsoon period*

References

[1] Protat, A. and I. Zawadzki, 1999: A semi-adjoint method for real time retrieval of three-dimensional wind field from multiple-Doppler bistatic radar network data. J. Atmos. Oceanic Tech., 16, 432-449

[2] Keenan, T, 1999: *Hydrometeor classification with a C-band. polarimetric radar*. 29th AMS Conf. On Radar. Meteorology, Amer. Meteor. Soc.