Profiler observations of vertical velocity in convective, stratiform, and anvil cloud over Darwin

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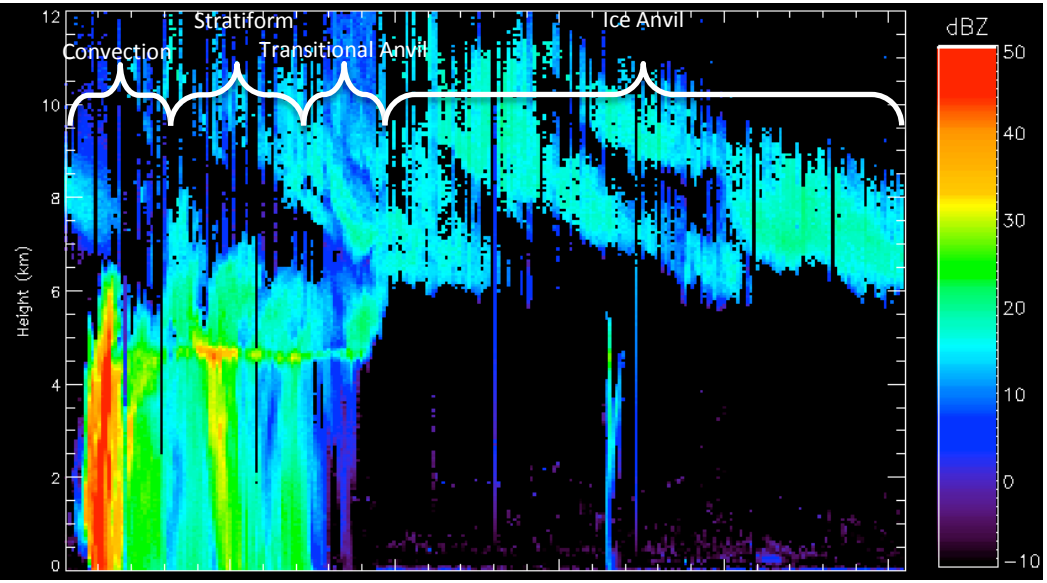
Echo separation over Darwin

S-band profiler reflectivity 18 January 06

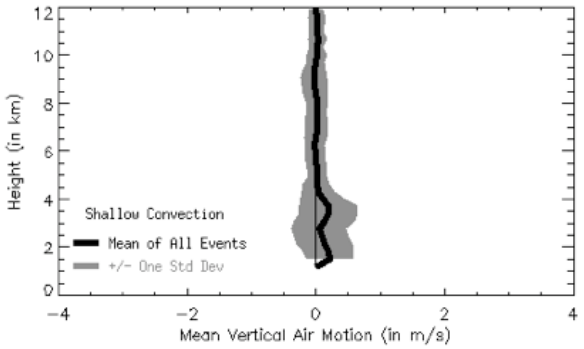


Vertical velocities were retrieved using a dual-wavelength profiler algorithm (50 and 2835 MHz, Protrat and Williams 2011), while echo type was determined using C-POL and S-band profiler reflectivities.

Type	Criteria	Hours
Shallow Convection	Top < 4 km	8
Mid-Level Convection	Top 4-8 km	20
Deep Convection	Top > 8 km	12
Robust Stratiform	Surface > 28 dBZ	12
Weak Stratiform	Surface 5-28 dBZ	35
Transitional Anvil	Surface < 5 dBZ	21
Ice Anvil	Base > 6 km	65
Nov 05 – Feb 06	**TOTAL**	**172**

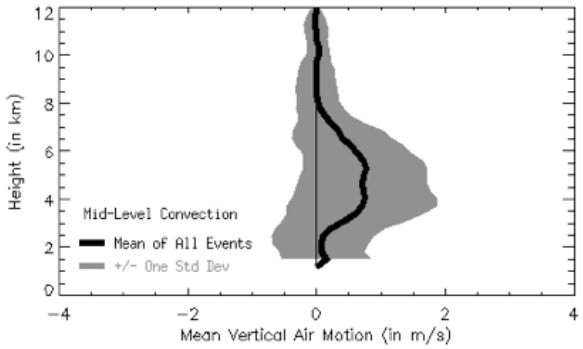
Convective vertical velocities

Shallow



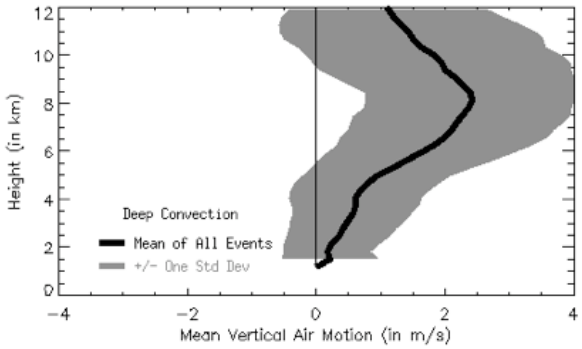
1.5/3.5 km, 0.25 m/s

Mid-level



5 km, 0.75 m/s

Deep



8 km, 2.5 m/s

Convective vertical velocities increase in magnitude and height as the depth of the convective cell increases (not too surprising…).

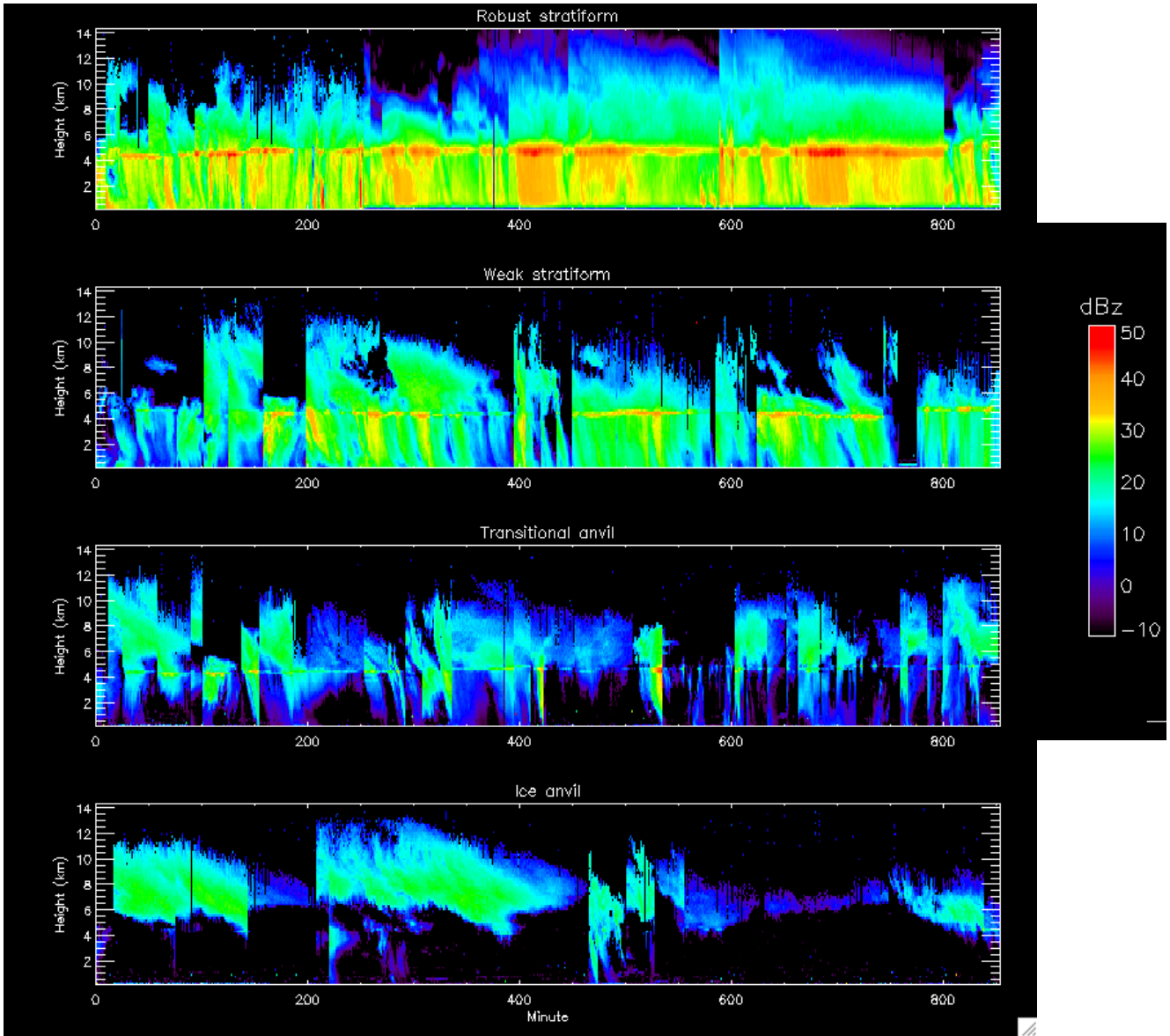
Stratiform and anvil reflectivity

Robust SF

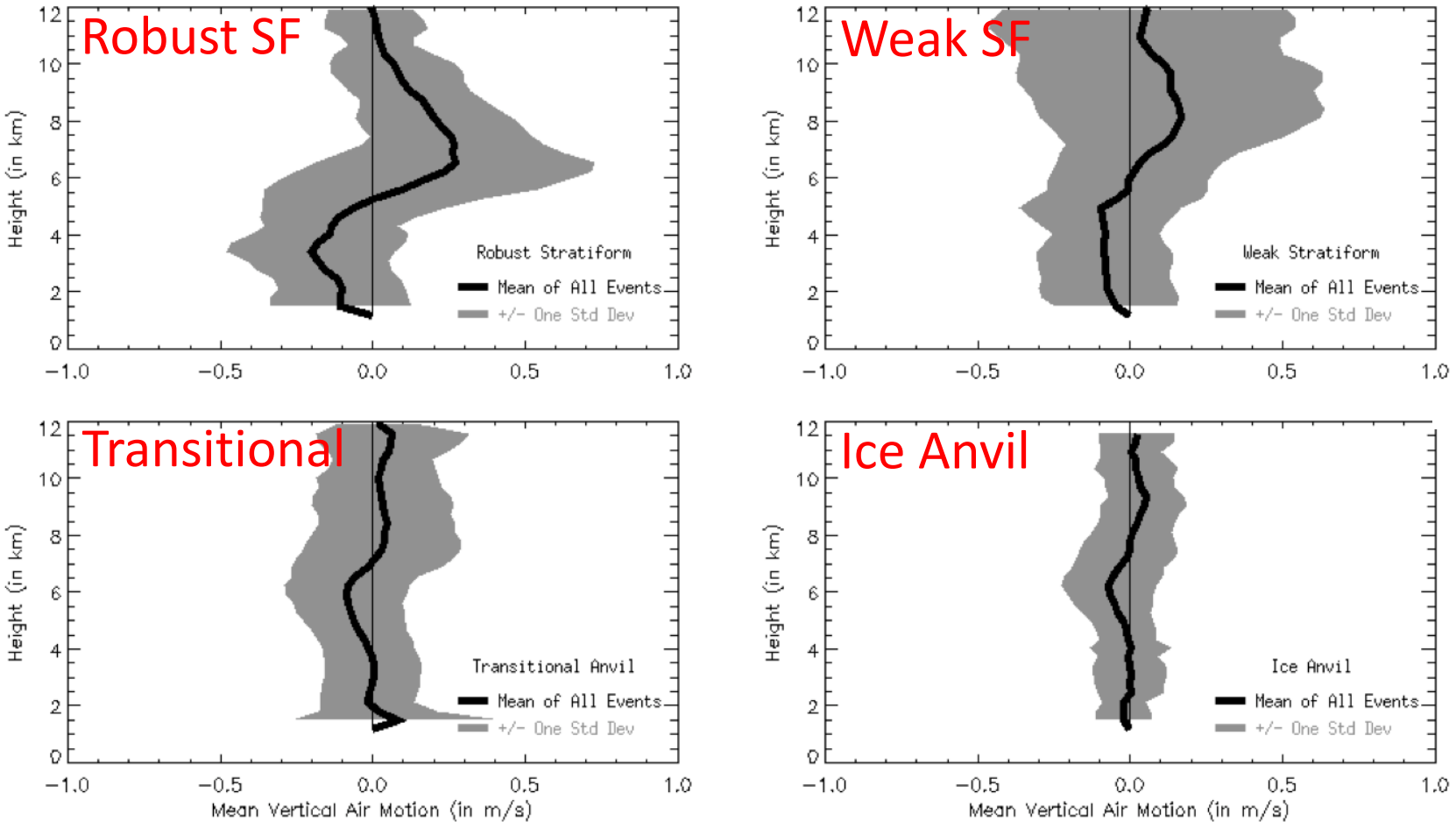
Weak SF

Transitional

Ice Anvil

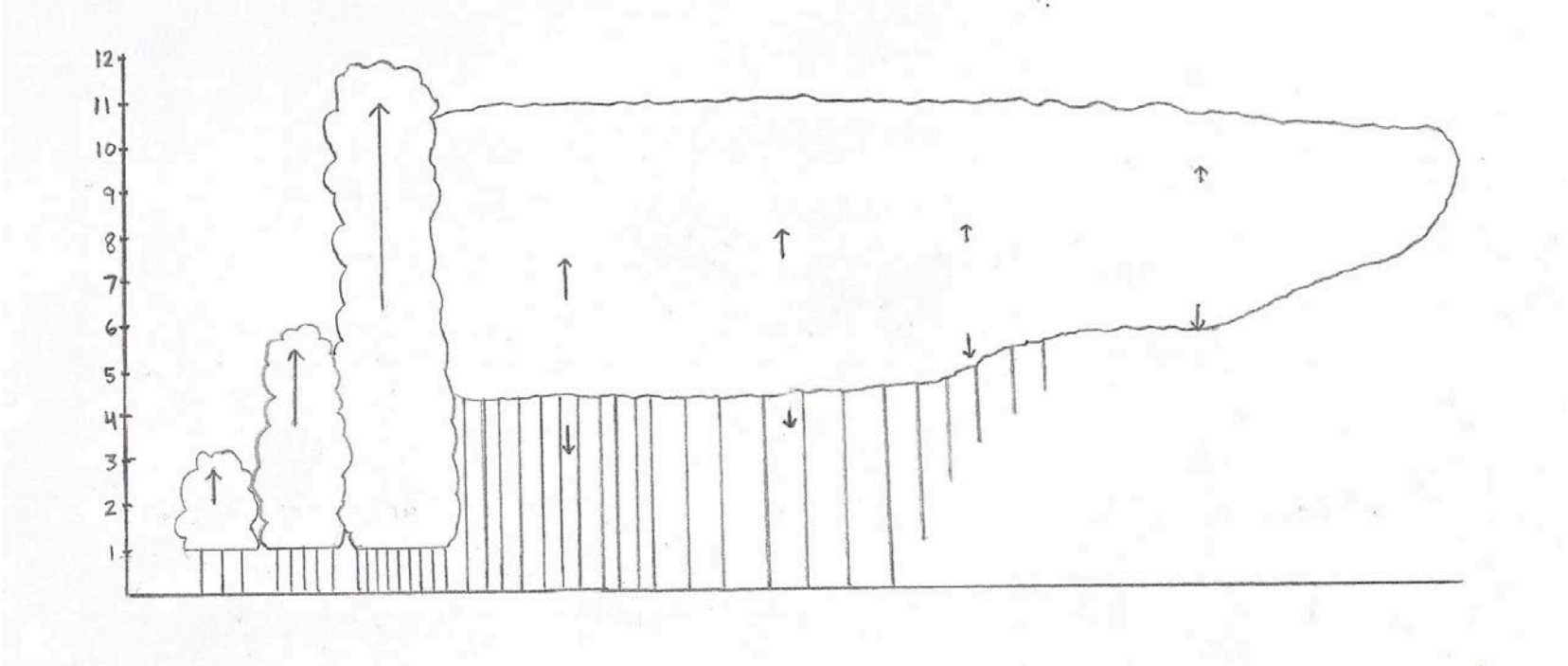


Stratiform and anvil vertical velocities



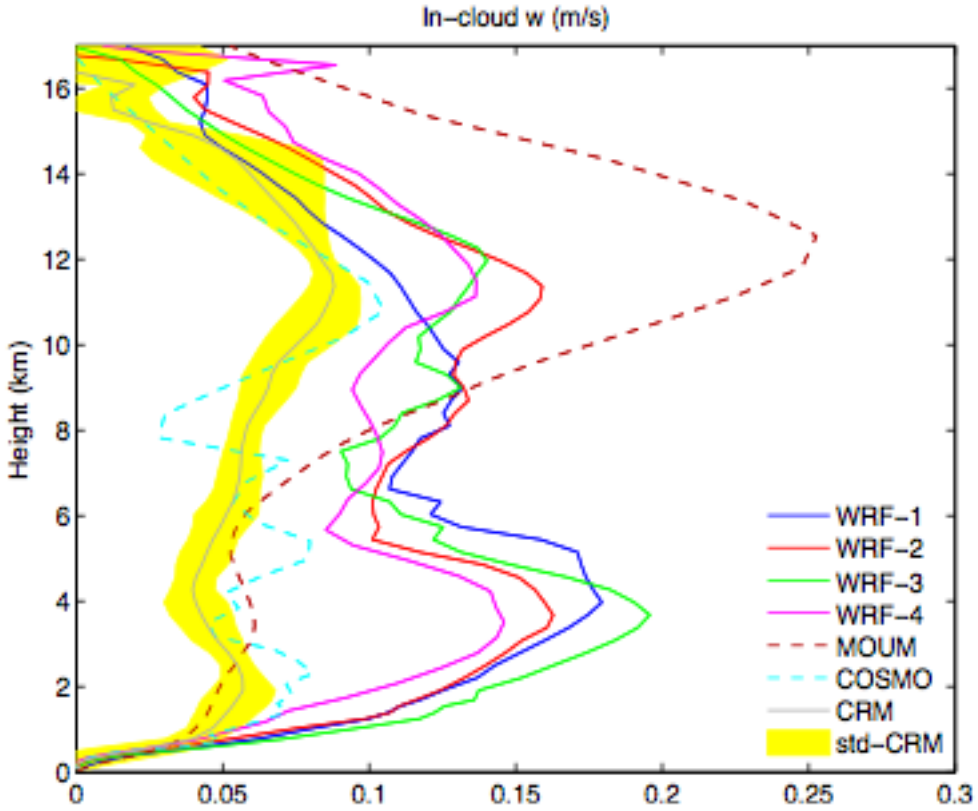
Stratiform: UL updrafts > LL downdrafts, Anvil: ML downdrafts > UL updrafts

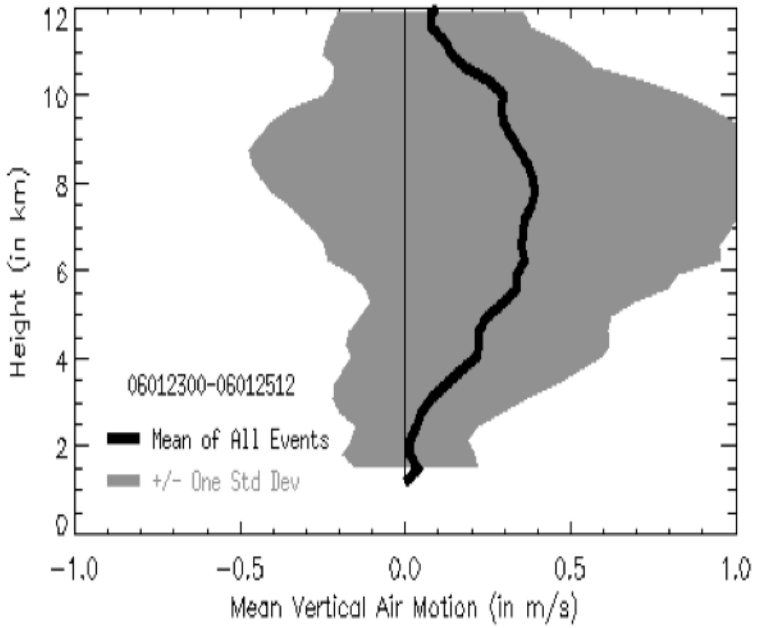
Summary



- Vertical velocities by cloud type can help elicit the dynamics of the convective-stratiform-anvil transition
- Future work would be to further examine dynamics (temporal evolution, role of gravity waves, etc.), microphysics (e.g., compare to C-POL hydrometeor IDs), and model comparisons…

LAM/CRM comparison 23-25 Jan 2006





Zhu et al. (submitted)