Flight Patterns for PREDICT

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Vorticity budget

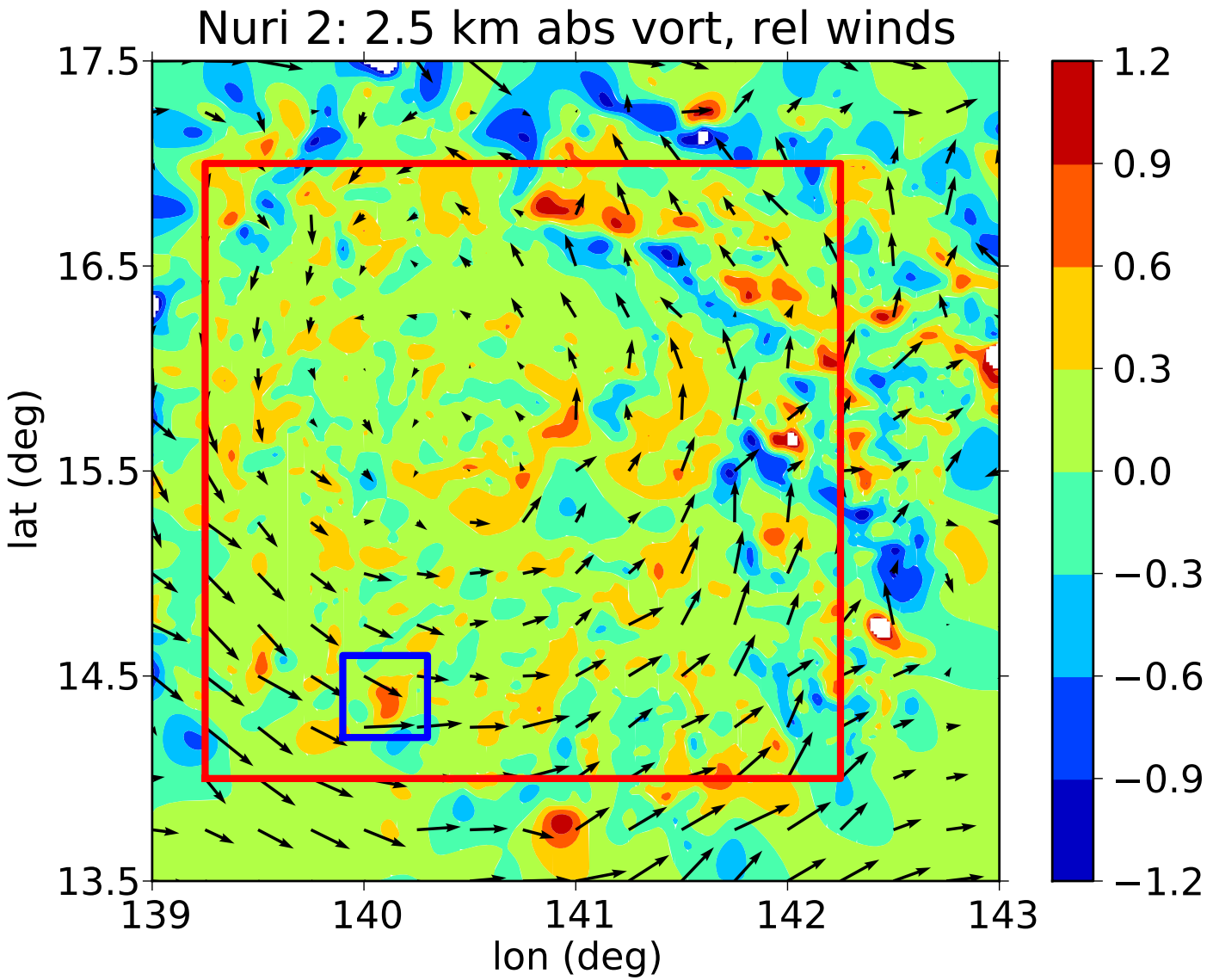
Integrate over co-moving area:

$$\Gamma = \int \zeta_z dA$$

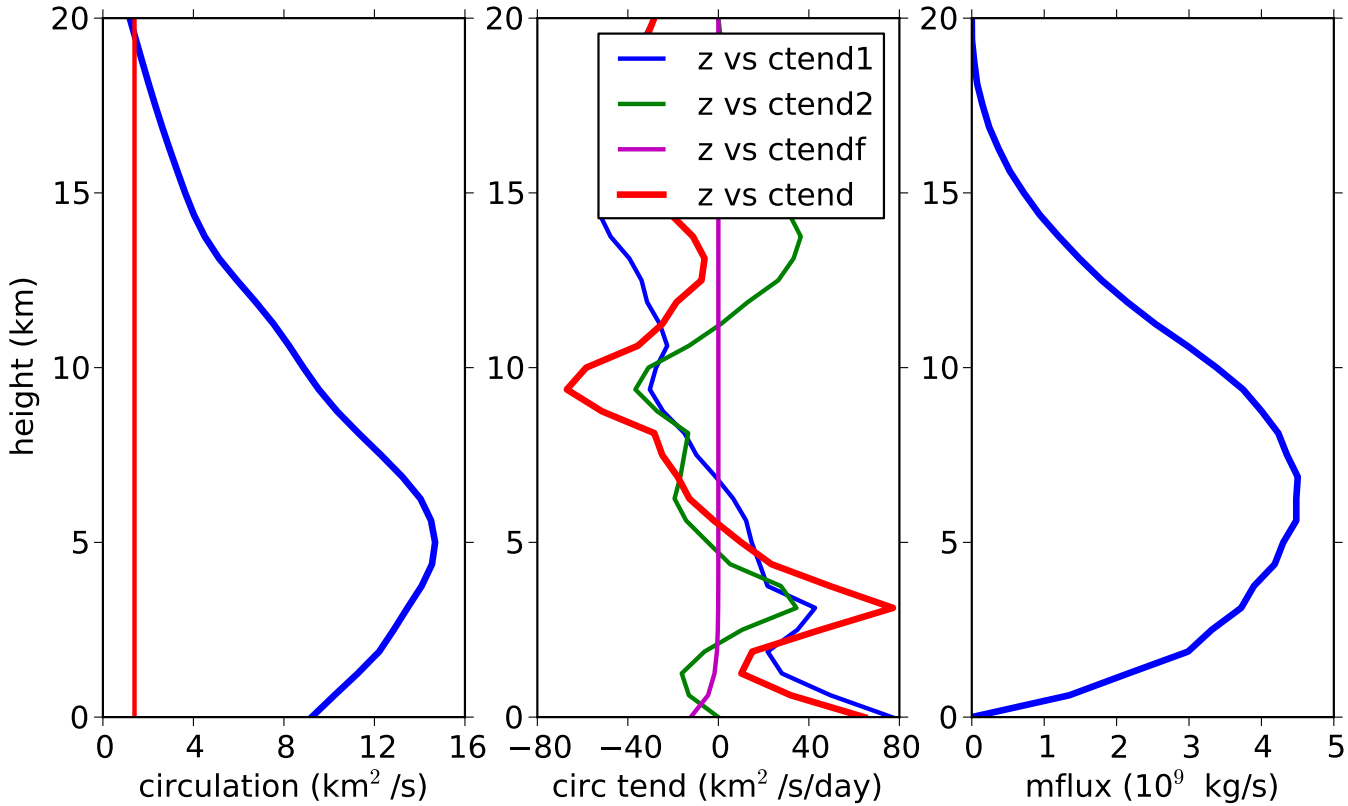
$$\frac{d\Gamma}{dt} = C_1 + C_2 + C_f$$

- C_1: Tendency due to vorticity convergence
- C_2: Tendency due to vertical advection of horizontal vorticity (tilting)
- C_f: Tendency due to surface friction

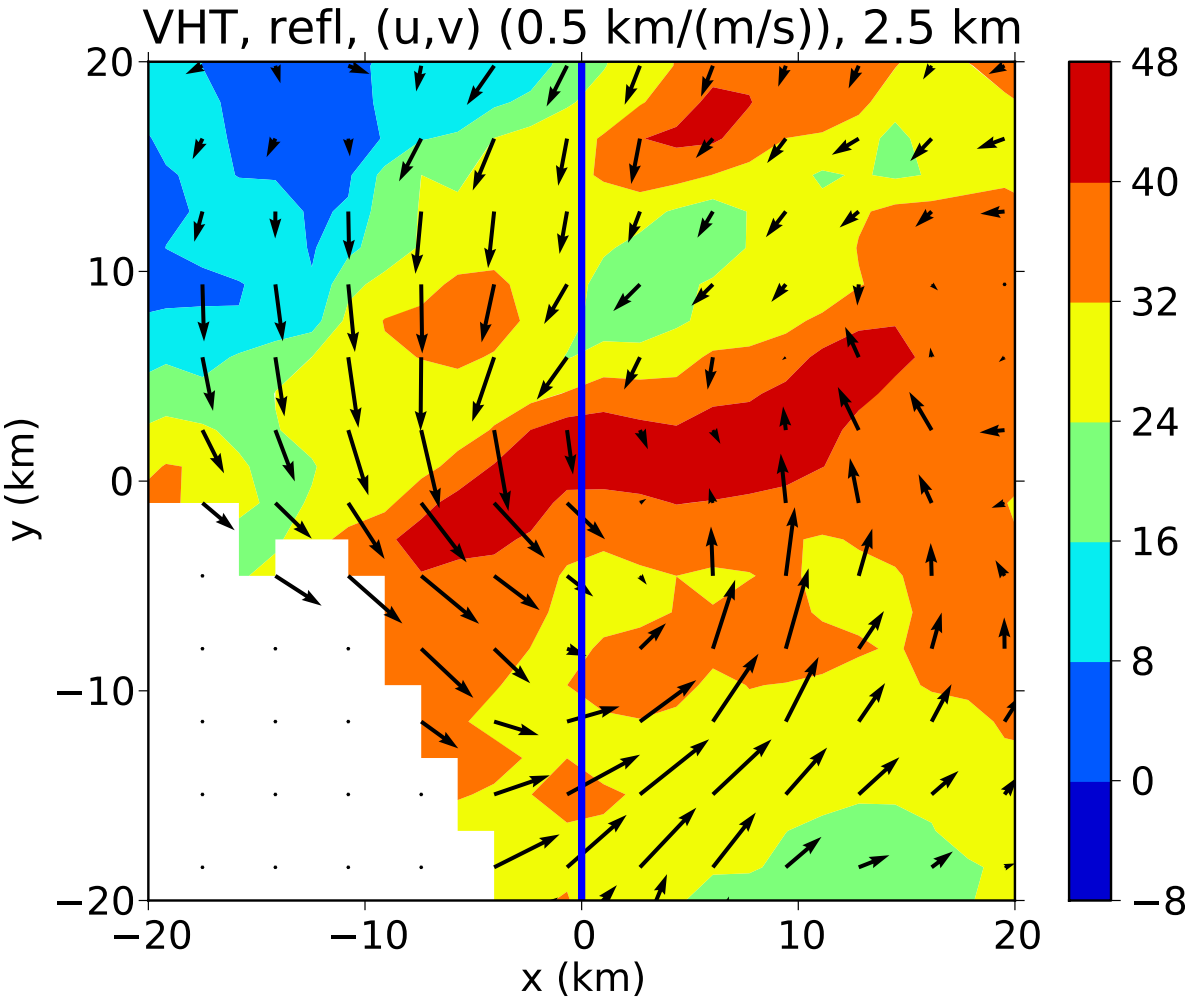
Example from TCS-08



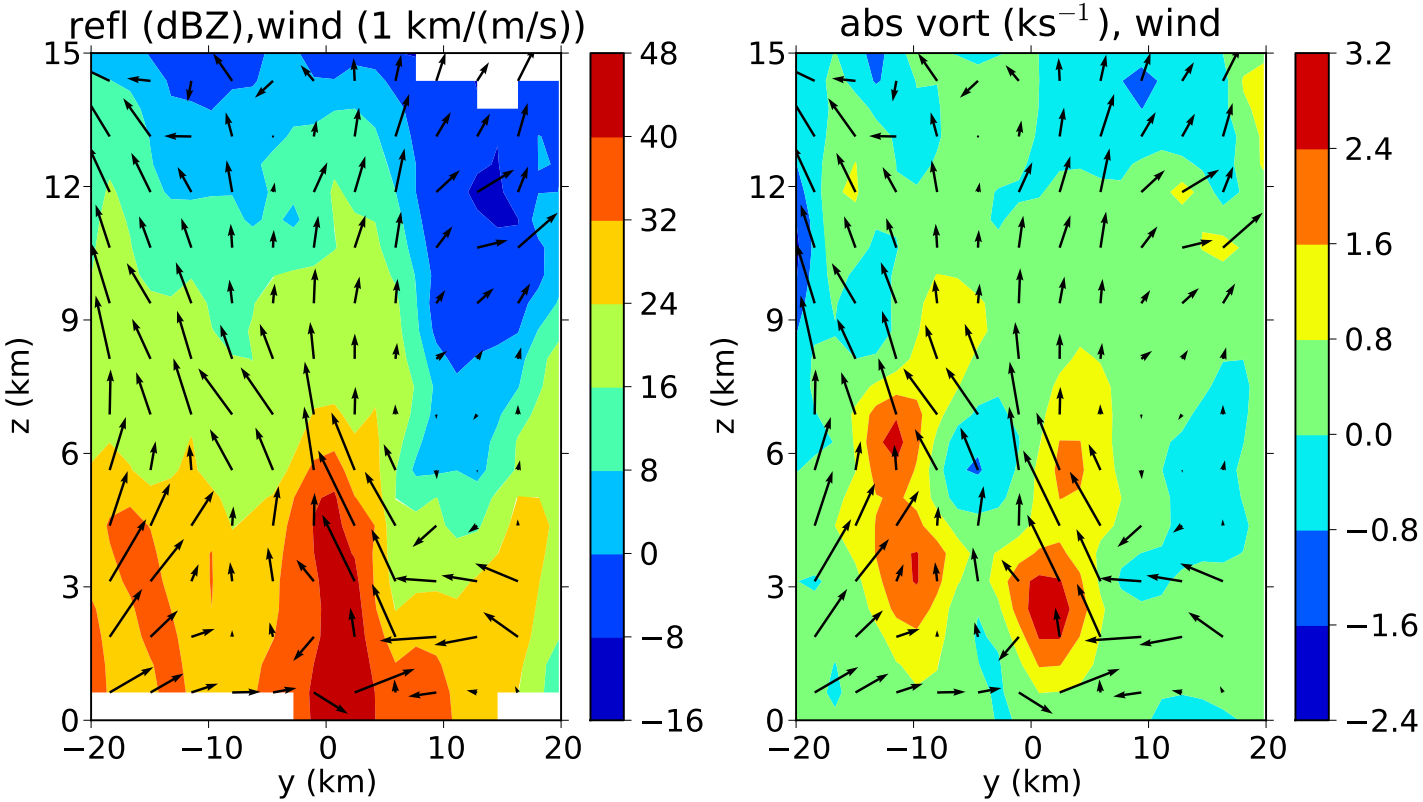
Circulation tendencies over red box



Vortical Hot Tower



NS Section


refl (dBZ),wind (1 km/(m/s))
z (km)
y (km)
15
12
9
6
3
0
−20
−10
0
10
20
48
40
32
24
16
8
0
−8
−16
abs vort (ks^{-1}), wind
z (km)
y (km)
3.2
2.4
1.6
0.8
0.0
−0.8
−1.6
−2.4

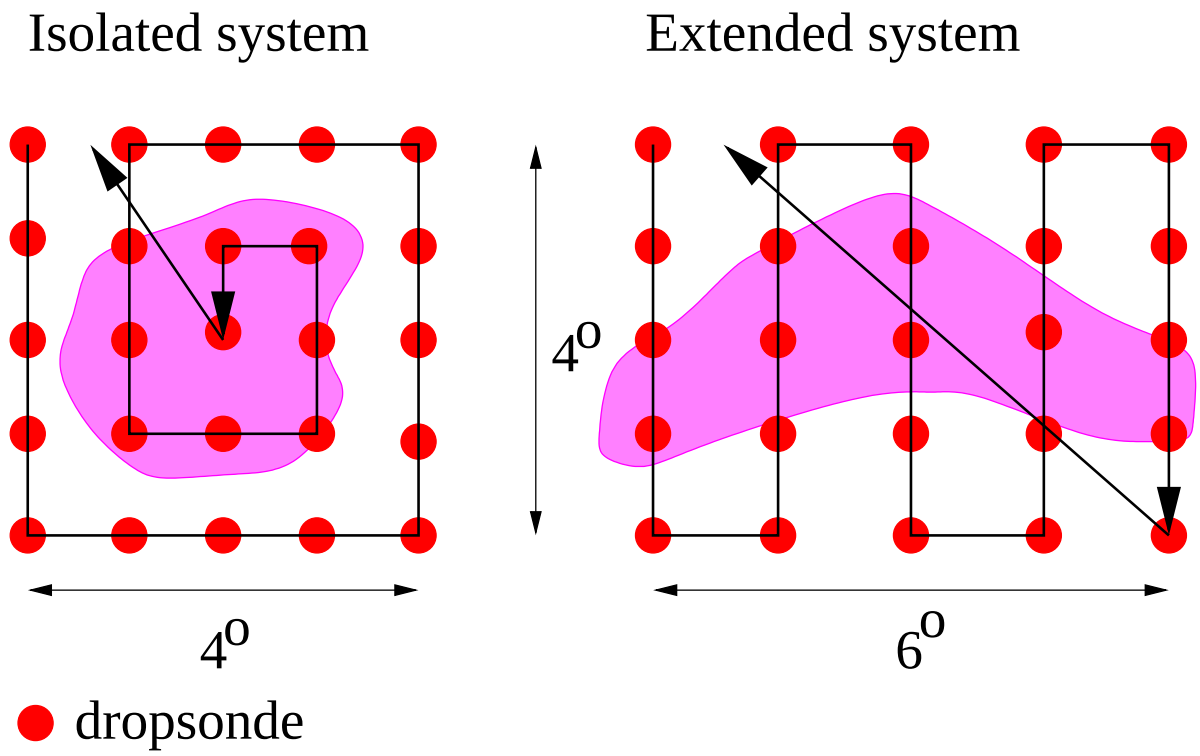
Entropy and water budgets from dropsondes

Normalized gross moist stability (NGMS):

$$\Gamma = -\left[T_R \oint_{\partial A} s\mathbf{v}\cdot\mathbf{n}dl\right] \Big/ \left[L \oint_{\partial A} r\mathbf{v}\cdot\mathbf{n}dl\right]$$

The square brackets indicate a vertical pressure integral.

Flight patterns for G-5; P-3s execute smaller versions



New analysis tools

- 3-D variational wind analysis scheme for Doppler radar and dropsondes (developed for TCS-08, but can be used here as well)
- 3-D variational analysis for thermodynamics – to be developed, but far easier problem than for winds