Upsondes

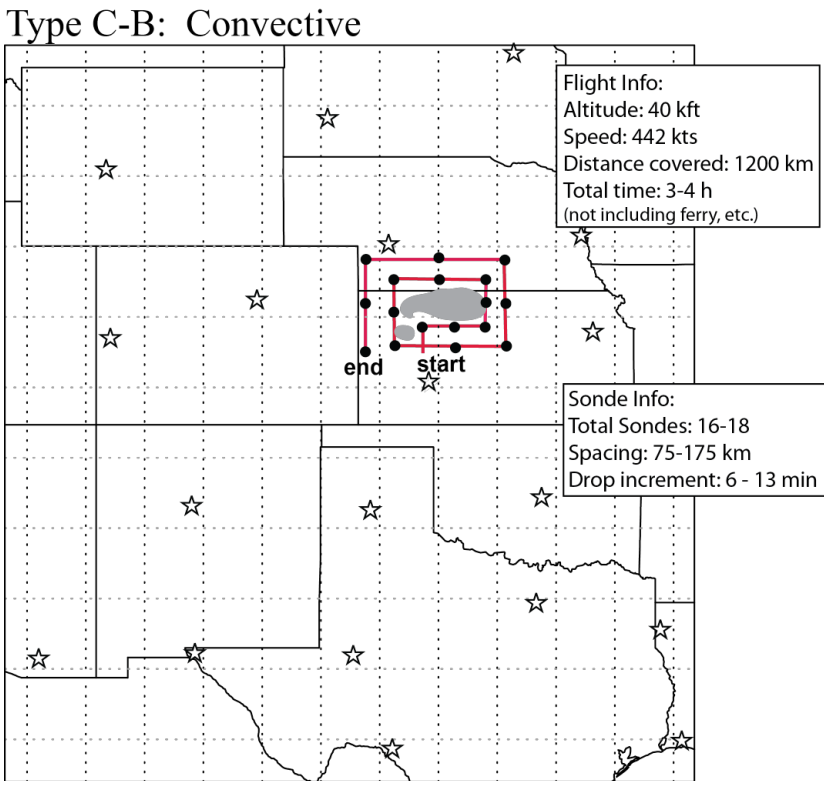
- Purpose: to pursue the fundamental scientific questions of convective storm-environmental feedbacks and predictability under MPEX Hypothesis 2, e.g.,
  - quantify the observed environmental modifications and upscale feedbacks from deep convection, and relate these back to the characteristics of the convection;
  - evaluate model simulations of upscale feedbacks from deep convection with MPEX observations; and
  - explore the predictability of convectively disturbed atmospheres.

Upsondes

- These objectives will be met using various diagnostic approaches applied to the radiosonde observations (raobs), including:
  - calculation of thermodynamic and kinematic parameters (e.g., CAPE, SRH, PV)
  - numerical model simulations with ensemble Kalman filter data assimilation at convection-allowing resolutions; and
  - careful comparisons between MPEX observations and model simulations.

Upsonde deployment

- *two* mobile units total (an NSSL unit, and a Purdue unit), each containing *two sonde systems*.
  - with two dual-channel systems, a total of 4 raobs will be collected within an hour
    - both teams will be using InterMet systems
  - assuming redeployment after each launch, (8 to) 12 raobs per mission will be collected in and around the region of convection
- possible (hopeful) addition of CSU system
  - single channel; additional 2-3 raobs per mission
- We plan to conduct some some variant of the originally proposed C-B strategy



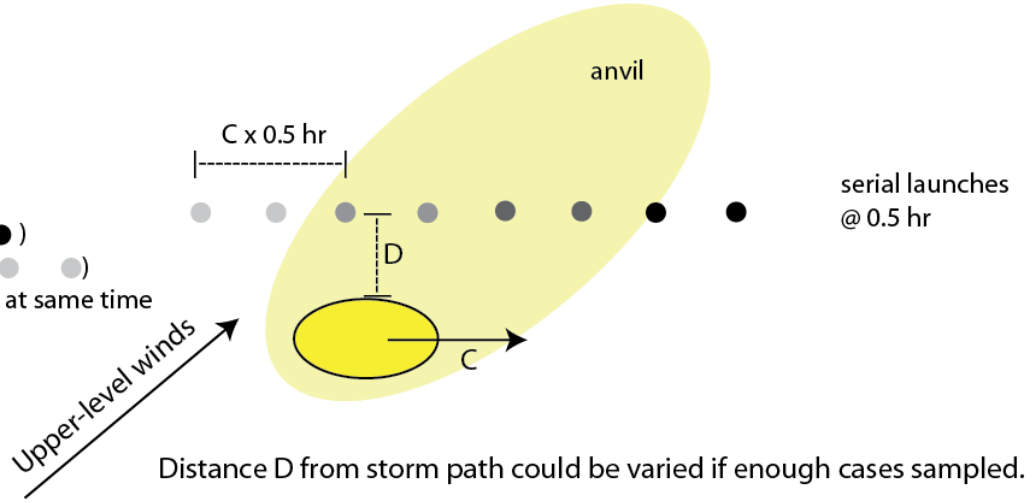
For each C-B(Ground) IOP: 12 sondes

Strategies

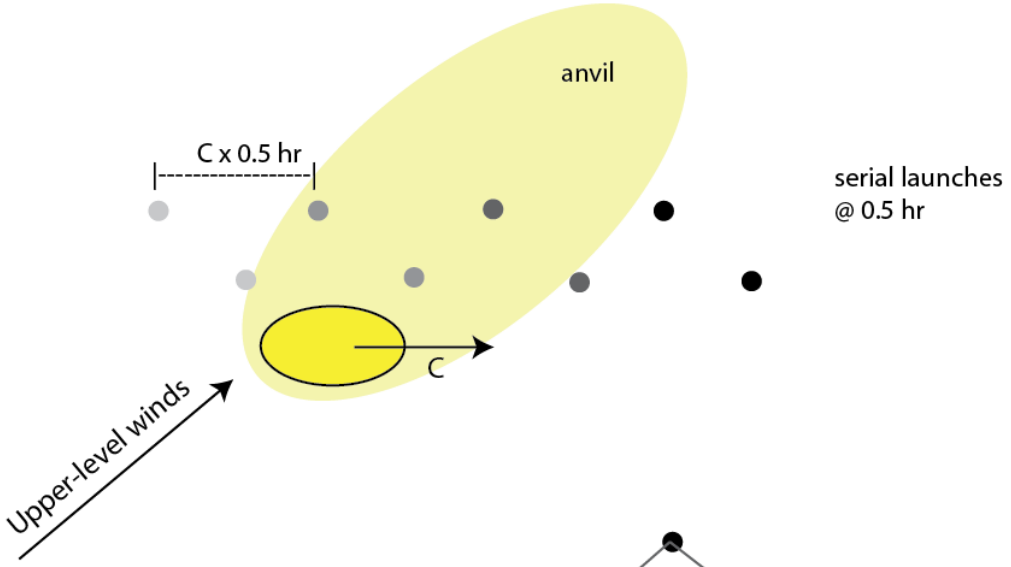
- proposed: serial launches, at ~fixed sites
  - mobile strategies also plausible
- strategy depends on storm motion
  - time-space conversion based on **C**
- a (RM) supercell motion is assumed in the following examples

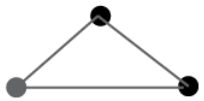
Downstream Effects

2 mobile vans
simultaneous launches
first soundings (black ● ●)
to last soundings (light gray ● ●)
assumes max 4 sondes in air at same time



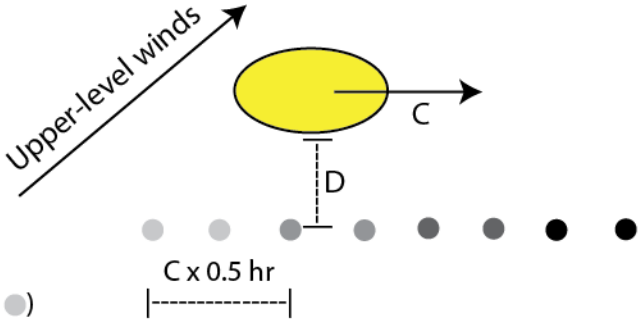
Distance D from storm path could be varied if enough cases sampled.





Use time-to-space and
line integral methods to
calculate vertical profiles
of divergence and vorticity

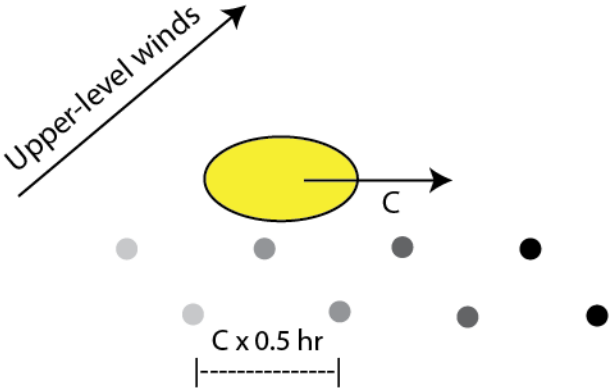
Upstream Effects



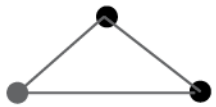
2 mobile vans
simultaneous launches
first soundings (black ● ●)
to last soundings (light gray ● ●)
assumes max 4 sondes in air at same time

serial launches
@ 0.5 hr

Distance D from storm path could be varied if enough cases sampled.



serial launches
@ 0.5 hr



Use time-to-space and
line integral methods to
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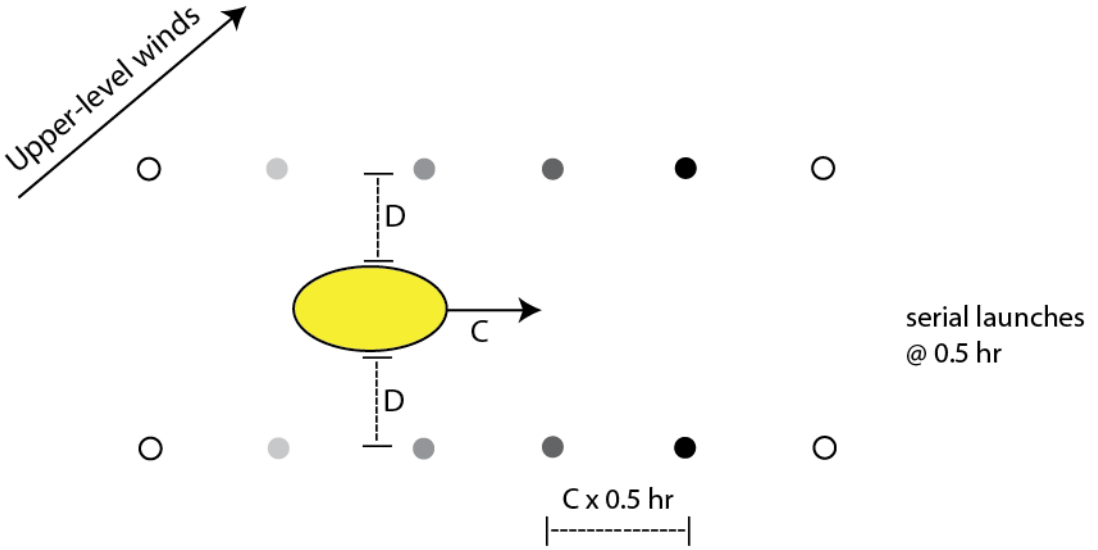
of divergence and vorticity

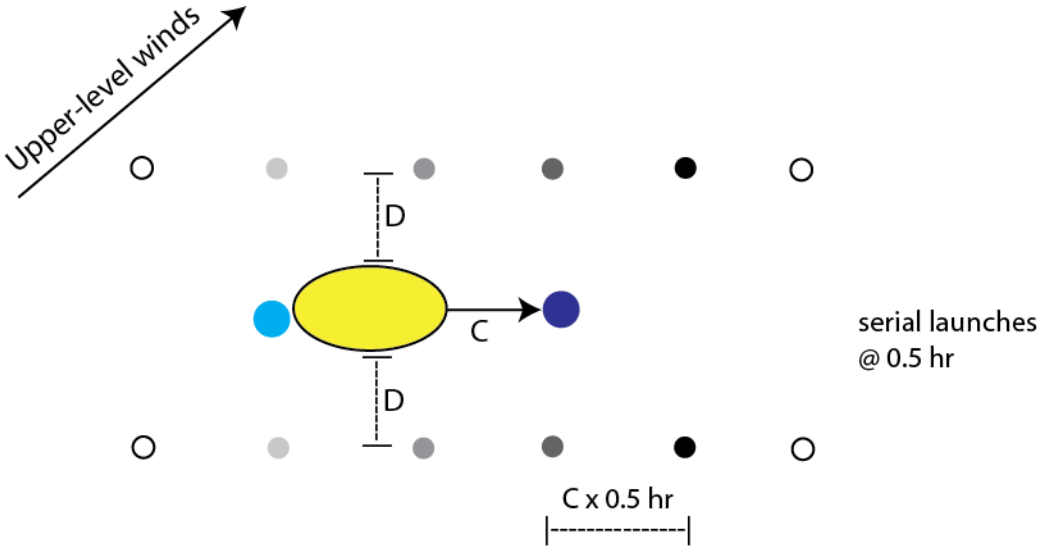
Surround Strategy (Upstream and Downstream Effects)



2 mobile vans
simultaneous launches
first soundings (black ●)
to last soundings (light gray ●)
assumes max 4 sondes in air at same time

Distance D from storm path could be varied if enough cases sampled.

Surround Strategy (Upstream and Downstream Effects)



serial launches
@ 0.5 hr

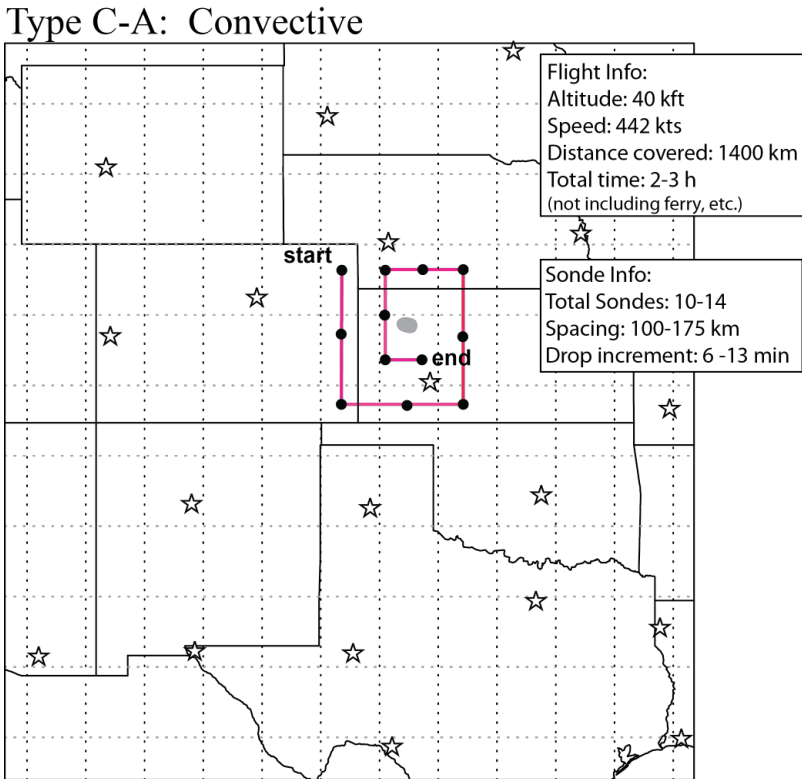
2 mobile vans
simultaneous launches
first soundings (black ●)
to last soundings (light gray ●)
assumes max 4 sondes in air at same time

blue shows possible CSU launches?

Distance D from storm path could be varied if enough cases sampled.

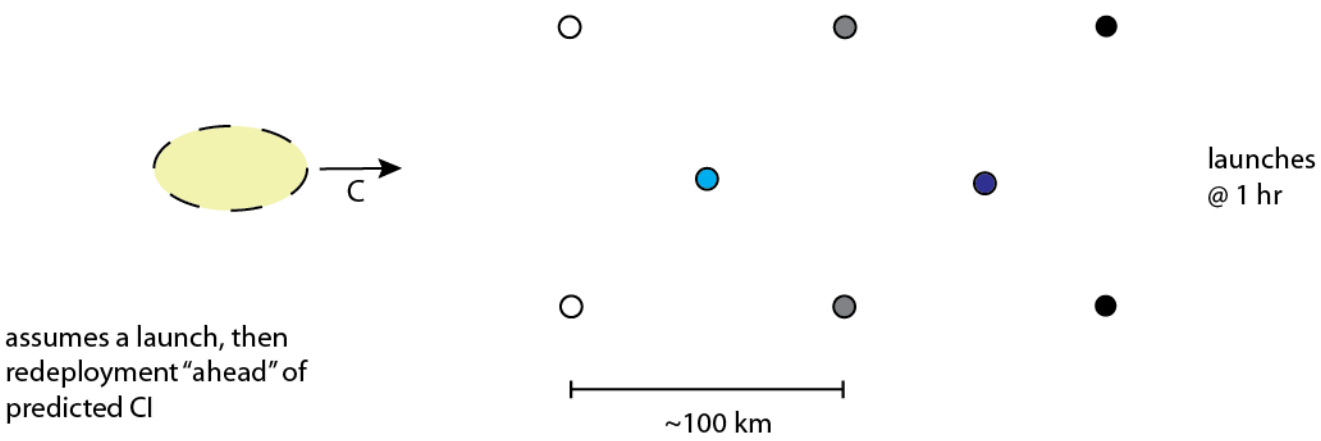
Upsonde deployment

- We plan to conduct some some variant of the originally proposed C-A strategy, provided that we're already in a favorable geographic location for the C-B sampling
- proposed "mobile" deployments, moving in the direction of initial launch sites for C-B sampling
  - hence, in a direction downstream of CI location



For each C-A(Ground) IOP: 8 sondes

Pre-convective launches

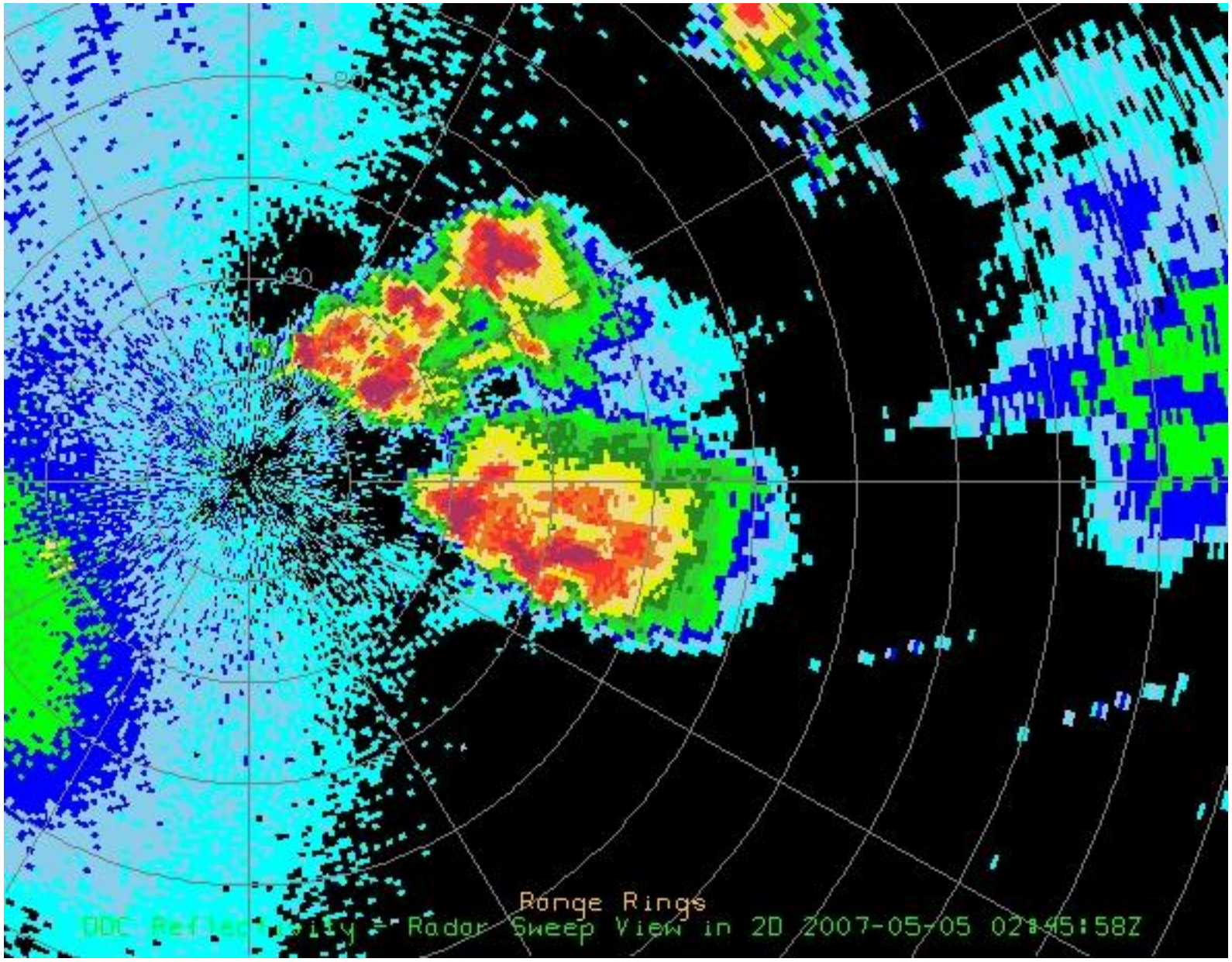


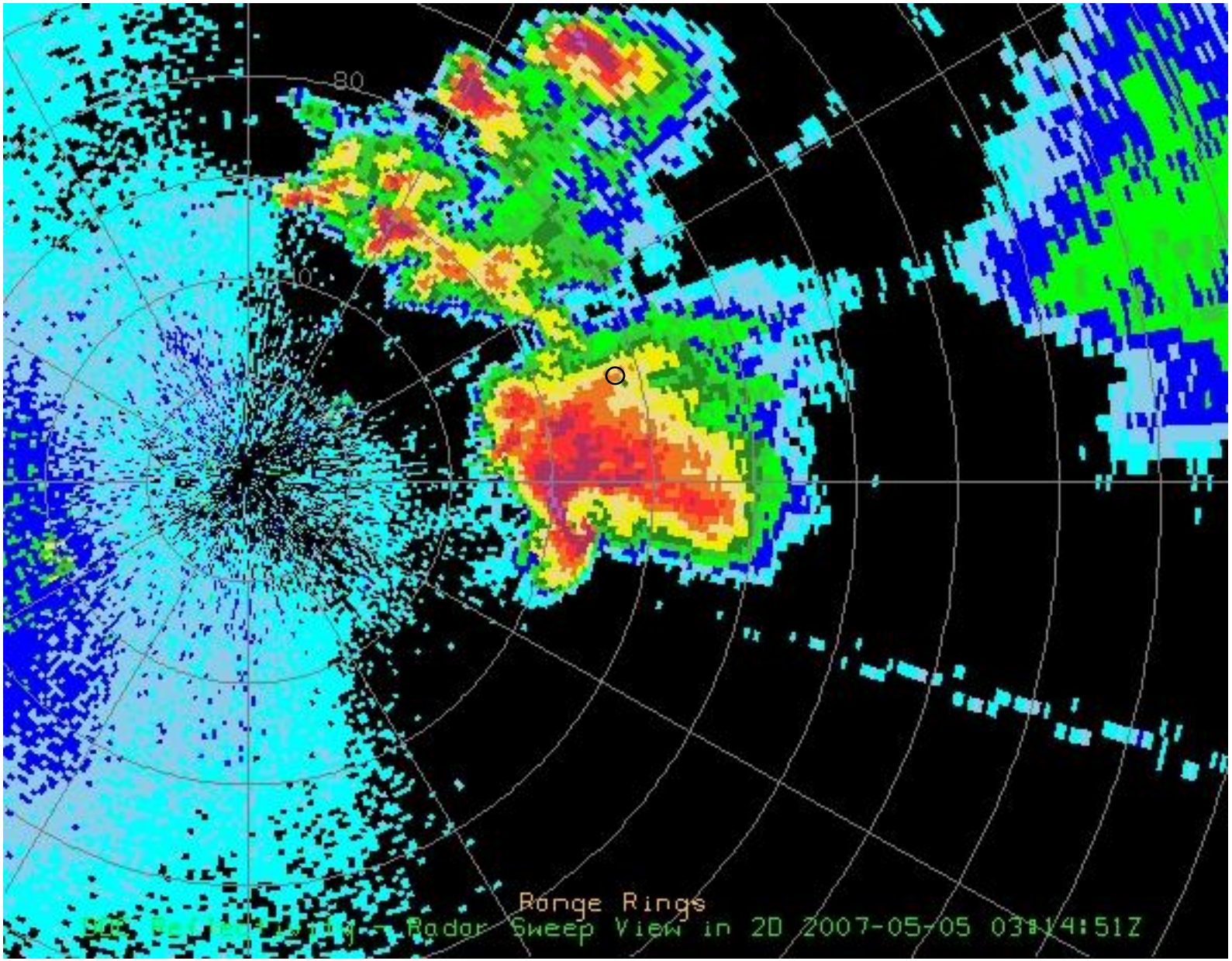
assumes a launch, then redeployment "ahead" of predicted CI

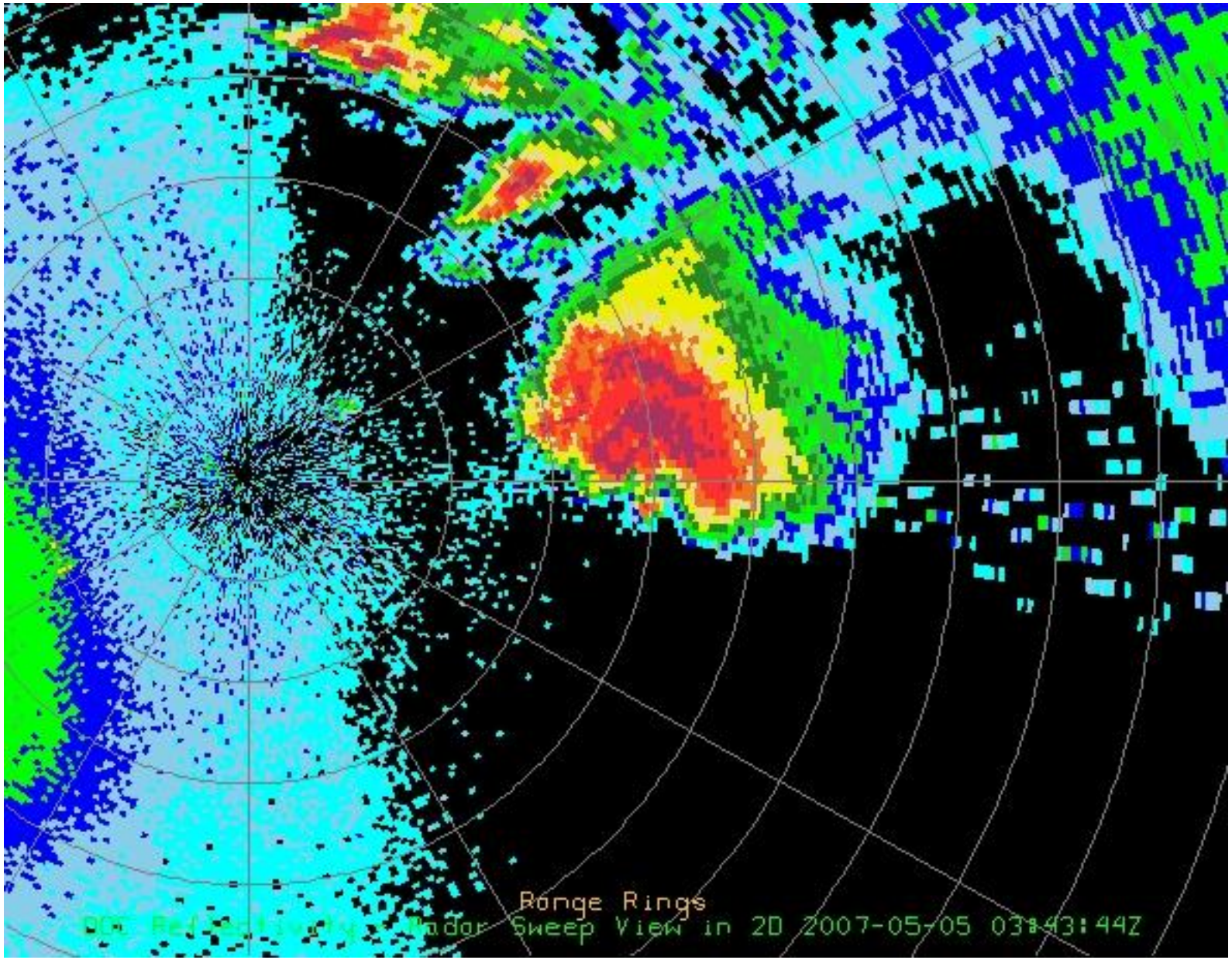
Factors that will influence deployment decisions/strategies

- anticipated convective mode
  - sample variety of modes…(but with desire to have reasonable sample of supercells?)
- storm motion
- relative proximity to ARM SGP site
  - 4xdaily launches (00,06,12,18 UTC)
- relative proximity to NWS sites, profilers

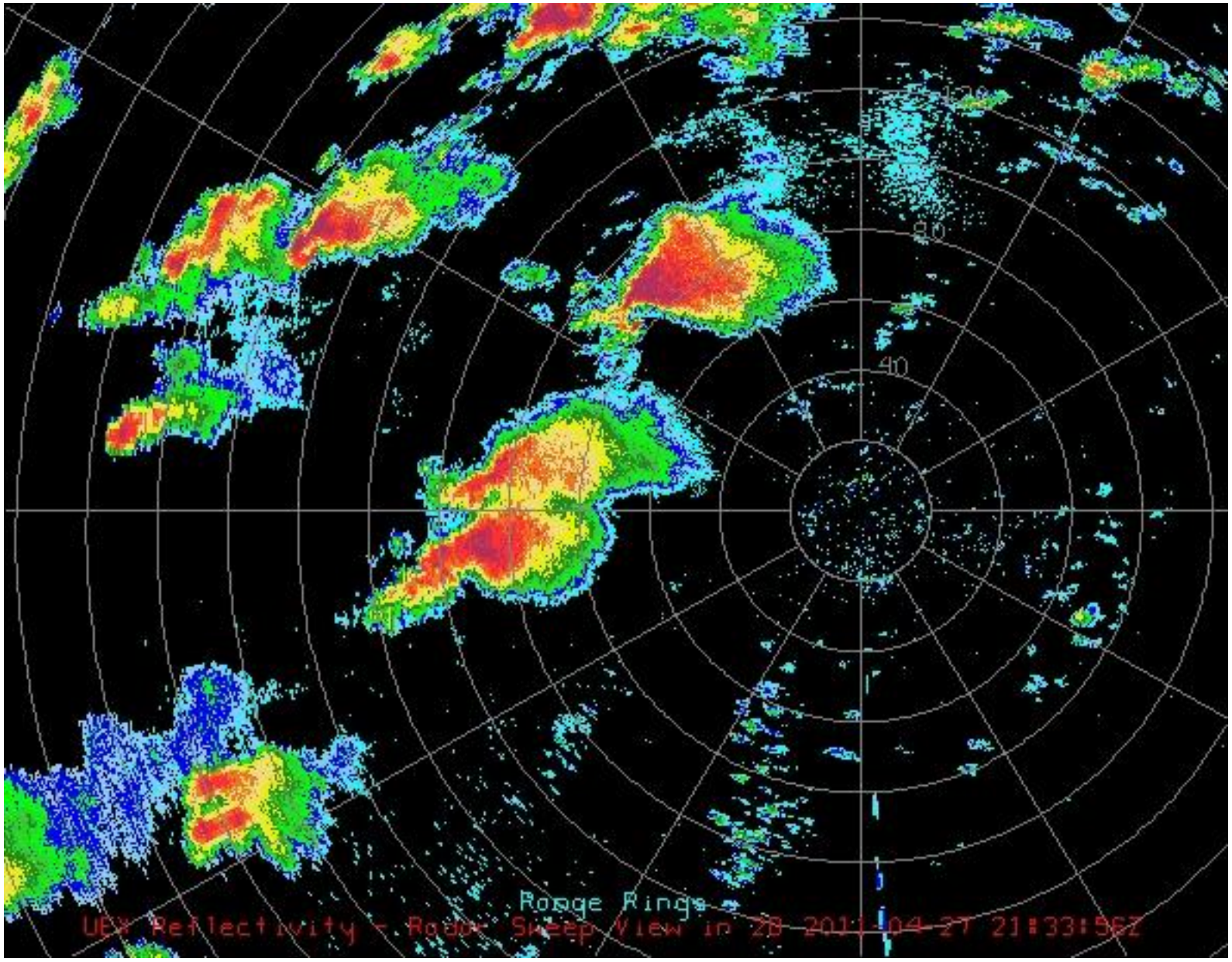
Case 1: how to deploy?

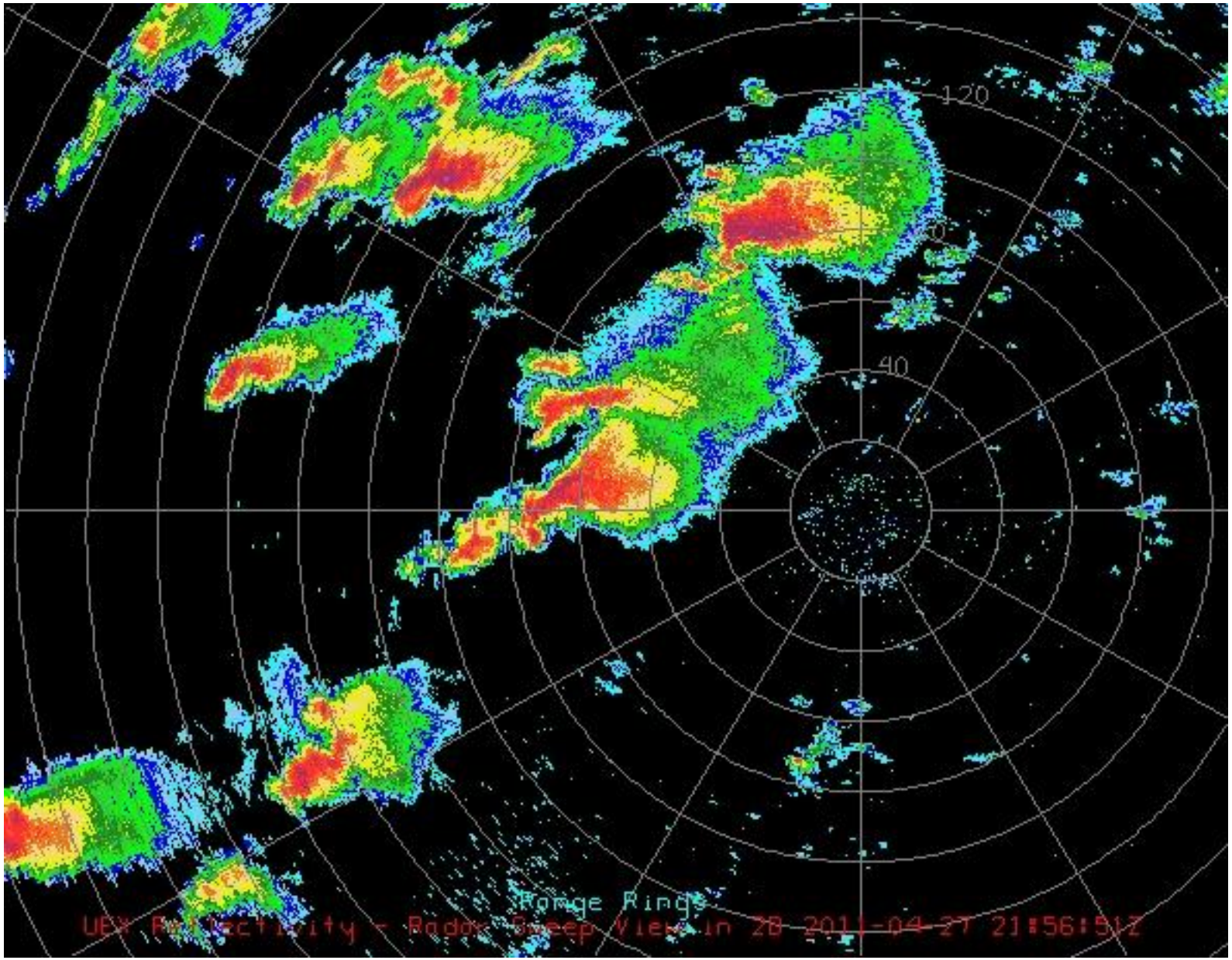


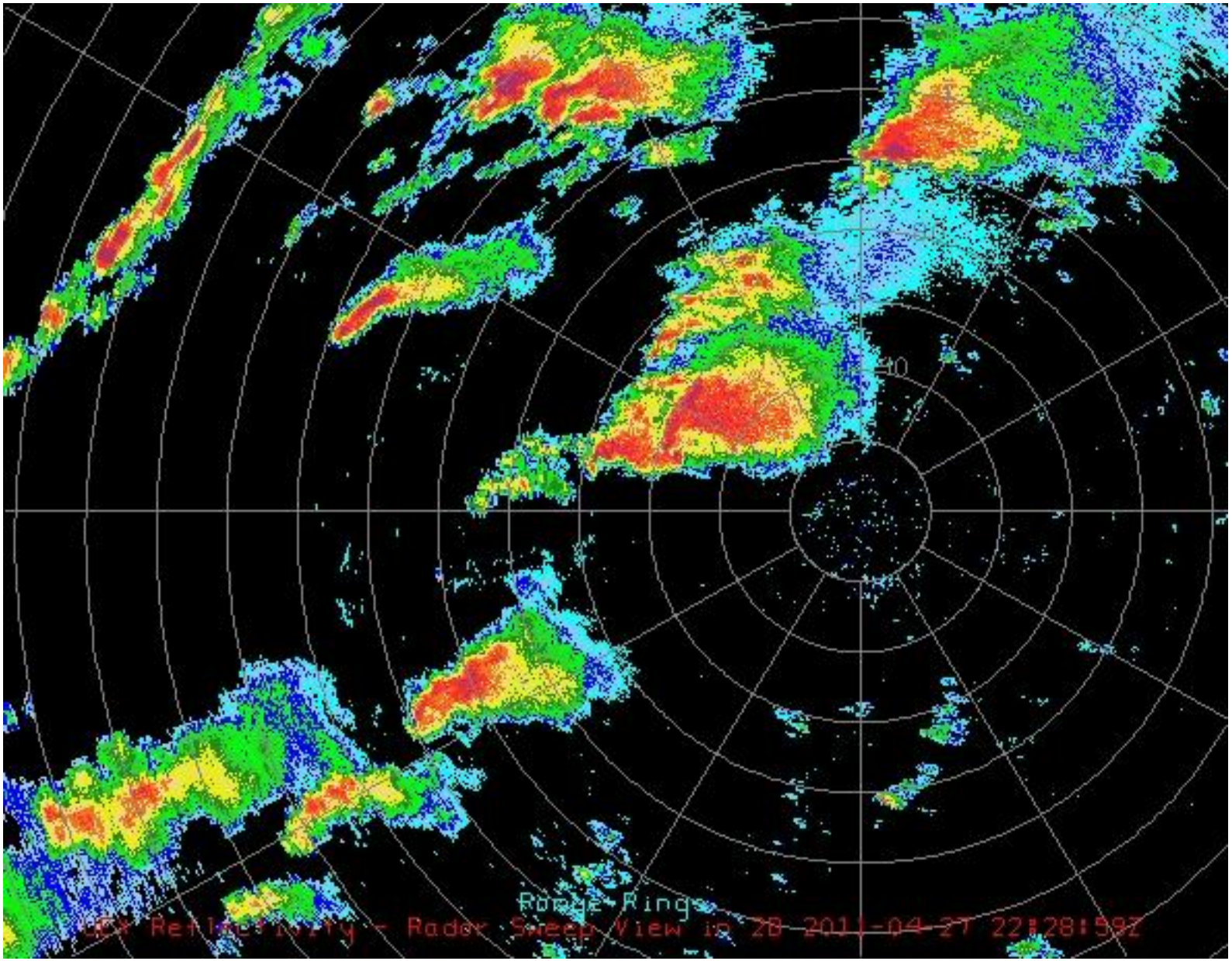

80
40
Range Rings
Radar Sweep View in 2D 2007-05-05 03:14:51Z


Range Rings
Radar Sweep View in 2D 2007-05-05 03:43:44Z

Case 2: how to deploy?




120
80
40
Range Rings


40
Range Ring
Radar Sweep View in ZB 2011-04-27 22:28:59Z

Logistics

- Both teams will be forward deployed during the duration of the project.
- One key issue relates to a nationwide shortage of helium
  - we will begin acquiring tanks of helium soon, store them at NSSL, and then use a rented vehicle (U-Haul) outfitted with racks to shuttle tanks to the field teams

Communication

- cell-phone communication:
  - between teams, to coordinate launch positions, times
  - with ops center, for forecast/nowcast information
- transmission of raob for real-time use

Forecasting/nowcasting

- critical forecast information: (by 0600 UTC?)
  - predicted storm motion
  - geographical location of convection initiation (CI)
  - predicted time of CI
- critical nowcast information
  - actual storm motion
  - storm location/mode
    - we are planning to access radar data in each vehicle using GR level III

Safety considerations

- launches after dark?
- lightning
- crew fatigue