Implementing the VAHIRR Launch Commit Criteria Using Existing Radar Products

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Overview

- Definition of VAHIRR
- Implementation
  - Current radar products cannot do true VAHIRR
  - Current products permit conservative work-around pending development of true VAHIRR software

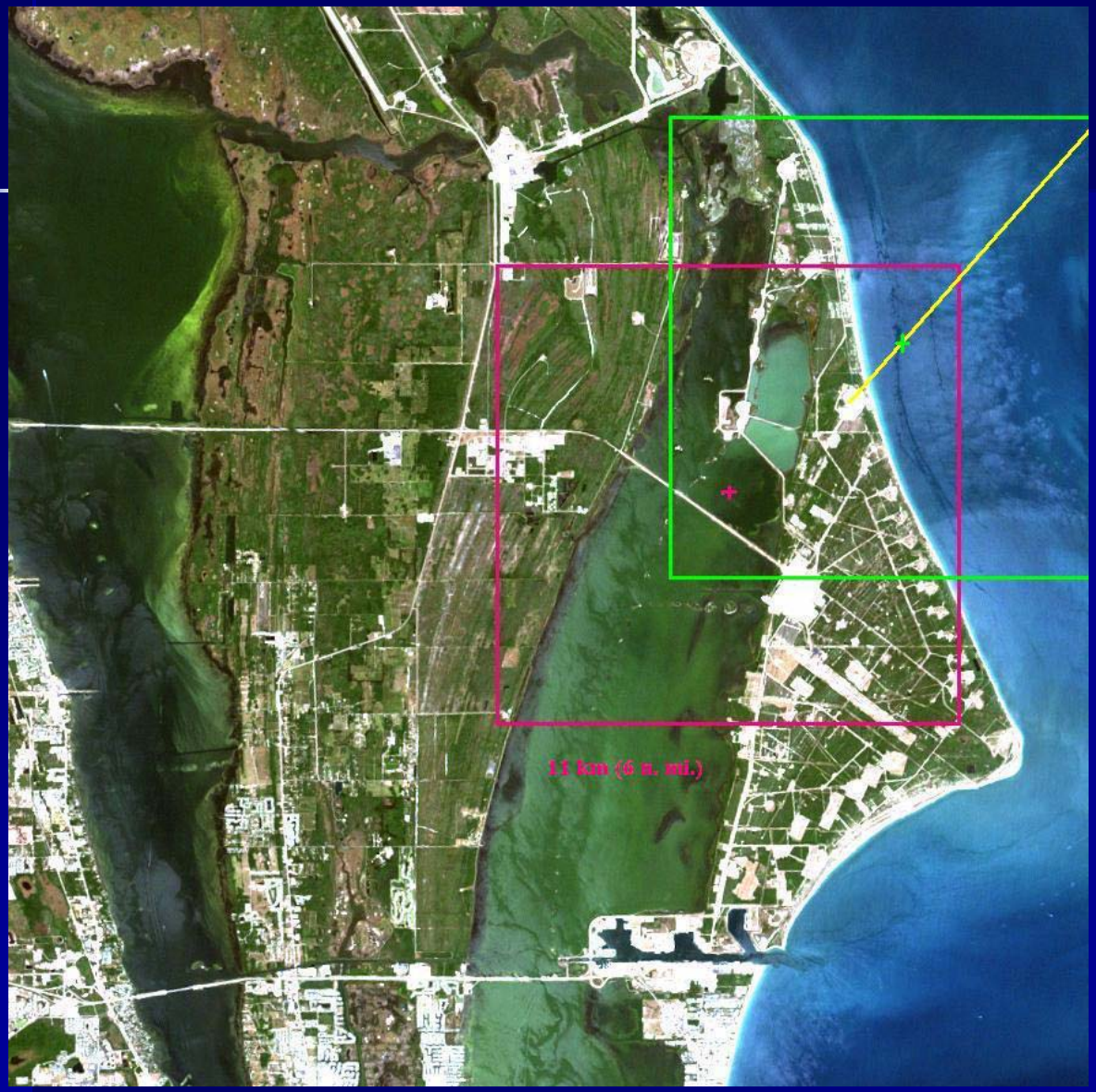
The VAHIRR Concept

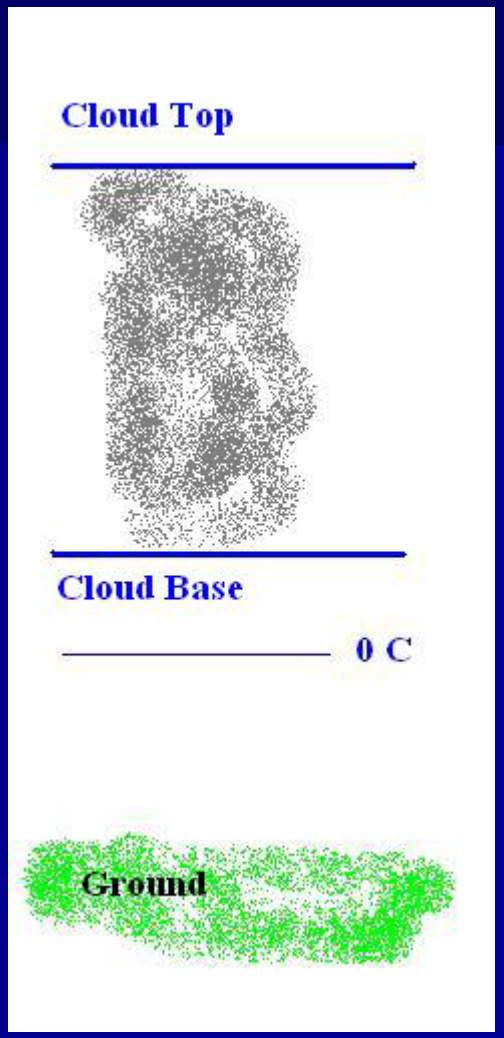
- **V**ertically **A**veraged
- **H**eight **I**ntegrated
- **R**adar **R**eflectivity
- Defined at each horizontal (X-Y) point
- Must be less than the specified threshold at each point of the flight's ground track
- Safely relaxes restrictive triggered lightning launch constraints

Computing VAHIRR

- In a specified volume (explained on next chart)
- Compute average radar reflectivity (ARR) in dBZ, excluding reflectivity < 0 dBZ
- Compute average cloud top height (cth)
- Compute average cloud base height
- Cloud thickness (CT) = cth minus greater of
  - height of the 0C isotherm
  - average cloud base height
- VAHIRR = ARR * CT

The VAHIRR "Specified Volume"





The Problem

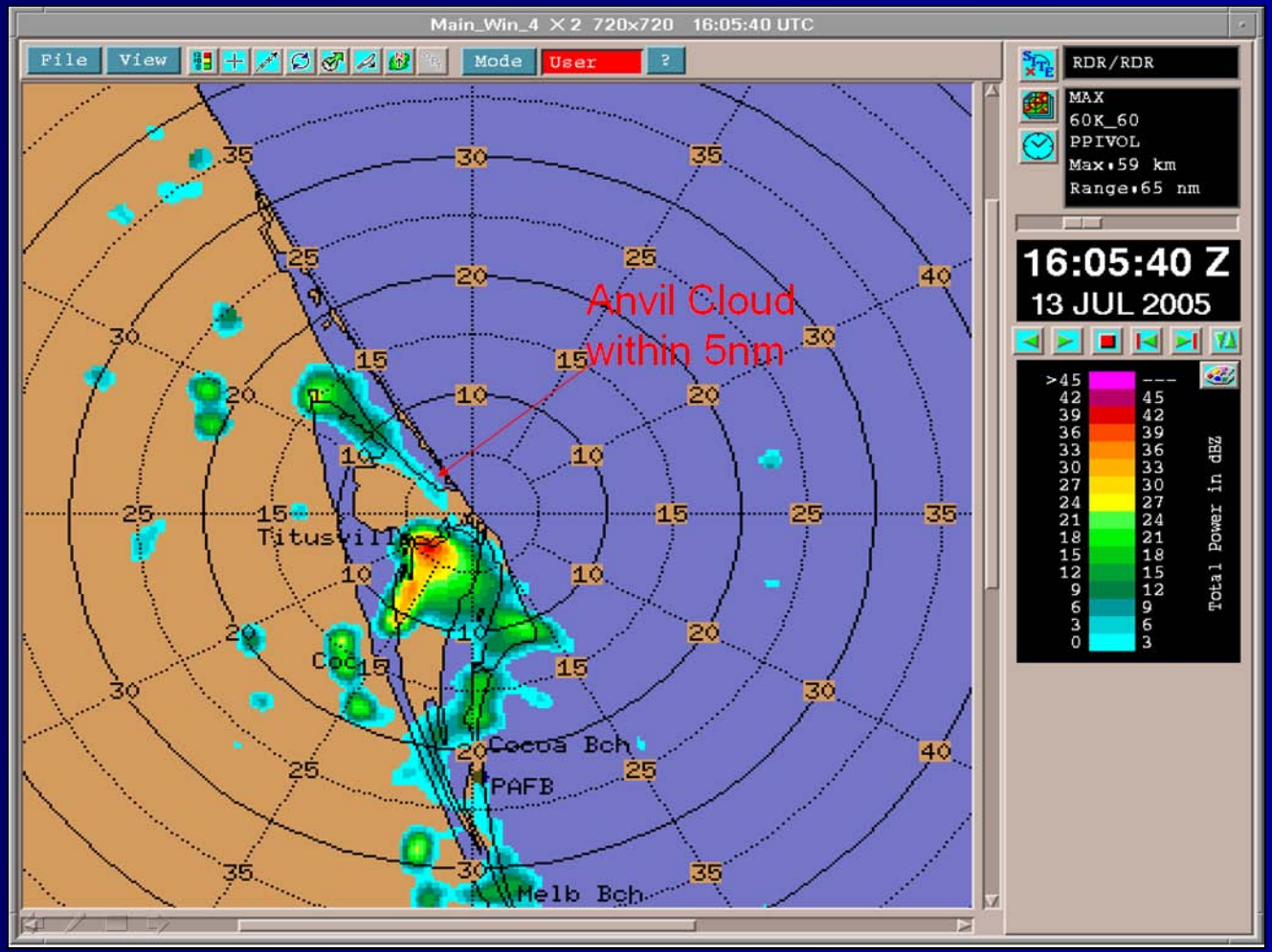
- VAHIRR safely reduces unnecessary launch delays and scrubs
- Current radar products do not allow the operator to take advantage of VAHIRR
  - Requires volume averaged radar reflectivity
  - No current operational radar product generates a volume average

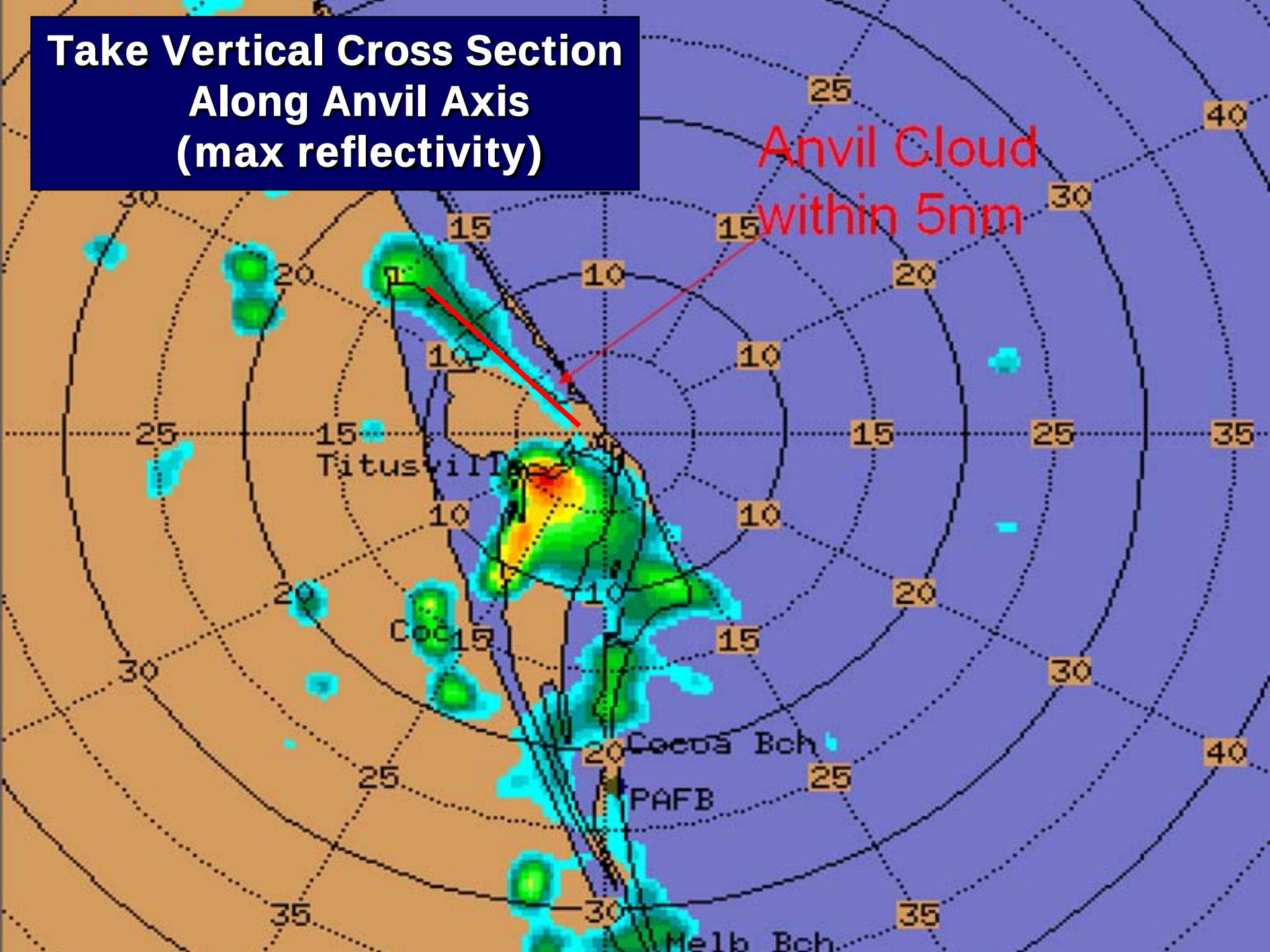
The Workaround

- Current radar products can be used to determine cloud top and cloud base heights and thus cloud thickness (CT)
- Current products include user selectable layer maximum reflectivity (MAX)
- Workaround (WA) = MAX * CT
- WA is conservative since WA >= VAHIRR

Implementing WA: Radar

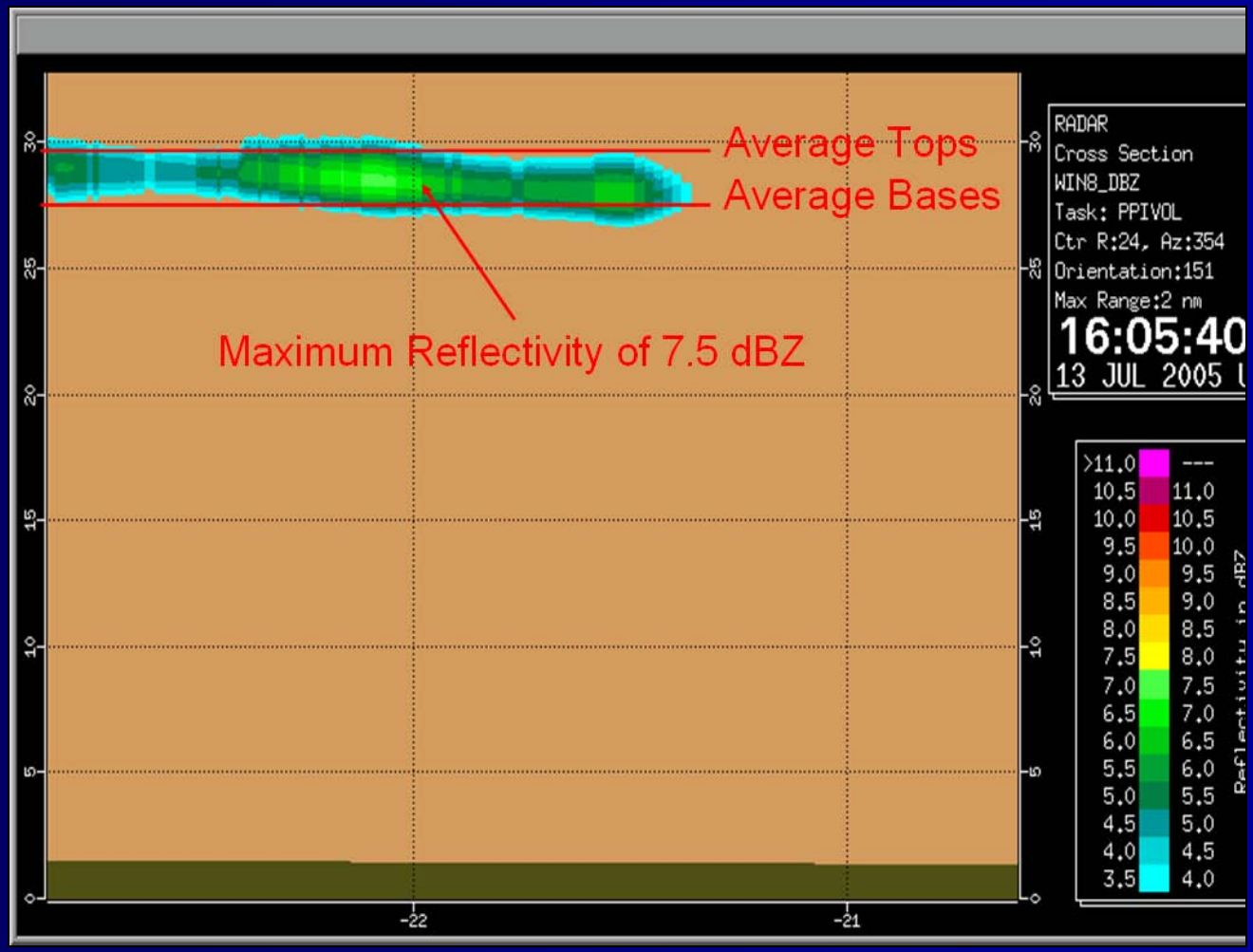
- Max Reflectivity Product




Take Vertical Cross Section
Along Anvil Axis
(max reflectivity)
Anvil Cloud
within 5nm
Titusville
Cocoa Bch
PAFB
Melb Bch

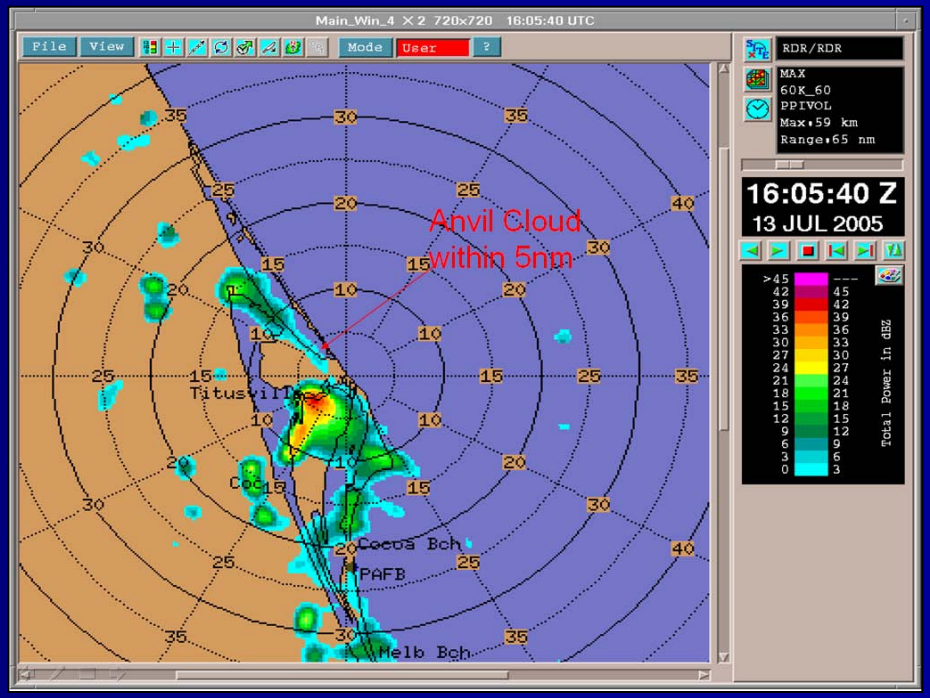
Implementing WA: Radar

- Vertical Cross Section



Implementing WA: Thresholds

Average Anvil Thickness (Ft)	Max Reflectivity Allowed (dBZ)
1,000	33.00
2,000	16.50
3,000	11.00
4,000	8.25
5,000	6.60
6,000	5.50
7,000	4.71
8,000	4.13
9.000	3.67
10,000	3.30
11,000	3.00
12,000	2.75



Summary

- VAHIRR provides safe relaxation of anvil lightning launch commit criteria (LLCC)
- Until VAHIRR software can be developed and certified, a workaround is needed to take advantage of the new LLCC
- Use of existing user-selectable layer maximum products and cross sections provides a conservative workaround