



# Melissa Peterson

## PLOWS Research Project

### PLOWS Meeting 7/20/10

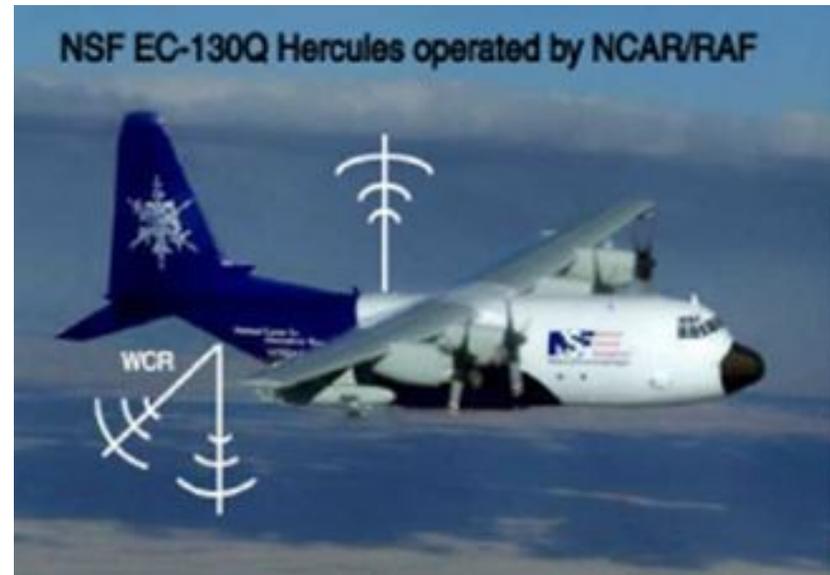


# Research Goals

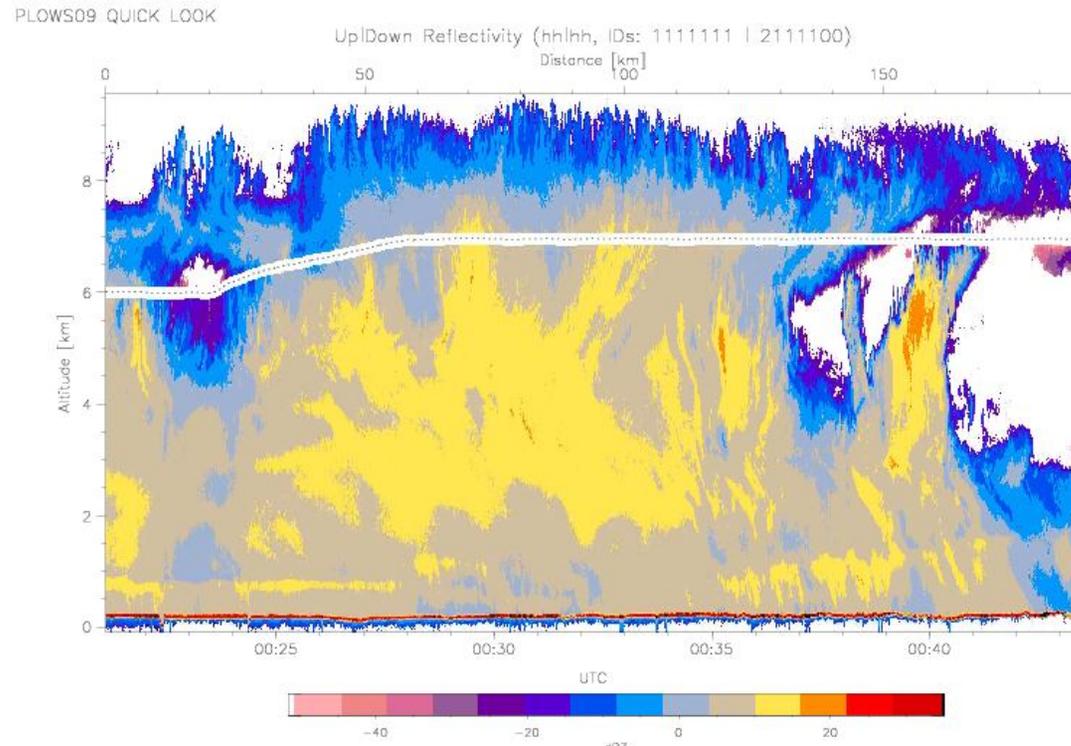
- Determine instability mechanism in banded precipitation features within cyclone
  - Current theory is conditional symmetric instability (or CSI), we hypothesize potential instability (or PI)
- Analyze WCR to determine cloud types, measure updraft structures, and assess instabilities within convective regions
  - Explore using 40° WCR beam data to discern regions of stratiform and convective clouds

# Data to be used

- Wyoming Cloud Radar
- Relevant Soundings (temporally, spatially)
- Results of other relevant research being conducted within PLOWS
  - Particularly Andrew Rosenow's work with profilers

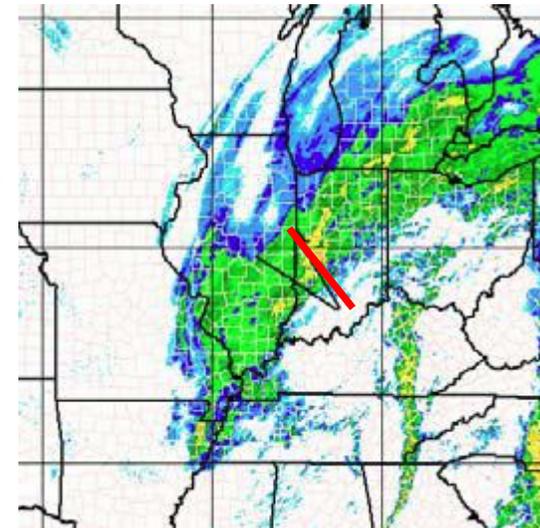


# WCR Quick Looks



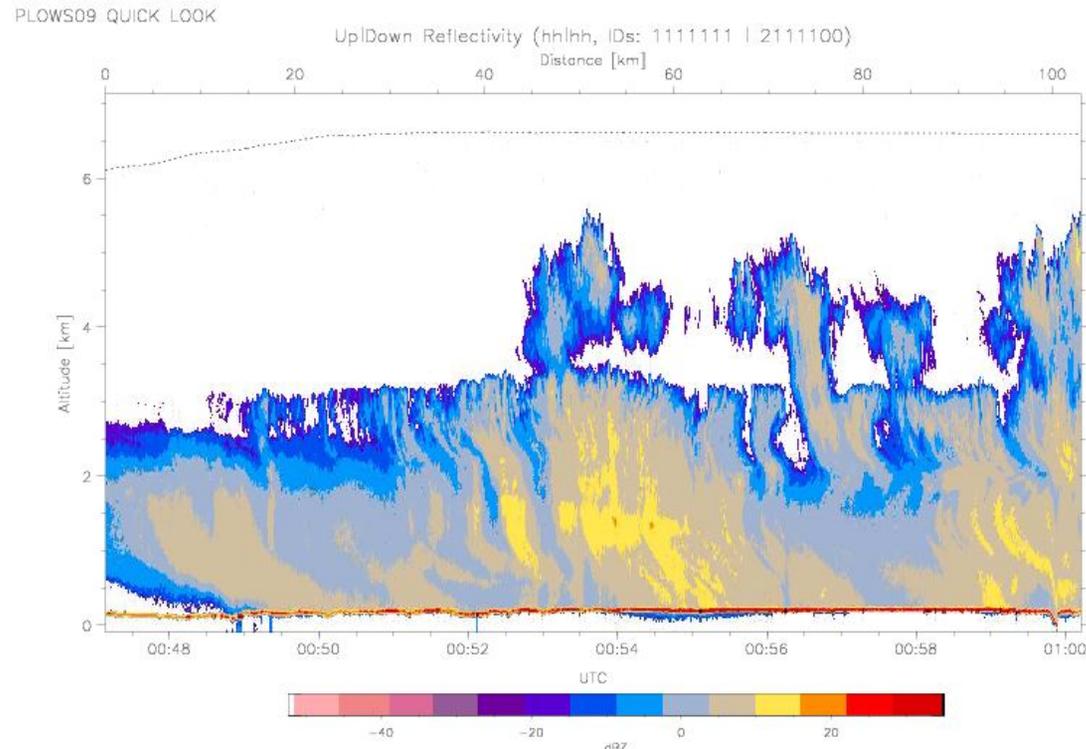
Fri Dec 11 17:15:02 2009 WCR, PLOWS09.20091203.002105\_004329.CPP.dBZhh1.updown

- IOP 9 (Franklin, IN)
- Flying thru wrap-around
- Note convection erupting near dry slot



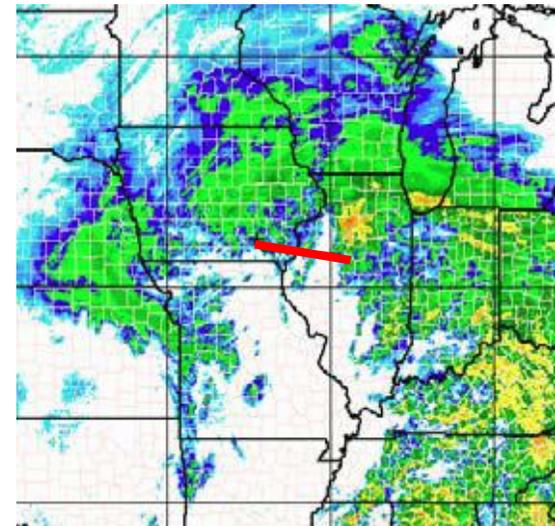
0021 UTC

# WCR Quick Looks

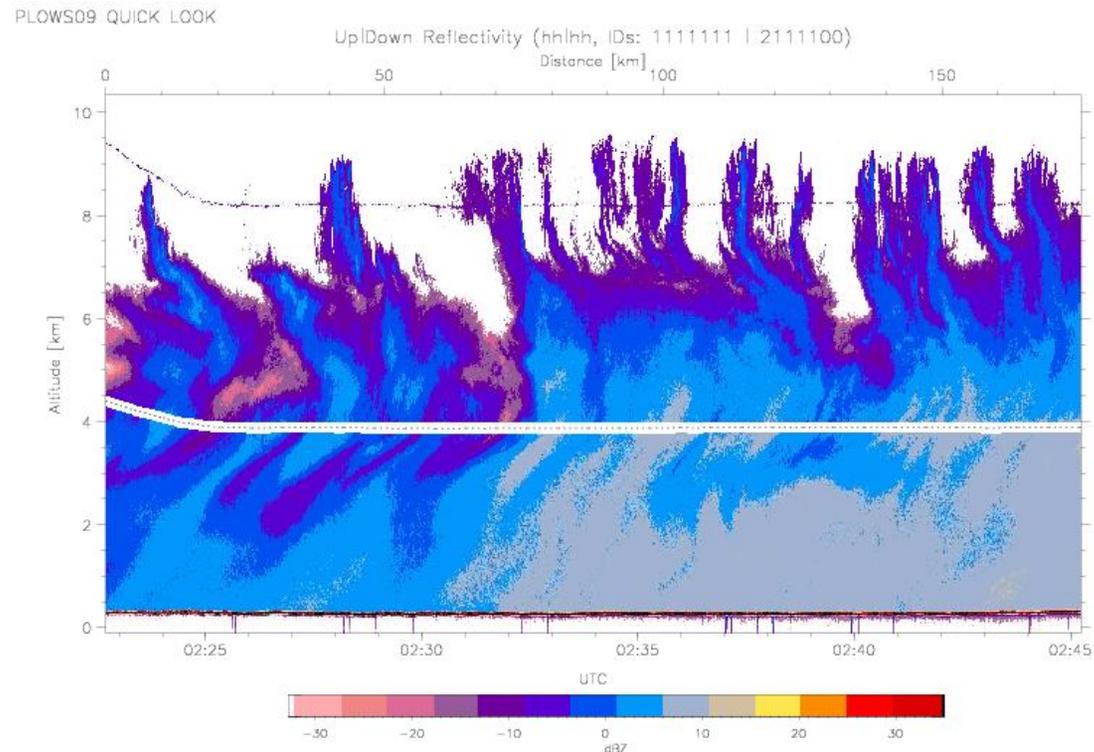


Mon Dec 21 15:36:00 2009 WCR.PLOW09.20091209.004708\_010013.CPP.dBZhh1,updown

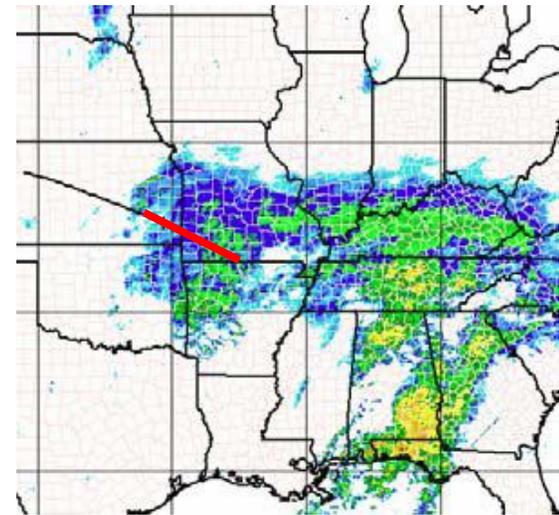
- IOP 10 (Clinton, IA)
- Flying thru dry slot
- Note cloud-top convective features



# WCR Quick Looks



Mon Feb 1 17:35:48 2010 WCR,PLOWS09,20100130.022241\_024515.CPP,dBZhh1.updown

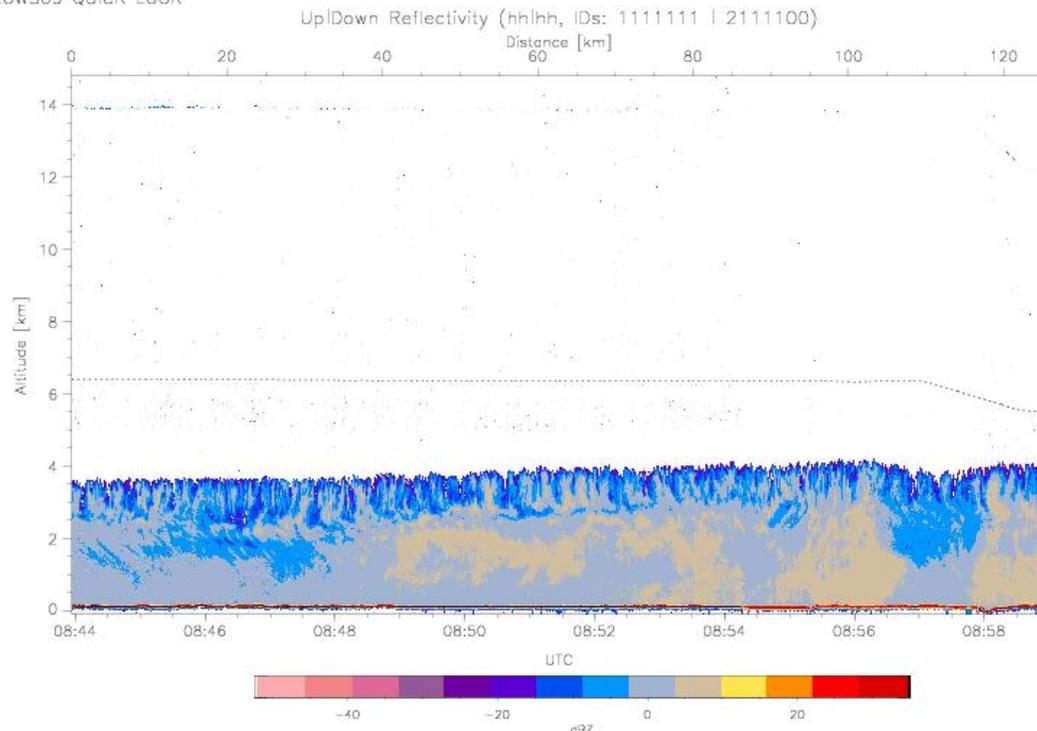


0230 UTC

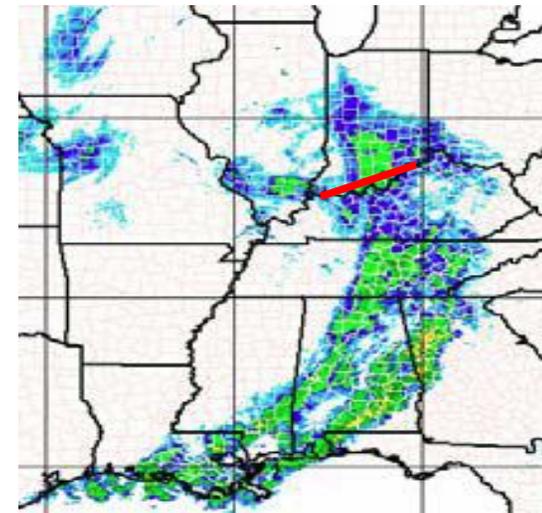
- IOP 15 (Vienna, IL)
- Flying from Boulder, CO, one pass thru storm, to PIA
- Note again the interesting cloud-top features

# WCR Quick Looks

PLOWS09 QUICK LOOK



Tue Feb 16 12:17:00 2010 WCR\_PLOWS09.20100215.084356\_085858.CPP\_dBZh1\_updown



0839 UTC

- IOP 19 (Evansville, IN)
- Note shallow clouds (<4km) that have cellular features at cloud top.

# Methodology

- Using WCR up/down-beam data, calculate vertical velocities in turbulent cloud tops
- Calculate ice-saturated CAPE, if any
  - If no CAPE can be found, this would support CSI
- Determine what atmospheric conditions would create this amount of CAPE
- Determine if PLOWS sounding data matches the theoretical calculations

# How to Calculate CAPE

- Not using the parcel method, instead lifting layers
- Looking for layers that have dry air over moist air
  - Near the dry slot
  - At the cloud tops
- Due to varying adiabatic ascent rates, lifting may create instability
  - How far does layer need to be lifted? Is it a reasonable amount given the synoptic flow?