

Developing the configuration trade space for space-based DWLs: vertical and horizontal coverage

G. D. Emmitt, S. A. Wood and S. Greco

Simpson Weather Associates

S. Majumdar (U Miami) and R. Atlas (NOAA/AOML)

Wind Lidar Working Group Meeting

Boulder, 2015

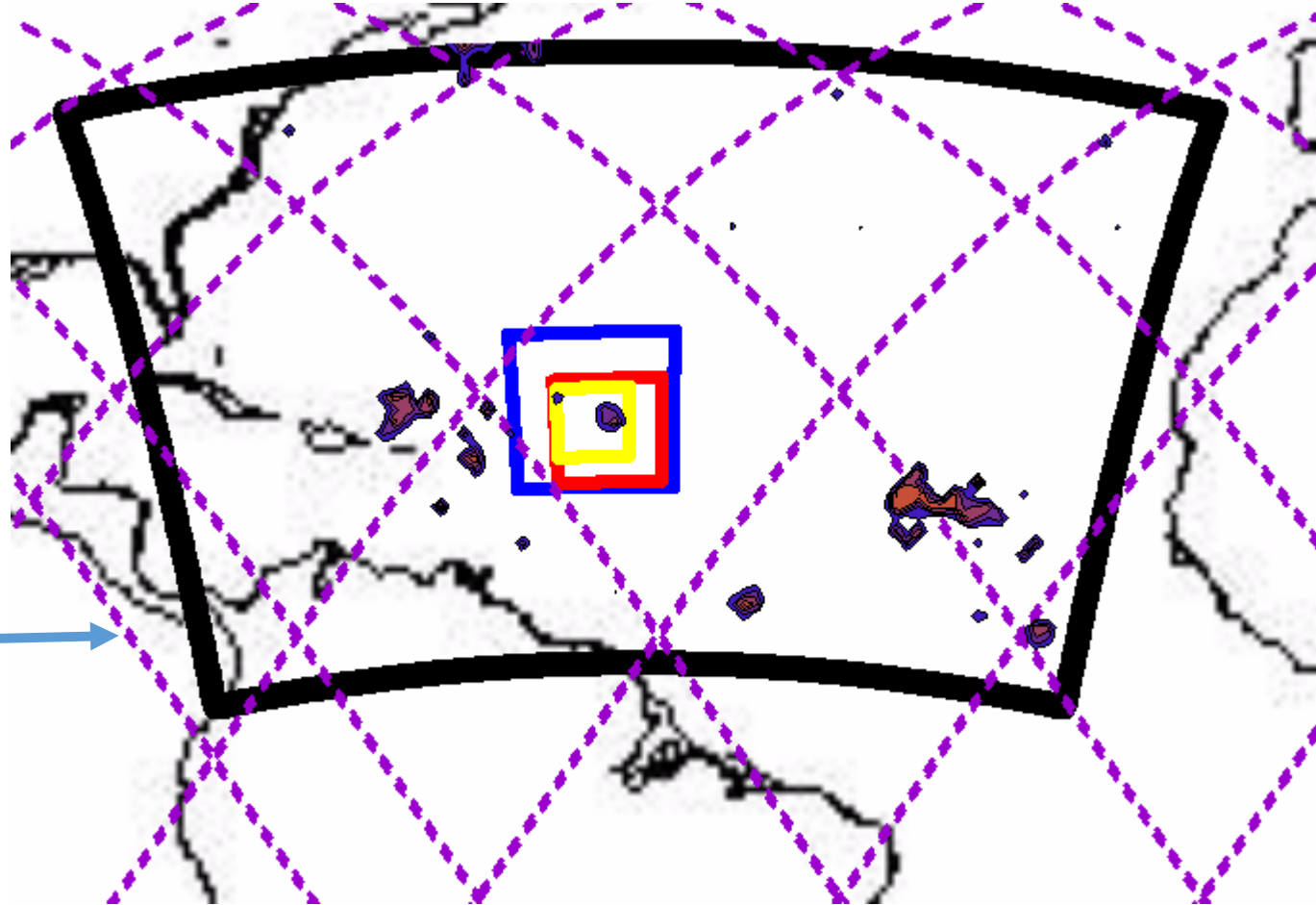
Overview

- NASA has funded a data impact trade study through its ROSES-13 program: CYGNSS related call
 - Directed at Doppler Wind Lidars
 - Explore synergisms between AMVs, OVWs and future DWL products.
 - Technology neutral in details
- Issues to be addressed
 - Swath vs lesser horizontal coverage
 - Upper vs lower troposphere coverage
 - Concentrated precision vs sample distribution (equal resources)
 - Temporal revisit interval benefits (GEO vs. LEO?)
- Cost vs. benefit study
 - Cost expressed in terms of mission complexity
 - Benefit expressed in terms of OSSE impact metrics

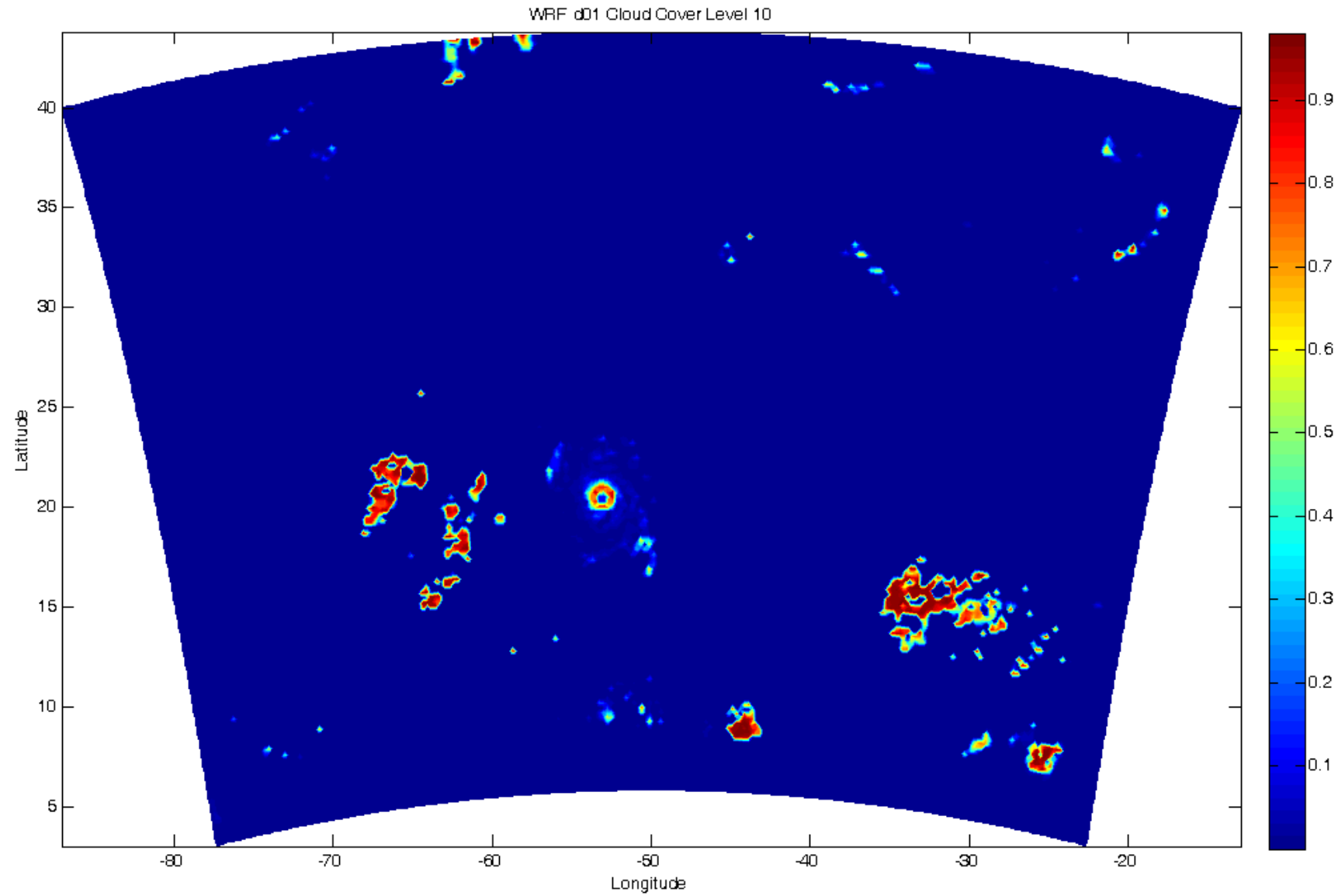
The Nature Run

- Nature Runs
 - T511 provided by ECMWF
 - WRF provided by NOAA
 - 27,9,3,1 km nested domains
- A hurricane case in August
- Model cloud issues
 - T511 reports much greater cloud coverage than the WRF does
 - Plan to adjust the WRF cloud coverage post NR generation.

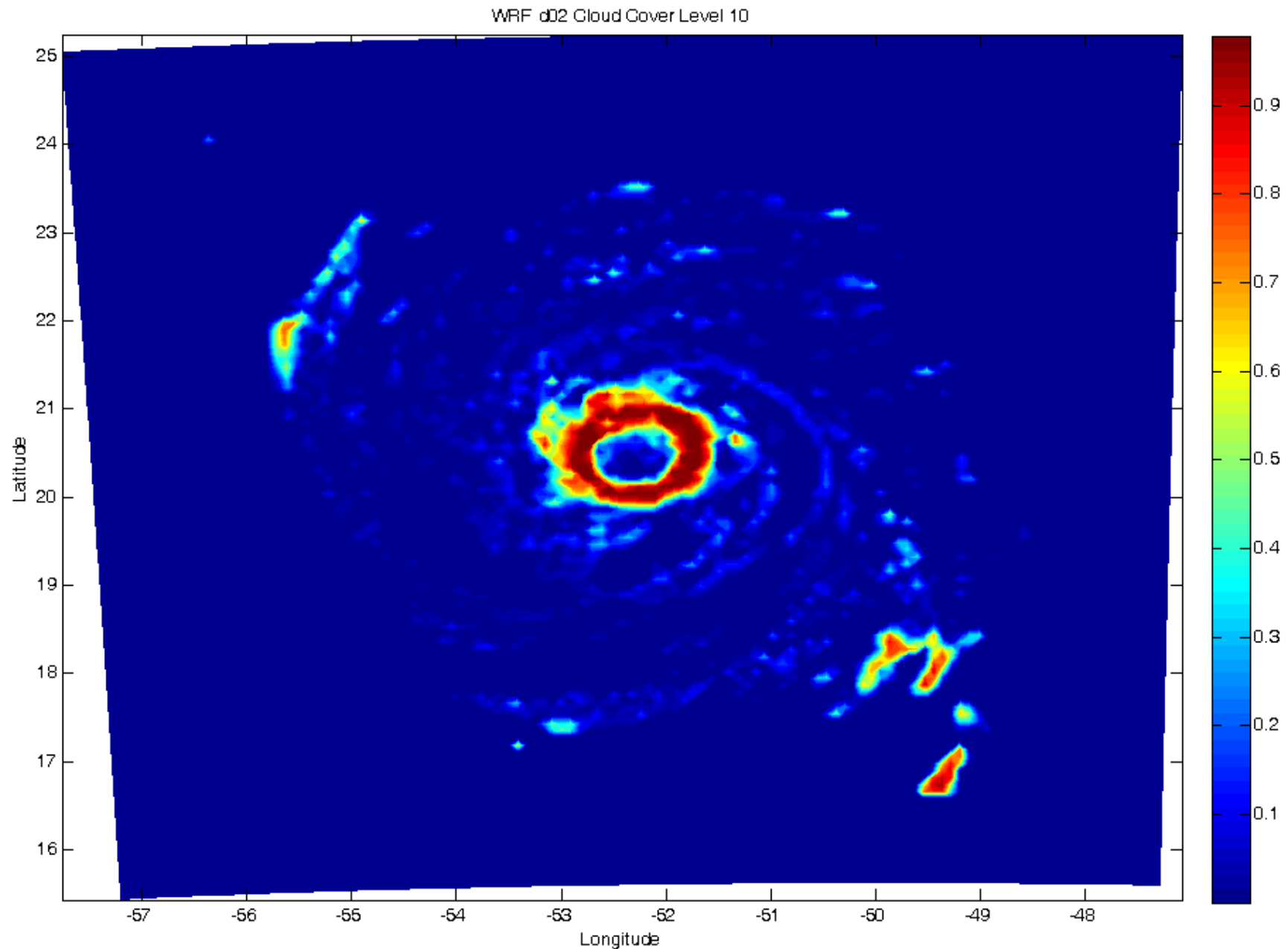
WRF MESOSCALE NR – Nested Grids (27, 9, 3 and 1 km)



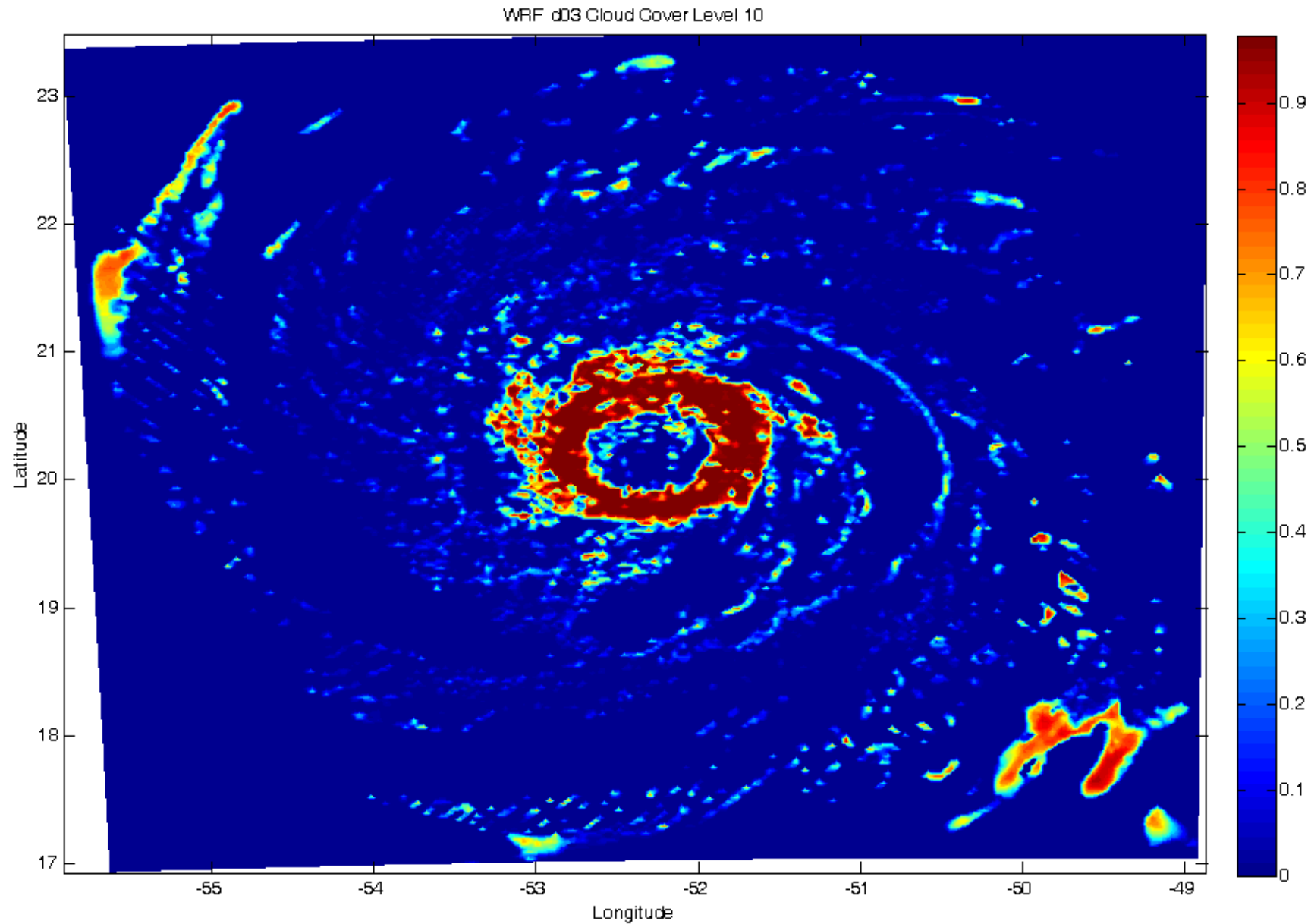
Polar orbiting
satellite ground track



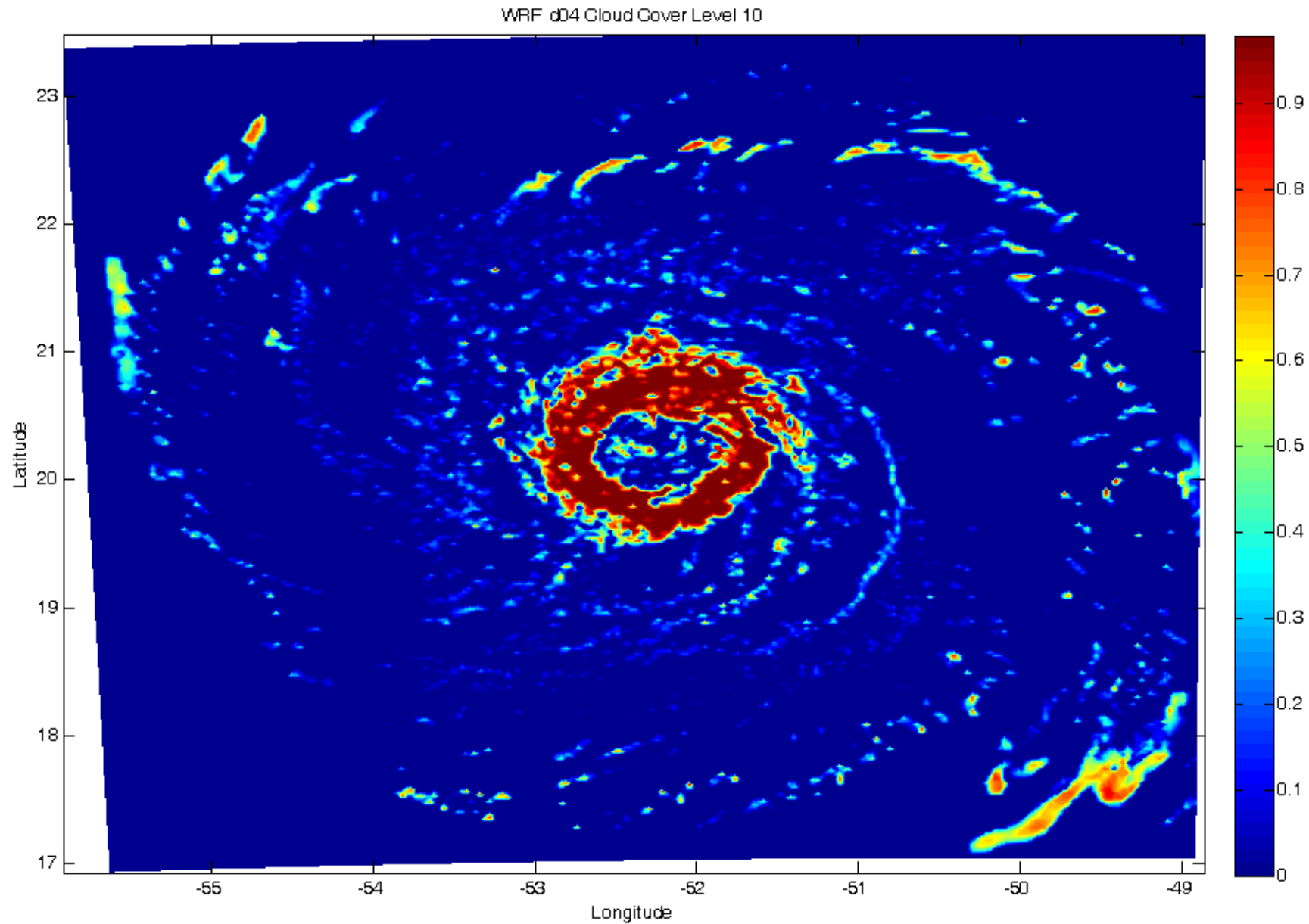
WRF MESOSCALE NR 8/04/12Z – Domain 1 Cloud Fraction Level 10



WRF MESOSCALE NR 8/04/12Z – Domain 2 Cloud Fraction Level 10



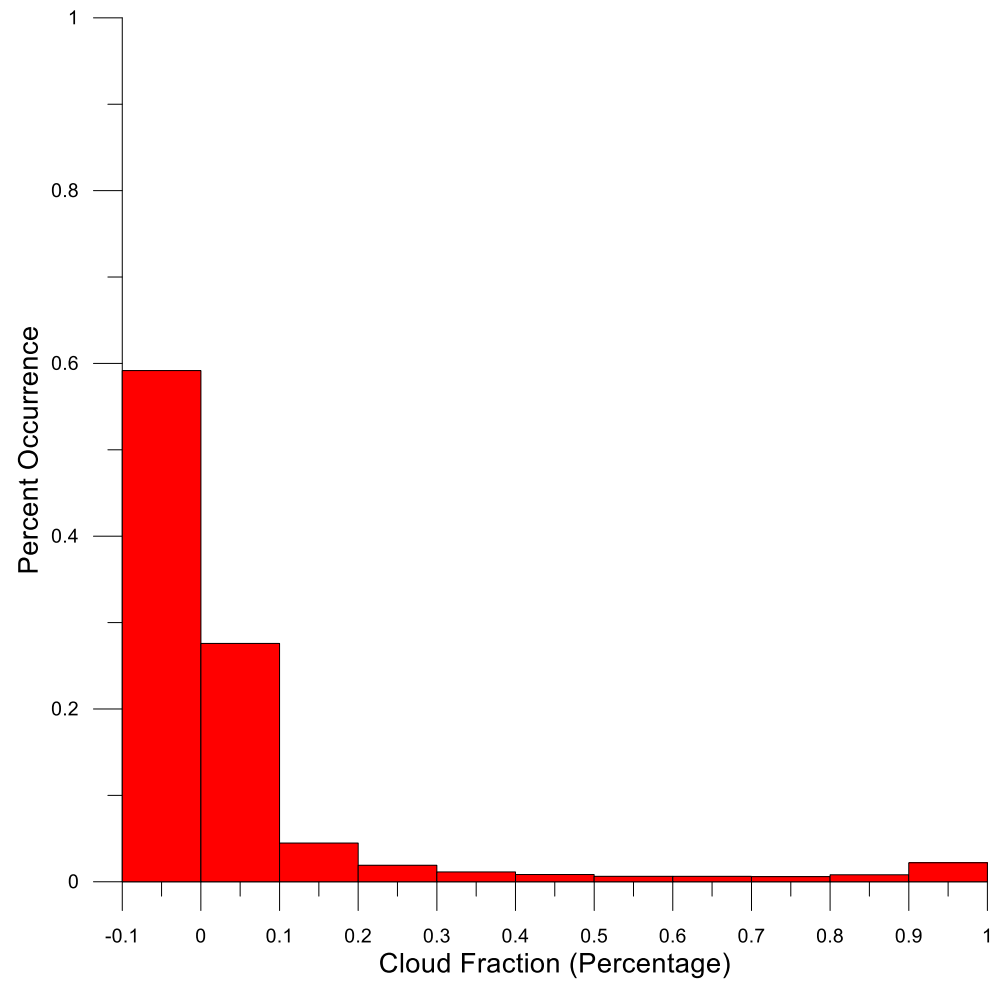
WRF MESOSCALE NR 8/04/12Z – Domain 3 Cloud Fraction Level 10



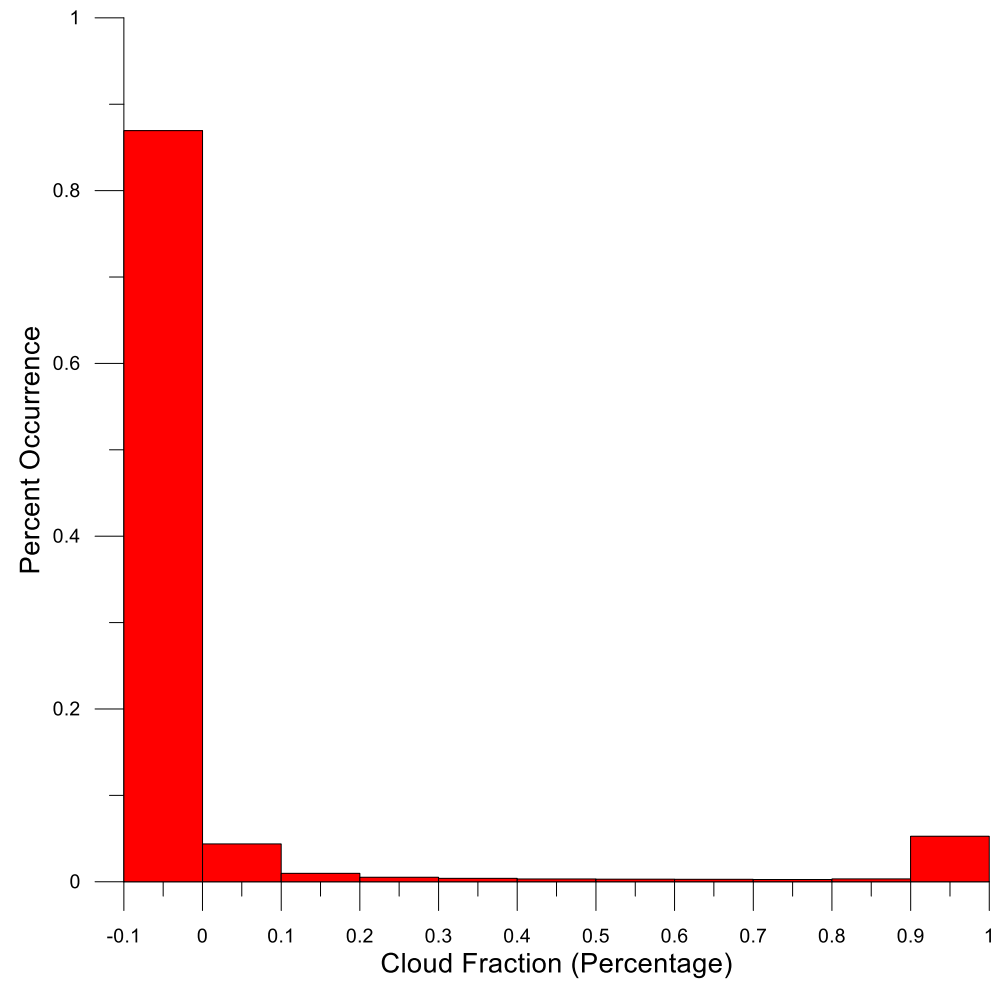
WRF MESOSCALE NR 8/04/12Z – Domain 4 Cloud Fraction Level 10

Nature Run Cloud Coverage Issues

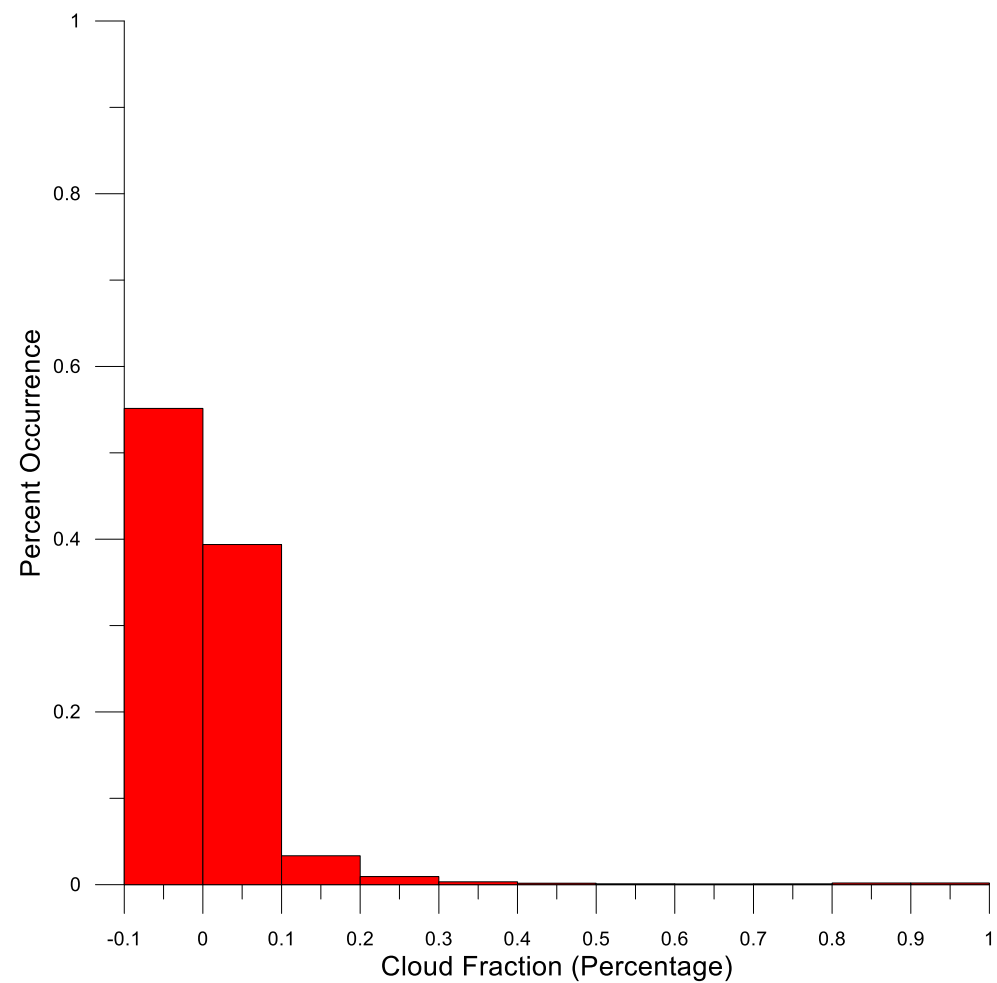
T511 High Level (100-400mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z



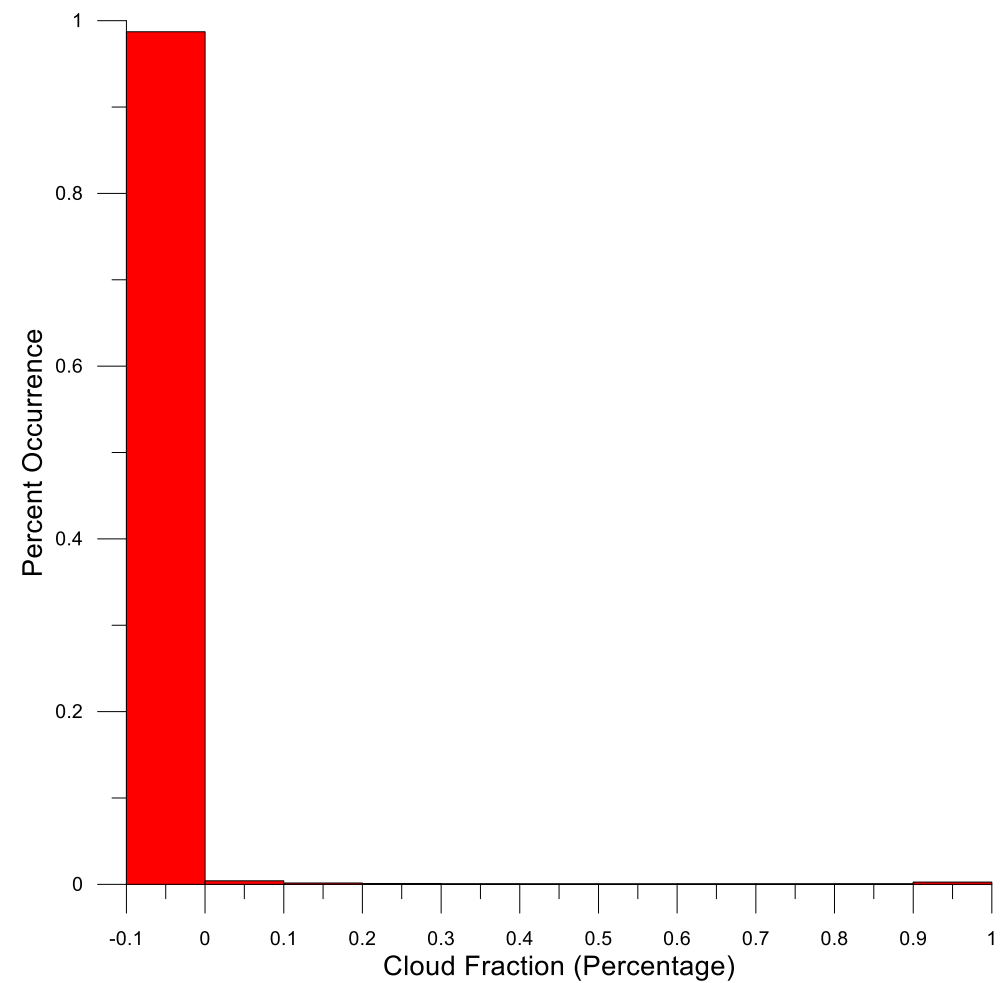
WRF High Level (100-400mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z



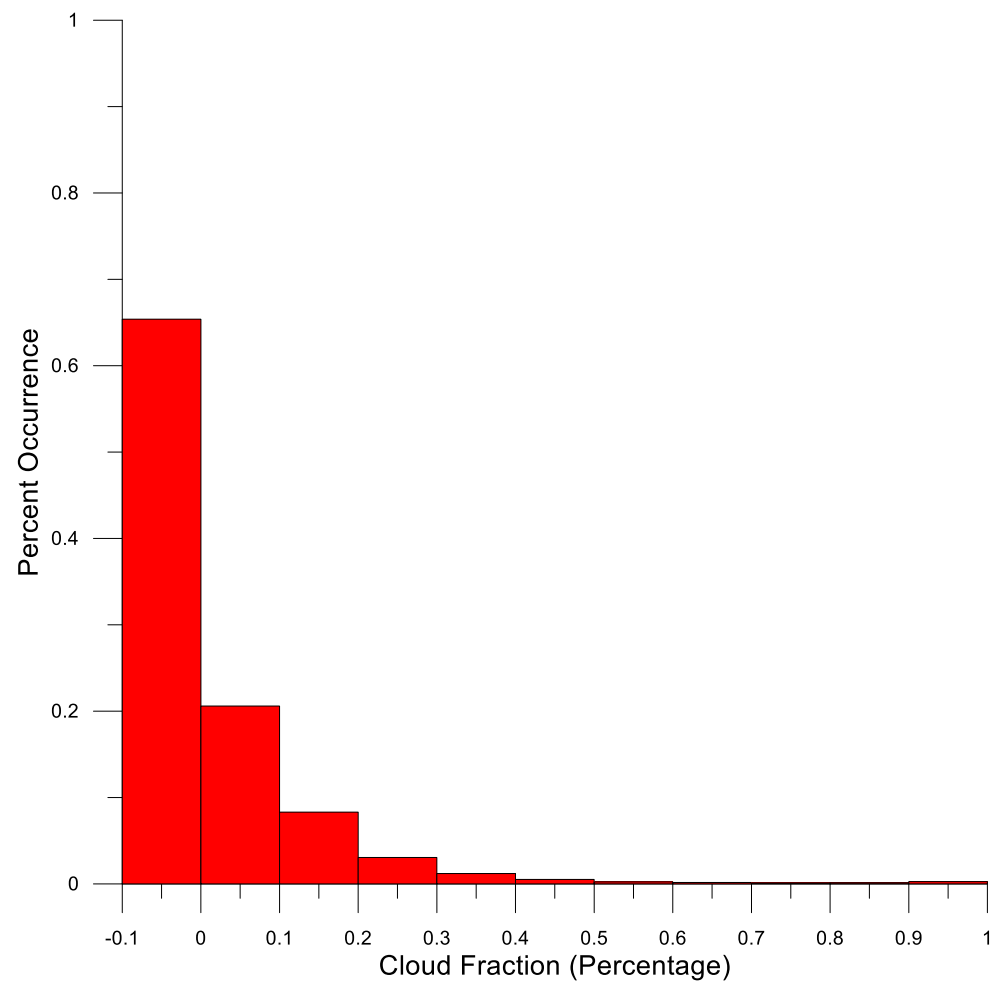
T511 MID Level (400-750mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z



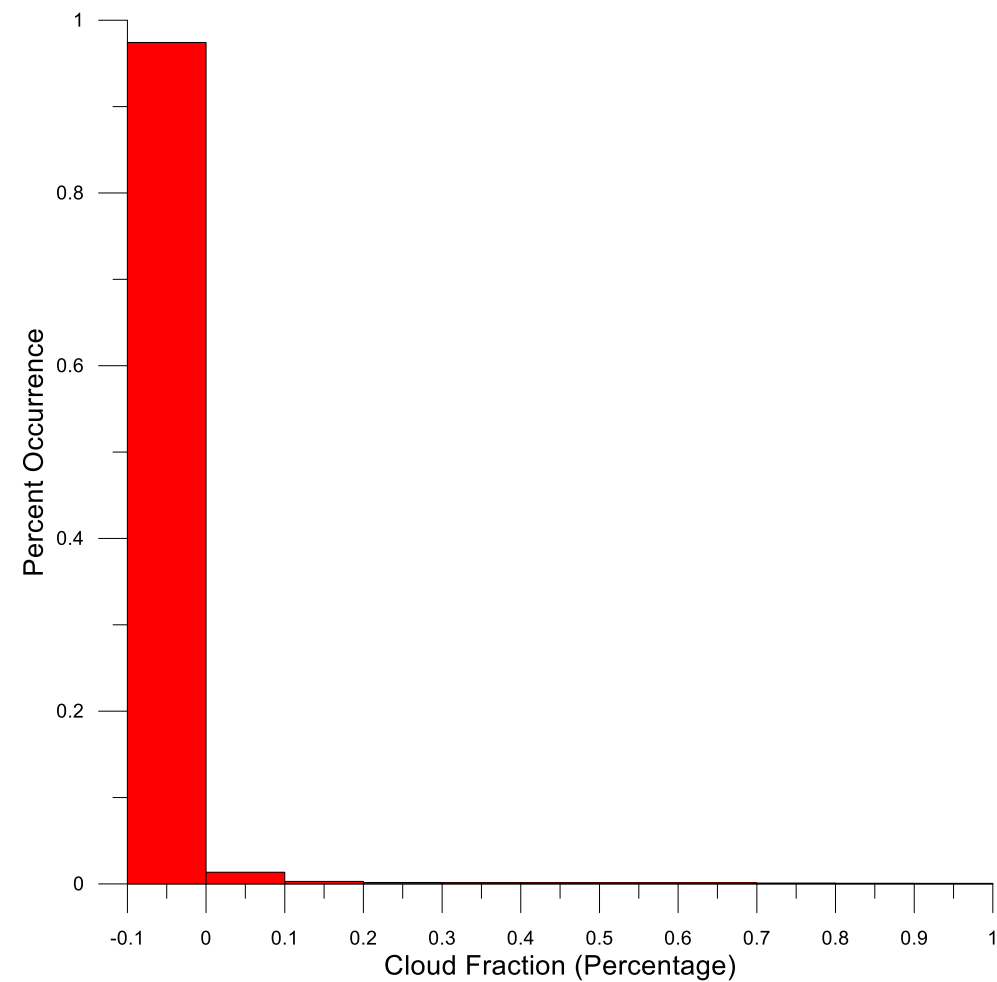
WRF MID Level (400-750mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z



T511 low Level (Below 750mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z

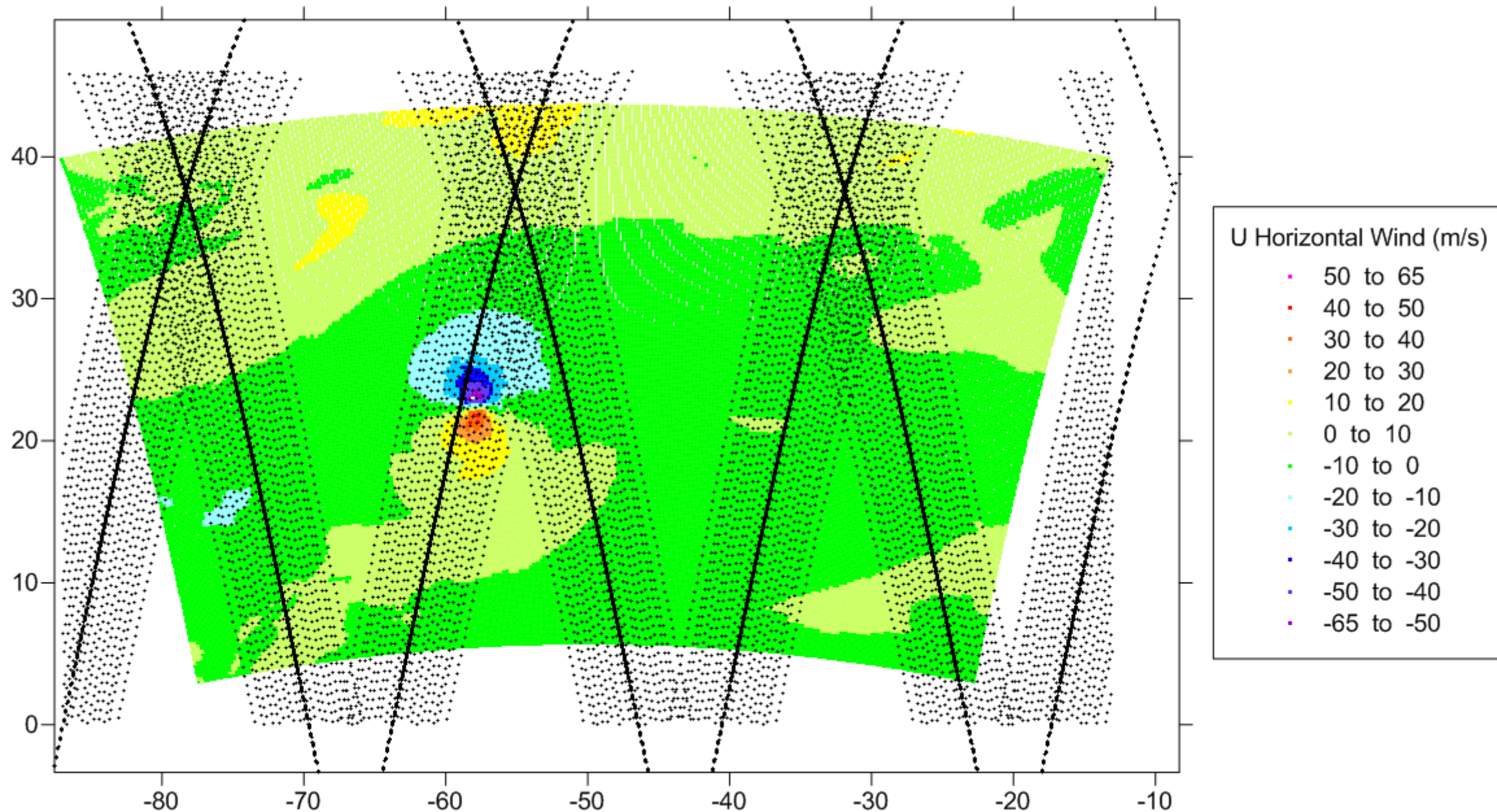


WRF low Level (Below 750mb) Cloud Fraction Histogram
Over WRF Nature Run Domain 1
2005080500 - 00Z

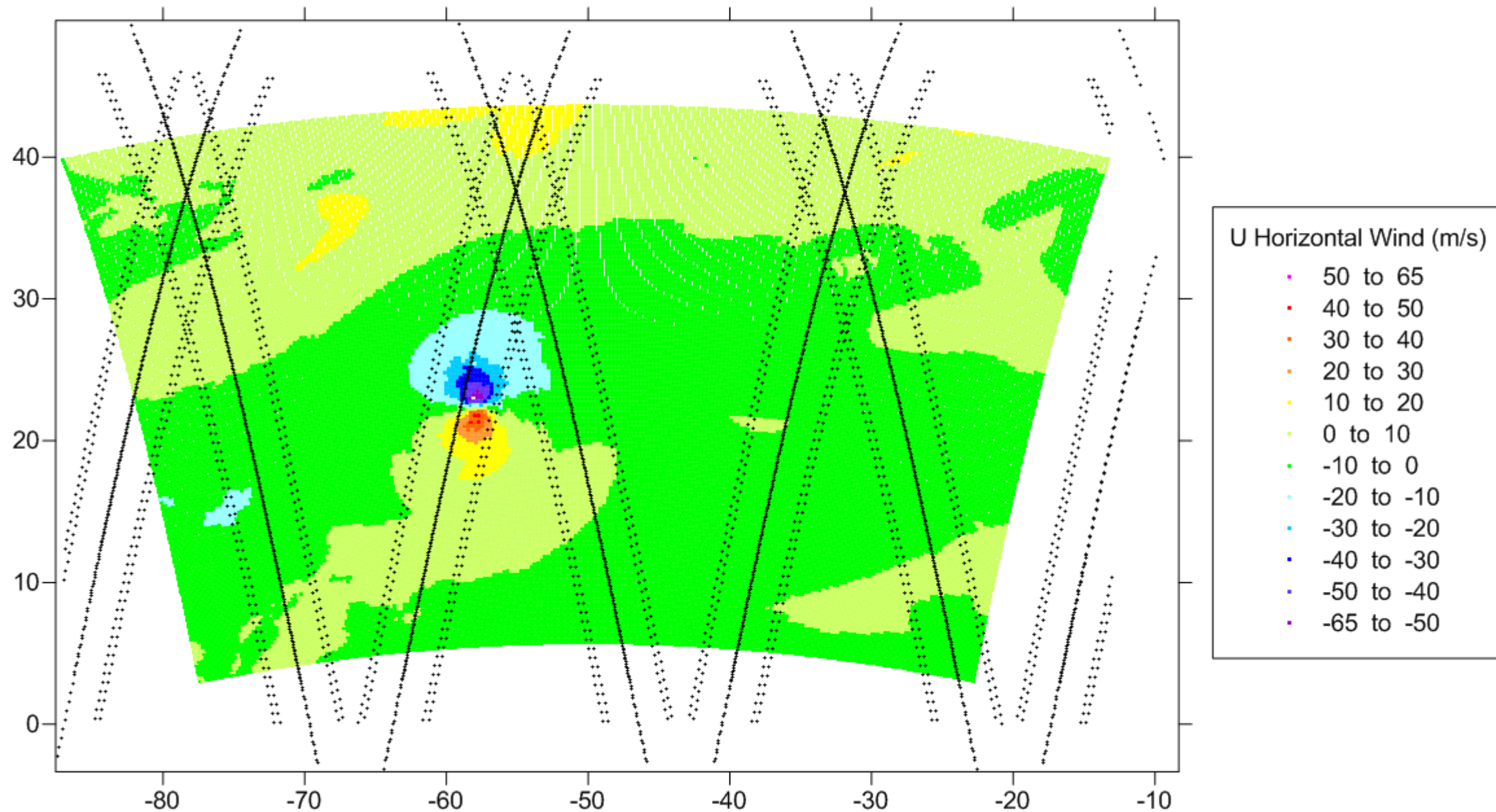


The “reference” sampling case

Satellite and Shot Coverage Pattern (20 Azimuth Angles) over WRF Model U Wind Field (10 Km)



Satellite and Shot Coverage Pattern (4 Azimuth Angles) over WRF Model U Wind Field (10 Km)



Summary

- Cloud free DWL-like product simulations for 10 days have been completed for predictability reference experiments
- Adjustment schemes to WRF NR clouds are being discussed and evaluated
- Trade studies will be performed as described by Bob Atlas in previous presentation