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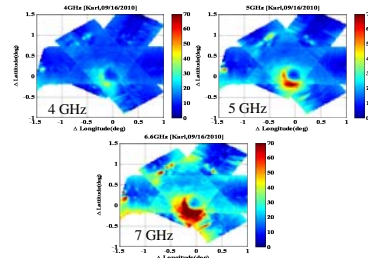
1. University of Central Florida, 2. NOAA/HRD, 3. NASA/MSFC, 4. University of Michigan, 5. NRL/SAIC

## Summary

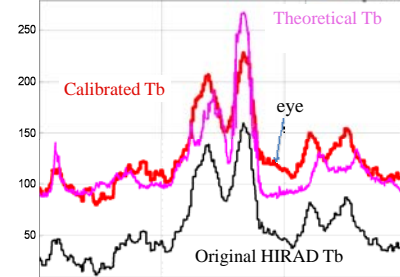
- HIRAD retrievals of wind speed and path average rain rate are presented for Hurricane Karl
  - Three flight legs (6, 8 & 10) on Sept. 16, 2010
- HIRAD absolute brightness temperature (Tb) calibration is derived from simultaneous SFMR measurements (see slide-6 & 7)
- Also comparisons are presented with NOAA P-3 Stepped Frequency Microwave Radiometer (SFMR) and Tail Doppler Radar measurements (see slides- 9, 10 & 11)

## HIRAD Excess Tb Images

- Excess Tb removes the incidence angle variation

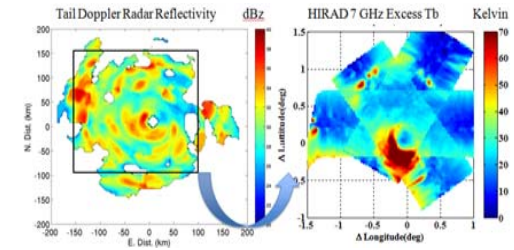


## Absolute Calibration of HIRAD 7 GHz Image @ EIA = 56 using SFMR



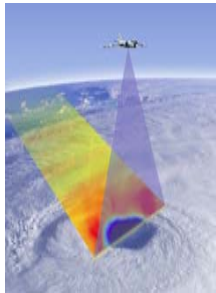
## P-3 Tail Doppler Radar Reflectivity in storm-centric co-ordinates

- High radar dBz corresponds to high excess Tb

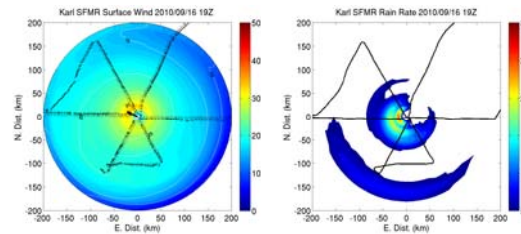


## HIRAD Instrument

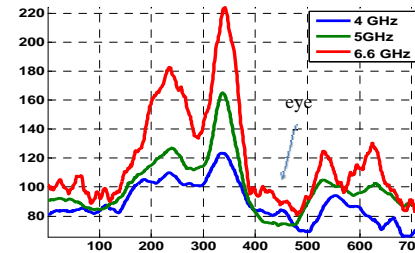
- Synthetic aperture radiometer
- Freq: 4, 5, 6 & 6.6 GHz
- H-pol @ EIA = 60
- Spatial resolution:
  - 2 km @ nadir
  - 6 km @ edge of swath
- Swath = 3 AC altitude
  - 60 km for GRIP



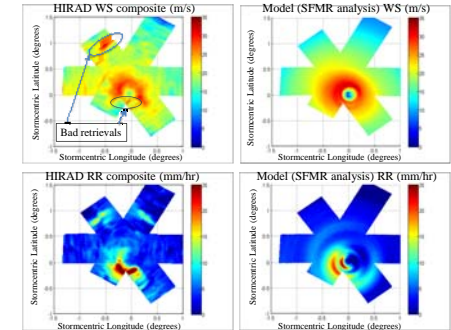
## SFMR flight tracks and 2D Wind & Rain Surface Analyses



## HIRAD Calibrated Tb Time Series Karl, Leg-6

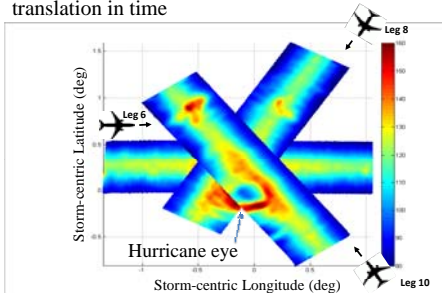


## HIRAD and SFMR Wind Speed and Rain Rate Comparisons



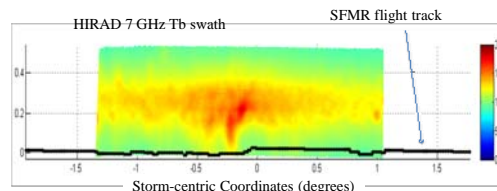
## HIRAD Flight Tracks for Karl

- Storm-centric coordinate system adjusts for storm translation in time

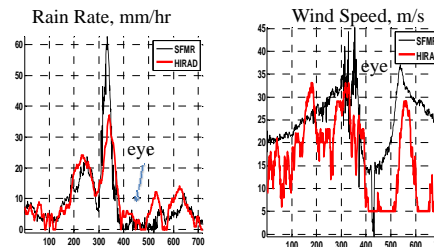


## HIRAD Ad Hoc Tb Calibration based upon SFMR Measurements

- Near simultaneous SFMR wind speed & rain rates used to calculate the theoretical Tb for HIRAD chans
- Theoretical Tb used to set the absolute brightness scale



## Karl Leg-6: WS & RR Time Series (HIRAD & SFMR)



## Conclusions

- HIRAD absolute Tb calibration continues
- Preliminary wind speed and rain rate retrievals are encouraging compared to SFMR
- Wind speed and rain rate 2D images are high resolution and show dominate hurricane eye-wall structure in a single aircraft pass
  - Infrequent anomalous retrievals (shown as ellipses in slide-11) result from improper Tb calibration