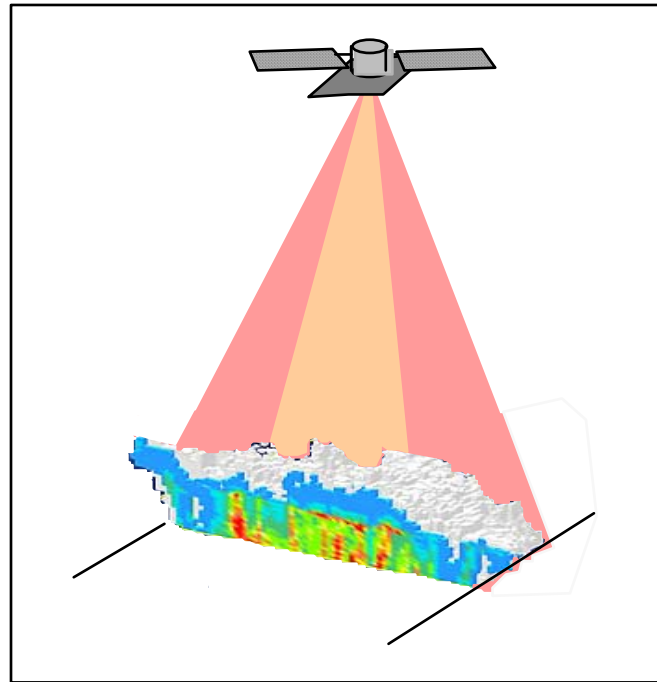


PR-2 Observations in Hurricane Humberto



**S. Durden, E. Im, Z. Haddad, J. Meagher, and
A. Heymsfield**

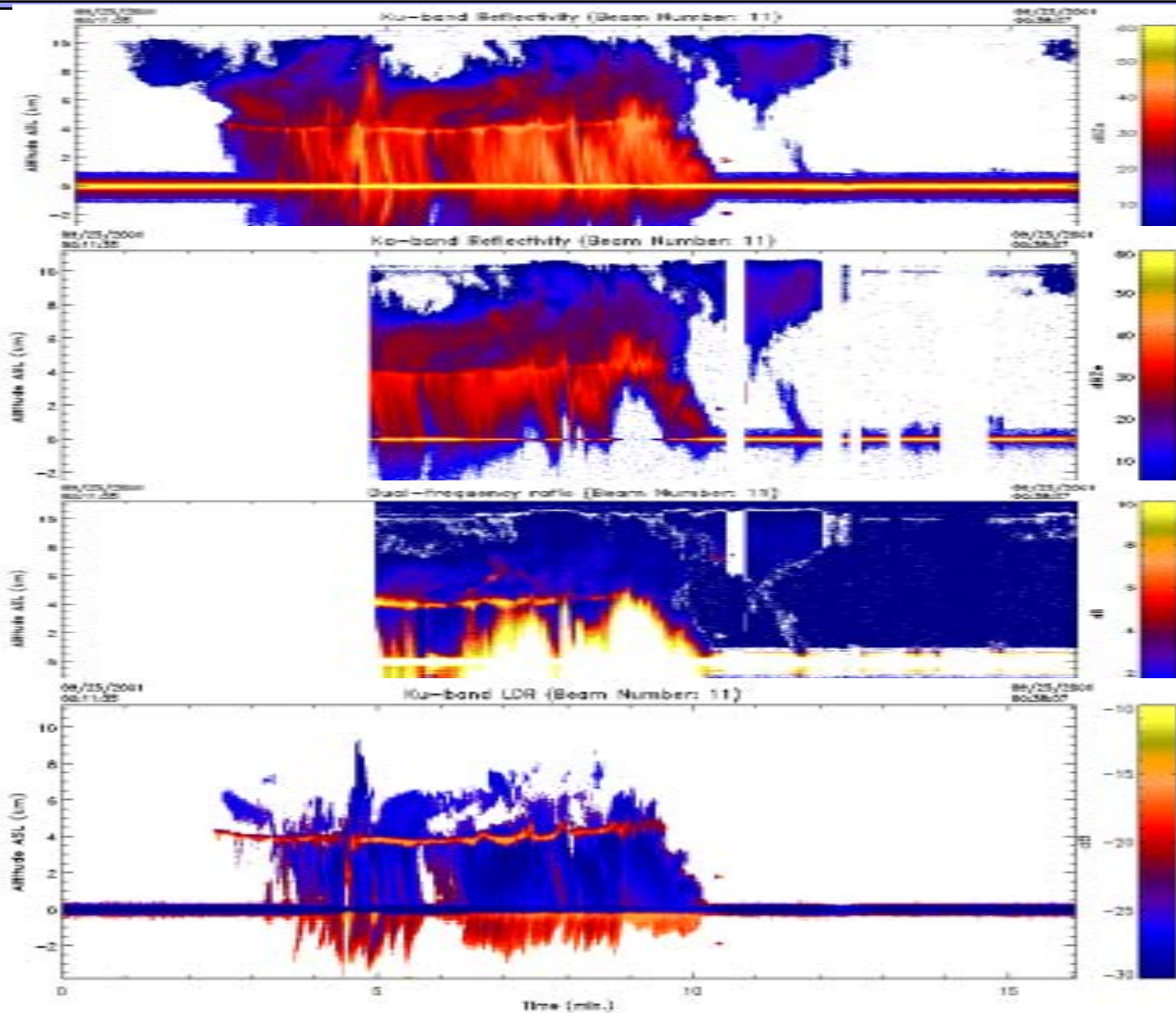


Introduction

- **PR-2 airborne simulator (APR-2)**
 - is the prototype for a second generation spaceborne precipitation radar (PR-2)
 - performs cross-track scanning +/- 25 degrees from nadir
 - operates at 13.4 and 35.6 GHz
- **Version 1 of APR-2 CAMEX-4 data was delivered early April 2002, along with documentation and sample code; minor problems noted**
 - LDR was not properly masked for SNR; low SNR areas may show high LDR
 - variable which holds range bin number of the surface may be incorrect at edges of scan
 - some small segments of Ka-band data missing from HDF and quicklooks
 - Ka-band calibration may need adjustment upward by ~ 1 dB
- **Submitted APR-2 instrument paper for publication**
 - to appear in Jan'03 issue of Microwave Journal
- **Analyses of data since delivery**
 - focused on Hurricane Humberto near 0020 UTC, acquired during 9/24 flight
 - dual-frequency data has been used to estimate rain rates
 - collaborated with A. Heymsfield in using dual-frequency data to investigate ice microphysics
 - also performed preliminary analysis of TS Gabrielle on 9/15/01



14- and 35-GHz Observations of Hurricane Humberto on 09/24/01 Flight



Ze-Ku

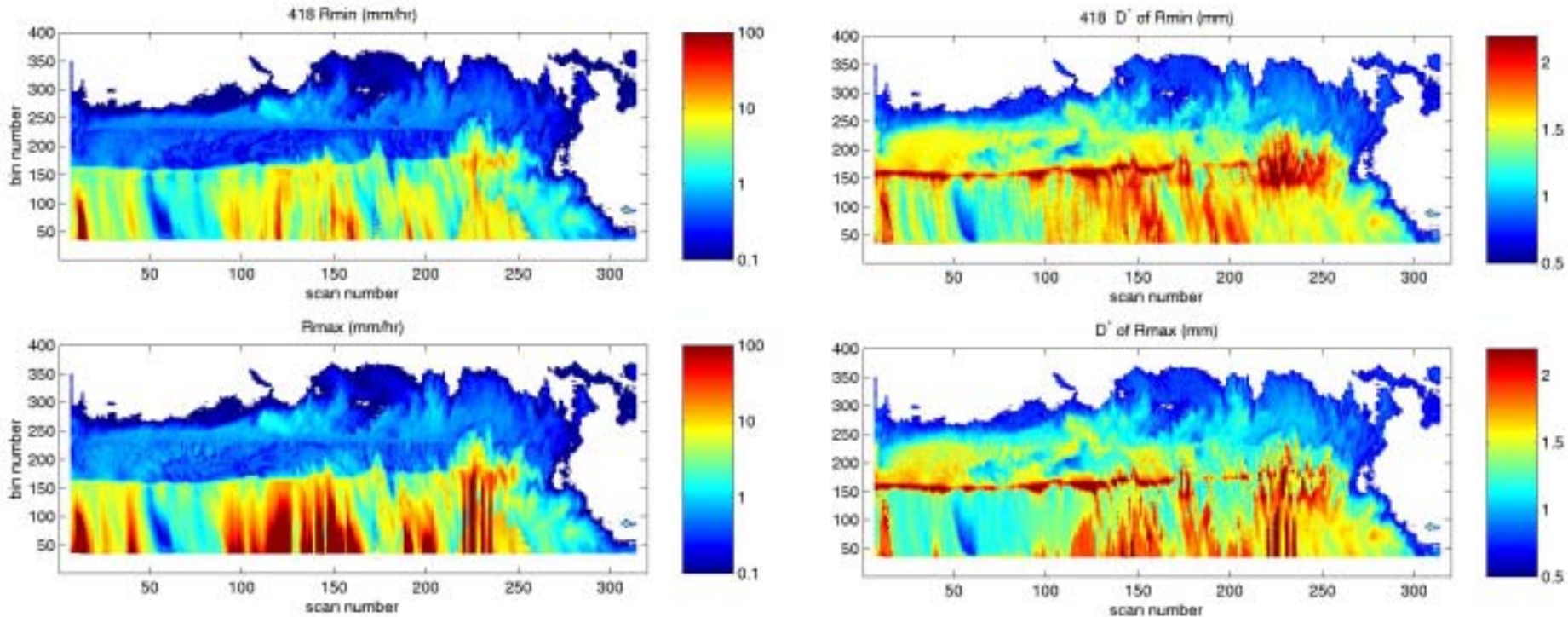
Ze-Ka

Ku-Ka

LDR-Ku

Dual-Frequency Rainfall Retrieval

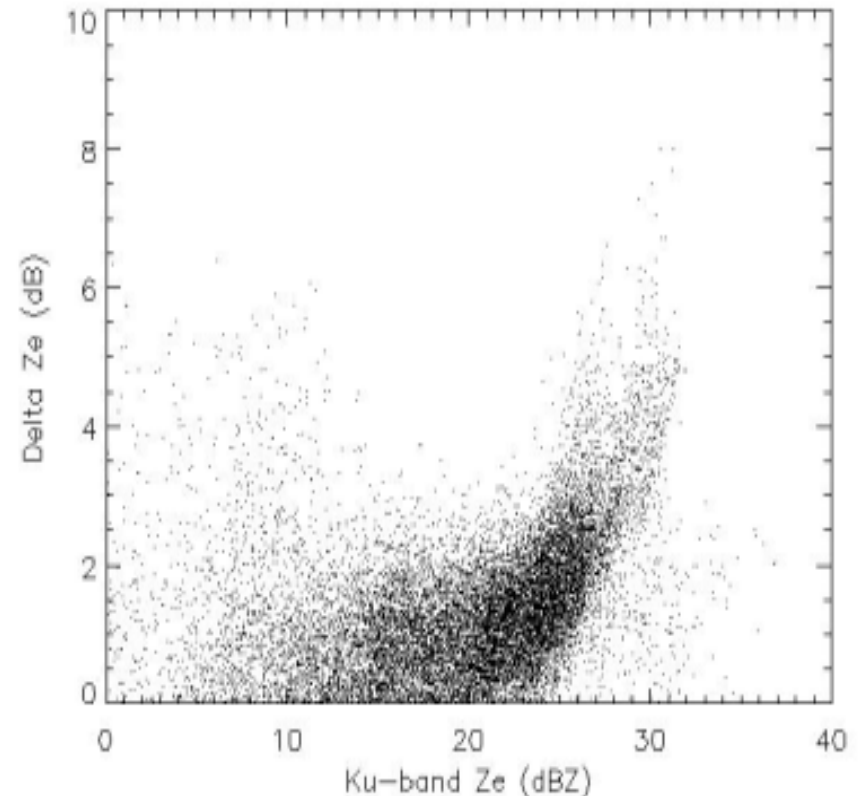
- We have recently developed algorithms that use a probabilistic framework; developed two approaches which calculate full rain rate PDF
 - particle filter Monte Carlo method
 - grid-based: used to create images of rain rate and mass-weighted mean diameter





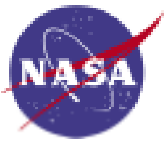
Application to Ice Microphysics

- In ice, the measured difference between Ku-band and Ka-band reflectivity is dominated by Mie scattering effects, since attenuation is small
- Dual frequency measurements can be directly translated to N_0 and D^*
- Areas with large reflectivity and small differential reflectivity correspond to small particle size and large number density
- Areas with large differential reflectivity have large particles (more details in A. Heymsfield's presentation)
- Due to problem with Ka-band tube (now fixed), very limited data were acquired in CAMEX-4; remote sensing of ice microphysics could be an important aspect of CAMEX-5
- Plot at right shows measured ΔZ_e versus 13.4 GHz Z_e

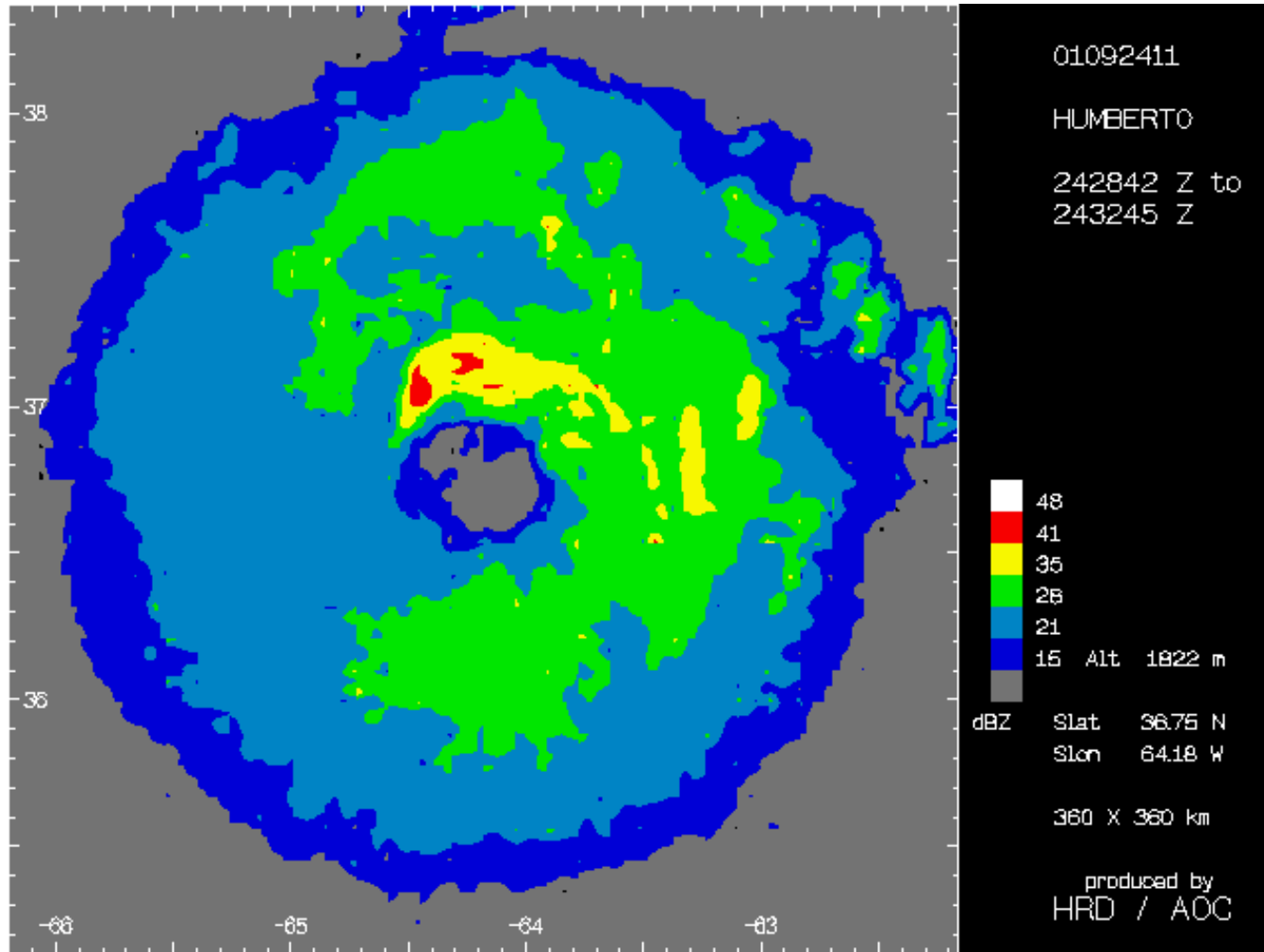




Backup Material



HRD Radar Composite of Humberto



DC-8
flight track
was
NE to SW
at time of
PR-2 data