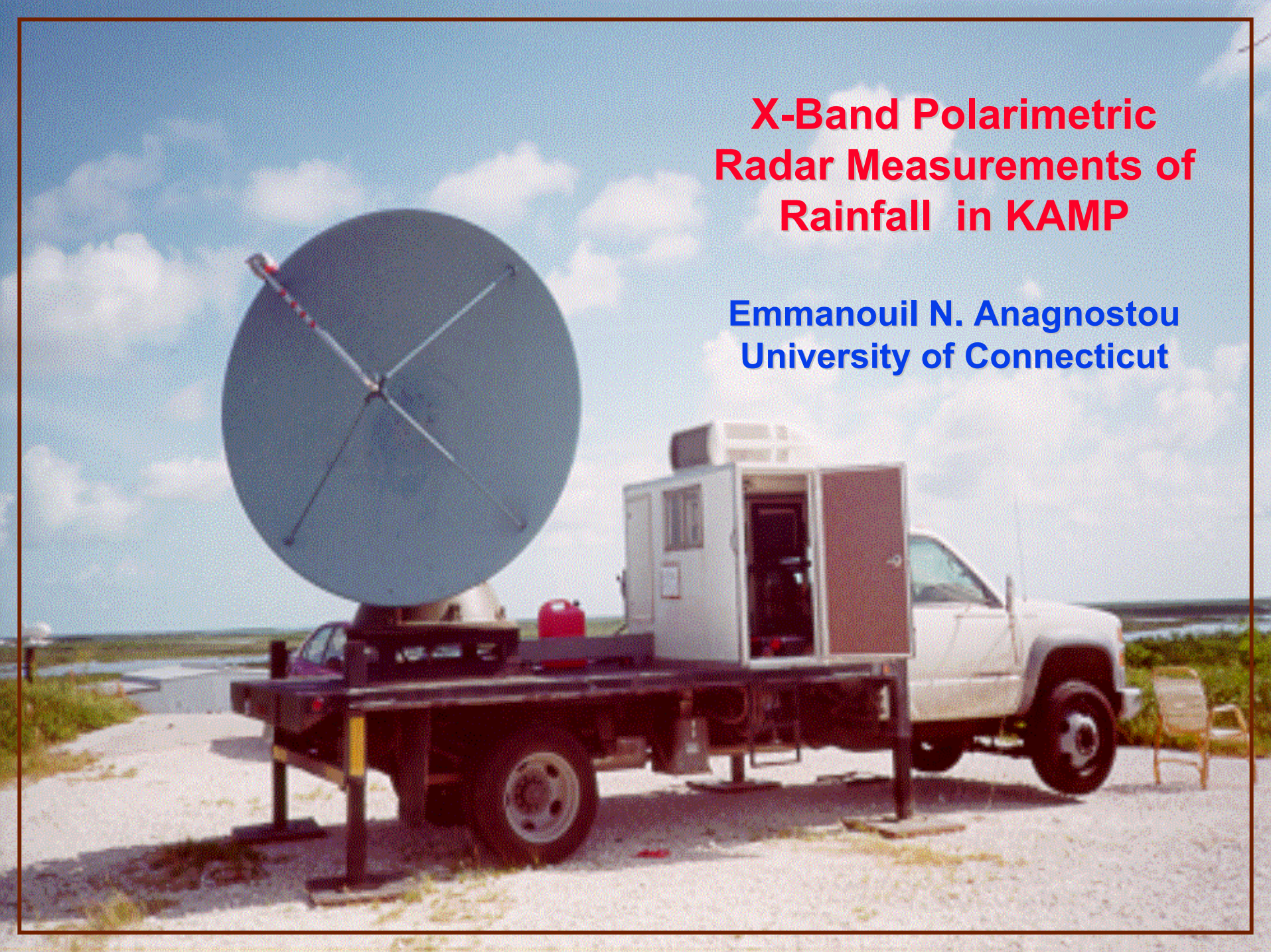

X-Band Polarimetric Radar Measurements of Rainfall in KAMP

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University of Connecticut

Objectives

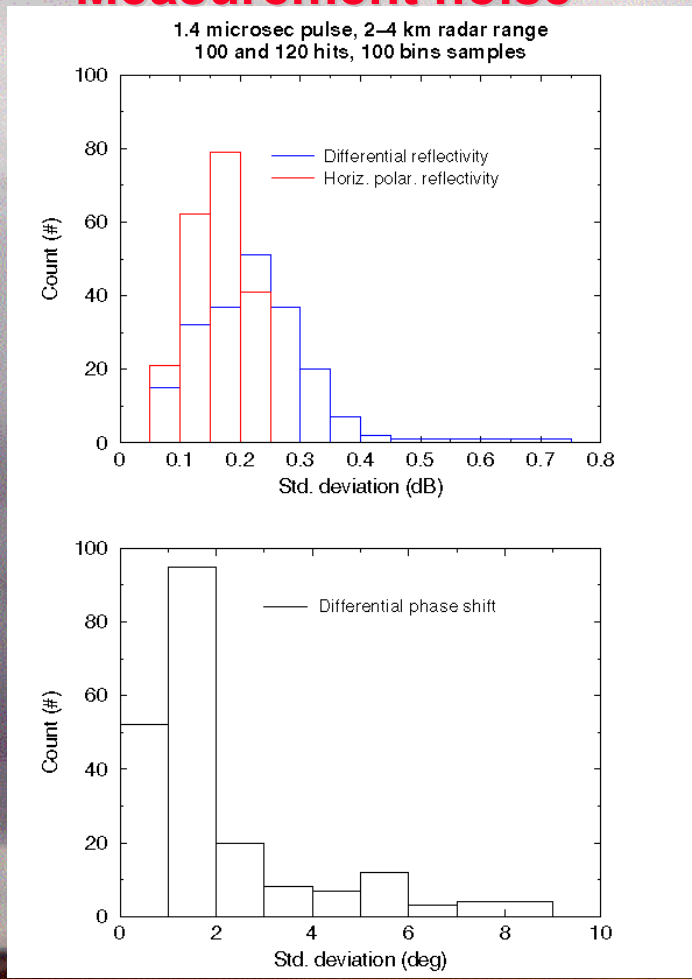
Provide high resolution rain rate and DSD retrievals from combination of polarimetric and Doppler radar data.

Investigate radar/radiometer rain retrieval techniques and quantify their error characteristics through physical validation.

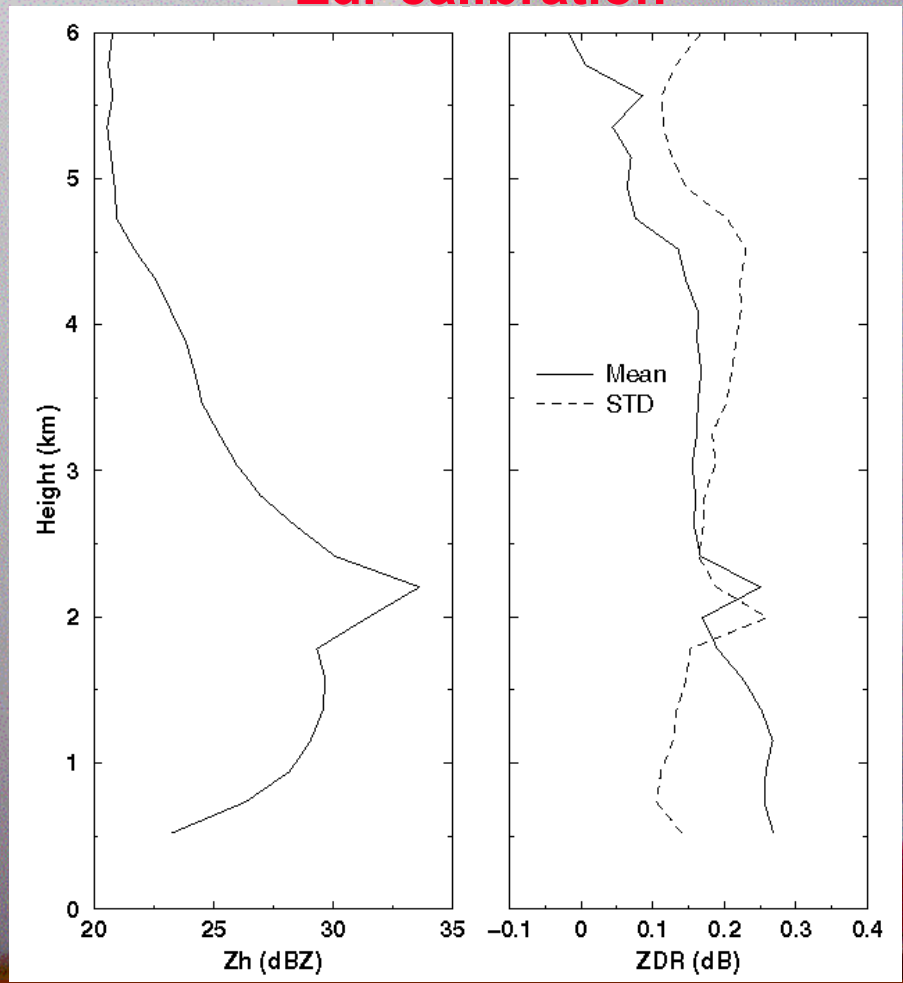
XPOL System Overview

- 9.3 GHz H/V transmission at 50 KW peak power;
- NCAR's transmitter/receiver system;
- 0.9 deg beam width; variable pulse length (60-400 m); 110 km max range

Measurement noise

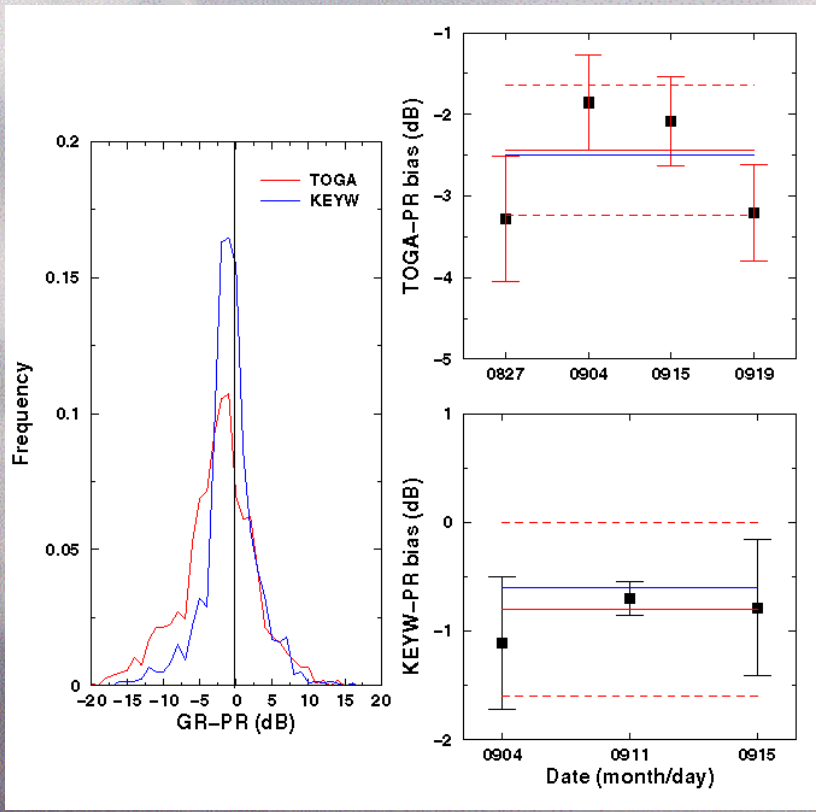


Zdr calibration

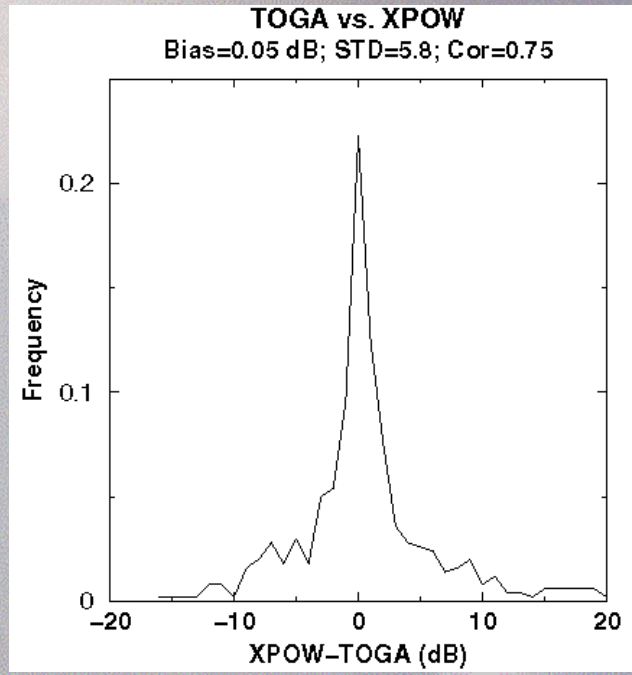


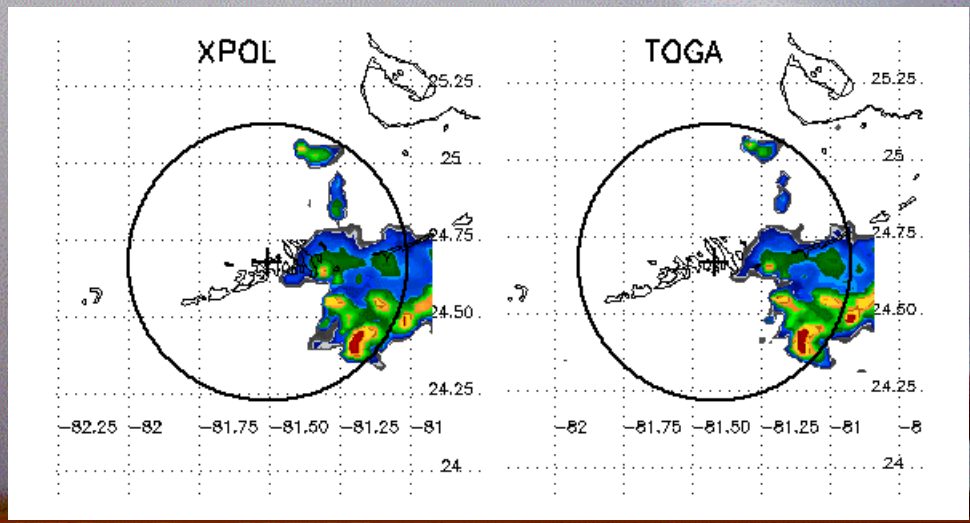
XPOL System Overview

TOGA and WSR cal. assessment from PR



XPOL cal. ass. from TOGA





XPOL Data & Rain Products

Raw data (~25 GB)

↓

Filtered & compressed data (~2.5 GB) → Data archive & V.1 data reading code

↓

Φ_{dp} unfolding and filtering: Ψ_{dp} → V.2 data reading code (March 02)

↓

Zh/Zdr attenuation correction & microphysical retrievals for selected cases (09/19; 09/26-28) → Rain rate and DSD products archive

Attenuation Correction – A way to retrieve rain rate and DSD

➢ **Parameterizations derived from DSD data:**

$$b/a=(1+0.05\beta)-\beta*D$$

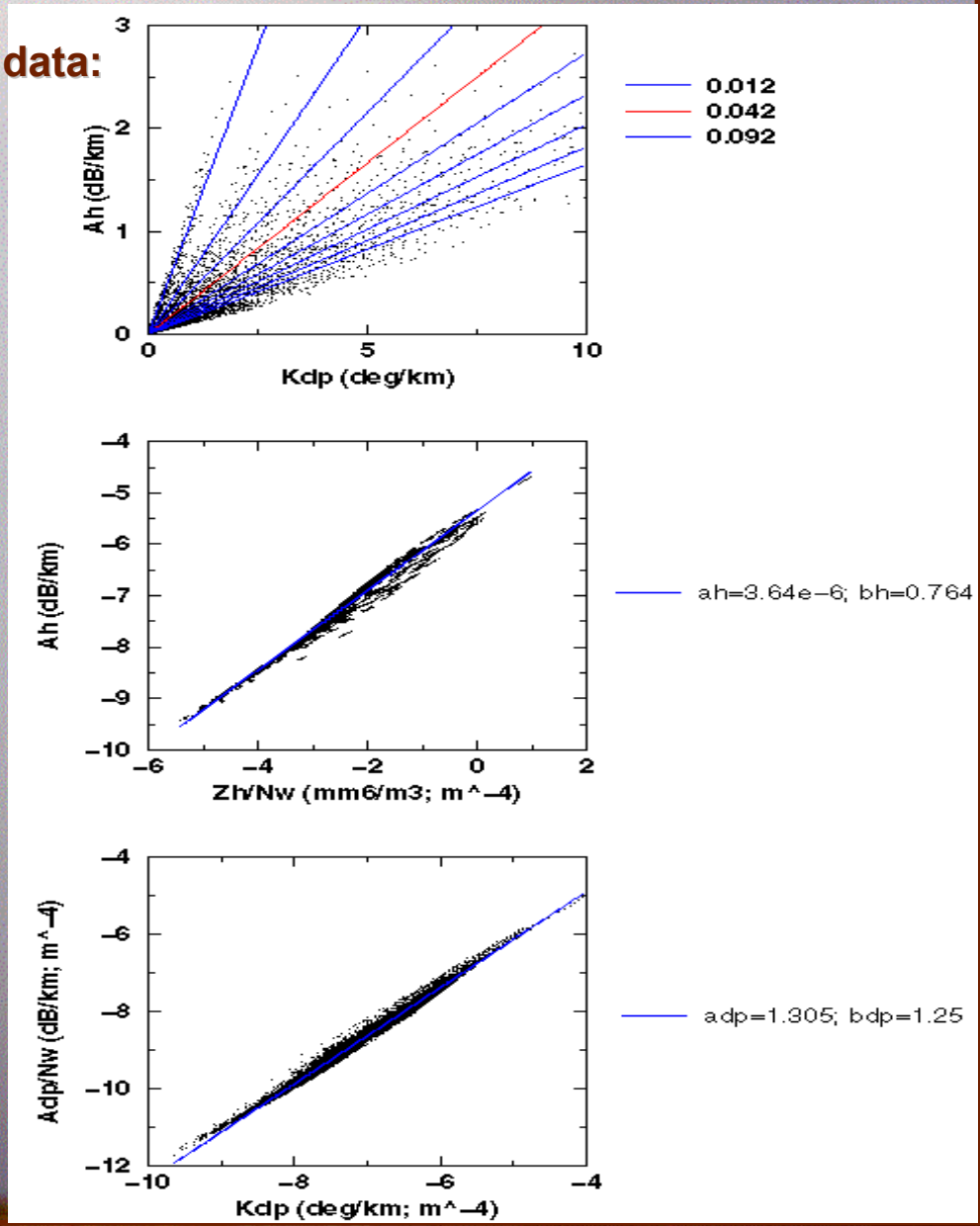
$$Ah = \gamma(\beta)\, Kdp$$

$$Ah=a\, N_w^{1-b}\, Zh^b \rightarrow N_w$$

$$A_{dp} = c\, N_w^{1-d}\, K_{dp}^{d}$$

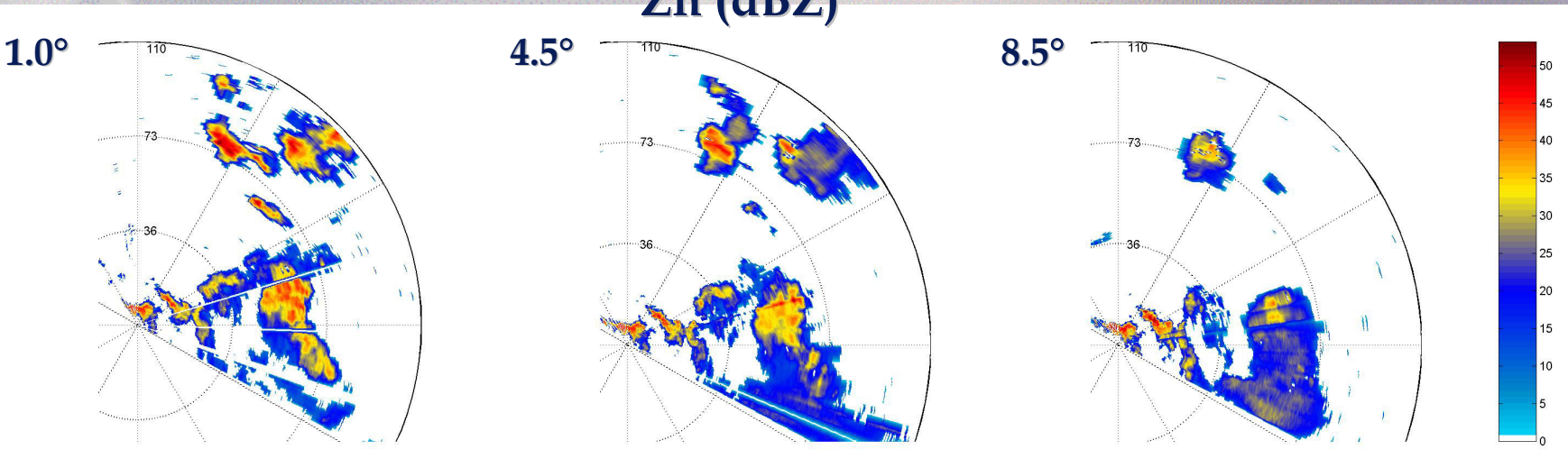
$$D_0 = e\,\{Z_{DR} + A_{dp}\}^f$$

$$R = g\, N_w^{1-h}\, Z_e^{h}$$

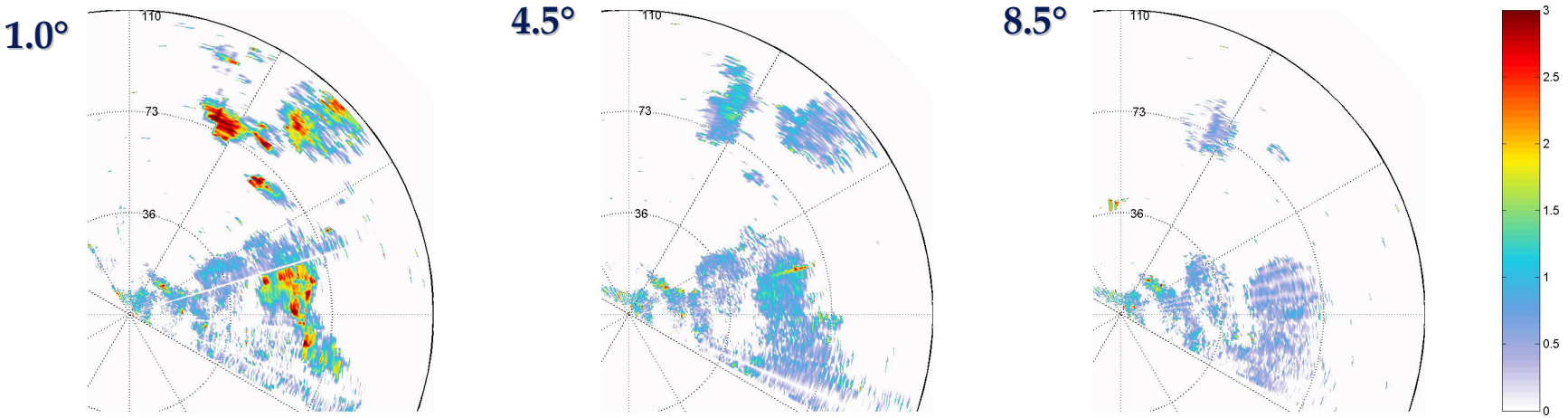


Example cases for Sept. 19th @18:50 UTC

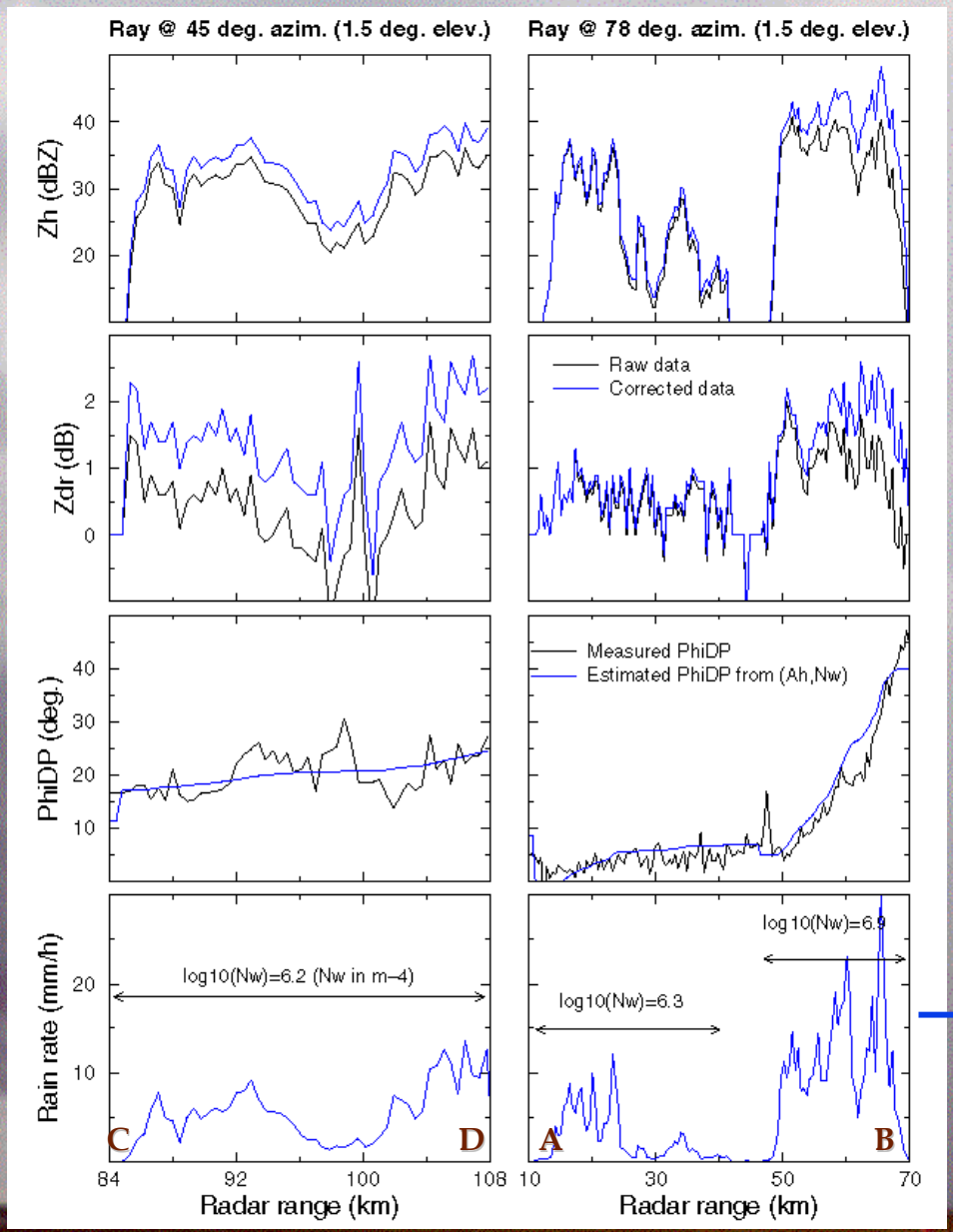
Zh (dBZ)

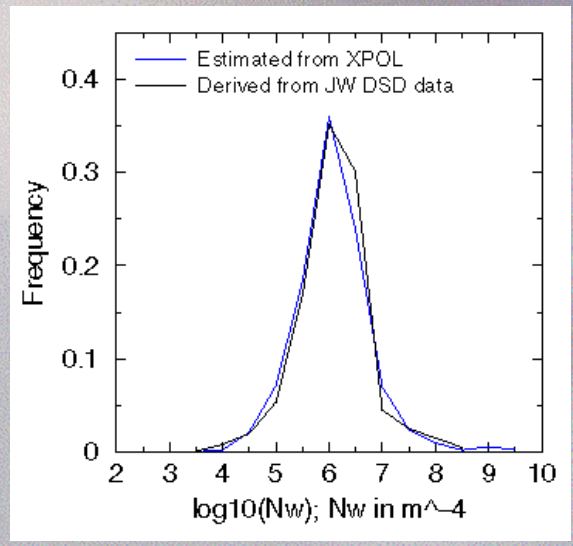


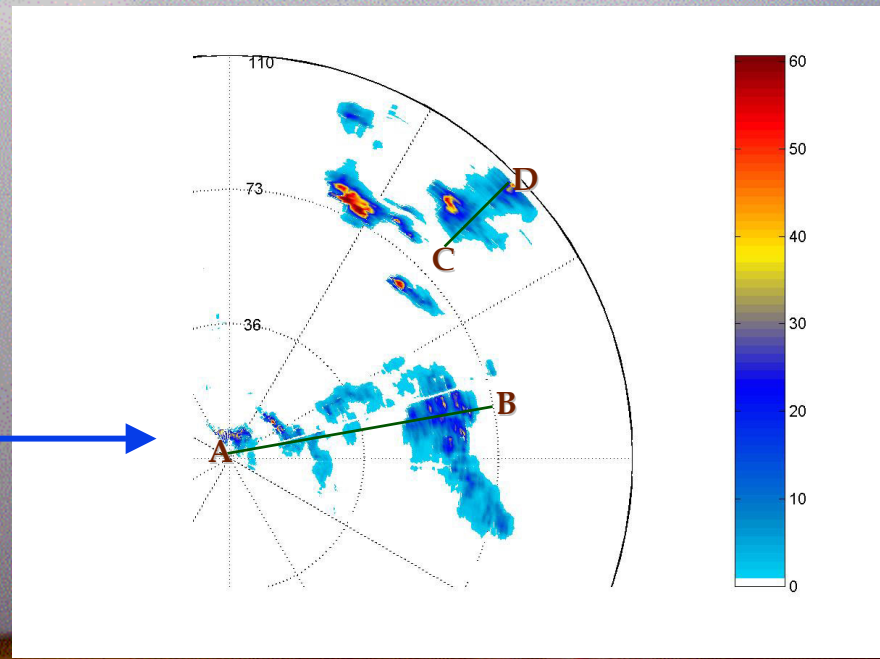
Zdr (dB)



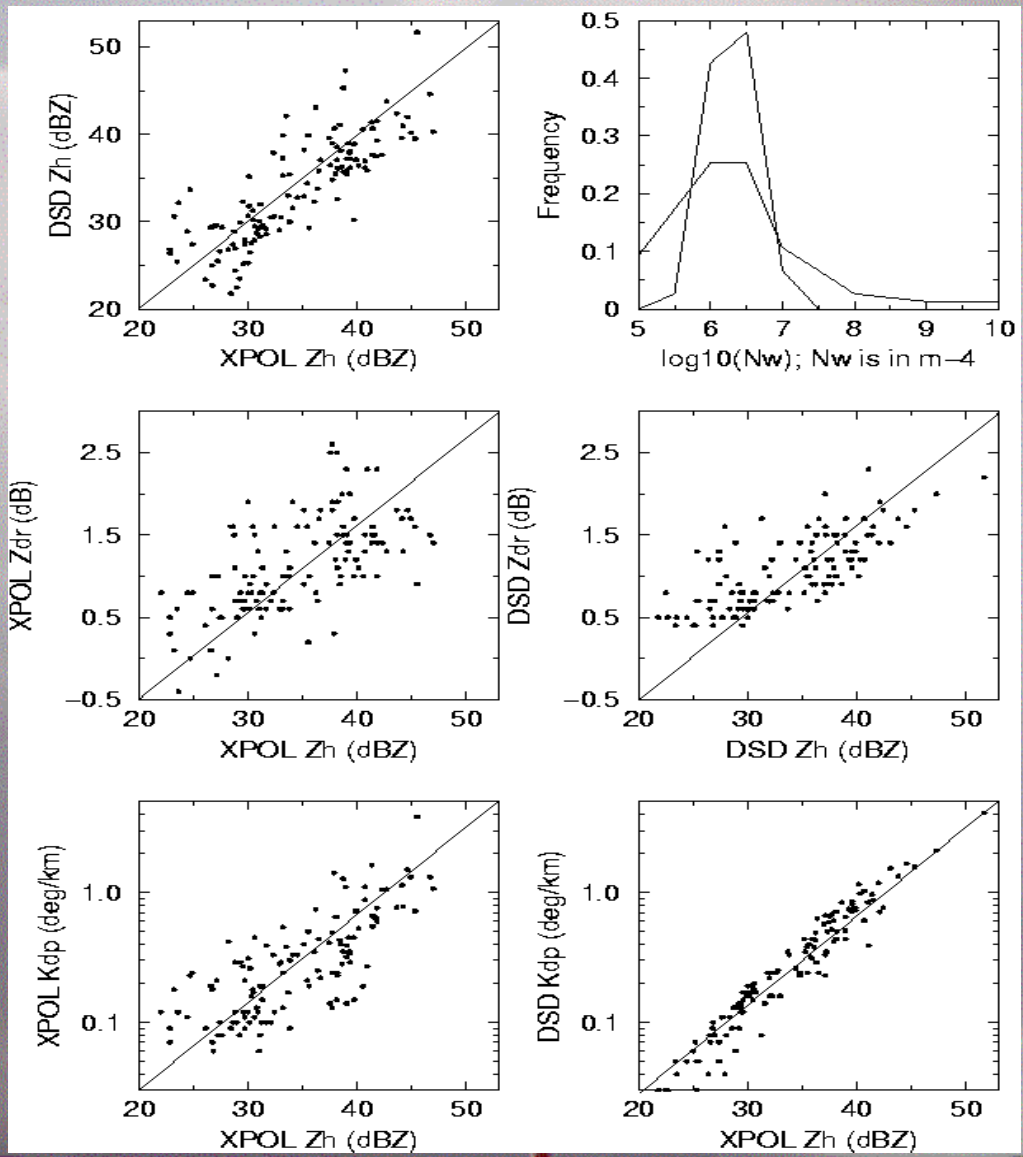
Example cases for Sept. 19th @ 18:50 UTC



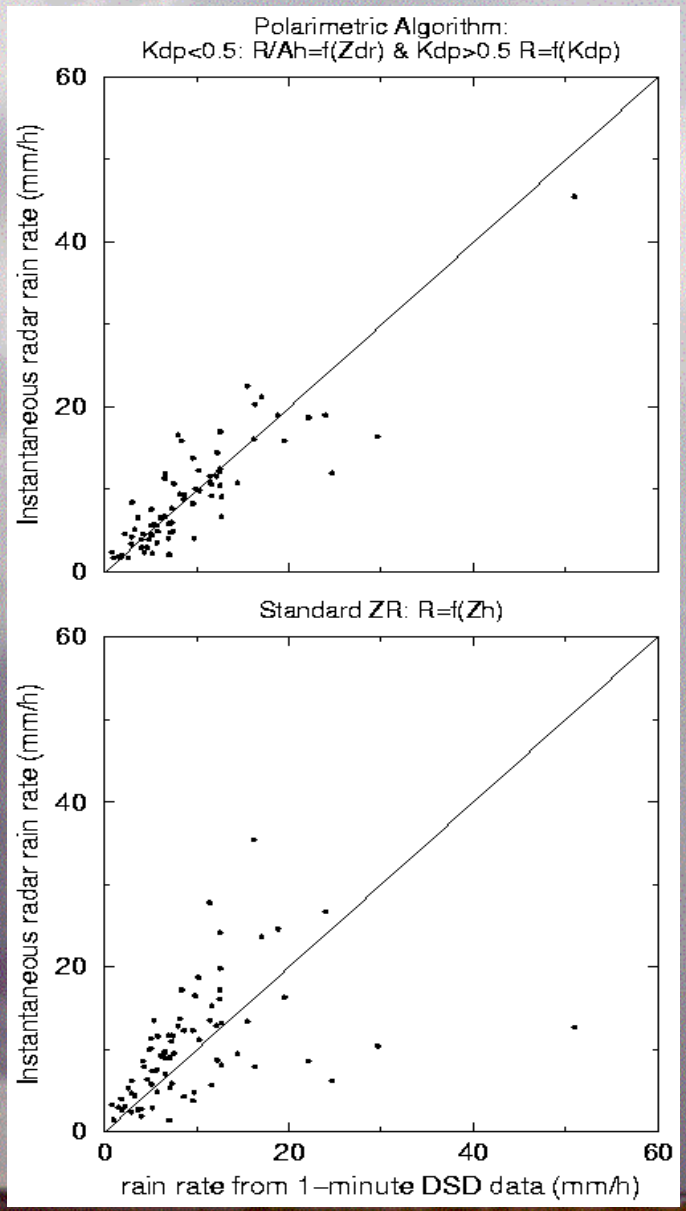


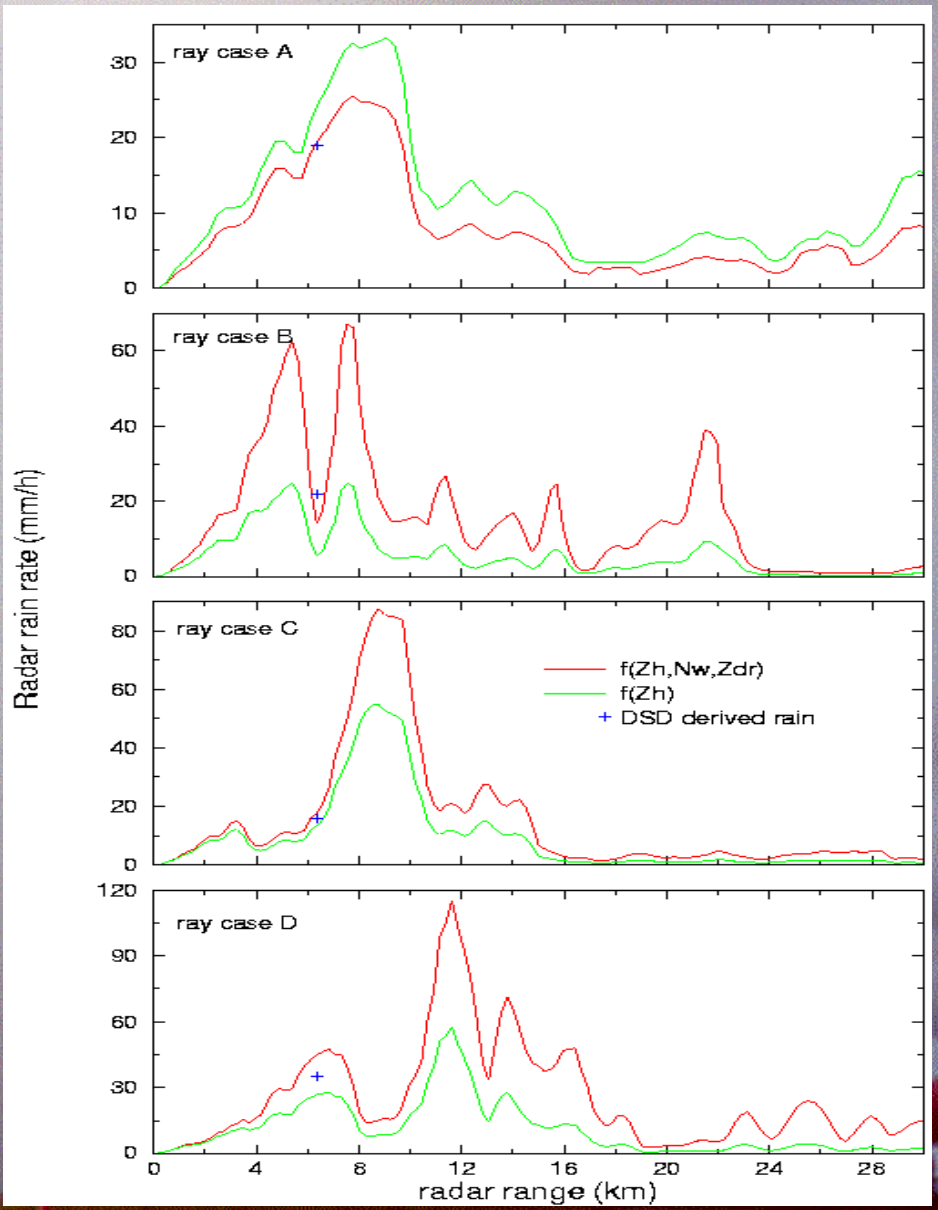


Comparison with DSD data from other experiments



Assessment of rain rate estimates





Continued research

- ✓ **Use the Sept. 19th XPOL rain rate and DSD products with coincident airborne observations to investigate combined radar/radiometer retrievals.**

- ✓ **For other storm cases (e.g., Sept. 27-28) in KAMP use coincident XPOL and dual-Doppler TOGA/SMART-R observations to do combined microphysics-kinematics tropical ocean precipitation studies.**