

Polarimetric Radar Observations of Mesoscale Convective Systems in West Africa

Paul A. Kucera^{1,2}, Andrew Newman¹, Brad Klotz¹, and John C. Gerlach³
¹University of North Dakota, ²NCAR/RAL, ³NASA/GSFC



NPOL Summary:

Location of NPOL

- Deployed at Kawsara, Senegal (40 km SE of Dakar)
- 14° 39' 23" N, 17° 05' 53" W

Dates of operation

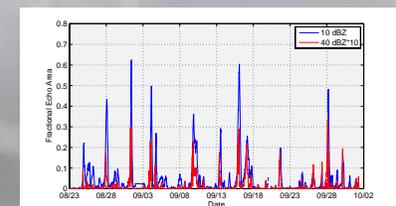
- 1415 UTC 21 August – 1200 UTC 30 September 2006
- A total of 7299 volume scans (29 GB) were collected by NPOL
- Temporal scanning resolution was 15 min
- The scanning strategy was composed of a long range (270 km) surveillance scan followed by a full volume scan (150 km)

Significant Outages

- 25 Aug 2006: 1.5 h: System down because of generator overheating
- 28 Aug 2006: 2.0 h: System down for oil change on generator
- 10 Sep 2006: 12.0 h: Antenna issues – Intermittent scanning in effort to fix the problem
- 18 Sep 2006: 24.0 h: Replaced magnetron and tested system throughout the day
- 20-21 Sep 2006: 26.5 h: Antenna pointing error problem

Cases:

- | | |
|--------------------------|--------------------------|
| Event 1: 24-25 Aug 2006 | Event 11: 11 Sep 2006 |
| Event 2: 25 Aug 2006 | Event 12: 13-14 Sep 2006 |
| Event 3: 26 Aug 2006 | Event 13: 14-15 Sep 2006 |
| Event 4: 27-28 Aug 2006 | Event 14: 19 Sep 2006 |
| Event 5: 29 Aug 2006 | Event 15: 22 Sep 2006 |
| Event 6: 30-31 Aug 2006 | Event 16: 26 Sep 2006 |
| Event 7: 01-02 Sep 2006 | Event 17: 27 Sep 2006 |
| Event 8: 02 Sep 2006 | Event 18: 28 Sep 2006 |
| Event 9: 05-06 Sep 2006 | Event 19: 29 Sep 2006 |
| Event 10: 07-08 Sep 2006 | |

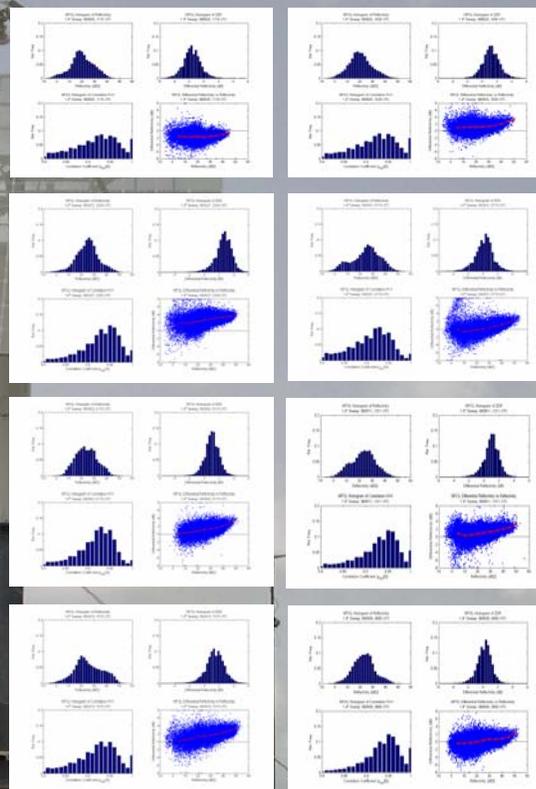
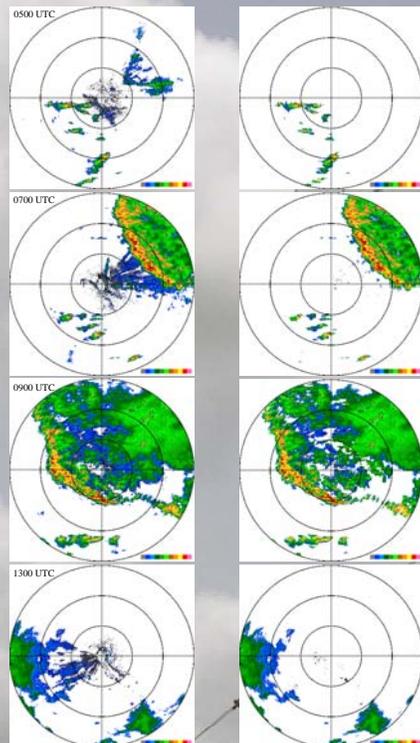


Quality Control Summary:

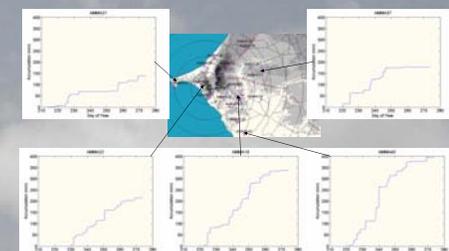
- A polarimetric algorithm (Theisen et al. 2007) was applied to the reflectivity fields to remove non-meteorological echo (AP, backlobes, sidelobes, ground clutter, etc.)
- Wet antenna periods were identified and flagged (removed) from the QC dataset
- Examples of the algorithm performance is given below for the 31 August Case

Polarimetric Evaluation:

- The quality of the polarimetric fields were examined throughout the campaign
- Distributions of ZDR, reflectivity, rhoHV and differential phase along the path were examined
- Examples of the analysis is given below



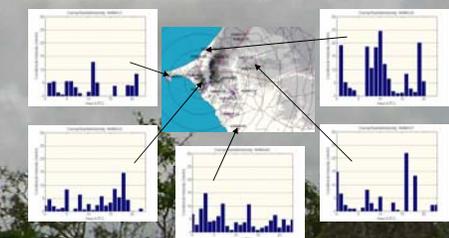
Rain Gauge Observations: Rainfall Accumulation



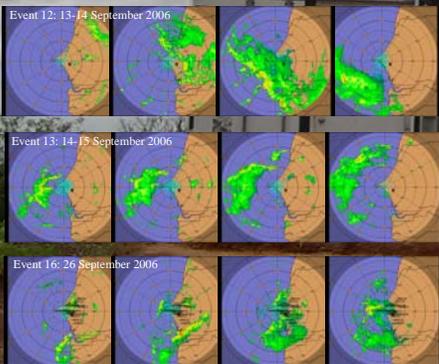
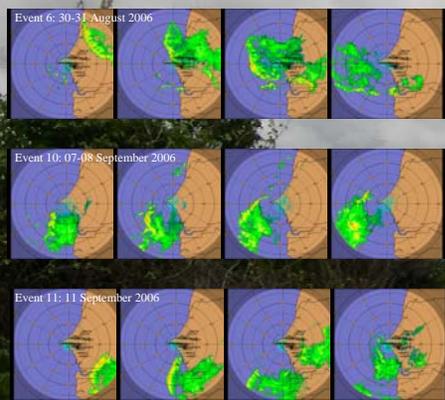
Diurnal Cycle of Occurrence



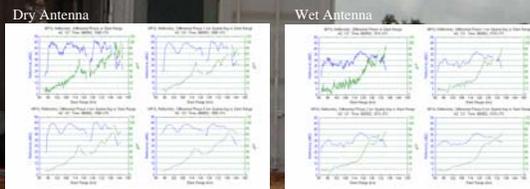
Diurnal Cycle of Rainfall Intensity



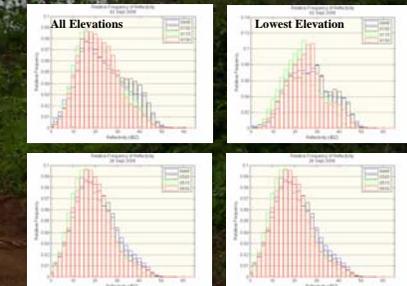
Example Cases



Differential Phase Comparison



Wet Antenna Examples



Data Archival Schedule:

- NPOL data are in the final stages of QC – Need to complete the dBZ bias evaluation (Comparison with TRMM)
- Quick look (dBZ) radar images are ready for archival
- Volume scan data will be archived by late summer
- Radar rainfall product development will begin this summer
- Rain gauge data from Senegal have been QC'ed and accumulated to 1 min, 1 hour, and daily accumulation files
- Rain gauge data are ready for archival

Contact Information:
 -Please contact Paul Kucera (pkucera@ucar.edu) for more information.