The Data Analysis and Integration Team supports FASTER research by producing quality controlled data products that fill important gaps and meet specific needs.
Integrating the Microwave Radiometer Profile Into a Merged Soundings Product

- Trial with Niamey data
- Working with Lynne DiPretore and Mark Miller
Convective/Stratiform Rain Partitioning
S. Giangrande, T. Toto, P. Kollias

May 20, 2011 (MC3E)
KAZR-ARSCL

UAZR (Wind Profiler)
Convective/Stratiform Rain Partitioning
S. Giangrande, T. Toto, P. Kollias

May 20, 2011 (MC3E)
KAZR Calibrated & Corrected for Rain Attenuation

Reflectivity (dBZ) vs Height (km) vs Time (hrs)

UAZR (Wind Profiler)
Convective/Stratiform Rain Partitioning
S. Giangrande, T. Toto, P. Kollias

May 20, 2011 (MC3E)
UAZR, KAZR Combined Product

Echo Classification

Stratiform+Trans
Drizzle
BB Layer
BB
Convection
Weak Convection
Cloud
Bragg
Convective/Stratiform Rain Partitioning
S. Giangrande, T. Toto, P. Kollias

May 20, 2011 (MC3E)

Fall Speed

Vertical Velocity

Echo Classification

Bright Band Area

Convective/Stratiform Rain Partitioning
S. Giangrande, T. Toto, P. Kollias
• Planning an evaluation with other convective/stratiform methods
• Processed all of the MC3E events, but can extend this into the future
• Conducted a comparison to our KAZR-only method for the MC3E period, in order to improve MMCR long-term convective/stratiform dataset
• Comparison to (X. Dong) NEXRAD partitioning
• Conditional CFADS in stratiform rain, based on surface reflectivity and drop size
• Compare to aircraft measurements
Estimating vertical profiles of entrainment rate
From millimeter-wavelength radar observations

Using a method developed by Pavlos Kollias and Chunsong Lu

- The cloud grows adiabatically from cloud base and then experiences the first entrainment event and isobaric mixing at Level 1.
- After a new saturation is achieved during isobaric mixing, the cloud ascends adiabatically without entrainment from Level 1 to Level 2.
- It then experiences the second entrainment event and isobaric mixing at Level 2.
- The process is repeated for Level 3 and higher levels.
Mixing is based on the ratio of the vertical velocity of the relative adiabatic parcel and radar-measured vertical velocity.
Estimating vertical profiles of entrainment rate
From millimeter-wavelength radar observations

Radar-measured
Relative Adiabatic Cloud Parcel
Entrained Dry Air (Sounding)
In-Cloud

Evaluation:
We have done some comparisons to the Entrainment Rate in Cumulus Algorithm (ERICA) (Wagner, T.), an observationally-based bulk entrainment rate method and we have preliminary found very good agreement.
Estimating vertical profiles of entrainment rate from millimeter-wavelength radar observations

Future Plans:
- Apply to other cloud types
- Extend to other ARM sites, particularly the Azores and tropical sites
- Produce long-term dataset

Radar-measured
Relative Adiabatic Cloud Parcel
Entrained Dry Air (Sounding)
In-Cloud

Graphs showing vertical profiles of entrainment rate with data points and lines indicating different cloud types and conditions.
Contact Information:

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Convective/Stratiform Rain Partitioning

S. Giangrande, T. Toto, P. Kollias

- Conditional CFADS in stratiform rain
- Compare to aircraft measurements

### Reflectivity at surface

<table>
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### Drop Size

- 0.8-1.1 mm
- 1.1-1.3 mm
- 1.3-1.6 mm
- 1.6-1.9 mm