

Browsing a Wealth of Millimeter-Wavelength Doppler Spectra Data

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SUMMARY

Graphical Spectra Browser and Spectra Simulator

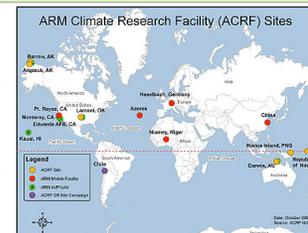
Visually browse ARM's extensive collection of millimeter-wavelength (35 and 95 GHz) vertically-pointing Doppler radar spectra. A graphical user interface is being developed to facilitate access to a wealth of **MMCR** and **WACR** spectra data. Users can "drill down" from daily reflectivity plots, through spectrograms, then down to individual spectra. A time and height looping feature makes it possible to watch evolving droplet size distributions. A spectra simulator is also in development to relate the observed spectra to liquid and ice microphysical characteristics. The simulator will be incorporated into the browser to provide a link between observations and models.

ARM's multi-year Doppler Spectra Data Sets

Ka- and/or W-band at Vertical Incidence

North Slope of Alaska (since 2004)

Southern Great Plains (since 2003)



Niger (2006) Germany (2007) China (2008) Azores (2009)

Manus, PNG (since 2006)

Nauru Island (since 2006)

Darwin (since 2003)

SpectraView: User interface for browsing Doppler spectra

1) Browse through daily Reflectivity images

2) Select an hour

3) Choose radar mode for hour zoom

4) Select a feature

5) View Spectrograms

6) Select a height to view spectrum

7) Loop through spectra in time or height

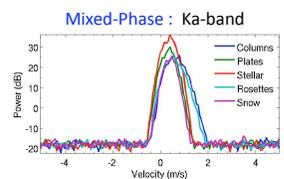
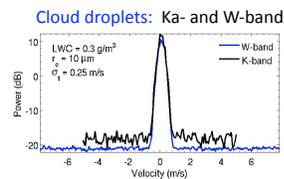
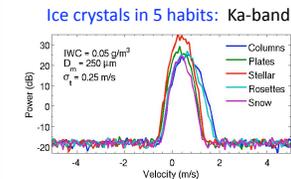
Planned SpectraView features:

- Include WACR spectra
- Incorporate spectra simulator
- Correct spectral artifacts
- Correct velocity aliasing
- Package custom data sets
- Ability to browse images of
 - Mean velocity
 - Hydrometeor vs. Clutter Mask
 - Number of spectral peaks
 - Spectral skewness
 - Spectral kurtosis

Spectra Simulator: Interface between observations and microphysical models

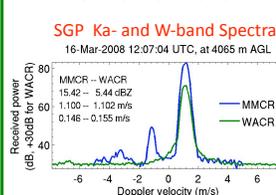
Simulated Doppler Spectra

The simulator generates Doppler spectra from cloud constituents (liquid, mixed-phase and ice) and precipitation for both ARM cloud radar frequencies. Simulator inputs include hydrometeor phase, water content, shape of size distribution, Gaussian turbulence width, and radar characteristics.



A Doppler Spectra Simulator has been developed (see J. Remillard poster) and will be incorporated into the SpectraView application. The simulator enables forward modeling and generation of Doppler spectra from model particle size distributions.

Observed vs. Simulated Doppler Spectra for Ice



Observed SGP Doppler ice cloud spectra, above, are compared with simulations at right. The power difference in the W-band is probably due to water vapor attenuation of the WACR beam, not accounted for in the simulator. Overall, agreement is good at both frequencies.

