A Preliminary Analysis of StormVEx Radar Reflectivity Spatial Characteristics

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Two key questions

1. Is the distribution of cloud particles observed at SPL the same as that directly above the radar (where Doppler spectra are obtained)?

2. Can we use reflectivity observations obtained while pointing directly toward SPL or does surface clutter greatly contaminate the reflectivity data?
SPL pointing reflectivity distribution

Range, km

dBZe

log_{10} counts/sum(counts)
Reflectivity, fixed SPL pointing 2010.931747 (year fraction)
"Instantaneous" joint reflectivity PDF, corr-coef. = 0.94
Two key questions - revisited

1. Is the distribution of cloud particles observed at SPL the same as that directly above the radar (where Doppler spectra are obtained)?
   - Preliminary analysis of radar detection frequencies and reflectivity distributions strongly suggest that the cloud radar is sufficiently close to SPL that the distribution of cloud particles observed at SPL is the same as that directly above the radar.

2. Can we use reflectivity observations obtained while pointing directly toward SPL or does surface clutter greatly contaminate the reflectivity data?
   - Radar reflectivity observations are strongly spatially correlated on scale of a kilometer and there are ample low-clutter observations in the near vicinity to SPL which are suitable for correlative analysis with SPL microphysical observations.
Still much to do ...

- Lots of instruments $\rightarrow$ lots of QC (ASSIST, HSRL, MWR, MPL, etc.)
- SWACR Calibration issues (comparisons with JPL radar & CloudSat)
- Microphysics data
  - Remove periods where deicing probes.
  - Determine uncertainty due to flow rates.
  - Blowing Snow?
  - Combine data from multiple probes in coherent fashion.
  - Determine habits from CPI/CIP/PIP
- Comparison of radar (co & cross-pol) with forward model reflectivity from microphysics probe data
- Develop case studies (Aircraft data too!)
Reflectivity Distribution above radar at altitude 0.6 km, AGL
Fixed Vertical Pointing vs. Extracted from RHI Scan

- Black line: Fixed (samples = 1185883)
- Red dotted line: RHI (samples = 2271)
"~ 5 min. mean" joint reflectivity PDF, corr-coef. = 0.99