

## ICE FOCUS GROUP

### Recommendations:

1. ARM sites other than SGP need lidar more powerful than MPL (e.g. HSRL) for extinction measurements.
2. Need another narrow band multispectral IR instrument for window region (e.g. AERI).
3. Provide option for user to select a threshold OD on MPL (or other lidar) for delineating cloud boundaries (cloud vs. no cloud).

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## New Developments:

- 1) Greg McFarquhar reported microphysical differences between fresh and aged anvil cirrus (including crystal shapes), dependence of phase function on complexity of common plate aggregates, and potential for using the CPI to measure PSD ( $D > 50 \mu\text{m}$ ).
- 2) Alain Protat characterized cloud property retrievals for ARM sites at Darwin and Niamey using lidar-radar. Useful for model validation and reference to evaluate new satellite retrievals. Retrievals include ice cloud fraction, ice cloud top, base, thickness, radar reflectivity, ice fall speed, IWC,  $D_e$ ,  $N$  and extinction.
- 3) David Mitchell used PSD schemes based on in situ observations to characterize larger ice particles and satellite channels at 11 and 12  $\mu\text{m}$  to estimate the relative concentration of small ice crystals to estimate the complete PSD. 3 of 4 PSD schemes appear to be affected by shattering problem; small crystals still important.

## New Developments (continued)

- 4) Lori Borg summarized U. Madison project results that include: Long-term record of cirrus cloud extinction at SGP, limitations of MMCR retrievals and need for lidar-radar combination, clear-sky OLR is now understood to level of  $1 \text{ W m}^{-2}$ .
- 5) Alexander Marshak discussed need for better understanding of ice particle phase functions and the PSD for satellite altimetry measurements that monitor the depth of polar ice caps.
- 6) Zhien Wang combined MMCR and WACR to retrieve microphysical properties in optically thick clouds. The single wavelength IWC- $Z_e$  relationships yield IWC values smaller than this dual wavelength approach by a factor of 2-3.