

ARM Cloud and Precipitation Measurements and Science Group

<https://www.arm.gov/publications/programdocs/doe-sc-arm-19-001.pdf>

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- The CPMSG ... is charged with working together to provide **constructive recommendations regarding the operation, characterization, and development of instruments providing cloud and precipitation measurements along with the development of data products** derived from these instruments and the identification of measurement gaps
- A driving consideration for the group should be **how resources can best be applied** to measurements of cloud and precipitation properties and the development of associated data products **to increase the scientific impact of these measurements**

Leading questions

- Given scientific focus areas that are important to DOE objectives and relevant to ARM measurements, **are there subtopics where ARM has strong potential to contribute but is not reaching that potential** for various possible reasons?
- Are there specific barriers to progress over a five-year time frame that key investments could feasibly address?
- Are *you* encountering any specific barriers to progress?
- Do you see areas where you could be engaged in lowering barriers?
- Feedback welcomed
 - <http://bit.ly/tellarm> • talk to any of us

Wednesday breakout discussion of focus areas / subtopics

- **Boundary layer structure and near-cloud dynamics**
 - Valuable to observe 3D sub-cloud structure (e.g. w/DL)
- **Shallow-warm cloud precipitation formation and structure**
 - Again, 3D structure important (→ scanning); benefit from more than 1 radar frequency
 - Calibrated ceilometers could provide information about precipitation
 - Aerosol profiles also important
- **Hydrometeor phase evaluation in climate models**
 - Discussion of importance of instrument simulators
 - Valuable to have open-source code to combine measurements (eg. Radar/lidar)
 - Need uncertainties
- **Ice properties and processes**
 - Need more in situ observations (mass size distribution would be useful at surface)
 - Retrievals should identify more than one habit (for comparison with models)
 - Include mixed-phase
 - Consider potential of multi-wavelength zenith measurements
- **Coupled dynamics and microphysics in deep convection**
 - Consideration of special scan operations (radar and lidar) along with baseline
 - Need 3D thermodynamic structure and vertical profiles of aerosols; satellite also useful
 - Benefit from multiple disdrometers (one baseline and others for statistical sampling)
 - Need to implement certain datasets so more scientists can engage, would be useful to get a short period for exploration
 - Is there a place for lab studies? potentially through ASR or EMSL
- **Cirrus dynamics and microphysics**