Breakout Session Report
ARM/ASR User and PI Meeting
March 16-20, 2015

Session Title: Mesoscale Convective Organization
Session Date: Monday, March 16, 2015
Session Time: 2:00–3:15 p.m.
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Main Discussion

This session was split into two parts. The first focused on prioritization of VAPs and instruments for Mesoscale Convective Organization (MCO). The session participants were supportive of FY15 and proposed FY16 priorities dealing with precipitation radars and warm cloud precipitation measurements. The group was especially supportive of the planned availability of a transportable C-band radar and the emphasis on improving scanning cm-wavelength radar operations since cm-wavelength radar retrievals, including convective vertical velocities from both scanning and vertically pointing instruments, are key for MCO progress.

The second portion of the session focused on the representation of MCO in global climate models (GCMs). Currently, the Donner scheme in the Geophysical Fluid Dynamics Laboratory model is the only scheme in a GCM that attempts to represent mesoscale organization, but participants generally agreed that representing this organization is important to accurately predicting current and future climate. Suggested activities that will increase the probability of representing MCO in GCMs include: retrieving representative convective vertical velocity PDFs for a variety of environmental conditions, determining the predictability of convective initiation, organization, and life cycle given large-scale environmental conditions, and finding ways to represent the spatiotemporal persistence of MCSs given GCM time steps and parallelization.

Decisions

The participants of the session recommended higher prioritization of Mapped Moments to a Cartesian Grid (MMCG) to broaden use of volumetric radar data. They also recommend higher prioritization of planetary boundary layer (PBL) retrievals (e.g., height, moments, q and T profiles) to study convective initiation and cold pools. It was noted that a number of PBL profiling instruments are regularly deployed (e.g., atmospheric emitted radiance interferometer and Doppler lidar), but no standard products are available. These products should also be a priority for the ARM Facility since the lack of standard products significantly limits the usefulness of these instruments.

Future Plans

Explore expansion of the convective vertical velocity product suite to include convective vertical velocity (CONVV), ultra-high frequency (UHF) derived vertical velocity, and specific differential phase (KDP) columns. Some of these are principal investigator products (UHF technique) or simply ideas (KDP columns), but should be pursued because of the need for a large sample size in a number of different regimes to better differentiate MCO conditions and eventual GCM parameterization.

Uncertainty quantification is important to all quantities, especially vertical velocity. However, this quantification should include bias in addition to relative error and further include conditions in which a

retrieval does not work well. The session participants support a 1-sheet outline of the main caveats of every ARM product along with contact information for the product developer.

Participants also expressed interest for an in-house ARM multi-frequency radar simulator.

Action Items

Participants agreed that a radar scanning strategy intensive operational period (IOP) at the ARM Southern Great Plains sites would yield crucial information about the capabilities of the radars and the scanning patterns (e.g., surveillance versus cell-tracking relative humidity with respect to ice [RHIs]) that best serve specific science needs. Such an IOP could be done in concert with additional environmental observations and high-resolution simulations so that the advantages and disadvantages of different scan patterns for model validation can also be explored.