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# Sub-Seasonal Variability of Tropical Rainfall Observed by TRMM and Ground-based Polarimetric Radar

Brenda Dolan (1), Steven Rutledge (1), Timothy Lang (1), Robert Cifelli (2), and Stephen Nesbitt (3)

(1) Department of Atmospheric Science, Colorado State University, Fort Collins, CO USA, United States (bdolan@atmos.colostate.edu), (2) Cooperative Institute for Research in the Atmosphere, NOAA Earth Systems Research Laboratory, Boulder, CO USA, (3) Department of Atmospheric Science, University of Illinois at Urbana-Champagne, Urbana, IL USA

Studies of tropical precipitation characteristics from the TRMM-LBA and NAME field campaigns using ground-based polarimetric S-band data have revealed significant differences in microphysical processes occurring in the various meteorological regimes sampled in those projects. In TRMM-LMA (January-February 1999 in Brazil; a TRMM ground validation experiment), variability is driven by prevailing low-level winds. During periods of low-level easterlies, deeper and more intense convection is observed, while during periods of low-level westerlies, weaker convection embedded in widespread stratiform precipitation is common. In the NAME region (North American Monsoon Experiment, summer 2004 along the west coast of Mexico), strong terrain variability drives differences in precipitation, with larger drops and larger ice mass aloft associated with convection occurring over the coastal plain compared to convection over the higher terrain of the Sierra Madre Occidental, or adjacent coastal waters. Comparisons with the TRMM precipitation radar (PR) indicate that such sub-seasonal variability in these two regions are not well characterized by the TRMM PR reflectivity and rainfall statistics. TRMM PR reflectivity profiles in the LBA region are somewhat lower than S-Pol values, particularly in the more intense easterly regime convection. In NAME, mean reflectivities are even more divergent, with TRMM profiles below those of S-Pol. In both regions, the TRMM PR does not capture rain rates above 80 mm hr-1 despite much higher rain rates estimated from the S-Pol polarimetric data, and rain rates are generally lower for a given reflectivity from TRMM PR compared to S-Pol. These differences between TRMM PR and S-Pol may arise from the inability of Z-R relationships to capture the full variability of microphysical conditions or may highlight problems with TRMM retrievals over land.

In addition to the TRMM-LBA and NAME regions, analysis of sub-seasonal precipitation variability and comparison of TRMM PR statistics with ground-based radar has been extended to other regions of the globe. The Australian Bureau of Meteorology C-band polarimetric radar C-Pol has been collecting data in Darwin, Australia for over a decade. The Darwin region affords the opportunity to look at precipitation characteristics over land and ocean, as well as variability associated with monsoon and break periods over long periods of time. The polarimetric X-band radar XPort was stationed in West Africa at a field site in Benin during the 2006 and 2007 African monsoon periods, where differences in rainfall associated with African Easterly Wave (AEW) passages and non-AEW periods can be examined. Similar comparisons between TRMM PR and ground based polarimetric radars will also be reported for these regions.