Geophysical Research Abstracts
Vol. 14, EGU2012-6938, 2012
EGU General Assembly 2012

Intercomparison of Deep Convection over the Tibetan Plateau–Asian Monsoon Region and Subtropical North America in Boreal Summer Using CloudSat/CALIPSO Data

Y. Luo (1), R. Zhang (1), W. Qian (1), and Z. Luo (2)

(1) State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Society, Beijing, China (yali@cams.cma.gov.cn), (2) Department of Earth and Atmospheric Sciences, and NOAA/CREST Center, City College, City University of New York, New York, New York

Deep convection in the Tibetan Plateau–southern Asian monsoon region (TP–SAMR) is analyzed using CloudSat and Cloud–Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) data for the boreal summer season (June–August) from 2006 to 2009. Three subregions are defined—the TP, the southern slope of the plateau (PSS), and the SAMR—and deep convection properties (such as occurrence frequency, internal vertical structure, system size, and local environment) are compared among these subregions. To cast them in a broader context, four additional regions that bear some similarity to the TP–SAMR are also discussed: East Asia (EA), tropical northwestern Pacific (NWP), and western and eastern North America (WNA and ENA, respectively).

The principal findings are as follows: 1) Compared to the other two subregions of the TP–SAMR, deep convection over the TP is shallower, less frequent, and embedded in smaller-size convection systems, but the cloud tops are more densely packed. These characteristics of deep convection over the TP are closely related to the unique local environment, namely, a significantly lower level of neutral buoyancy (LNB) and much drier atmosphere. 2) In a broader context in which all seven regions are brought together, deep convection in the two tropical regions (NWP and SAMR; mostly over ocean) is similar in many regards. A similar conclusion can be drawn among the four subtropical continental regions (TP, EA, WNA, and ENA). However, tropical oceanic and subtropical land regions present some significant contrasts: deep convection in the latter region occurs less frequently, has lower cloud tops but comparable or slightly higher tops of large radar echo (e.g., 0 and 10 dBZ), and is embedded in smaller systems. The cloud tops of the subtropical land regions are generally more densely packed.Hence, the difference between the TP and SAMRismore of a general contrast between subtropical land regions and tropical oceanic regions during the boreal summer. 3)Deep convection over the PSS possesses some uniqueness of its own because of the distinctive terrain (slopes) and moist low-level monsoon flow. 4) Results from a comparison between the daytime (1:30 p.m.) and nighttime (1:30 a.m.) overpasses are largely consistent with researchers' general understanding of the diurnal variation of tropical and subtropical deep convection.