



The spatial and temporal variability of the vertical structure of precipitation systems in Africa, based on TRMM precipitation radar data

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Five years of the Tropical Rainfall Measuring Mission (TRMM) 2A25 radar reflectivity profiles and derived surface rain rates are used to describe the vertical structure of precipitation systems in boreal and austral summer rainy seasons in Africa. The continent is divided into several climatologically rather homogenous regions and those regions are characterized and contrasted. To place the composite reflectivity profiles in context, they are also contrasted against TRMM 2A25 observations over the Amazon.

Precipitation systems tend to be deeper and more intense in all of tropical Africa than in the Amazon, and shallow warm-rain events are less common. Storms, in all African regions, are characterized by high echo tops, high hydro-meteor loading aloft, little indication of a radar bright band maximum at the freezing level, and evidence for low-level evaporation.

The diurnal modulation is regionally variable. The amplitude of the diurnal cycle of the mean echo top height decreases from the arid margins of the zenithal rain region toward the equatorial region, and is smallest in the Amazon. A secondary predawn (0000-0600 LT) maximum occurs in the Congo, in terms of rainfall frequency, rainfall intensity, and echo tops.

The difference between all African regions and the Amazon, and the relatively smaller differences between regions in Africa, can be understood in terms of the climatological humidity, CAPE, and low-level shear values.