

Diurnal Variations of Convection and Rainfall over the Continents, Ocean and Islands

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This talk will give a broad overview of our recent findings on the diurnal variations of warm-season rainfall and convection over the continents and coastal lines, along with strong regional and intraseasonal variations. These diurnal convective cycles are strongly linked with thermally driven regional/local circulations due to the differential heating between high mountains, flat plains, and the ocean. Differences in the prevailing flow pattern, strength and humidity during different rainy periods are the key factors in explaining the differences of the diurnal precipitation variations. Convection-permitting simulations can successfully capture the observed diurnal variations and propagation, as well as the importance of mountain-plains solenoids, sea breeze circulations and cold pool dynamics. More recent research shows the diurnal convective cycles by a regional scale mountain-plains solenoid on the lee of the Tibetan Plateau can be crucial in the initiation, modulation and propagation of mesoscale convective vortices riding along the Meiyu front, the most potent producer of heavy rainfall and flooding in East Asia. Also shown will be the diurnal rainfall cycle over a tropical island that has high volume and high variations of diurnal precipitation.