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Persistent Multiple Diurnal Modes of Precipitation from TRMM Measurements

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This study presents systematically the multiple diurnal modes of precipitation based on the use of Tropical Rainfall Measuring Mission (TRMM) microwave radiometer and radar data. A sophisticated clock-face diagram scheme is developed to clearly display the prominent late-evening to early-morning (LE-EM) precipitation maxima over oceans and the counterpart prominent mid- to late-afternoon (MLA) maxima over continents; and to reveal a widespread distribution of secondary precipitation maxima, i.e., many ocean regions exhibit clear-cut secondary MLA precipitation maxima and many continental regions exhibit evident secondary LE-EM maxima. This investigation is the first comprehensive study of these globally prevalent secondary maxima and their widespread nature, a type of study only made possible when the analysis procedure is applied to a high-quality global-scale precipitation dataset. This investigation also seeks a better understanding of the assorted mechanisms controlling the global distribution of precipitation diurnal variability.