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Climatology of Seasonal Convective and Stratiform Rainfall from TRMM Measurements

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This study presents the climatology of seasonal convective and stratiform rainfall based on eight years Tropical Rainfall Measuring Mission (TRMM) microwave imager (TMI) and precipitation radar (PR) measurements. Results demonstrate that the precipitation products from TRMM facility rain algorithms are highly consistent in spatiotemporal distributions. Both convective and stratiform rainfall have much less seasonal variations over ocean than over land. Overall, there are about 42-45% convective and 55-58% stratiform rainfall over ocean, while 52% convective and 48% stratiform rainfall over land. However, the spatial variations of convective and stratiform rainfall are evident. There is a distinct day and night difference on both convective and stratiform rainfall. In general, the oceanic convective rainfall is about 25% more during nighttime than daytime, while the continental convective rainfall is dominant during daytime. The seasonal variability of convective rainfall is insignificant. However, the day and night variation of stratiform rainfall is evident, especially for relatively more daytime oceanic stratiform rainfall. There is an apparent seasonal variability of stratiform rainfall. This kind of characteristics of strtiform rainfall could explain the secondary oceanic precipitation maximum in afternoon along with its dominant early morning peak, whereas the continental rainfall shows a secondary peak in the early morning with a dominant peak in the afternoon. In addition, the spatial variability of seasonal convective and stratiform rainfall diurnal cycle is discussed. The observed convective and stratiform rain climatology would be useful for cloud model and general circulation model simulations of hazardous storms.