Influences of Wind Speed on the Diurnal Cycle of Precipitation over the Coastal Areas Revealed by Spaceborne Precipitation Radars

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Precipitation in coastal areas has received much interest because of the large amount of precipitation brought about by the unique processes at the sea-land interface. To reveal how low-level wind speed controls the processes and diurnal variations of coastal precipitation, we classified precipitation datasets from spaceborne radars according to "the distance from the coastline" and "the cross-shore component of low-level wind." In tropics, we used the Tropical Rainfall Measuring Mission (TRMM) Precipitation Radar (PR), and revealed that the distribution pattern of precipitation differed greatly depending on the cross-shore wind speed. Under conditions of strong onshore winds, low-level prevailing winds, such as monsoon flows, are forced to rise on the windward side of the coastal mountain ranges, bringing continuous precipitation with small diurnal variation to coastal areas. In weak wind regimes, precipitation is mainly caused by diurnal land–sea circulation caused by heating contrast between them, and we observed large diurnal variability and the propagation of precipitation away from the coastline for both land and sea. In strong offshore wind regime, precipitation tends to be small around the coastline. For outside tropics, we applied the same method to the Dual-frequency Precipitation Radar (DPR) onboard the Global Precipitation Measurement (GPM) Core Observatory to investigate the latitudinal and seasonal dependences.