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Precipitation Characteristics around Nepal and Bangladesh revealed by TRMM data

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Bangladesh and Nepal regions are interesting regions in a core region of the Asian monsoon. The Nepal region is characterized by a very steep mountain slope. On the other hand, Bangladesh is a very flat region facing to the Bay of Bengal. The precipitaion characteristics are studied using the long-term Tropical Rainfall Measuring Mission (TRMM) data.

For the Nepal region, the precipitation is strongly affected by the mountains. In the mature monsoon season, two precipitation bands parallel to the mountain range appear. The first one is above a front (southern) low mountain range and the other is above the steep slope. The former is more convective and the latter is more frequent and maybe more persistent. The front precipitation band is less clear in the pre-monsoon season. It is suggested that the atmosphere is less moist to trigger convections in the pre-monsoon season, and sufficiently moist in mature monsoon season. The convections over the front low mountain range may moisten the middle layer, and the water vapor in the atmosphere condensates due to the forced lifting along the slope making the second rain band. The total rain amount is primarily determined by the frequency of rain. The rain conditioned rain rate along the slope monotonically decreases with elevation. This fact suggests that the precipitation is due to forced lifting.

Over the Bangladesh, the stability of the atmosphere seems to affect the precipitation system in the vertical profiles. In the pre-monsoon season, rain rate increases with height in the lower part of the profile, while in the mature monsoon season, rain rate is nearly constant in the lower part of the profile. The structure of precipitation system is more persistent and homogenous in the mature monsoon season. The rain top is higher in pre-monsoon season than in mature monsoon season. The rain total is generally determined by rain frequency. The horizontal size of the precipitation systems is larger for pre-monsoon season than for mature monsoon season. In other words, the precipitation system is small but many in the mature monsoon season. This fact may be explained that the atmosphere is sufficently humid to be easily triggered by small liftings.

Keywords: TRMM, precipitation, Asian monsoon, Nepal, Bangladesh