Role of coastal precipitation in Asian monsoon

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Precipitation dominates over the tropical coastal region [e.g., Houze et al., 1981; Mori et al., 2004]. The precipitation amount over the coastal region (±300km from the coastlines) accounts for more than 30% and about 20% of the tropical total and global total, respectively [Ogino et al., 2016; Yamanaka et al., 2018]. Therefore, it plays an essential role in determining the Earth's energy budget. Furthermore, it plays the role of dehydrator by wringing the half of water vapor from the atmosphere over the coastal region in the global ocean-land water circulation [Ogino et al., 2017].

The physical mechanisms of coastal precipitation generation have not yet been fully clarified. As a result, we have not yet understood the reason why precipitations occur dominantly over the coastal region. The amount of the coastal precipitation accounts for about 40% of the total amount over the southeast Asian monsoon region, which means that the coastal precipitation plays essential roles in driving the Asian monsoon circulation and in exchanging the water between the ocean and land over the Asian monsoon region. Therefore, the precipitation along the complex coastlines over the Asian monsoon region should be investigated in order to understand and predict the Asian monsoon behavior.

The subjects to be investigated are (1) clarifying the physical mechanisms of precipitation over the various regions where the typical coastal precipitations appear, (2) getting general understanding on dominance of coastal precipitation by integrating the results obtained from the local precipitation studies, in which the cross-cut studies across the AsiaPEX regions would be essential, (3) understanding the role of coastal precipitation in driving the Asian monsoon circulation and in maintaining the water circulation over the Asian monsoon region, and (4) expanding the obtained knowledge into interdisciplinary researches for the better prediction of the future water cycle and climate change.