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Land-Sea thermal contrast over south Asia and its influences on tropical monsoon circulation

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Based on the NCEP/NCAR reanalysis data, the thermodynamic features and the effect of spatially nonuniform heating on the circulation of the tropical monsoon area in South Asia due to the land-sea distribution have been analyzed. The influences of the subcontinent topography on the Asian tropical circulation are mostly characterized by its thermodynamic effects on low-level circulation, of which the strongest is observed in winter and spring but the relatively weak in summer, followed by the weakest in autumn. The thermodynamic difference between the Indochina Peninsula and Indian Peninsula and its influence on the circulation are regulated by the Tibetan Plateau. During the transitional period from spring to early summer, the Tibetan Plateau thermal forcing generates a large-scale cyclonic circulation in low latitudes in the lower troposphere. As a result, the southerlies/northerlies are increased to the east/west of the Bay of Bengal, Therefore latent heating of the atmosphere is strengthened and the surface sensible heating over the Indochina Peninsula is weakened. On the other hand the surface sensible heating over the Indian Peninsula is increased. It is shown that heating with various scales and different kinds can affect the tropical atmosphere in different ways, which lead to the unique characteristics of the tropical Asian circulation.