Geophysical Research Abstracts
Vol. 19, EGU2017-3515, 2017
EGU General Assembly 2017

The dynamical and thermodynamical structure of the monsoon over Southern India

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The monsoon over southern peninsular India is characterised by heavy, persistent rainfall over the Western Ghats mountain range and more intermittent rainfall over the plateau to the east of the Ghats. As in northern India, strong connections exist between the large scale flow, convection and clouds, and the land surface and orography. Model biases in monsoon precipitation persist despite increases in resolution because these connections are poorly understood and not represented in the models.

In June 2016 groundbreaking aircraft measurements of the monsoon over South India were taken. These measurements will fill a major gap in our understanding of the interactions between land, atmosphere, and ocean in the Indian monsoon. We present initial results from these measurements and use aircraft, radiosonde, and satellite observations to provide a comprehensive overview of the dynamics and thermodynamics of the monsoon over South India during this time. Our results focus on a) the large scale gradient in precipitation from the Arabian Sea and rainy Western Ghats to the eastern rainshadow and Bay of Bengal; b) the impact of a Bay of Bengal monsoon low pressure system on the usually-dry southeast coast; and c) the diurnal cycle in winds and precipitation over and offshore of the Western Ghats.