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Relationship between monsoon precipitation and low pressure systems in climate model simulations

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The north north-west propagating Low Pressure Systems (LPS) play an important role in bringing rainfall in to the interior parts of Indian subcontinent. The detection and tracking of these weak systems are challenging compared to the tropical and extra tropical cyclones. An objective detection and tracking algorithm of LPS is developed and tested on reanalysis products and climate model simulations. This novel method mimics the conventional identification of tracking algorithm based on the detection of closed isobars on surface pressure charts. A fair comparison between the LPS detected using the algorithm and observations obtained from daily weather charts (Sikka, 2006) is obtained. The algorithm is further applied on historical CMIP5 simulations. About 60% of the observed total summer monsoon precipitation over east-central India is found to be associated with LPS activities, while that in model simulations this ratio varies between 5 – 60%. The analysis found that the models with realistic LPS activity were able to produce a reasonable mean seasonal monsoon precipitation. The skill of simulating a better LPS activity is found to be linked to the representation of Tropical Easterly Jet in these models.