



## **Impacts of soil moisture on precipitation over Bangladesh and its surrounding area**

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Soil moisture is an important contributor for regional-scale precipitation. Over Bangladesh and its surrounding area, we can clearly find seasonal variations of wetness in land surface and atmosphere depending on a transition of summer Asian monsoon. Under this atmospheric condition, sensitivities of precipitation to soil moisture are expected to differ with the season. Hence, in this study, a seasonal variation in effects of soil moisture on precipitation are investigated using a regional climate model; Weather Research and Forecasting (WRF) model version 3.5.1.

Horizontal mesh size is 20 km for outer domain and 5 km for inner domain without cumulus convective scheme. The numerical experiment is conducted from 20 March through 1 October for each year during 2003–2007 to analyze the seasonal transition of soil moisture impacts on precipitation from April to September. Under the same conditions of atmospheric and SST forcing by reanalysis datasets, three kinds of simulations were performed to examine the precipitation sensitivity to soil moisture; (1) A land surface condition including soil moisture was calculated by a land surface scheme coupled with the WRF (control; CTL run), (2) and (3) soil moisture was fixed for 0.1 or 0.6 kg/kg over Bangladesh and its surrounding area (22–27N, 88–93E) for sensitivity experiments (DRY or WET run).

The CTL run could successfully simulate diurnal variations of intensity and frequency of precipitation for each month. In April and May, i.e. pre-monsoon season, differences of three-hourly precipitation between WET and DRY runs indicated precipitation decrease during afternoon and evening and its increase from night to next morning in the WET run. This diurnal variation in differences of precipitation amount was strongly controlled by differences in precipitation frequency. Precipitation intensity also weakened during daytime in pre-monsoon season without significant changes during nighttime. On the other hand, in July, August, and September, i.e. mature monsoon season, only daytime increases in precipitation amount and frequency were recognized in the WET run. We need to examine a relationship between seasonal transition of atmospheric wetness and seasonal variations in soil moisture impacts on precipitation.