Topographic and resolution impact on the monsoon rainfall in dynamical downscaling simulation

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It is worthwhile to understand the monsoonal rainfall system comprehensively based on the boundary problem; e.g. surface condition, orographic effect or resolution of the climate model, for the future climate prediction. We first ever conducted the downscaling monsoon experiment for the broad scale computational domain (30E-160E, 20S-45N) by using regional climate model; SCALE-RM (http://r-ccs-climate.riken.jp/scale/index.html) to examine the impact of (1) horizontal resolution (45km and 15km) and (2) topography (steep terrain) on the climatological monsoonal rainfall. We also specifically examined the topographic effect over the monsoonal rainband area (0-20N, 60E-150E). The results show that Increase of horizontal resolution (45km to 15km) provides more rainfall over the Indochina Peninsula and the entire western Pacific (WP). In contrast, the rainfall over the Indian subcontinent and Arabian Sea (AS) is decreased. Increase of acceptable slope of the topography in the model enhances the rainfall along the Himalayan foothill and southwesterly wind toward to Himalayan foothill both in 45km and 15km experiment, while it suppresses the rainfall along the broad monsoonal rainfall area along the steep terrain. We discuss the impact of continuous integration on the reproducibility of the monsoonal rainfall in the model as well in the presentation.

Keywords: monsoon, rainfall, topography