Figure S1. Vertical profile of MERRA-2 PM2.5 dust mixing ratio on 2006-07-08.
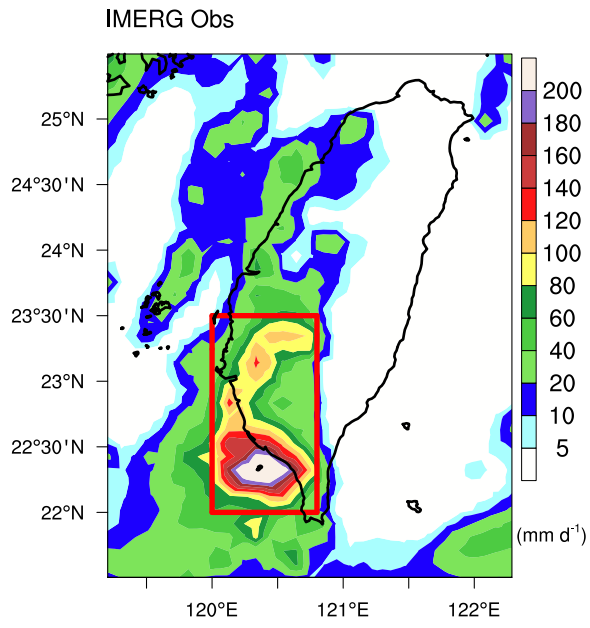
Figure S2. 24-hour accumulated precipitation (r_{24h}) (LT 2006-07-08) observations from IMERG observation.
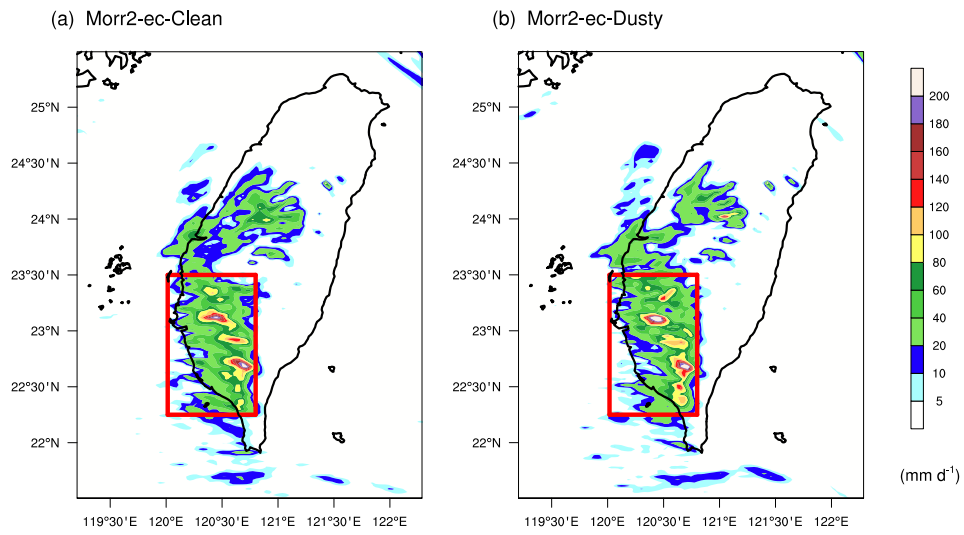
Figure S3. 24-hour accumulated precipitation (LT 2006-07-08) simulations from (b) Morr2-ec-Clean and (b)

Morr2-ec-Dusty.
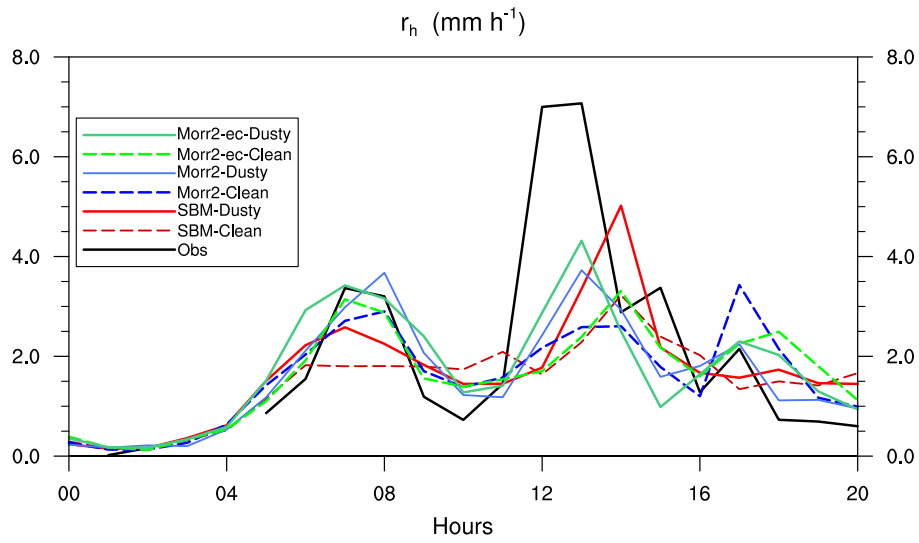
Figure S4. Hourly rainfall rates from IMERG observation (black line) and six numerical runs (colored lines) (LT 00:00–20:00, 2006-07-08), averaged among rainfall grids (> 0 mm hr^{-1}) in the High-Pcp area.