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Supplement of

**WRF-GC (v1.0): online coupling of WRF (v3.9.1.1) and GEOS-Chem (v12.2.1)
for regional atmospheric chemistry modeling – Part 1: Description of the
one-way model**

Haipeng Lin et al.

Correspondence to: Tzung-May Fu (fuzm@sustech.edu.cn)

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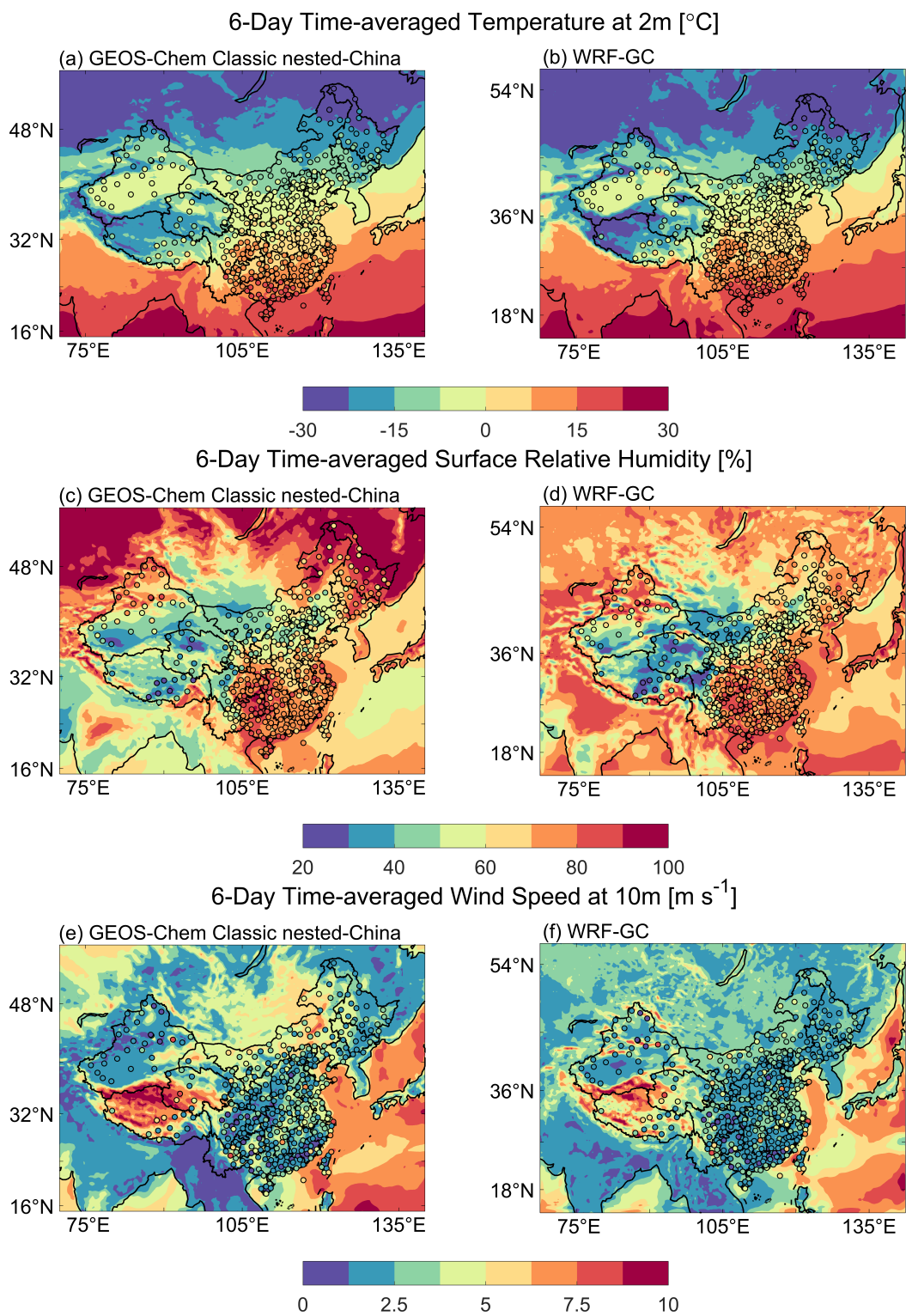


Figure S1: Six-day average values of simulated (filled contours) and observed (symbols) 2-m air temperature (upper panel), surface relative humidity (middle panel), and 10-m wind speed (bottom panel) during January 22-27, 2015: (a,c,e) meteorological variables used to drive the GEOS-Chem Classic nested-China simulation (i.e., the GEOS-FP dataset); (b,d,f) meteorological variables simulated by the WRF-GC model. Surface meteorological measurements at 367 sites were obtained from the U.S. National Climate Data Center (<https://gis.ncdc.noaa.gov/maps/ncei/cdo/hourly>).

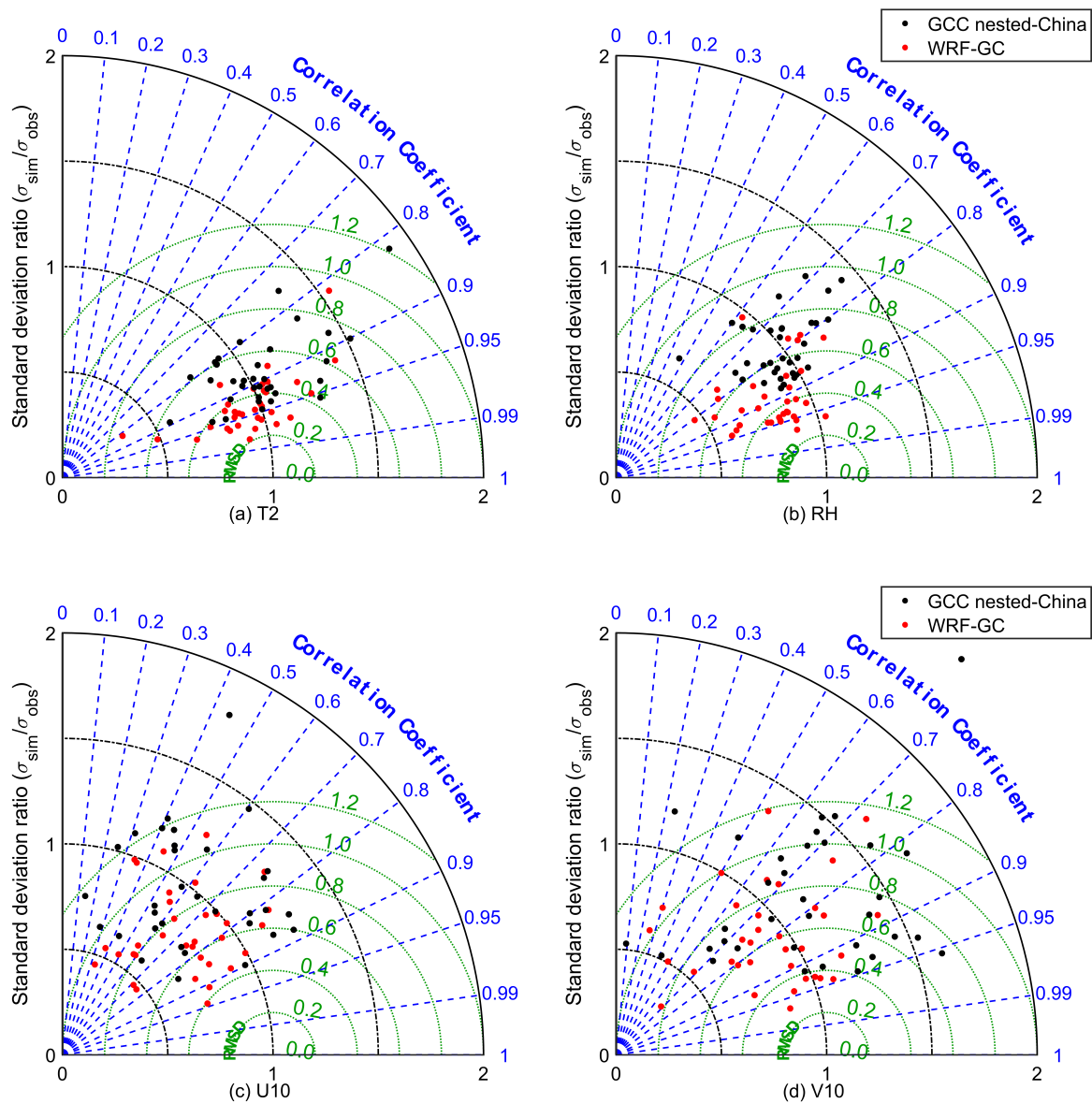


Figure S2: Assessments of the hourly meteorological variables simulated by the WRF-GC model (red dots) and those used to drive the GEOS-Chem Classic nested-China simulation (i.e., the GEOS-FP dataset, black dots) against hourly measurements at 34 surface sites during January 22-27, 2015: (a) 2-m air temperature, (b) surface relative humidity, (c) 10-m U-wind, and (d) 10-m V-wind. Green, black, and blue dashed lines indicate contours of the normalized centered root-mean-square differences (RMSD), the ratios of simulated versus observed standard deviations, and the Pearson correlation coefficients, respectively. Surface meteorological measurements were obtained from the U.S. National Climate Data Center (<https://gis.ncdc.noaa.gov/maps/ncei/cdo/hourly>). The 34 sites were selected (out of a total 367 sites) because hourly measurements were publicly-available at these sites.

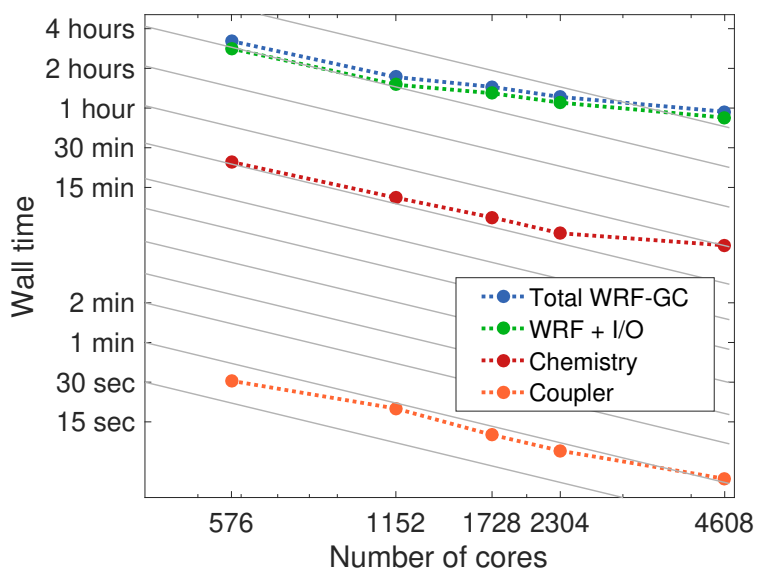


Figure S3: Scalability test of the WRF-GC model on the Amazon Web Services using up to 64 nodes and 4,608 cores. The simulation domain was over the continental U.S. at $5 \text{ km} \times 5 \text{ km}$ resolution (950×650 atmospheric columns), using 10-second dynamical time step and 5-minute external chemical time step.