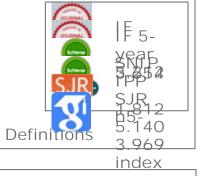
<u>Geoscientific Model Development</u> An interactive open-access journal of the European Geosciences Union

EGU Journals	EG
Manuscript	
Manuscript tracking	
About	
Editorial board	
Articles GMD	
 Recent final revised papers 	
Volumes and issues	
Special issues	
 Full text search Title and outbor 	
 Title and author search 	
Articles GMDD	
Subscribe to alerts	
Peer review	
For authors	
For reviewere	
For reviewers	
	_
User I D	
Password	
New user? Lost login?	
Fallow	
Follow	

@EGU_GMD

Journal metrics



Abstracted/indexed

- Science Citation Index Expanded
- Current Contents/PCE
- Scopus
- ADS
- Chemical Abstracts
- CLOCKSS
- CNKI
- DOAJ
- EBSCO
- GBA
- Gale/Cengage
- GeoBase
- GeoRef
- Google Scholar
- J-Gate
- Portico
- ProQuest
- World Public Library

Geosci. Model Dev., 5, 619-648, 2012 www.geosci-model-dev.net/5/619/2012/ doi:10.5194/gmd-5-619-2012 © Author(s) 2012. This work is distributed under the Creative Commons Attribution 3.0 License.

Article Metrics F

Related Articles

Model Description Paper

11 May 2012

Simulations over South Asia using the Weather Research and Forecasting model with Chemistry (WRF-Chem): chemistry evaluation and initial results

R. Kumar¹, M. Naja¹, G. G. Pfister², M. C. Barth², C. Wiedinmyer², and G. P. Brasseur³ ¹Aryabhatta Research Institute of Observational Sciences, Nainital, 263129, India ²Atmospheric Chemistry Division, NCAR, Boulder, CO 80307-3000, USA ³Climate Service Center, Helmholtz Zentrum Geesthacht, Hamburg 20146, Germany

> Received: 15 Dec 2011 – Published in Geosci. Model Dev. Discuss.: 03 Jan 2012 Revised: 17 Apr 2012 – Accepted: 17 Apr 2012 – Published: 11 May 2012

Abstract. This study presents annual simulations of tropospheric ozone and related species made for the first time using the WRF-Chem model over South Asia for the year 2008. The model-simulated ozone, CO, and NO_x are evaluated against ground-

based, balloon-borne and satellite-borne (TES, OMI and MOPITT) observations. The comparison of model results with surface ozone observations from seven sites and CO and NO_x observations from three sites indicate the model's ability in reproducing seasonal variations of ozone and CO, but show some differences in NO_x. The modeled vertical ozone distribution agrees well with the ozone soundings data from two Indian sites. The vertical distributions of TES ozone and MOPITT CO are generally well reproduced, but the model underestimates TES ozone, OMI tropospheric column NO₂ and MOPITT total column CO retrievals during all the months, except MOPITT retrievals during August–January and OMI retrievals during winter. Largest differences between modeled and satellite-retrieved quantities are found during spring when intense biomass burning activity occurs in this region. The evaluation results indicate large uncertainties in anthropogenic and biomass burning emission estimates, especially for NO_x. The model results indicate clear regional differences in the seasonality of surface ozone over South Asia, with estimated net ozone production during daytime (1130–1530 h) over inland regions of 0–5 ppbv h⁻¹ during all seasons and of 0–2 ppbv h⁻¹ over marine regions during outflow periods. The model results indicate that ozone production in this region is mostly NO_x-limited. This study shows that WRF-Chem model captures many important features of the observations and gives confidence to using the model for understanding the spatio-temporal variability of ozone over South Asia. However, improvements of South Asian emission inventories and simulations at finer model resolution, especially over the complex Himalayan terrain in northern India, are also essential for accurately simulating ozone in this region.

Citation: Kumar, R., Naja, M., Pfister, G. G., Barth, M. C., Wiedinmyer, C., and Brasseur, G. P.: Simulations over South Asia using the Weather Research and Forecasting model with Chemistry (WRF-Chem): chemistry evaluation and initial results, Geosci. Model Dev., 5, 619-648, doi: 10.5194/gmd-5-619-2012, 2012.

