Geophysical Research Abstracts
Vol. 17, EGU2015-13684-6, 2015
EGU General Assembly 2015

Global aerosol modeling with the online NMMB/BSC Chemical Transport Model: sensitivity to fire injection height prescription and secondary organic aerosol schemes

Michele Spada (1), Oriol Jorba (1), Carlos Pérez García-Pando (2,3), Kostas Tsigaridis (4,2), Joana Soares (5), Vincenzo Obiso (1), Zavisa Janjic (6), Jose M. Baldasano (1,7)

(1) Barcelona Supercomputing Center, Earth Sciences, Barcelona, Spain, (2) NASA Goddard Institute for Space Studies, New York, USA, (3) Department of Applied Physics and Applied Math, Columbia University, New York, USA, (4) Center for Climate Systems Research, Columbia University, New York, NY, USA, (5) Finnish Meteorological Institute, Air Quality, Helsinki, Finland, (6) National Centers for Environmental Prediction, College Park, MD, USA, (7) Universitat Politècnica de Catalunya, Barcelona, Spain

We develop and evaluate a fully online-coupled model simulating the life-cycle of the most relevant global aerosols (i.e. mineral dust, sea-salt, black carbon, primary and secondary organic aerosols, and sulfate) and their feedbacks upon atmospheric chemistry and radiative balance. Following the capabilities of its meteorological core, the model has been designed to simulate both global and regional scales with unvaried parameterizations: this allows detailed investigation on the aerosol processes bridging the gap between global and regional models.

Since the strong uncertainties affecting aerosol models are often unresponsive to model complexity, we choose to introduce complexity only when it clearly improves results and leads to a better understanding of the simulated aerosol processes.

We test two important sources of uncertainty - the fires injection height and secondary organic aerosol (SOA) production - by comparing a baseline simulation with experiments using more advanced approaches. First, injection heights prescribed by Dentener et al. (2006, ACP) are compared with climatological injection heights derived from satellite measurements and produced through the Integrated Monitoring and Modeling System For Wildland Fires (IS4FIRES). Also global patterns of SOA produced by the yield conversion of terpenes as prescribed by Dentener et al. (2006, ACP) are compared with those simulated by the two-product approach of Tsigaridis et al. (2003, ACP).

We evaluate our simulations using a variety of observations and measurement techniques. Additionally, we discuss our results in comparison to other global models within AEROCOM and ACCMIP.