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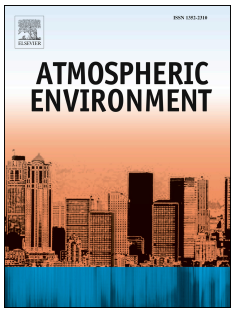

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Simulation of fresh and chemically-aged biomass burning organic aerosol

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Abstract

A three-dimensional chemical transport model, PMCAMx, was used to quantify the contribution of biomass burning organic aerosol (bbOA) to total organic aerosol (OA) concentrations in the continental U.S. Simulations were performed during three seasonally-representative months (April, July, and September 2008). Biomass burning is predicted to contribute 9% of the domain-averaged OA in April, 28% in July and 13% in September. Secondary OA from semivolatile and intermediate volatility organic compounds is the largest contributor to bbOA concentrations for all months simulated, followed by fresh primary OA. PMCAMx bbOA predictions using the Volatility Basis Set were compared to the results of CAMx version 6.10 that assumes that bbOA is nonvolatile and inert. PMCAMx predicts 66%, 113%, and 108% higher average concentration values of bbOA for April, July, and September, respectively. Predicted OA concentrations at biomass-impacted sites were compared to observed values from the STN and IMPROVE networks. The treatment of biomass burning emissions as semivolatile and reactive improved model performance during the spring and summer. During the fall both models overpredicted the OA levels, suggesting that the fire emissions may have been overestimated. In this case the additional SOA produced in PMCAMx resulted in worse performance.

1. Introduction