

Effect of Terrestrial and Marine Organic Aerosol on Regional and Global Climate: Model Development, Application, and Verification with Satellite Data

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Summary

Organic aerosol (OA) is a ubiquitous constituent of atmospheric particulate matter (PM) and contributes significantly to the tropospheric aerosol burden. A number of studies have shown that organic aerosol plays an important role in global as well as regional climate and chemistry. However, at present global budgets of OA are poorly constrained and there is significant underestimation of the source of OA in current models that is believed to be primarily associated with poorly quantified sources and sinks of secondary organic aerosol (SOA). Since a major precursor of SOA on a global scale has biogenic origin, future model improvements will primarily come from better representation of SOA.

This project employs multi-disciplinary team to develop new computer modules to advance our understanding of the role of OA on regional and global climate. In order to capture the short term regional (with higher accuracy) and long-term radiative and climatic effects of OA we intend to use several different state-of-the-art model formulations:

- CAM5 will be used to carry out decade-to-multi-century modeling simulations.
- Global-WRF/Chem will be used to carry out long term simulations for the same domain/time scale of CAM5 to allow intercomparison of two model predictions.
- WRF/Chem-MADE/SORGAM will be employed to examine regional scale radiative and climatic effects of SOA in East Asia and North America. Both MIRAGE and Global-WRF/Chem models will provide boundary conditions for regional WRF/Chem model.

Remotely sensed data collected by MODIS sensor located on board of NASA's *Terra* and *Aqua* satellites will be employed to derive model constrains.