Geophysical Research Abstracts
Vol. 12, EGU2010-13443-1, 2010
EGU General Assembly 2010

Impact of aerosol long-range transport on the direct radiative forcing of climate as derived from HTAP model simulations

Hongbin YU (1,2) and Mian Chin (1)

(1) NASA Goddard Space Flight Center, Greenbelt, Maryland, United States (Hongbin.Yu@nasa.gov), (2) University of Maryland Baltimore County, Baltimore, Maryland, United States

There has been mounting evidence for intercontinental and even hemispheric transport of aerosols as provided by long-term surface monitoring networks, in-situ measurements from intensive field campaigns, and satellite observations backed by model simulations. We have estimated from the Moderate resolution Imaging Spectroradiometer (MODIS) aerosol measurements that about 4.4 Tg/a of pollution (non-dust) aerosol is imported to North America, which is equivalent to about 15% of local emissions from the United States and Canada. Because of the long-range transport, aerosols emitted in a region can have far-reaching impacts on climate and air quality over downwind continents. In this study, we assess the direct radiative forcing of climate due to the aerosol long-range transport. We examine 9 models for the Task Force on Hemispheric Transport of Air Pollutants (TF-HTAP) project, each with a base run (SR1) and 4 perturbation runs (SR6) for respective 20% reduction of anthropogenic emissions in North America, Europe, East Asia, and South Asia. Aerosol optical depths from TF-HTAP models together with surface and cloud properties from the NASA GEOS-4 model are used to calculate the aerosol direct radiative forcing. The foreign contributions of aerosol optical depth and direct radiative forcing relative to that from the region itself are assessed on seasonal basis. Model diversity will be discussed.