Geophysical Research Abstracts
Vol. 16, EGU2014-1804, 2014
EGU General Assembly 2014

Unexpected increasing AOT trends over north-west Bay of Bengal in the early post-monsoon season: satellite and model data

Pavel Kishcha (1), Boris Starobinets (1), Arlindo da Silva (2), and Pinhas Alpert (1)

(1) Tel Aviv University, Department of Geophysical, Atmospheric and Planetary Sciences, Tel Aviv, Israel (pavel@cyclone.tau.ac.il, 972-3 640-7411), (2) NASA/GSFC, Global Modeling and Assimilation Office, Greenbelt, USA

Over the ten-year period 2000 – 2009, in October, MODIS showed strong increasing aerosol optical thickness (AOT) trends of approximately 14 % per year over north-west Bay of Bengal (BoB) in the absence of AOT trends over the east of the Indian subcontinent. This was unexpected, because sources of anthropogenic pollution were located over the Indian subcontinent, and aerosol transport from the Indian subcontinent to north-west BoB was carried out by prevailing winds. In order to understand the increasing AOT trends over north-west BoB, the NASA GEOS-5 model was used to extend the MERRA reanalysis with five atmospheric aerosol components (sulfates, organic carbon, black carbon, desert dust, and sea-salt). The obtained eight-year (2002 – 2009) MERRA-driven aerosol dataset (MERRAero) was applied to study AOT and its trends over the Ganges basin and north-west Bay of Bengal (BoB) in the early post-monsoon season. In October, MERRAero was successful in reproducing the main structure of AOT trends over north-west BoB, exceeding AOT trends over the east of the Ganges basin. Different aerosol components included in the model showed strong increasing AOT trends over north-west BoB. Air pollution modeling allowed us to determine aerosol species responsible for the increasing AOT trends over north-west BoB: aerosols were dominated by anthropogenic air pollution, such as sulfates and carbon aerosols. Our analysis showed that sea-salt aerosols did not contribute to the increasing AOT trends over north-west BoB: no sea-salt AOT trend was observed in year-to-year variations during the study period. There were a number of meteorological factors contributing to the increasing AOT trends over north-west BoB: (1) an increasing number of days in each October when prevailing winds blew from land to sea, resulting in an increase in air pollution over north-west BoB; (2) during the second 4-year period (2006 – 2009), prevailing winds blowing mainly from land to sea were responsible for a drier environment with less precipitation causing less wet removal of air pollution than in the first 4-year period (2002 – 2005); (3) in October 2009, the vertically integrated aerosol mass flux over north-west BoB was maximal, while monthly mean wind was minimal. This indicates accumulating anthropogenic aerosol particles over north-west BoB.