Geophysical Research Abstracts
Vol. 12, EGU2010-6392-2, 2010
EGU General Assembly 2010

Year-round probing of soot carbon and secondary organic carbon contributions and sources to the South Asian Atmospheric Brown Cloud using radiocarbon (14C) measurements

Elena Kirillova (1), Rebecca J. Sheesley (1), August Andersson (1), Martin Kruså (1), P.D. Safai (2), Krishnakant Budhavant (2), P.S.P. Rao (2), P.S. Praveen (3), and Örjan Gustafsson (1)

(1) Department of Applied Environmental Science (ITM) and Bert Bolin Climate Research Centre, Stockholm University, Sweden (elena.kirillova@itm.su.se), (2) Indian Institute for Tropical Meteorology, Pune, India, (3) UN Environmental Programme Asia Pacific, Maldives Climate Observatory, Hanimaadhoo, The Maldives

South Asia is one region of vital importance for assessing human impact on radiative forcing by atmospheric aerosols. Previous research in the region has indicated that black carbon is a significant component of the regional aerosol load. In contrast, there is more ambiguous information regarding the contribution of secondary organic aerosols (SOA) to the total carbonaceous (TC) aerosol composition. Here we primarily address the SOA component of the South Asian Atmospheric Brown Cloud (ABC) by a combination of measurements of SOA concentrations and the 14C signature of TC. Atmospheric particulate matter was collected during fourteen-month continuous sampling campaigns Jan 2008 – March 2009 at both the Maldives Climate Observatory at Hannimaadho (MCO-H) and at the Sinhagad hilltop sampling site of the Indian Institute of Tropical Meteorology (SIN) in central-western India. The radiocarbon method is an ideal approach to identify fossil sources (14C "dead") compared to biogenic and biomass combustion products (with a contemporary 14C signal). The radiocarbon source apportionment of TC revealed very similar contribution from biogenic/biomass combustion (60-70%) for Indian SIN site and the MCOH receptor regions for much of the year. However, during the summer monsoon season biomass contribution to TC at the Indian Ocean site increases to 70-80%, while it decreases to 40-50% at the Indian site. Source apportionment of a soot carbon (SC) isolate (CTO-375 method; a tracer of black carbon) shows a similar trend. According to preliminary data in summer biomass contribution is higher at the MCOH receptor site (70%) compared to the SIN background site (45%). These unique year-round 14C data will be interpreted in view of the SOA concentration and the varying origin of the air masses.