

Multi-satellite Observation on Aerosols and Carbon Monoxide Characteristics Over Arabian Sea During Agricultural Crop Residue Burning Period Over Indo-gangetic Plains

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The Indo-Gangetic Plains (IGP) is a very important agro eco-region in South-Asia, occupy nearly one fifth of the total geographic area in the four countries (Pakistan, India, Nepal and Bangladesh) of the Indian sub-continent. The IGP in India alone, with 20% geographical area contributes ~ 42% to the total food grains production and holds nearly 40% of the total population. In the Indo-Gangetic plains region of India, ~ 12 million hectares is accounted for rice-wheat rotation. Harvesting of these crops with combine harvesters is very popular with the farmers of Punjab, Haryana and western Uttar Pradesh on account of high labour wages and anxiety of the farmers to get the crop produce collected and marketed at the earliest. Residues burning in the Rice – Wheat Cropping system (R-W-S) due to the use of combines has resulted in pollutant emission, loss of nutrients, diminished soil biota, and reduced total N and C in the topsoil layer. In the present study, integrated remote sensing datasets from Terra-MODIS, IRS-P4 Ocean Color Monitor (OCM), MOPITT, CALIPSO and AURA – OMI as well as a back trajectory model were used to synthesize AOD and CO information over the IGP region. Higher incidence of fires over IGP region, mainly in the Punjab and Haryana state was observed during November, 2007. These fire practices are mainly attributed to agricultural crop residues burning associated with rice–wheat crop rotation system over the IGP region resulted increase in concentrations of atmospheric aerosols and trace gases over the IGP region during the first fortnight of November 2007. These anthropogenic aerosols and trace gases are transported from the land to the oceanic region through advection. Aerosol index (AI) obtained from ozone monitoring instrument (OMI) and CO from measurements of pollution in the troposphere instrument (MOPITT). CO showed higher values over the Arabian Sea suggesting long-range transport of anthropogenic aerosols and trace gases from the continental to Arabian Sea region. A ~30% increase in AOD at 550nm occurred over the Arabian Sea during study period, mainly associated with long-range transport of aerosols emitted due to crop residue burning in the IGP region.

Keywords: AOD, AI, CO, IGP, Agriculture crop residue burning