MAPAN
Journal of Metrology Society of India

DOI 10.1007/s12647-014-0109-x

Springer

Short Communication

Atmospheric Fine and Coarse Mode Aerosols at Different Environments of India and the Bay of Bengal During Winter-2014: Implications of a Coordinated Campaign

A. Sen[1], Y. N. Ahammed[2], B. C. Arya[1], T. Banerjee[3], G. Reshma Begam[2], B. P. Baruah[4], A. Chatterjee[5], A. K. Choudhuri[6], A. Dhir[7], T. Das[8], P. P. Dhyani[9], N. C. Deb[10], R. Gadi[11], M. Gauns[12], S. K. Ghosh[5], A. Gupta[7], K. C. Sharma[12], A. H. Khan[13], K. M. Kumari[14], M. Kumar[3], A. Kumar[1], J. C. Kuniyal[15], A. Lakhani[14], R. K. Meena[14], P. S.Mahapatra[8], S. W. A. Naqvi[16], D. P. Singh[12], S. Pal[10], S. Panda[8], Rohtash[1], J. Saikia[4], P. Saikia[4], A. Sharma[1], P. Sharma[15], M. Saxena[1], D. M. Shenoy[16], C. Viswanatha Vachaspati[2], S. K. Sharma[1] and T. K. Mandal[1]

(1) Radio and Atmospheric Sciences Division, CSIR-National Physical Laboratory, Dr. K S Krishnan Road, New Delhi 110012, India
(2) Department of Physics, Yogi Vemana University, Kadapa 516003, India
(3) Institute of Environment and Sustainable Development, Banaras Hindu University, Banaras, UP, India
(4) CSIR-North East Institute of Science and Technology, Jorhat, Assam, India
(5) Centre for Astroparticle Physics and Space Science, Bose Institute, Kolkata and Darjeeling, West Bengal, India
(6) Indian Statistical Institute, Giridih, Jharkhand, India
(7) School of Energy and Environment, Thapar University, Patiala, Punjab, India
(8) CSIR-Institute of Minerals and Materials Technology, Bhubaneswar, Odisha, India
(9) G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarmal, Almora, Himachal Pradesh, India
(10) Indian Statistical Institute, B.T. Road, Kolkata, West Bengal, India
(11) Indira Gandhi Delhi Technical University for Women, Kashmiri Gate, Delhi, India
(12) Central University of Rajasthan, Ajmer, Rajasthan, India
(13) CSIR-Indian Institute of Toxicology Research, Lucknow, Uttar Pradesh, India
(14) Dayabagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh, India
(15) G.B. Pant Institute of Himalayan Environment and Development, Himachal Unit, Mohal, Kullu, Himachal Pradesh, India
(16) CSIR-National Institute of Oceanography, Dona Paula, Goa 403004, India

T.K. Mandal
Email: tuhin_m@yahoo.com; tuhin@nplindia.org

Received: 11 March 2014 **Accepted:** 12 June 2014 **Published online:** 26 August 2014

Abstract

In this paper, we present mass concentrations of particulate matter [$PM_{2.5}$, PM_{10} size fractions and total suspended particulates (TSP)] measured simultaneously over land stations (Kullu, Patiala, Delhi, Ajmer, Agra, Lucknow, Varanasi, Giridih, Kolkata, Darjeeling, Jorhat, Itanagar, Imphal, Bhubaneswar, and Kadapa), mostly distributed across the Indo-Gangetic plain (IGP) of India as well as in the marine atmosphere over Bay of Bengal (BoB) in the period from 20 January to 3 February, 2014. The main objective of this study was to quantify the continental outflow of particulates ($PM_{2.5}$, PM_{10} and TSP) from IGP and associated regions into the BoB along with low level north-east wind flow during winter monsoon period. The present study provides a glimpse of the aerosol loading over the IGP region. During this campaign, the highest average $PM_{2.5}$ (187.8 ± 36.5 μg m^{-3}, range 125.6–256.2 μg m^{-3}), PM10 (272.6 ± 102.9 lg m^{-3}, range 147.6–520.1 μg m^{-3}) and TSP (325.0 ± 71.5 μg m^{-3}, range 220.4–536.6 μg m^{-3}) mass concentrations were recorded at Varanasi, Kolkata and Lucknow over middle and lower IGP regions. The PM2.5 (average 41.3 ± 11.9 μg m^{-3}; range 15.0–54.4 μg m^{-3}), PM_{10} (average 53.9 ± 18.9 μg m^{-3}; range 30.1–82.1 μg m^{-3}) and TSP (average 78.8 ± 29.7 μg m^{-3}; range 49.1–184.5 μg m^{-3}) loading over BoB were found to be comparable to land stations and suggests possible continental outflow. Over the continental region, the highest $PM_{2.5}/PM_{10}$ ratio was recorded at Delhi (0.87). The $PM_{2.5}/PM_{10}$ ratio over BoB (0.77) was found to be quite high and comparable to Varanasi (0.80) and Agra (0.79).

Keywords

$PM_{2.5}$ − PM_{10} − TSP and Bay of Bengal