

Atmospheric modelling of particulate matter and its impact

Jean Vinod* Sapana Gupta† Z. Klimont‡
jenavinod02@gmail.com sapana.gupta02@gmail.com klimont@iiasa.ac.at

Chris Heyes‡ K.S. Patel§
heyces@iiasa.ac.at patelks.55@hotmail.com

Particulate matter (PM) has been widely studied in recent years due to its potential health impact and need for its control. The particulate matter can pass through the natural protective mechanism of human respiratory system and plays an important role in genesis and augmentation of allergic disorders. Sources of air pollution in the area and the unique problem arising out of the emission from the vehicles, industries, etc. have been described. A study of the atmospheric particulate matter (APM) and associated anions present in aerosol has been carried out for the city of Raipur India using principal component analysis (PCA) and positive matrix factorization (PMF) models. The data are analysed to evaluate the critical situation arising out of the emission of air pollutants and the impact on human health due to respirable diseases (RDs) to middle class sub-population in the area are assessed. A strategic air quality management plan has been proposed. The particulate matters (PM10 and PM2.5) in the ambient air at residential site of Raipur city were collected using sequential speciation air equipped with temperature and humidity sensor. The annual mean mass concentration distribution of PM2.5 and PM10 was ranged from 9.0 – 207 and 28 – 464 $\mu\text{g m}^{-3}$ with mean, median and STD values of 93, 196 ; 82, 158 and ± 57 and 116 $\mu\text{g m}^{-3}$, respectively. The seasonal evolution of the daily contributions confirmed the interpretations of these sources. Ambient air quality was monitored along with micrometeorological data and the results are discussed. The status of air pollution in the area has been evaluated and its future impact as well as prediction is carried out through GAIN Asia model developed at IIASA Vienna.

Key words : Chemical components of PMs, Aerosol, Health effects, RDs.

Allen, A.G., Nemitz, E., Shi, J.P., Harrison, R.M., Greenwood, J.C. *Atmos. Environ.* **35** (2001), 4581–4591.

Mouli, P.C., Mohan, V.S., Reddy, J.S. *Environ. Monit. Assess.* **117** (2006), 291–305.

Mishra, U.C.J. *Aerosol Sci.* **19** (1988), 1165–1169.

*Department of Engineering Chemistry, Columbia Institute of Eng. & Technology, Near Vidhan Sabha, Mandhar, Raipur 493111, India.

†Department of Applied Sciences, Central Institute of Technology, Abhanpur Road, Raipur, 492001, India.

‡IIASA, Schlossplatz 1, A-2361 Laxenburg, Austria.

§School of Studies in Chemistry, Pt. Ravishankar Shukla University, Amanaka G.E.Road, Raipur (Chhatisgarh), India – 492010, India.