Session: C12 Poster: M51B

Chemical characterization of atmospheric particulate matters and trace gases in a developing country (Bangladesh)

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Atmospheric pollutants play an important role in our environment with regards to climate change and health effects. Large numbers of clinical and epidemiological studies have indicated the cause and effect associations between respiratory-related mortality and morbidity [1]. Particulate matters (PM) have important implications through the inhalation of fine particles fractions (<PM10), which can be deposited in the tracheobronchial and alveolar regions of the lung [2]. Particulate matters can modify the climate forcing directly by altering the radiative heating of the planet [3], indirectly by altering cloud properties e.g., acts as cloud condensation nuclei (CCN), and semi-directly by evaporating the clouds [4]. Black carbon absorbs solar radiation and heating the atmosphere, and it can change the sign of forcing from negative to positive [5]. Bangladesh is a developing country in Southeast Asia with a population of about 160 million. It is the most effected country of the World due to the climate change. Dhaka, capital of Bangladesh, has all kinds of problems of a rapidly growing mega city. Traffic emissions, brick fields, construction activities, windblown dusts, and long range transport are the mainly responsible for the severe air quality in Dhaka. Anthropogenic activities are increasing the pollutions by emitting aerosol particles (e.g., fly ash, dust, black carbon, and heavy metal) and aerosol precursor gases [6]. Concerning the air quality measurement either urban or rural locations in Bangladesh, only few campaign based studies were found in the literatures [7-10]. Though, the rural areas in Bangladesh are much cleaner compared to the rural areas in USA and EU [8]. About 80% of the people in Bangladesh are living in the rural areas. About 70% of them are using biomasses in the cooking stoves for their daily meal preparation [11]. Therefore, rural areas of Bangladesh also has hung amount of contribution to the atmosphere from biomass burning emissions. Biomass burning is an important global source for fine particulate matters and toxic gases to the atmosphere [12]. Therefore, we urgently need to characterize these biomass burning emissions. I will be presenting here the chemical characterization of atmospheric particulate matters (PM10, PM2.5) and trace gases (SOx, NOx, CO, O3) at rural and urban areas in Bangladesh with the possible impacts on climate change. The particulate matters and trace gas sampling were done with two EnviroTech samplers (Model: EnviroTech 460 NL and EnviroTech APM 550) and these filters were analyzed for carbonaceous species (OC and BC), water soluble ions (Na, K, Ca, Mg, NH4, Cl, F, NO3, SO4 PO4), and heavy metals (As, Cd, Cu, Fe, Pb and Zn). This presentation will also be included the trace metal concentrations in the Black Solid Materials [BSM] deposition from ten different types of biomass burning at the cooking stoves in the rural areas of Bangladesh. References: 1. Adler, K.B. and Fischer, B.M. (1994). Annals of the NY Aca. Sci., 725, 128 - 145. 2. Hileman, B. (1981). Environ. Sci. Technol., 15, 983 - 986. 3. Charlson, R.J., Langner, J. et al. (1991).Tellus-A. 43, 152 - 163. 4. Ackerman, A.S., Toon, O.B.et al., (2000). Science 288, 1042 - 1047. 5. Haywood, J.M. and Ramaswamy, V. (1998).J. Geophys.Res.,103, 6043 - 6058. 6. Schwartz, Z., Dockery, D.W., Neas, L.M. (1996).J.Waste Manage.Ass., 46, 927 - 939. 7. Azad, A.K. and Kitada, T. (1998).Atmos. Environ.,32, 1991 - 2005. 8. Salam, A., Bauer, H. et al.(2003). Atmos. Environ., 37(18), 2517-2528. 9. Begum, B.A., Kim, E., Biswas, S.K., Hopke, P.K. (2004). Atmosp. Environ.,38:3025-3038. 10. Hasan, M., Salam, A. and Alam, A.M.S. (2009). Biomass and Bioenergy, 33: 1376-1380. 11. Sarkar, M.A.R and Islam, S.M.N. (1998). Energy, 23(9):785-9. 12. Arbex, M.A., Martins L.C.et al. (2007).J. Epid. Commun. Health, 61:395-400.