Atmospheric Dry and Wet Deposition Fluxes at a Tropical Site in India

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Atmospheric deposition is a process through which the pollutants are transferred from air to the earth's surface. The process through which the transfer occurs involves dry and wet deposition. Two major pollutants present in the atmosphere namely SO₂ and NO_x are the main factors responsible for acid deposition which has lead to serious damage to the ecosystem as well as monuments. Acid deposition is becoming a serious problem nowadays and hence it is necessary to monitor the deposition level and to quantify the critical load of the factors responsible for acid deposition. Critical load is defined as 'a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on sensitive elements do not occur' (1). North East India has different climatic conditions than the rest of India and to the best of author's knowledge such study has not been carried out in North East. The present study addresses wet and dry deposition flux and acid deposition at a tropical site Jorhat (26⁰44'19" N, 94⁰09'31" E), Assam in North East India. Situated in the upper Assam, Jorhat district experiences moderate climate (temperature 9-39°C; average annual rainfall 2244 mm). The samples were analyzed for pH, conductivity, Ca⁺², Mg⁺², NH₄⁺, SO₄⁻², NO₃⁻, and HCO₃⁻. During the study period, the average pH value of the rain water was found to be lower than that for dry deposition. As far as rain water samples were concerned, only one of the samples was observed to be acidic though other samples were slightly alkaline similar to the rain water in another rural site in India (2). Average nitrate and sulphate ion concentration in the rain water samples was found to be greater than those of dry deposition samples. Combustion of wood as fuel may explain for NO₃⁻. Deposition flux due to SO_4^{-2} was observed to be greater than that of NO_3^{-2} which may be attributed to contribution of coal utilization from the surrounding tea gardens, brick kilns etc.

Keywords: Critical load of acidity; Wet deposition; Dry deposition; Deposition flux.

References

- [1] A. Bhattacharya, R. Mudgal and A. Taneja, J. Haz. Mat. 106B, 157 (2004).
- [2] S. Tiwari, A. Ranade and D. Singh, Ind. J. Radio Space Phys. 35, 35 (2006).