

Wet Deposition of Major Ionic Species at Different Locations in India

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Depositions of air pollutants especially S and N affect the various ecosystems like forest, soil, and lakes. The studies related to them are very much essential to understand the acid rain phenomenon, air quality, removal processes and major Bio-Geo Chemical cycles.

Daily wet deposition samples are being collected at Pune (regularly), and other locations (for limited period) representing different environments (i.e., Urban, rural, Industrial, high altitude, marine, traffic etc.) in India. All the rain water samples were analysed for pH, conductivity, anions (Cl, SO₄ and NO₃) and cations (NH₄, Na, K, Ca and Mg). The wet deposition data for Pune for the period 2000-2007 and for the other locations for the different time periods during 2001- 2007 are considered in this study. Also, the wet deposition fluxes of major ionic constituents for 10 GAW (Global Atmospheric Watch) locations in India for a period of 8 years during 2000 – 2007 will be presented.

In general, the rain water was found to be in alkaline range in India. Out of 10 GAW stations, the 8 years average pH was slightly acidic (pH 5.15 – 5.36) at only three locations. At the remaining 7 locations the pH was alkaline (pH > 5.65). This alkaline nature is due to high dust levels. Neutralization factors indicated that Ca is the major neutralizing cation in wet deposition. Ca concentrations were higher in N and NW regions and lower in southern and NE regions. Non-sea salt component and back trajectory analyses showed that Ca and SO₄ aerosols were transported to Indian sub-continent from North African and Gulf countries. Long term trend analyses (two decades) in the ionic composition at Pune showed the increasing trend of SO₄, NO₃ and decreasing trend of Ca and pH. The wet deposition fluxes were estimated for all the ionic components. At all the locations, the NO₃ – N depositions were higher compared to NH₄ – N. At some of the locations, even though the concentrations are low, the depositions were higher due to the high rainfall amounts. Temporal variation of wet depositions of Total Nitrogen, excess SO₄, Ca and pH of rain water at the 10 GAW locations in India will be presented. In regional perspective, the excess SO₄ - S deposition was higher at an industrial location and the Nitrogen deposition was higher at a traffic junction in Pune region. At an high altitude rural location (Sinhagad) nearby Pune, the concentrations of excess SO₄, NO₃ and NH₄ were lower but their depositions were higher due to higher rainfall amounts.

Key words: pH; ionic composition; deposition fluxes; trends; non sea-salt fractions

