Chemical characteristics of atmospheric aerosols over southwest coast of India

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Abstract

Ambient aerosol samples, collected from Mangalore region in the southwest coast of India during the period of late winter (February and March) to early summer (April and May), have been analysed for water-soluble ionic species. Their abundance pattern is dominated by HCO$_3^-$, SO$_4^{2-}$, Na$^+$, Cl$^-$, with minor contribution from NO$_3^-$, Ca$^{2+}$, NH$_4^+$, K$^+$ and Mg$^{2+}$ indicating the contribution from not only sea salt, but also from anthropogenic and dust sources; with pronounced seasonal variability. The suspended particulate matter concentration varied from 35 to 160 $\mu$g m$^{-3}$, with consistently higher values during the late winter. Back trajectory analysis suggests the origin of the air masses shifting from Indo-Gangetic Plains (during late winter) to those from the Arabian Sea and the area around Persian Gulf during April–May. Air masses passing over Northern India (Indo-Gangetic Plains) impart characteristic contribution of ionic species from fossil fuel combustion, biomass burning and eolian dust as asserted by the factor analysis. A detailed study on characterisation of aerosols from south Asian region is rather sparse but essential for modelling the effect of tropospheric aerosols on climate. © 2007 Elsevier Ltd. All rights reserved.

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1. Introduction

Atmospheric deposition is an important source of chemical elements to the aquatic and marine environments. Due to increase in anthropogenic activities since the industrial revolution and urban development, the health of the environment is deteriorating in terms of increase in different types of contaminants and acidic species. Atmospheric aerosols originate from several natural (wind blown) and anthropogenic sources such as cement manufacturing, mining operations and metal processing; changes in land-use pattern and conversion of forest to agricultural land, vehicular emissions, etc. Therefore, properties of the atmospheric aerosols are closely linked to their sources. Aerosols can also be transported for a long distance through regional and global wind circulation patterns (Savoie et al., 1987). Anthropogenic aerosols are typically in the submicrometre to micrometre size range and are composed of numerous inorganic and