1.252 Observations of Carbonaceous Aerosols at Nainital, a high altitude site in the central Himalayas.

Early Career Scientist

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Abstract:

Carbonaceous aerosols are currently the most important with respect to aerosol effect on climate as they have largest uncertainties. They can absorb or scatter solar radiation and hence have great contribution in determining the radiation budget of the earth's atmosphere. An important part of carbonaceous aerosols is BC that forms due to incomplete combustion of fuels containing carbon such as gasoline, diesel, natural gas, wood and other biomasses. Emissions from these sources are of major concern in many regions of the world. In this reference, extensive observations of aerosols and trace gases are initiated at a high altitude site in the central Himalayas (Nainital (India), 29.4°N, 79.5° E, 1958 m) and are supported by Indian Space Research Organization (ISRO). Here, we present observations of BC and OC/EC made using an Aethalometer and a Sunset analyzer, respectively. BC, OC and EC show maximum values in spring with a unimodal diurnal variation which indicates increased aerosol loading in the daytime. This has been attributed to rise in the boundary layer which could flush valley emissions to the observational site. Spring time values of EC and OC are observed to be about 15 μg/m^3 and 50 μg/m^3, respectively. Their lowest levels (5-10 μg/m^3) are observed in summer-monsoon. A nine particles back-air trajectory analysis showed greater (3-4 days) residence time over the defined region of Northern India during many days of higher BC levels. The major contribution in higher BC levels is found to be originated from the Indo-Gangetic Plain region. Observations of CO along with BC have also been used to identify the role of different emissions sources. A strong positive correlation between both signifies influence of fresh emissions while a poor correlation suggested role of aged emissions or scavenging of BC (in monsoon). Detailed analysis of this work will be presented.