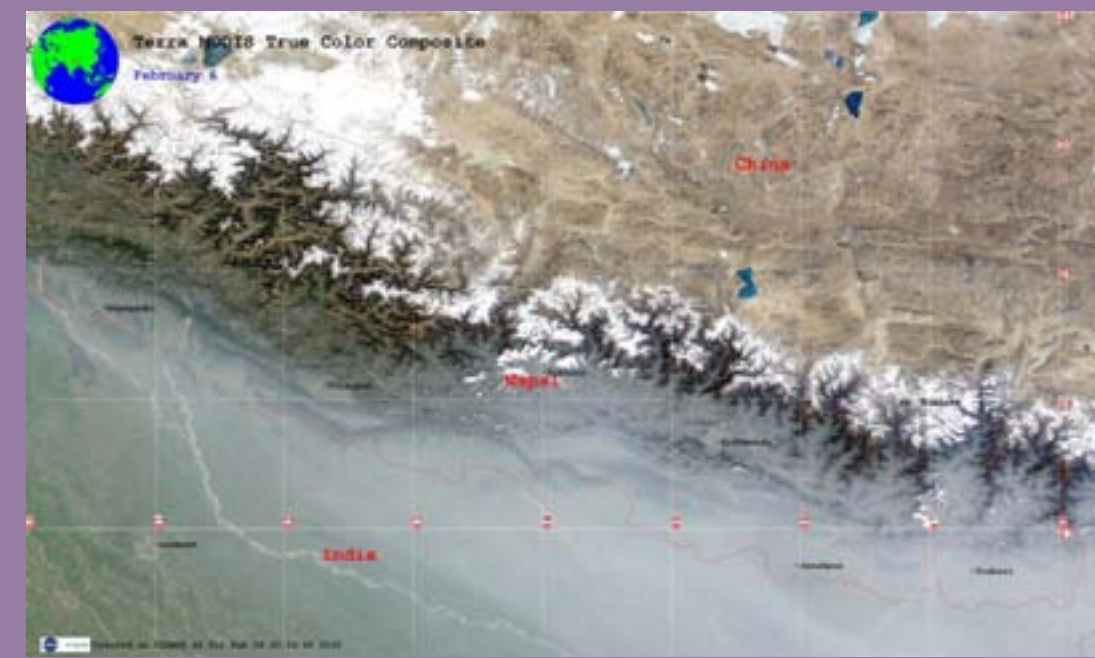


Source Apportionment of Carbonaceous Aerosol in Kathmandu Valley under Atmospheric Brown Cloud Study

Background

Biomass Combustion is an important source of atmospheric aerosol in South Asia where it is a major source of energy. These aerosols absorb or reflect sunlight and directly impact climate by changing the amount of radiation reaching the earth. The climate impacts of atmospheric aerosols on both climate and health relate to its chemical composition. Light absorption is dominated by dark-coloured particles like elemental carbon (EC), also called black carbon or soot, whereas organic carbon (OC) like sulphate and nitrate aerosols are highly reflective and reduce the amount of sunlight reaching the ground.

(Ramanathan et al., 2001)



Approach

Daily sampling of fine particulate matter and observing meteorological information

Instruments

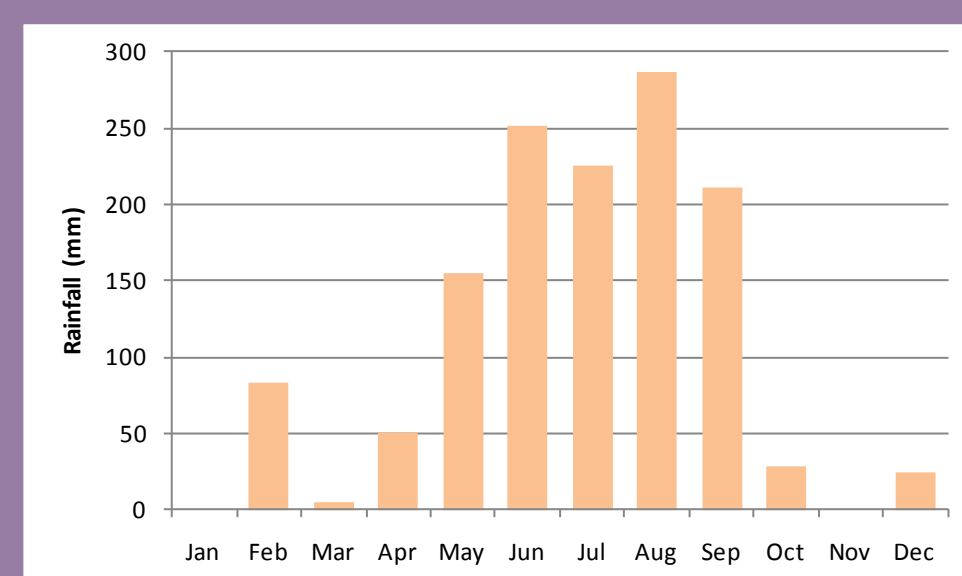
- Medium Volume Particulate Sampler URG 3000ABC
- Automatic Weather Station

Analysis

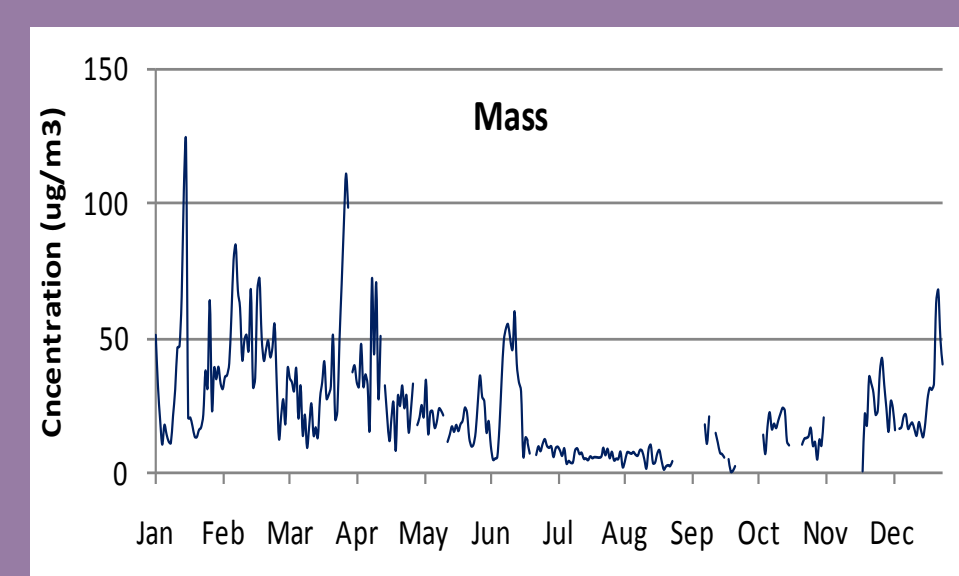
- Mass: Gravimetrically
- Elemental and Organic Carbon: Thermal optical techniques
- Organic Molecular Marker: Chromatography mass spectrometry
- Primary Source Contribution: Chemical mass balance modeling

Results

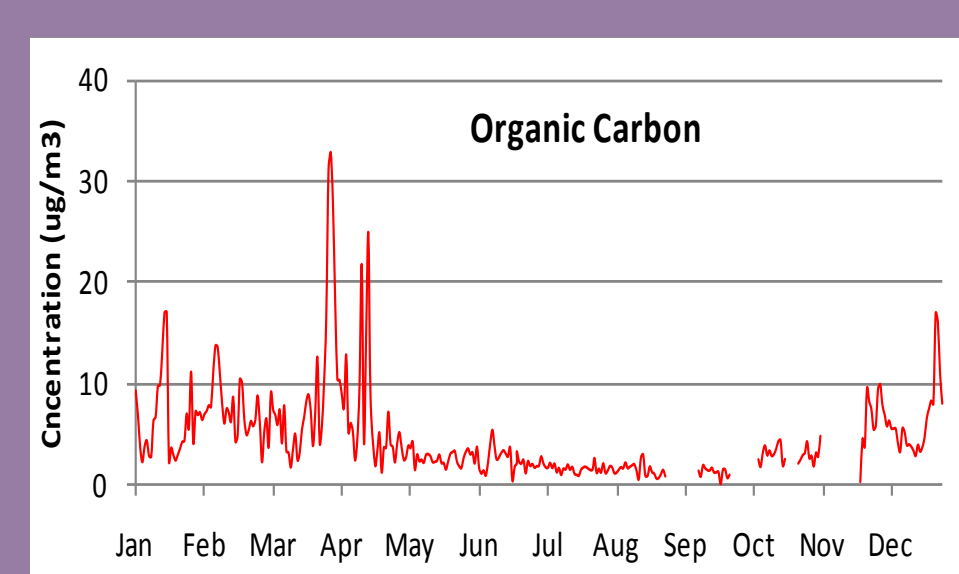
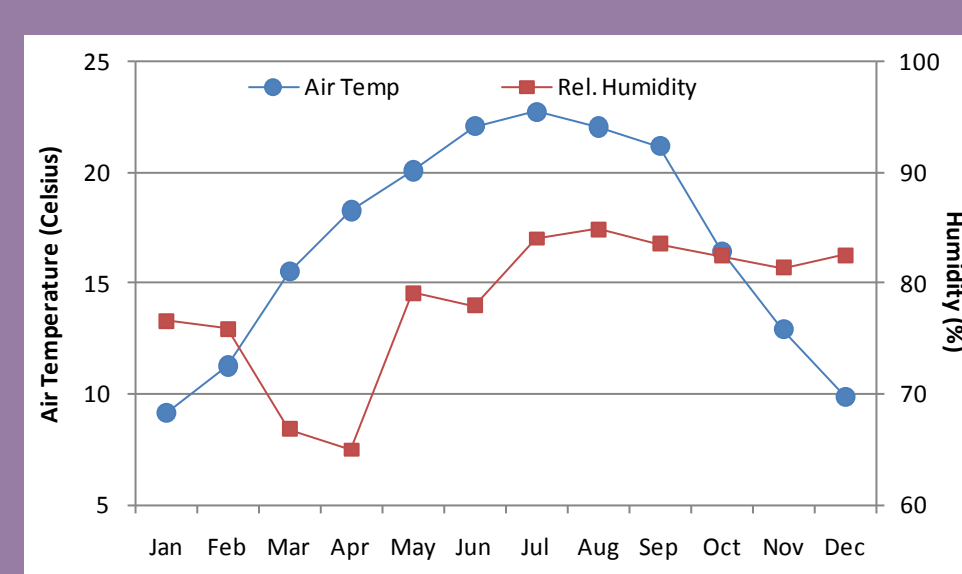
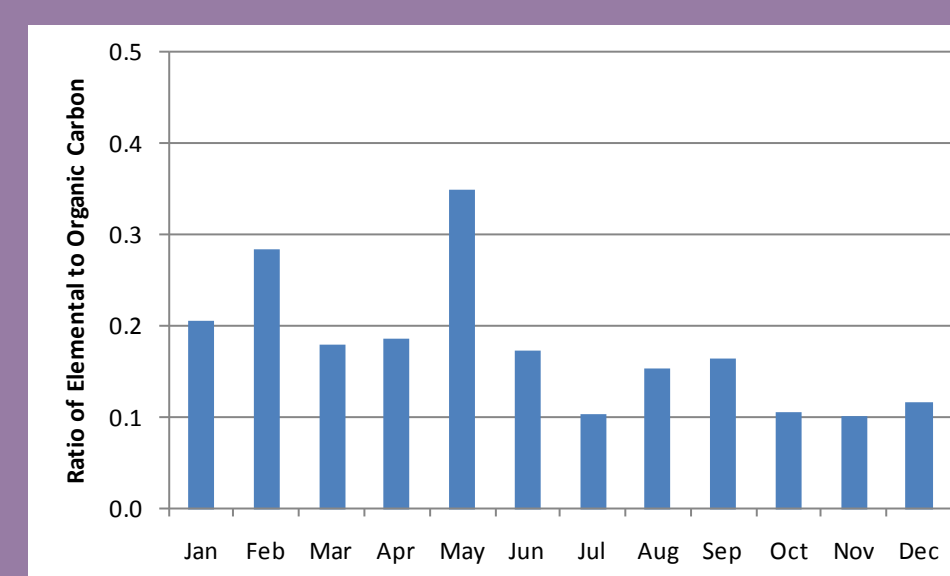
Meteorological Information



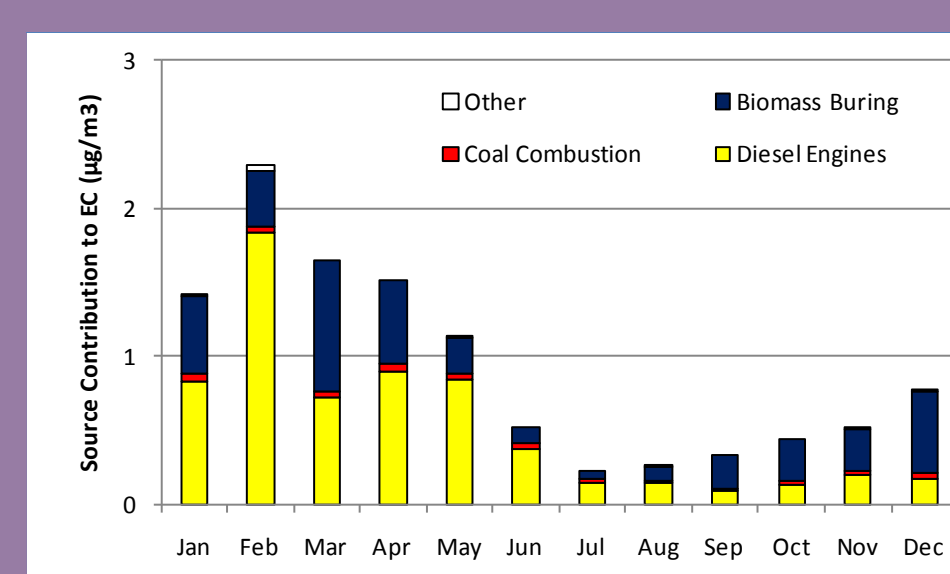
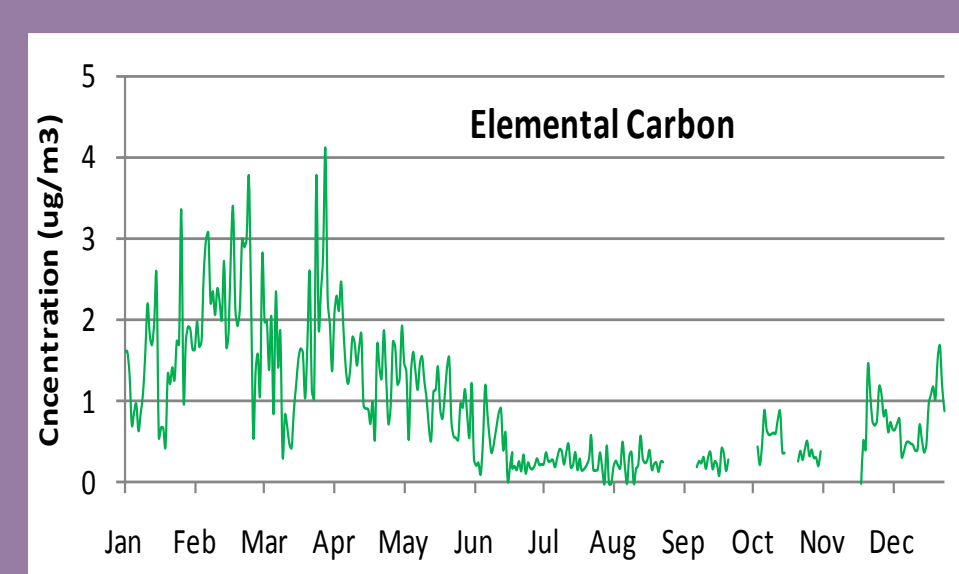
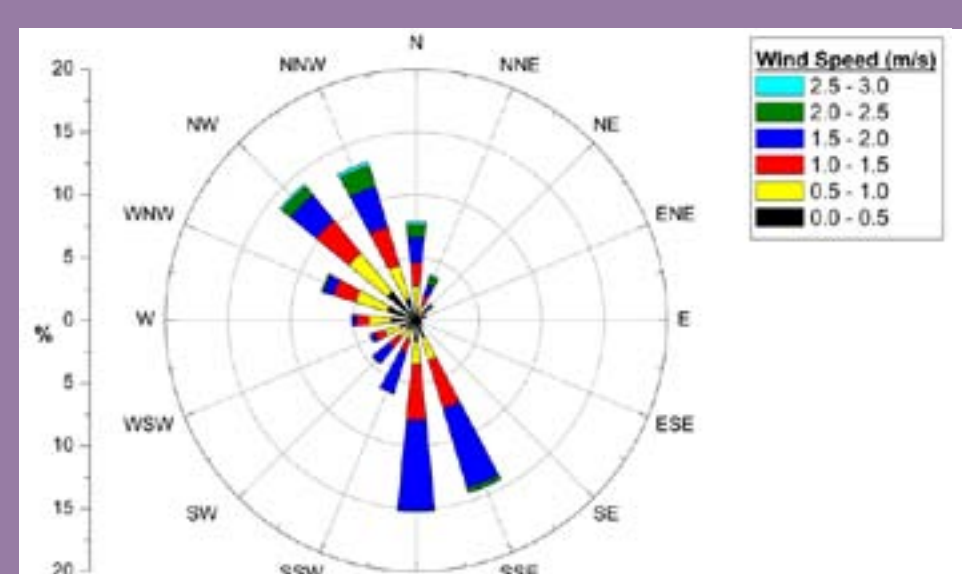
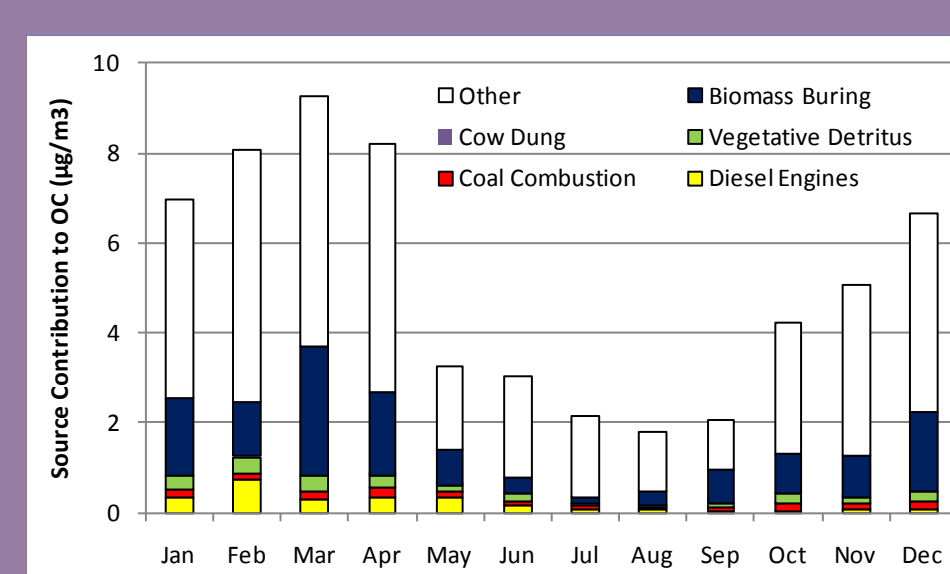
Aerosol Chemistry



Carbonaceous Aerosol Chemistry



Source Apportionment



Key Findings

- The annual trends of particulate mass, EC, OC shows maximum concentration in dry season and minimum concentrations during the monsoon season.
- Molecular markers were used to identify the aerosol sources: motor vehicles, coal combustion, biomass combustion, vegetative detritus, and secondary organic aerosol.
- Biomass combustion and motor vehicles were both major sources of EC. The majority of OC was unapportioned to primary sources and was attributed to secondary organic aerosol formation based on high concentrations of aromatic carboxylic acids.