DRAFT

Fossil fuel vs. Biomass burning Black Carbon

Motivation

Atmospheric pollution represents a risk factor for respiratory and cardiovascular diseases and for cancer. The two major contributions come from traffic emissions and biomass burning. On-road and off-road diesel engines account for ~70% of BC emissions in Europe, North America, and Latin America whereas the burning of residential solid fuels, especially coal and biomass, contribute ~60 - 80% of the Asian and African BC emissions.

Wood combustion in residential areas is commonly used for heating (and cooking) during cold winter seasons. Abatement measures include better stowes and alternative heating methods. Traffic pollution can be reduced by encouragement of public transportation usage, public tranport modernization, ring road utilization, traffic flow improvement, speed limit reduction and implementation of low emission zones. Since all restrictions are an unpopular and costly it is important to know which sources need regulation and how efficient this regulation is.

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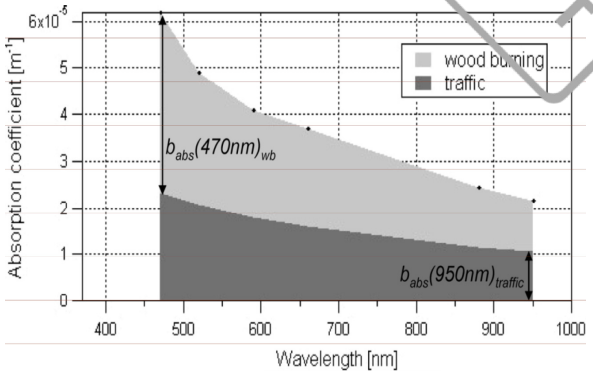
Methodology

Using the Aethalometer to measure BC and BB

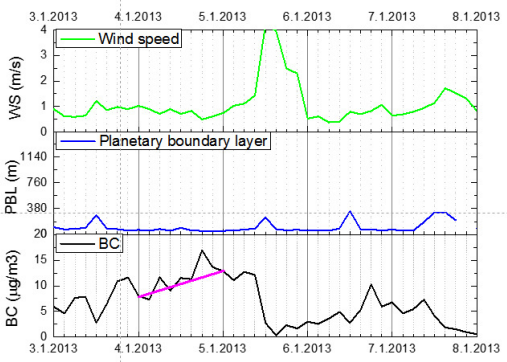
- BC should be measured year round, since the biomass burning contribution is much larger in winter and also total concentrations are larger in winter due to meteorology.
- The biomass burning ratio can be determined by measuring BC at two different wave lenghts.
- Non-convective time intervals can be used to determine BC production.
- Regional contribution can be estimated as the average BC when the planetary boundary level is higher than the surrounding hills.
- Measurements should be done for different sites, namely road side, street canyon, urban background and suburban background.

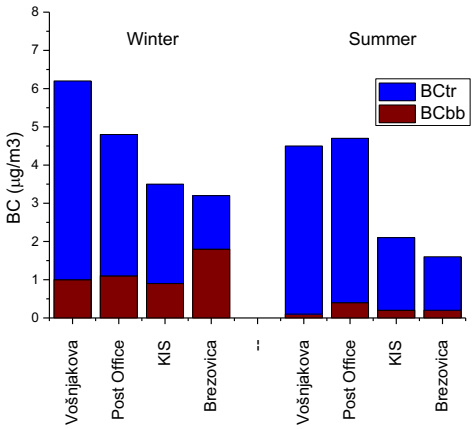


Example

The Ljubljana campaign

- Several ambient campaigns performed in Ljubljana basin to investigate BC sources during summer and winter.
- 4 sites of different types were used.
- Ljubljana is surrunded by hills 500-700 m above basin floor. Therefore regional transport can be observerd when planetary boundary is above 1000m.
- Urban background BC concentrations are 3.5 μg/m^3 in winter and 2 μg/m^3 in summer.
- In urban background locations during winter 25% of BC is produced by biomass burning, while it is 5% in summer.
- Influence of traffic diminishes quickly with distance from the highway, while biomass burning has regional effects.
- BC production during winter is 120-360 gkm^{-2}day^{-1} for traffic.
- Regional contribution is around 50%.





Related aticles

- J. Sandradewi et. al., „Using Aerosol Light Absorption Measurements for the Quantitative Determination of Wood Burning and Traffic Emission Contributions to Particulate Matter“, *Environ. Sci. Techhol*, 42, 3316-3323 (2008).
- L. Drinovec et. al., „Application of real-time source apportionment algorith for black carbon and carbonaceous aerosols“, *AAAR* (2012).
- I. Jezek et. al., „Influence of biomass combustion on air quality in two pre-alpine towns with different geographical settings“, *ICCPA* (2011).

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