



Black Carbon Measurement and Modeling in the Arabian Peninsula

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Black carbon is an important atmospheric aerosol as an effective factor in public health, changing the global and regional climate, and reducing visibility. Black carbon absorbs light, warms the atmosphere, and modifies cloud droplets and the amount of precipitation. In spite of this significance, knowledge of black carbon over the Arabian Peninsula is hard to find in literature until recently.

The total mass of black carbon and wind direction and speeds were measured continuously at Hada Al-Sham, Saudi Arabia for the year 2013. In addition, a state of the art global aerosol – climate model (ECHAM5-HAM) was used to determine black carbon climatology over the Arabian Peninsula. Simulation of the model was carried out for the years eight years (2004 - 2011).

The daily mean values of the concentrations of black carbon had a minimum of 15.0 ng/m³ and a maximum of 6372 ng/m³ with a mean of at 1899 ng/m³. The diurnal pattern of black carbon showed higher values overnight, and steady low values during daytimes caused by sea and land breezes. Seasons of black carbon vary over the Arabian Peninsula, and the longest is in the Northern Region where it lasts from July to October.

High concentrations of black carbon at Hada Al-Sham was observed with a mean of 1.9 μm^3 , and seasons of black carbon vary widely across the Arabian Peninsula. Assessment of the effects of black carbon over the Arabian Peninsula on the global radiation balance. Initiating a black carbon monitoring network is highly recommended to assess its impacts on health, environment, and climate.