

Black carbon (BC) and Dust Mass Concentrations Measures at North Atlantic Free Troposphere

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INTRODUCTION

The PICO-NARE observatory is an experimental site on the Pico Island (38.470°; 28.404°; 2225 m altitude) in the Azores Archipelago, developed to provide a base for free troposphere measurements (Richard & Fialho, 2002). One Aethalometer (AE31) was used to determine the aerosol seasonal variability for the Central North Atlantic region. Application of the separation technique, proposed by Fialho *et al.* (2005,2006), allowed the establishment of the seasonal cycles for BC and Dust.

METHODS

The aerosol absorption coefficients were measured by using the AE31 Aethalometer, and by uncoupling the BC and Dust contribution to the aerosol signal (Fialho *et al.*, 2005, 2006), the variability of BC and dust was calculated.

The separation of the MBL and FT samples was done by applying the meteorological analysis proposed by Kleiss & Honrath (2005).

RESULTS

The averaged seasonal variability of BC and Dust along the year, in the FT or in the FT plus the upper MBL is not significantly different (Figure 1 and 2). For BC this seasonality can be translated by $BC(\text{ng}/\text{m}^3) = 24 - 21\text{Cos}(0.26 + 180 M / 12)$ with a correlation coefficient of 0.997.

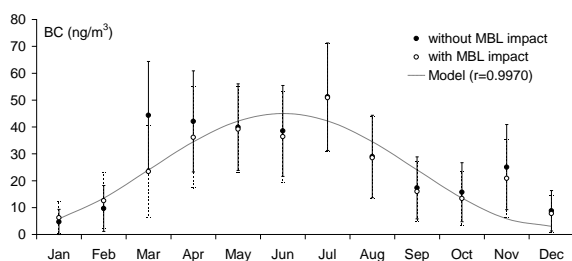


Figure 1. Black carbon variation.

The figure 2 presents the obtained dust variation throughout the time.

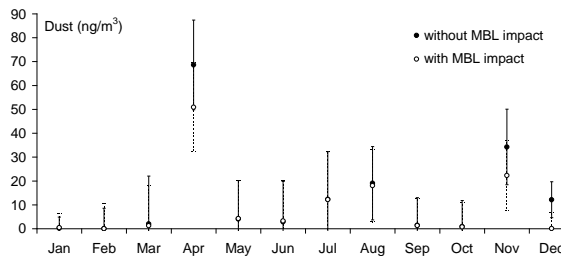


Figure 2. Dust variation

The BC average value is $27 \pm 16 \text{ ng}/\text{m}^3$ and $24 \pm 14 \text{ ng}/\text{m}^3$, without and with MBL, respectively.

The dust average value is $13 \pm 20 \text{ ng}/\text{m}^3$ and $10 \pm 15 \text{ ng}/\text{m}^3$, without and with MBL, respectively.

DISCUSSION

The BC mass concentration average value is in accordance with literature values for north of Atlantic (Jennings *et al.*, 1993). Without forgetting the winter sample limitations, consequence of the hard climatologically conditions, the BC variation throughout the time of year shows a sinusoidal behaviour in North Atlantic.

The dust mass concentration value is most variable according to the expected long transport Sahara dust events influence. April looks the richest month in this type of occurrences.

Keywords: Free tropospheric aerosols, North Atlantic

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