Aerosol optical properties at Santiago Island, Cape Verde

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EAC-2012 Granada European Aerosol Conference 2-7 Sept 2012

Introduction

> huge amounts of mineral dust are emitted every year from the Sahara desert to the atmosphere;

> optical parameters of mineral aerosols determine the direct interaction of solar and terrestrial radiation in the atmosphere through scattering and absorption;

> mineral dust has a great impact on cloud formation leading to additional indirect radiation effects;

> The dense haze from dust events is also known to affect visibility.

Aim

> the aim of this study was to contribute to a better characterization of the aerosols present over the Cape Verde islands using optical methods.

Experimental

> aerosol measurements were performed at the outskirts of Praia, Santiago Island, Cape Verde (14º55'N, 23º29'W, 98 m above sea level), between January 2011 and January 2012;

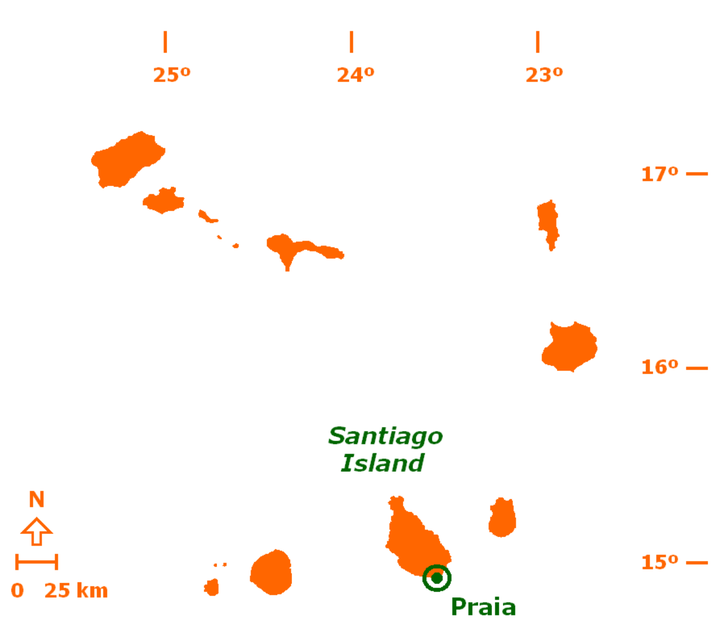

Figure 1. *Sampling site location at the Cape Verde Islands.*

> aerosol size distribution was measured with a GRIMM EDM164 optical dust monitor from 0.25 um to 32 µm in 31 channels;

> aerosol light absorption was measured with a Magee Scientific AE31 Aethalometer at seven wavelengthts (370, 470, 520, 590, 660, 880 and 950 nm).

Results & Discussion

> time variation of daily average $PM_{2.5}$, PM_{10} and TSP concentrations (Fig. 2) shows that the highest values were observed in January and February 2011, during periods of air mass transport from northern Africa, and the lowest during November 2011, under the influence of marine air masses;

> average $PM_{2.5}$, PM_{10} and TSP mass concentrations for the whole monitoring period were 18, 38 and 66 µg m^{-3}, respectively;

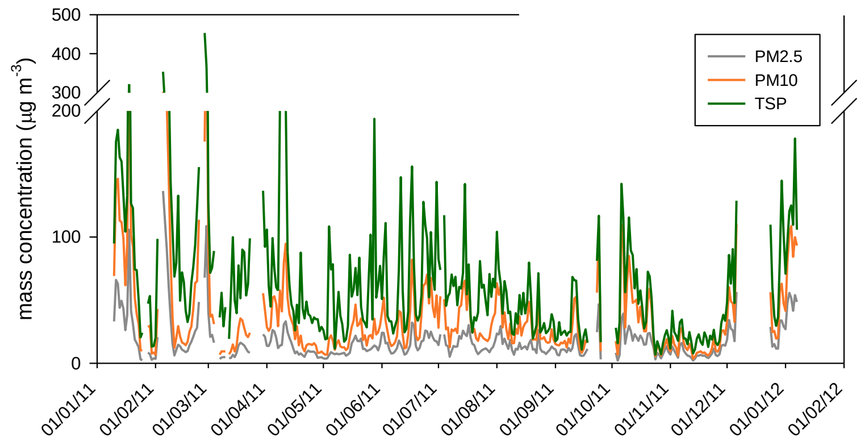

Figure 2. *Time variation of daily average $PM_{2.5}$, PM_{10} and TSP concentrations.*

> the seven wavelength spectra of the aerosol absoption coefficient during a period of strong dust advection (February) shows similar profiles but with different amplitudes of variation (Fig. 3);

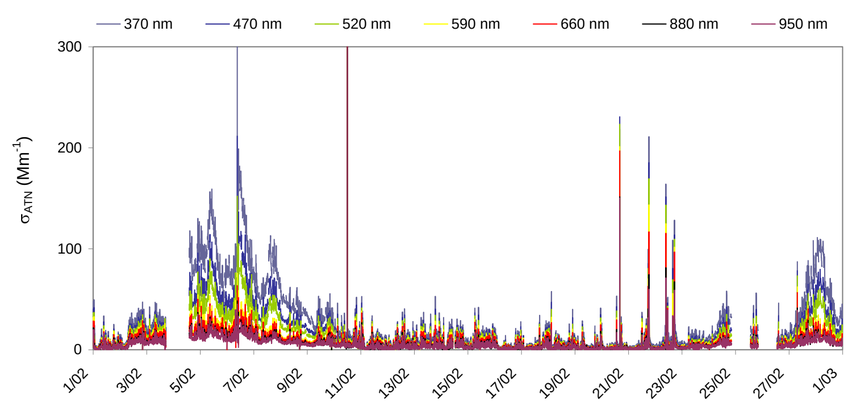

Figure 3. *Time variation of the aerosol absorption coefficients during February 2011.*

> the method described by Fialho et al. (2006) was used to determine the iron and black carbon contributions to aerosol mass (Fig. 4);

> deviations from spectral uniformity in Fig. 3 reflect the time variation of iron dust concentrations;

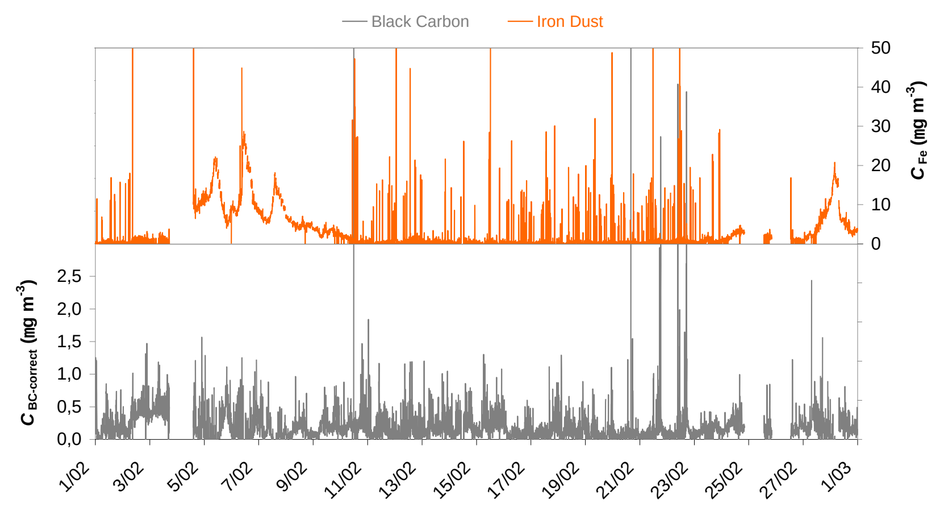

Figure 4. *Time variation of iron dust and black carbon concentrations during February 2011.*

Conclusions

> aerosol mass concentrations and aerosol absorption coefficients at Santiago Island were found to be strongly dependent on the origin of air masses;

> iron dust is a significant contributor to aerosol mass concentration during periods of air mass transport form northern Africa.

References

Fialho, P., Freitas, M.C., Barata, F., Vieira B., Hansen A.D.A., Honrath R.E. (2006) Journal of Aerosol Science, 37, 1497-1506.

Acknowledgements

This work was supported by the Portuguese Science Foundation (FCT) through the project PTDD/AAC-CLI/100331/2008 and FCOMP-01-0124-FEDER-008646 (CV-Dust) and by CESAM. J. Cardoso acknowledges the PhD grant SFRH-BD-6105-2009 from FCT.