

**Poster Session II. Atmospheric aerosols: elemental composition****AEROSOL COMPOSITION AT JABIRU, AUSTRALIA, AND IMPACT OF BIOMASS BURNING**W. MAENHAUT¹, M.-T. FERNÁNDEZ-JIMÉNEZ¹, J.L. VANDERZALM², B. HOOPER²,
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Keywords: atmospheric aerosols, aerosol source apportionment, biomass burning, Australia.

METHODS

From mid-May 1995 until December 1996 atmospheric aerosol samples were collected with a Gent PM10 stacked filter unit (SFU) sampler (Maenhaut *et al.*, 1994) at Jabiru (12°40'S, 132°53'E) in Kakadu National Park, Australia. The site is 240 km east of Darwin and about 60 km from the coast. The SFU sampler separates the aerosol in a coarse (2-10 µm equivalent aerodynamic diameter (EAD)) and a fine (<2 µm EAD) size fraction. The collection time per sample was typically 3 days. The coarse and fine filters (97 SFU samples) were analysed for the particulate mass (PM), black carbon (BC), and over 40 elements. The multielemental analyses were done by instrumental neutron activation analysis and particle-induced X-ray emission (Maenhaut *et al.*, 1996). Absolute principal component analysis (APCA) (Maenhaut and Cafmeyer, 1987) and chemical mass balance (CMB) receptor modelling techniques were used to identify the major aerosol components (source types) in each of the two size fractions and to apportion the PM and the various aerosol constituents to these components.

Table 1. Median concentrations (in ng/m³) of the particulate mass (PM), black carbon (BC), and 26 elements in the fine and coarse size fractions of 97 SFU samples collected at Jabiru, Australia, from mid-May 1995 until December 1996.

Variable	Fine	Coarse	Variable	Fine	Coarse
PM	4700	5700	Mn	0.32	2.2
BC	660	129	Fe	12.3	84
Na	166	480	Co	<0.015	0.034
Mg	40	123	Zn	0.72	0.82
Al	21	143	As	0.065	<0.09
Si	<100	259	Se	0.115	<0.18
P	<2	6.5	Br	2.8	<1.6
S	250	94	Sb	0.009	<0.015
Cl	8.8	610	I	1.06	0.24
K	73	63	Cs	0.010	0.017
Ca	11.8	65	La	<0.03	0.076
Sc	0.0033	0.024	Sm	0.0129	0.041
Ti	1.15	7.6	Pb	0.73	<0.5
V	0.075	0.23	Th	<0.019	0.029

RESULTS AND DISCUSSION

The median concentrations of PM, BC and 26 elements in the fine and coarse size fractions over the 19-month period are presented in Table 1. Fine PM (see Fig. 1), BC, K and some other elements (and to a lesser extent also Na) showed a seasonal variation with higher levels during June-November than in the rest of the year. The trends for the mineral dust elements and S did not exhibit such behaviour.

APCA on the fine size fraction data set identified 5 components, i.e., mineral dust, sea salt, and biomass burning (pyrogenic), pollution, and sulphate components. The sulphate component is most likely mainly from anthropogenic origin. For the CMB calculations on this same data set we used 4 source profiles, one for mineral dust, one for sea salt, one for pyrogenic aerosol (Maenhaut *et al.*, 1996), and a pure $(\text{NH}_4)_2\text{SO}_4$ profile. The pyrogenic component was responsible for around 60% of the total CMB-modeled fine PM during the period June-November, but it contributed less than 20% during January-April (see Fig. 1). During the latter period sulphate was the dominant aerosol type. The 4 profiles explained on average 83% of the experimental fine PM and there was no seasonal variability in this apportionment percentage. Part of the missing mass is likely attributable to biogenic organic aerosol and to nitrates.

For the CMB on the coarse data set 3 source profiles were used (i.e., the same ones as for the fine data with the exception of the pyrogenic profile). The 3-source solution explained on average 67% of the experimental coarse PM: 36% was attributed to mineral dust, 27% to sea salt and the remaining 4% to sulphates.

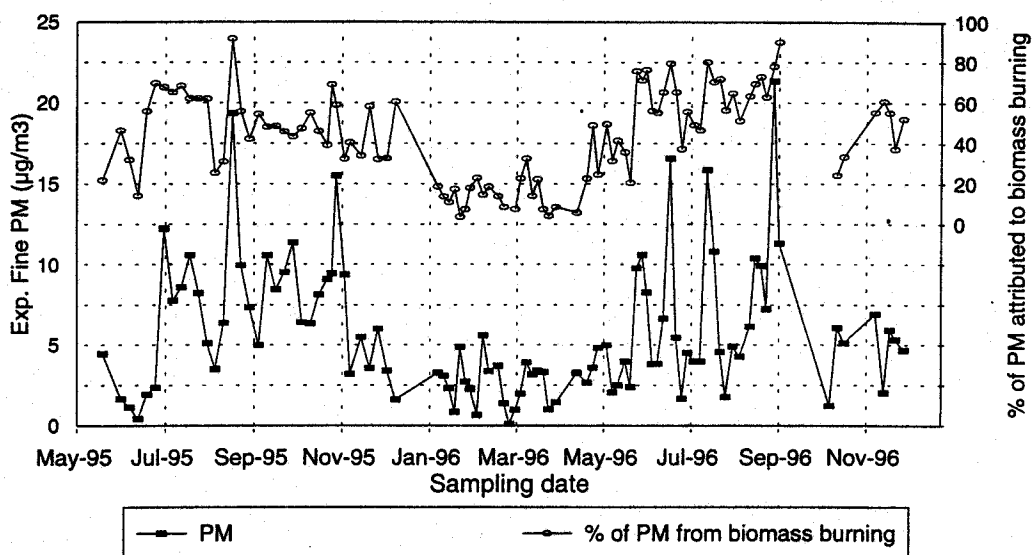


Fig. 1. Time trend of fine PM, and % contribution of pyrogenic aerosol to total CMB-modeled fine PM.

ACKNOWLEDGEMENTS

We gratefully acknowledge the financial support from the Belgian OSTC and the FWO-Vlaanderen.

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