

## Aerosol particle characteristics in a semi-clean savannah environment

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Despite some previous observations, in Africa combined long-term measurements of trace gas concentrations, aerosol particle mass concentrations and number size distributions (especially in ultrafine size range), air ion number size distributions and meteorological variables are practically non-existent, (Piketh et al., 2005; Laakso et al., 2008). We will describe here some preliminary results of 1.5 years measurements with a transportable measurement trailer (Petäjä et al., 2007) in a relatively clean savannah environment in Botsalano game reserve from the period 20 July 2006 to 30 January 2008.

The aerosol particle size distribution from 10 to 840 nm was measured using a DMPS system and air ion and charged particle distribution from 0.4 to 40 nm using an Air Ion Spectrometer. In addition to the measurements in the trailer 96-hour back-trajectories were calculated for each hour during the measurement period using HYSPLIT 4.8 model (Draxler and Hess, 2004). Satellite information on biomass burning was obtained from MODIS Thermal anomalies product (Kaufman et al., 2003).

New particle formation events were classified and formation and growth rates calculated according to Dal Maso et al. (2005). The strong and frequent – on 83% of days – new particle formation during morning hours is clearly visible in the averaged diurnal behaviour of the three-modal log-normal distribution fitted in the DMPS data, Figure 1.

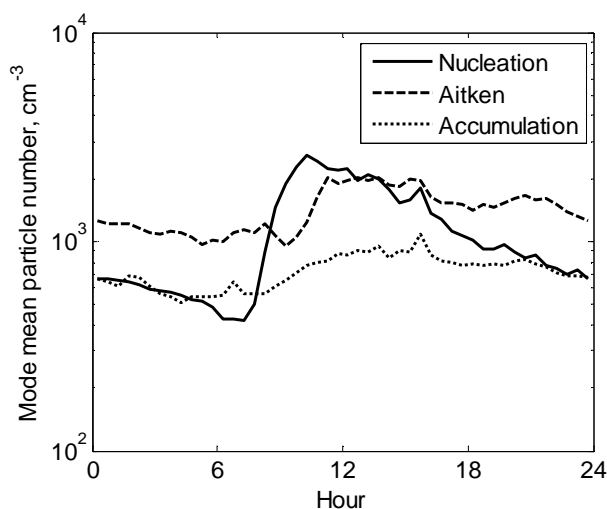


Figure 1 Averaged diurnal behaviour of fitted modal peak.

The average particle growth rate for particle size range 10-30 nm was  $9.2 \text{ nm h}^{-1}$  and average formation rate of 10nm particles,  $J_{10}$ ,  $4.7 \text{ cm}^{-3}\text{s}^{-1}$ . The average ion (or charged particle) growth rates for size ranges 1.5-3 nm, 3-7 nm and 7-20 nm were  $7.6 \text{ nm h}^{-1}$ ,  $10.1 \text{ nm h}^{-1}$ , and  $8.6 \text{ nm h}^{-1}$ , respectively. The average ion  $J_2$  was  $0.6 \text{ cm}^{-3}\text{s}^{-1}$ . Both DMPS and AIS growth rates show a weak minimum during winter and maximum at spring and summer, as do observations from other sites (Kulmala et al., 2004). The levels of growth rates and formation rates are among the highest observed in continental areas (Kulmala et al., 2004).

MODIS fire observations combined to measurements via back-trajectories indicate the fires to increase in the observed Aitken mode diameter from 56nm to 73nm and carbon monoxide concentration from 110 ppb to 150 ppb when average distance to 100 nearest fire observations along the trajectory was less than 50km.

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