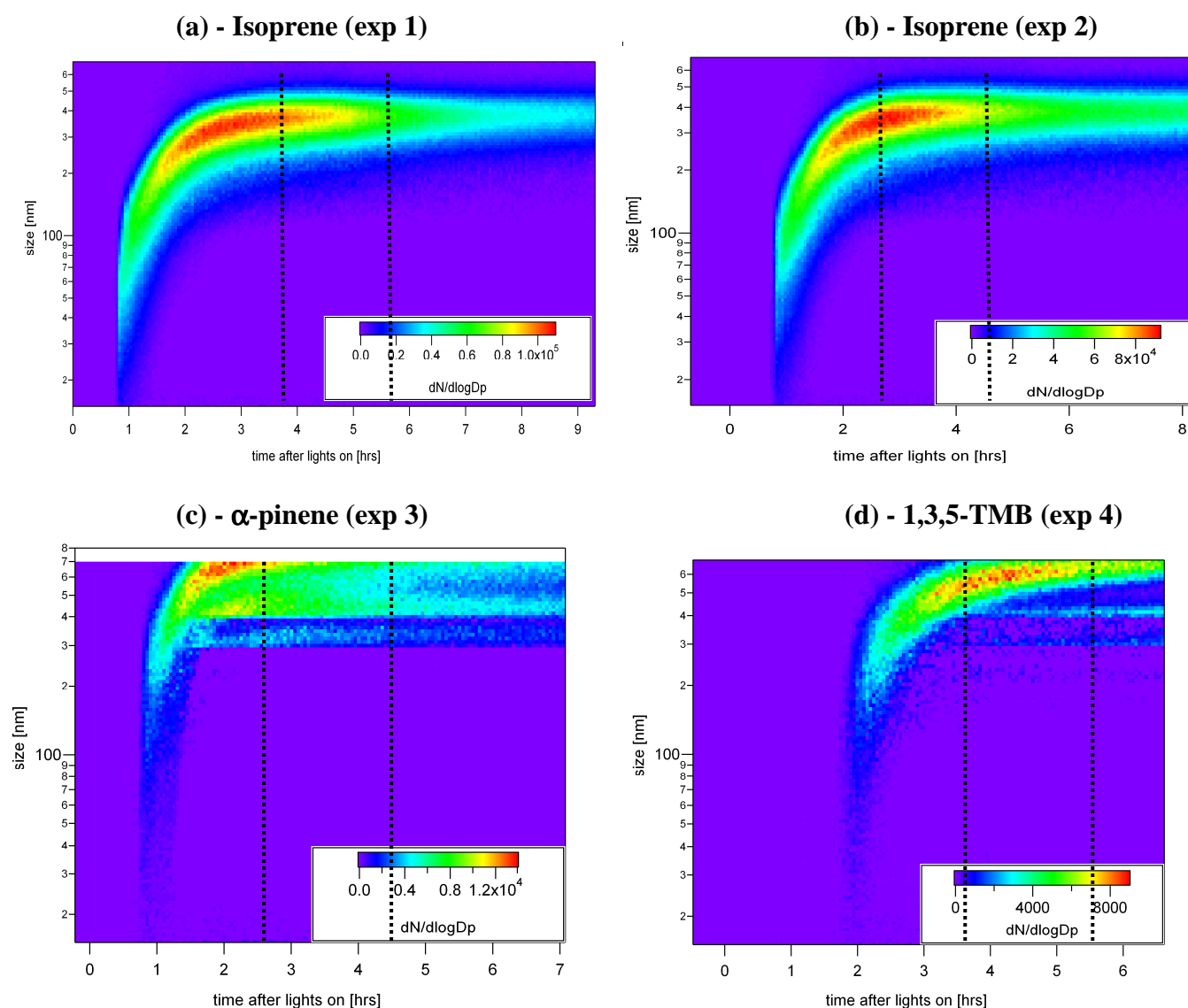
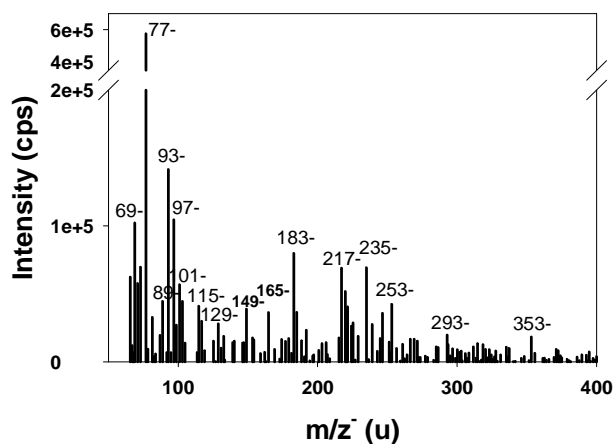


## Supplementary information



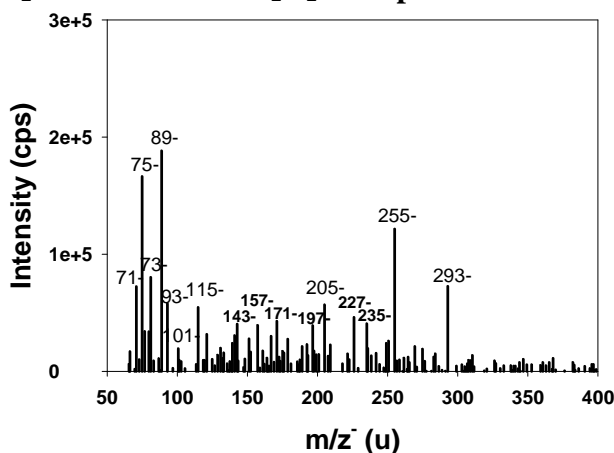
**Figure S1:** Evolution of the number size distribution (analyzed by SMPS) of the SOA formed in the smog chamber as a function of the reaction time during the gas-phase photooxidation of (a) and (b) isoprene (experiments 1 and 2), (c)  $\alpha$ -pinene (experiment 3) and (d) 1,3,5-TMB (experiment 4). The dashed lines indicate the filter sampling start and end times.

**“dark H<sub>2</sub>O<sub>2</sub>” – “control” samples: Ions’ formation**



**Figure S2** : Isoprene experiment (1). APCI-MS measurements (by direct infusion of liquid solutions, in the negative mode) of aqueous solutions. Mass spectra differences between “dark H<sub>2</sub>O<sub>2</sub>” samples and “control” samples which show the ions formed from dark oxidation by H<sub>2</sub>O<sub>2</sub> in the aqueous phase.

**“H<sub>2</sub>O<sub>2</sub> + h $\nu$ ” – “dark H<sub>2</sub>O<sub>2</sub>” samples: Ions’ formation**



**Figure S3** : Isoprene experiment (1). APCI-MS measurements (by direct infusion of liquid solutions, in the negative mode) of aqueous solutions. Mass spectra differences between “H<sub>2</sub>O<sub>2</sub> + h $\nu$ ” samples and “dark H<sub>2</sub>O<sub>2</sub>” samples which show the ions formed from OH-oxidation during the aqueous phase processing.