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Strong spectral dependence of light absorption by organic carbon particles formed by propane combustion

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Abstract. We have measured the extinction and absorption cross sections of carbon particles emitted by a propane diffusion flame both in an aerosol chamber and on size-segregated samples deposited on optical windows. The absorption cross section, the single scattering albedo, and the Ångström exponent show drastic dependencies both on the C/O ratio and on the particle size. This is interpreted as being due to the appearance of nucleation modes of smaller organic particles at higher C/O ratios, which were detected by SMPS measurements and partially by TEM analysis. The spectral range of the validity of the absorption power-law (Ångström exponent) model is investigated by vacuum ultraviolet extinction measurements. These measurements give also indications for a preferentially aromatic nature of the OC component of the flame products.

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