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Retrieving the aerosol extinction coefficient in broadband cavity-enhanced methods

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We present a spectral analysis procedure for broadband cavity-enhanced methods to retrieve the aerosol extinction coefficient at 687 nm. The method, which is based on the B-band absorption of molecular oxygen at this wavelength, exploits the fact that the high resolution absorption coefficient of oxygen is relatively constant, whereas the effective pathlength of the optical cavity decreases in the presence of aerosols. The unchanging molecular absorption coefficient of oxygen is used to compensate for fluctuations in the light source intensity with time. The influence of an overlapping absorption band of water vapour with the oxygen absorption band is also considered. Finally, we develop the analysis procedure to retrieve a broad extinction coefficient spectrum over the high reflectivity range of the cavity mirrors. Extinction data from several different experiments in the SAPHIR chamber are presented and discussed.