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Different wavelength evaluation ranges in the retrieval of trace gases with DOAS at the example of BrO

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Optical remote sensing via scattered sunlight Differential Optical Absorption Spectroscopy (DOAS) is routinely used to determine various trace gases in the atmosphere. Different applications and platforms (e.g. DOAS of volcanic plumes, Satellite measurements, Zenith DOAS or Max-DOAS) differ in measurement conditions, cross correlations of absorptions of different trace gases and their respective concentrations. Here, we present a method to determine the optimal evaluation range at the example of Bromine Oxide (BrO).
With strongest absorption features of BrO between 315nm - 360nm, its retrieval results can depend on cross correlations with strong absorbers like ozone (O_3) or sulfur dioxide (SO_2). Whereas O_3 influences especially satellite and stratospheric measurements, SO_2 cannot be neglected in the case of high volcanic gas emissions. Absorption features of both species are most pronounced at low wavelengths, but their diminished influence at higher wavelength ranges competes with a higher detection limit of BrO. The study is performed with both artificial and measured spectra of volcanic plumes, satellite and marine Max-DOAS measurements.