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Spectral classification of plants for satellite remote sensing

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DOAS (Differential Optical Absorbtion Spectroscopy) allows to determine the concentration of trace gases based on their specific absorptions cross-sections along a light path. Since 1995, this principle is employed successfully on satellite-based instruments like GOME, GOME-2 and SCIAMACHY for the global measurement of stratospheric and tropospheric trace gases like ozone and nitrogen oxides. Usually, spectral signatures from the ground, where a big part of the sunlight is reflected, are neglected in the evaluation. This can lead to errors in the trace gas determination. However, these structures offer the opportunity to identify surfaces of the earth and different types of vegetation.

To analyse this influence, high resolved reflection spectra (FWHM 0.29 nm) from plants and other materials were measured between 350 and 1050 nm. A classification was performed according to the biological systematics (subdivision, class, order, genus, unranked classification), distribution (continent, climate zone), photosynthesis mechanism (C3, C4, CAM) and environmental conditions. Results of these measurements and first applications are presented.