



**Time dependent tomography by balloon-borne spectroscopy: Profiling of UV/vis absorbing radicals by balloon-borne spectroscopic Limb measurements and implications for stratospheric photochemistry**

*Lena Kritten*

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## Time dependent tomography by balloon-borne spectroscopy: Profiling of UV/vis absorbing radicals by balloon-borne spectroscopic Limb measurements and implications for stratospheric photochemistry

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Nitrogen bearing compounds play an important role in catalytic loss of stratospheric ozone and will become even more important in future. Here balloon-borne limb measurements of the time and altitude dependent variation of O<sub>3</sub>, NO<sub>2</sub>, BrO and HONO are presented, providing new insight into the NO<sub>x</sub> and NO<sub>y</sub> photochemistry of the tropical upper troposphere, lower and middle stratosphere. A new method is discussed aiming at the retrieval of the diurnal variation of UV/vis absorbing radicals. The method employs spectroscopic measurements in combination with radiative transfer modeling and a mathematical inversion on a regularized time and height grid. The retrieval is tested by comparing the results to in-situ ozone sonding, simultaneous O<sub>3</sub>, NO<sub>2</sub> and BrO direct sun observations and to measurements of the ENVISAT/SCIAMACHY satellite instrument. The collected data are further explored to in-situ test photochemical parameters, critical for stratospheric ozone, exemplarily for the N<sub>2</sub>O<sub>5</sub> photolysis rate. Finally, first detection of HONO in the tropical upper troposphere is reported, and discussed in the context of NO<sub>x</sub> formation in thunderstorms.

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