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Balloon-borne limb profiling of UV/vis skylight radiances, O₃, NO₂, and BrO: technical set-up and validation of the method

F. Weidner¹, H. Bösch^{1,*}, H. Bovensmann³, J. P. Burrows³, A. Butz^{1,2}, C. Camy-Peyret², M. Dorf¹, K. Gerilowski³, W. Gurlit³, U. Platt¹, C. von Friedeburg¹, T. Wagner¹, and K. Pfeilsticker¹

¹Institut für Umweltphysik, University of Heidelberg, Heidelberg, Germany

²Laboratoire de Physique Moléculaire et Applications (LPMA), Université Pierre et Marie Curie, Paris, France

³Institut für Umweltphysik und Fernerkundung, University of Bremen, Bremen, Germany

* now at: Jet Propulsion Laboratory (JPL), Pasadena, USA

Abstract. A novel light-weight, elevation scanning and absolutely calibrated UV/vis spectrometer and its application to balloon-borne limb radiance and trace gas profile measurements is described. Its performance and the novel method of balloon-borne UV/vis limb trace gas measurements has been tested against simultaneous observations of the same atmospheric parameters available from either (a) in-situ instrumentation (cf., by an electrochemical cell (ECC) ozone sonde also deployed aboard the gondola) or (b) trace gas profiles inferred from UV/vis/near IR solar occultation measurements performed on the same payload. The novel technique is also cross validated with radiative transfer modeling. Reasonable agreement is found (a) between measured and simulated limb radiances and (b) inferred limb O₃, NO₂, and BrO and correlative profile measurements when properly accounting for all relevant atmospheric parameters (temperature, pressure, aerosol extinction, and major absorbers).

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