

Home

Online Library ACP

- Recent Final Revised Papers
- Volumes and Issues**
- Special Issues
- Library Search
- Title and Author Search

Online Library ACPD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper



Volumes and Issues Contents of Issue 15

Atmos. Chem. Phys., 7, 4117-4131, 2007
www.atmos-chem-phys.net/7/4117/2007/

© Author(s) 2007. This work is licensed under a Creative Commons License.

Comparison and synergy of stratospheric ozone measurements by satellite limb sounders and the ground-based microwave radiometer SOMORA

K. Hocke¹, N. Kämpfer¹, D. Ruffieux², L. Froidevaux³, A. Parrish⁴, I. Boyd⁴, T. von Clarmann⁵, T. Steck⁵, Y. M. Timofeyev⁶, A. V. Polyakov⁶, and E. Kyrölä⁷

¹Institute of Applied Physics, University of Bern, Switzerland

²MeteoSwiss, Payerne, Switzerland

³Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA

⁴University of Massachusetts, USA

⁵Institut für Meteorologie und Klimaforschung, Forschungszentrum Karlsruhe und Universität Karlsruhe, Germany

⁶Department of Atmospheric Physics, St. Petersburg State University, Russia

⁷Finnish Meteorological Institute, Helsinki, Finland

Abstract. Stratospheric O₃ profiles obtained by the satellite limb sounders Aura/MLS, ENVISAT/MIPAS, ENVISAT/GOMOS, SAGE-II, SAGE-III, UARS/HALOE are compared to coincident O₃ profiles of the ground-based microwave radiometer SOMORA in Switzerland. Data from the various measurement techniques are within 10% at altitudes below 45 km. At altitudes 45–60 km, the relative O₃ differences are within a range of 50%. Larger deviations at upper altitudes are attributed to larger relative measurement errors caused by lower O₃ concentrations. The spatiotemporal characteristics of the O₃ differences (satellite – ground station) are investigated by analyzing about 2300 coincident profile pairs of Aura/MLS (retrieval version 1.5) and SOMORA. The probability density function of the O₃ differences is represented by a Gaussian normal distribution. The dependence of the O₃ differences on the horizontal distance between the sounding volumes of Aura/MLS and SOMORA is derived. While the mean bias (Aura/MLS – SOMORA) is constant with increasing horizontal distance (up to 800 km), the standard deviation of the O₃ differences increases from around 8 to 11% in the mid-stratosphere. Geographical maps yield azimuthal dependences and horizontal gradients of the O₃ difference field around the SOMORA ground station. Coherent oscillations of O₃ are present in the time series of Aura/MLS and SOMORA (e.g., due to traveling planetary waves). Ground- and space-based measurements often complement one another. We discuss the double differencing technique which allows both the cross-validation of two satellites by means of a ground station and the cross-validation of distant ground stations by means of one satellite. Temporal atmospheric noise in the geographical ozone map over Payerne is significantly reduced by combination of the data from SOMORA and Aura/MLS. These analyses illustrate the synergy of ground-based and space-based measurements.

Final Revised Paper (PDF, 3522 KB) Discussion Paper (ACPD)



Search ACP

Library Search

Author Search

News

- Sister Journals AMT & GMD
- Financial Support for Authors
- Journal Impact Factor
- Public Relations & Background Information

Recent Papers

01 | ACPD, 16 Dec 2008: Single ice crystal measurements during nucleation experiments with the depolarization detector IODE

02 | ACPD, 16 Dec 2008: All weather IASI single field-of-view retrievals: case study – validation with JAIVEx data

03 | ACPD, 16 Dec 2008: The impact of weather and atmospheric circulation on O₃ and PM₁₀ levels at a mid-latitude site

Citation: Hocke, K., Kämpfer, N., Ruffieux, D., Froidevaux, L., Parrish, A., Boyd, I., von Clarmann, T., Steck, T., Timofeyev, Y. M., Polyakov, A. V., and Kyrölä, E.: Comparison and synergy of stratospheric ozone measurements by satellite limb sounders and the ground-based microwave radiometer SOMORA, *Atmos. Chem. Phys.*, 7, 4117-4131, 2007. [Bibtex](#) [EndNote](#) [Reference Manager](#)