Atmospheric Chemistry and Physics
An Interactive Open Access Journal of the European Geosciences Union

Atmos. Chem. Phys., 8, 3169-3183, 2008
www.atmos-chem-phys.net/8/3169/2008/

Validation of stratospheric water vapour measurements from the airborne microwave radiometer AMSOS

S. C. Müller[1], N. Kämpfer[1], D. G. Feist[2], A. Haefele[1], M. Milz[3,*], N. Sitnikov[4], C. Schiller[5], C. Kiemle[6], and J. Urban[7]
[1]University of Bern, Bern, Switzerland
[2]Max-Planck-Institute for Biogeochemistry, Jena, Germany
[3]Institut für Meteorologie und Klimaforschung, Karlsruhe, Germany
[4]Central Aerological Observatory, Moscow Region, Russia
[5]Forschungszentrum Jülich GmbH, Jülich, Germany
[6]DLR, Institut fuer Physik der Atmosphaere, Oberpfaffenhofen, Germany
[7]Chalmers University of Technology, Göteborg, Sweden
[*]now at: Luleå Technical University, Kiruna, Sweden

Abstract. We present the validation of a water vapour dataset obtained by the Airborne Microwave Stratospheric Observing System AMSOS, a passive microwave radiometer operating at 183 GHz. Vertical profiles are retrieved from spectra by an optimal estimation method. The useful vertical range lies in the upper troposphere up to the mesosphere with an altitude resolution of 8 to 16 km and a horizontal resolution of about 57 km. Flight campaigns were performed once a year from 1998 to 2006 measuring the latitudinal distribution of water vapour from the tropics to the polar regions. The obtained profiles show clearly the main features of stratospheric water vapour in all latitudinal regions. Data are validated against a set of instruments comprising satellite, ground-based, airborne remote sensing and in-situ instruments. It appears that AMSOS profiles have a dry bias of 0 to –20%, when compared to satellite experiments. Also a comparison between AMSOS and in-situ hygrosondes FISH and FLASH have been performed. A matching in the short overlap region in the upper troposphere of the lidar measurements from the DIAL instrument and the AMSOS dataset allowed water vapour profiling from the middle troposphere up to the mesosphere.

Final Revised Paper (PDF, 2294 KB) Discussion Paper (ACPD)

Citation: Müller, S. C., Kämpfer, N., Feist, D. G., Haefele, A., Milz, M., Sitnikov, N., Schiller, C., Kiemle, C., and Urban, J.: Validation of stratospheric water vapour measurements from the airborne microwave radiometer AMSOS, Atmos. Chem. Phys., 8, 3169-3183, 2008. Bibtex EndNote Reference Manager