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

Atmos. Chem. Phys., 5, 451-459, 2005
www.atmos-chem-phys.net/5/451/2005/

A practical demonstration on AMSU retrieval precision for upper tropospheric humidity by a non-linear multi-channel regression method

C. Jiménez[1], P. Eriksson[2], V. O. John[3], and S. A. Buehler[3]
[1]School of GeoSciences, The University of Edinburgh, Edinburgh, UK
[2]Department of Radio and Space Science, Chalmers University of Technology, Gothenburg, Sweden
[3]Institute of Environmental Physics, University of Bremen, Bremen, Germany

Abstract. A neural network algorithm inverting selected channels from the Advance Microwave Sounding Unit instruments AMSU-A and AMSU-B was applied to retrieve layer averaged relative humidity. The neural network was trained with a global synthetic dataset representing clear-sky conditions. A precision of around 6% was obtained when retrieving global simulated radiances, the precision deteriorated less than 1% when real mid-latitude AMSU radiances were inverted and compared with co-located data from a radiosonde station. The 6% precision outperforms by 1% the reported precision estimate from a linear single-channel regression between radiance and weighting function averaged relative humidity, the more traditional approach to exploit AMSU data. Added advantages are not only a better precision; the AMSU-B humidity information is more optimally exploited by including temperature information from AMSU-A channels; and the layer averaged humidity is a more physical quantity than the weighted humidity, for comparison with other datasets. The training dataset proved adequate for inverting real radiances from a mid-latitude site, but it is limited by not considering the impact of clouds or surface emissivity changes, and further work is needed in this direction for further validation of the precision estimates.

Final Revised Paper (PDF, 443 KB) Discussion Paper (ACPD)

Citation: Jiménez, C., Eriksson, P., John, V. O., and Buehler, S. A.: A practical demonstration on AMSU retrieval precision for upper tropospheric humidity by a non-linear multi-channel regression method, Atmos. Chem. Phys., 5, 451-459, 2005. Bibtex EndNote Reference Manager