

[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](#)

Impact
Factor
4.865

ISI
indexed

[Volumes and Issues](#) [Contents of Issue 18](#)

Atmos. Chem. Phys., 8, 5715-5729, 2008

www.atmos-chem-phys.net/8/5715/2008/

© Author(s) 2008. This work is distributed

under the Creative Commons Attribution 3.0 License.

Hygroscopicity of the submicrometer aerosol at the high-alpine site Jungfraujoch, 3580 m a.s.l., Switzerland

S. Sjogren¹, M. Gysel¹, E. Weingartner¹, M. R. Alfarra¹, J. Duplissy¹, J. Cozic¹, J. Crosier², H. Coe², and U. Baltensperger¹¹Laboratory of Atmospheric Chemistry, Paul Scherrer Institut, 5232 Villigen, Switzerland²School of Earth, Atmospheric and Environmental Science, University of Manchester, Manchester, UK

Abstract. Data from measurements of hygroscopic growth of submicrometer aerosol with a hygroscopicity tandem differential mobility analyzer (HTDMA) during four campaigns at the high alpine research station Jungfraujoch, Switzerland, are presented. The campaigns took place during the years 2000, 2002, 2004 and 2005, each lasting approximately one month. Hygroscopic growth factors (GF , i.e. the relative change in particle diameter from dry diameter, D_0 , to diameter measured at higher relative humidity, RH) are presented for three distinct air mass types, namely for: 1) free tropospheric winter conditions, 2) planetary boundary layer influenced air masses (during a summer period) and 3) Saharan dust events (SDE). The GF values at 85% RH ($D_0=100$ nm) were 1.40 ± 0.11 and 1.29 ± 0.08 for the first two situations while for SDE a bimodal GF distribution was often found. No phase changes were observed when the RH was varied between 10–90%, and the continuous water uptake could be well described with a single-parameter empirical model. The frequency distributions of the average hygroscopic growth factors and the width of the retrieved growth factor distributions (indicating whether the aerosol is internally or externally mixed) are presented, which can be used for modeling purposes.

Measurements of size resolved chemical composition were performed with an aerosol mass spectrometer in parallel to the GF measurements. This made it possible to estimate the apparent ensemble mean GF of the organics (GF_{org}) using inverse ZSR (Zdanovskii-Stokes-Robinson) modeling. GF_{org} was found to be ~ 1.20 at $a_w=0.85$, which is at the upper end of previous laboratory and field data though still in agreement with the highly aged and oxidized nature of the Jungfraujoch aerosol.

[Final Revised Paper](#) (PDF, 2573 KB) [Discussion Paper](#) (ACPD)

Citation: Sjogren, S., Gysel, M., Weingartner, E., Alfarra, M. R., Duplissy, J., Cozic, J., Crosier, J., Coe, H., and Baltensperger, U.: Hygroscopicity of the submicrometer aerosol at the high-alpine site Jungfraujoch, 3580 m a.s.l., Switzerland, Atmos. Chem. Phys., 8, 5715-5729, 2008. [Bibtex](#) [EndNote](#) [Reference Manager](#)

[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 | ACP, 20 Nov 2008:
Determination of the evaporation coefficient of D_2O

02 | ACPD, 19 Nov 2008:
Methyl chavicol: characterization of its biogenic emission rate, abundance, and oxidation products in the atmosphere

03 | ACPD, 19 Nov 2008:
Synoptic influences on springtime tropospheric O_3 and CO over the North American export region observed by TES

