

[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
4.865ISI
indexed[Volumes and Issues](#) [Contents of Issue 1](#)

Atmos. Chem. Phys., 7, 107-119, 2007

www.atmos-chem-phys.net/7/107/2007/

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

The water vapour distribution in the Arctic lowermost stratosphere during the LAUTLOS campaign and related transport processes including stratosphere-troposphere exchange

A. Karpechko¹, A. Lukyanov², E. Kyrö¹, S. Khaikin², L. Korshunov², R. Kivi¹, and H. Vömel³¹Finnish Meteorological Institute, ARC, Sodankylä, Finland²Central Aerological Observatory, Moscow, Russia³Cooperative Institute for Environmental Sciences, University of Colorado, Boulder, USA

Abstract. Balloon-borne water vapour measurements during January and February 2004, which were obtained as part of the LAUTLOS campaign at Sodankylä, Finland, 67° N, were used to analyse the water vapour distribution in the wintertime Arctic lowermost stratosphere. A 2.5 km thick layer (or 30 K in the potential temperature scale) above the tropopause is characterized by a significant water vapour variability on a synoptic timescale with values between stratospheric and tropospheric, which is in good agreement with previously reported measurements. A cross-correlation analysis of ozone and water vapour confirms that this layer contains a mixture of stratospheric and tropospheric air masses. Some of the flights sampled laminae of enhanced water vapour above the tropopause. Meteorological analyses and backward trajectory calculations show that these features were related to filaments that had developed along the flanks of cut-off anticyclones, which had been active at this time over the Northern Atlantic. The role of the filaments was however not to transport water vapour from the troposphere to the stratosphere but rather to transport it within the stratosphere away from regions where intensive two-way stratosphere-troposphere exchange (STE) was identified. Intensive STE occurred around cut-off anticyclones in regions of strong winds, where calculations suggest the presence of clear-air turbulence (CAT). Evidences that CAT contributes to the troposphere-to-stratosphere transport (TST) are presented. However, statistically, relation between TST and CAT during the studied period is weak.

[Final Revised Paper](#) (PDF, 3857 KB) [Discussion Paper](#) (ACPD)

Citation: Karpechko, A., Lukyanov, A., Kyrö, E., Khaikin, S., Korshunov, L., Kivi, R., and Vömel, H.: The water vapour distribution in the Arctic lowermost stratosphere during the LAUTLOS campaign and related transport processes including stratosphere-troposphere exchange, Atmos. Chem. Phys., 7, 107-119, 2007. [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 | ACPD, 27 Nov 2008: Estimates of mercury flux into the United States from non-local and global sources: results from a 3-D CTM simulation

02 | ACP, 27 Nov 2008: Modeling the effect of plume-rise on the transport of carbon monoxide over Africa with NCAR CAM

03 | ACP, 27 Nov 2008: Technical Note: Quantification of interferences of wet chemical HONO LOPAP measurements under simulated polar