

Interactive comment on “Statistics of vertical velocities in supercooled cloud layers over Leipzig and Praia measured with Doppler lidar” by Johannes Bühl et al.

Johannes Bühl et al.

buehl@tropos.de

Received and published: 29 June 2017

Dear Referees and Editors,

We appreciate the unconcealed review provided for our manuscript. The main point of the critics points to the fact that we emphasize a potential relationship between vertical motion and ice formation. In fact, the manuscript is supposed to 'just' provide a study that compares regional differences in vertical air motions in mid-level stratiform clouds (which is barely available to date). We did not aim on providing full conclusions on the effect of the air motion on the microphysical properties of the cloud layer which might, however, be part of future studies. Similar studies have been presented, e.g. by Hill et

C1

al. (2014) but they could only rely on very limited information about the actual vertical velocity statistics. This why we think that it is important to show the basic statistics of vertical motions in mixed-phase cloud layers.

We also want to make clear that we do not suspect a potential (and theoretically unjustified) relationship between ice nucleation and vertical air motions. We used the term “ice formation” to identify the complete process from ice nucleation via ice particle growth to sedimentation of the ice particles which has been shown to be strongly dependent on vertical motions, e.g., by Korolev and Field (2008). We can only suspect that the title of the UDINE study (Up- and Downdrafts in drop and Ice Nucleation Experiment) might have been misleading in this context.

We thus suggest that we will modify the manuscript by means of a major revision: We will better define with the term “ice formation” and straighten our motivation to the question about general comparability of vertical air motion in tropical and midlatitudinal mid-level clouds. The updated introduction will contain a condensed review of the potential effects of vertical air motion on cloud microphysical properties. The conclusions will concentrate on the found similarity in the vertical velocity distributions that is actually shown for the first time.

Yours sincerely,

Johannes Bühl and coauthors.

References used in this reply:

Hill, A. A., Field, P. R., Furtado, K., Korolev, A. and Shipway, B. J. (2014), Mixed-phase clouds in a turbulent environment. Part 1: Large-eddy simulation experiments. *Q.J.R. Meteorol. Soc.*, 140: 855–869. <https://doi.org/10.1002/qj.2177>

Korolev, A. and Field, P.R. (2008), The Effect of Dynamics on Mixed-Phase Clouds: Theoretical Considerations. *J. Atmos. Sci.*, 65, 66–86, <https://doi.org/10.1175/2007JAS2355.1>

C2

