

***Interactive comment on “The Eyjafjallajökull eruption in April 2010 – detection of volcanic plume using in-situ measurements, ozone sondes and a new generation ceilometer network” by H. Flentje et al.***

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Received and published: 8 October 2010

Following the suggestions of both reviewers, the measurements of the DWD ceilometer network are in this paper only used in a qualitative manner to detect and follow the ash layers directly and in relation to in-situ measurements at the Zugspitze/Hohenpeissenberg stations. The quantification of extinction coefficients and mass concentrations is now discussed only in the AMTD papers by "Flentje et al, 2010" and "Heese et al, 2010".

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Abstract should shortly presented what has been done and results. - The abstract was revised to focus on the topics of this manuscript.

Page 14948 line 11: " emissions " probably plume is better - Abstract was rewritten.

Page 14948, line 13-14: .."aerosol extinction coefficients and particle mass concentration were finally obtained. This is not shown in this paper. As reported at page 14953 line11-13 this is a result reported and discussed in Flentje et al 2010 AMTD. This cannot be a result also of this paper. - We agree that retrieval details are provided in another paper. We think however that it is not misleading (with respect to the content of this paper), to mention that the ceilometers were used for this purpose. In fact we show later corresponding results which confirm our in-situ measurements and provide the reference to the second paper (which should have been the first one "on stage").

Page 14949 lines12-17: a short description of evolution of the plume is described here as already known before this study. - To our knowledge there is no such description found earlier in a scientific paper, except for our own paper in AMTD (Flentje et al., 2010). Topical reports about DLR's Falcon aircraft flights, meanwhile published in ACPD by Schumann et al., refer to the situation after April 19th. Data from the lidar networks and the CALIOP instrument are spatially too sparse to provide a coherent overview. We therefore consider it adequate to briefly describe here what happened, in order to better understand our measurements and results. We added references to the AMTD papers.

Page 14950 line 2: the extinction coefficient detection limit is unclear to me. - The paragraph about the extinction retrieval has been withdrawn. Details can be found in the AMTD paper by "Flentje et al, 2010".

Page14953: figure 1 is not readable. - We removed this figure from the paper. Indeed, captions weren't readable and also rev#1 recommended updating this figure in the same manner as now done in "Flentje et al., 2010".

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Page 14593, lines 10-12: see my comments reported for the abstract - The inversion of the ceilometer profiles is described in the AMTD paper by "Flentje et al. 2010" and only cited here. In this paper, we focus on what happened at the GAW twin-station Zugspitze/Hohenpeissenberg.

Page 14953-14954: it would be much better for the reader to have a map reported measurements sites, both ceilometers, in situ and so on, otherwise it is very difficult to understand evolution and possible correlation with the different measurements - It is not clear to us what is meant by "map". As we focus on only two in-situ measurement sites here, we decided to provide a table of the measurements and their deviations to typical conditions as a function of parameter and time (Table 1).

Page 14954, line 12: why the SO<sub>2</sub> is enhanced by anthropogenic pollution in April 2010 ? - Presumably yes, since enhanced SO<sub>2</sub> values with typically lower absolute values are seen frequently at Hohenpeissenberg depending on the synoptic situation. Typically, emissions from coal mining areas in Poland and the Czech Republic are observed at Hohenpeissenberg, as well as SO<sub>2</sub> plumes from the Po Valley area. According to backward trajectories, air masses from North-Easterly direction reached HP on April 16 pointing to the above-mentioned coal mining and heavy industrialised regions in east Europe.

Page 14955, line 2: include references - Paragraph was rewritten.

Page 14955, line 9: at larger distances probably also small particles are expected, please report this in the paper. - We would also have expected enhanced concentrations of smaller particles but our in-situ measurements (both OPC and SMPS) did not register abnormally high concentrations of sub-micron particles through all the days when the ash air mass resided in the PBL over southern Germany. Estimated sedimentation of sub-micron particles would have been negligible within the 2 days the ash moved from Iceland to the Alps. It seems that smaller particles weren't generated. The dominance of the coarse fraction corresponds to the findings of Rose and Durant, 2009

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which was added to the references and matches also the results from other research groups (e.g. DLR flights of the Falcon aircraft).

Page 14956, line 20: which kind of conclusions authors have about figure8 - Paragraph was rewritten.

Conclusions in the present shape state something not shown in any part of the paper, namely the capability to forecast when the legal flight ban threshold is imminent to be exceeded. This would be of great relevance, but unfortunately there is nothing in the paper showing this result. - We agree; this statement was withdrawn from the conclusions as it follows from the quantitative evaluation of the ceilometer profiles which is on request of both reviewers disentangled and now discussed in the AMTD companion paper by Flentje et al. 2010.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 10, 14947, 2010.

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