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Interactive comment on "The operational eEMEP model for volcanic SO_2 and ash forecasting" *by* Birthe Marie Steensen et al.

M. Wiegner

m.wiegner@lmu.de

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The presentation of the current state of the eEMEP model and its benefit to describe the dispersion of volcanic ash is certainly quite interesting. In particular the attempt to validate an operational model by means of lidar measurements is appreciated – the Eyjafjallajökull eruption is a very good opportunity as the evolution of the ash layer was very well documented. Consequently, there are already numerous papers on this event, some of which pursues similar scientific objectives as Steensen et al.'s manuscript (henceforward referred to as "this paper") i.e. the comparison of model results and observations.

With this short comment I want to suggest to better emphasizing the previous work on this topic. It can be acknowledged in the introduction and in section 4; the latter can

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easily be extended to avoid the impression that studies beyond the "Norwegian ash project" (page 11, line 4) are more or less lacking.

Modelling studies related to lidar observations

In excess of the two references in this paper (page 2, lines 30ff) further applications of Eulerian models, which were compared to lidar measurements, include:

- WRF-Chem was used by Webley et al. (2012). Results were e.g. compared to different ash related parameters derived from spaceborne platforms like SEVIRI and Calipso and ground based lidar measurements at Maisach.
- MCCM was used by Emeis et al. (2011) to investigate the transport of ash during the first few days after the eruption. Validation was provided by measurements of the German ceilometer network – a unique opportunity due to its outstanding spatial coverage and resolution.
- COSMO-ART was used by Vogel et al. (2014). They compared the particle number density with in-situ measurements at Hohenpeißenberg and made a qualitative consistency check with lidar measurements at Maisach (Munich).

Lidar measurements

Wiegner et al. (2012) described the ash distribution for the same episode covered by this paper. The potential of ground based lidar- and ceilometer measurements was demonstrated and a very good agreement with measurements in Munich and Maisach was found. The comparisons were based on mass concentration profiles. The procedure to estimate mass concentration from lidar backscatter profiles was explained, revealing a complicated inversion because the conversion factors (backscatter → extinction → mass concentration) depend on the microphysics of the particles. Nevertheless we had chosen this way to provide a direct and quantitative intercomparison

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including estimates of the uncertainty. Our measurements at Maisach ("Munich") are also considered in this paper. An extension to a larger spatial area was performed in the above mentioned companion paper by Emeis et al., (2011).

Sidenote

The EARLINET site "Munich" is in fact "Maisach" (25 km north west of Munich). It is operated by the Ludwig-Maximilians-Universität, Munich; this may be the reason that it is often labeled as "Munich".

References

- Emeis, S., Forkel, R., Junkermann, W., Schäfer, K., Flentje, H., Gilge, S., Fricke, W., Wiegner, M., Freudenthaler, V., Groß, S., Ries, L., Meinhardt, F., Birmili, W., Münkel, C., Obleitner, F., and Suppan, P.: Measurement and simulation of the 16/17 April 2010 Eyjafjallajökull volcanic ash layer dispersion in the northern Alpine region, Atmos. Chem. Phys., 11, 2689-2701, doi:10.5194/acp-11-2689-2011, 2011.
- Vogel, H., Förstner, J., Vogel, B., Hanisch, T., Mühr, B., Schättler, U., and Schad, T.: Time-lagged ensemble simulations of the dispersion of the Eyjafjallajökull plume over Europe with COSMO-ART, Atmos. Chem. Phys., 14, 7837-7845, doi:10.5194/acp-14-7837-2014, 2014.
- Webley, P. W., Steensen, T., Stuefer, M., Grell, G., Freitas, S., and Pavolonis, M.: Analyzing the Eyjafjallajökull 2010 eruption using satellite remote sensing, lidar and WRF-Chem dispersion and tracking model, J. Geophys. Res., 117, D00U26, doi:10.1029/2011JD016817, 2012.
- Wiegner, M., J. Gasteiger, S. Groß, F. Schnell, V. Freudenthaler, and R. Forkel: Characterization of the Eyjafjallajökull ash-plume: Potential of lidar

remote sensing, Physics and Chemistry of the Earth 45–46, 79–86, doi: 10.1016/j.pce.2011.01.006, 2012.

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