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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influences of the 2010 Eyjafjallajökull volcanic plume on air quality in the northern Alpine region" *by* K. Schäfer et al.

Anonymous Referee #2

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This paper represents a thorough description of the Eyjafjallajökull plume detected in the Northern Alpine region. It also provides an illustrative overview on the joint measurement activities undertaken in the Austrian and German Alps. There is a strong focus on the discussion of the meteorological conditions and the spatiotemporal dispersion of the volcanic aerosol plume. Furthermore, relevant aerosol data (PM mass concentrations and chemical composition, number concentrations) as well as SO2 concentrations are described in detail, in order to characterize the volcanic plume in the designated study area.

The manuscript is scientifically sound and fits perfectly in this ACP special issue. I recommend it for publication in ACP after considering some structural corrections and minor other issues listed in the following.

Structure and length of the manuscript: While the text is well written and very informative, the manuscript is in my opinion partially somewhat too narrative or unfocused. The manuscript is structured into 'Results of observations and interpretation' (Sect. 4), 'Synthesis and Discussion' (Sect. 5) and 'Conclusions' (Sect 6). While I see the point that the large amount of information needs to be suitably summarized in the end, there are considerable repetitions in the way the text is presented now. I think the manuscript could be shortened to some extent without losing any relevant information. Here are some suggestions:

Introduction: The first paragraph introduces stratospheric volcano plumes. However, Eyjafjallajökull emitted mainly into the upper troposphere, so why don't' you mention this instead?

Health effects: While I absolutely agree that a discussion on possible health effects of volcanic aerosol is highly interesting, the discussion of this aspect (e.g. already in the abstract) is too prominent in this paper, which does not present health effect studies but focuses on the description field observations. Therefore I think chapter 5.2 should be omitted and replaced with a few sentences stating that toxicological studies are underway and will be described in forthcoming publications.

Sect 4.2, last two paragraphs: This information should be moved to the beginning of the section, where the chemical transformation pathway of SO2 to sulfate is already introduced. I suggest describing this pathway once, and then referring to this section in the further discussion.

Wet deposition, Section 4.4.4.: You state in your last sentence that in summary the wet deposition analysis did not provide information on the volcanic influence on the air composition. Therefore I think the Section should be omitted or significantly shortened, because it does not add information with respect to the scope of the study.

Section 5, page 9107, lines 7-22. This is repetition from Section 4.

Other remarks:

Page 9097, line 25/26 and page 9102, lines 20-27: Is there no significant increase because the background of the accumulation mode is high? I assume that the volcano related ultrafine particles will coagulate and grow into the accumulation mode. This is what you in fact mention on page 9102, lines 20-27 ('small increase'), but this is somewhat inconsistent with your phrasing in the rest of the manuscript ('no significant increase'). Please use a consistent wording.

Sect. 4.4.3. The title is 'ultrafine particle' but then you describe optical properties. Please change the title accordingly.

Figures: I realize that in ACPD, these figures which are intended as 'ACP two column figures' appear too small. Nevertheless I suggest increasing the font size in the figures for better readability.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 9083, 2011.