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

K. Schäfer et al.

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We thank the referee no. 2 for the constructive comments to our paper. We answer during the interactive discussion with the following and repeat the referee statements first.

“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.” We agree

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with this and are thankful for the 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?” We remove the stratospheric impacts because these are not within the scope of this paper.

“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.” We shorten this sentence in the abstract like: ‘Following this, it is assumed that the volcanic plume contributed to the overall exposure of the population and therefore may have had minor effects on the exacerbation of respiratory and cardiovascular symptoms.’ Following the proposed reduction of section 5 further down we reduce this chapter. We do not like to exclude the whole overview of possible health effects in section 5 and thus the introduction for the statement we have in section 6. Why we should inform about ongoing health studies about this volcanic impact if we do not explain why this is necessary? So we do not like to omit section 5.2. But if the editor recommends a reduction we can shorten the section 5.2.

“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.” We thank for this support and shorten the text in section 4.2 and further on.

“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

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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.” We exclude in Table 3 all concentration data and the May data so that this table becomes much smaller. The text is reduced by about half. The remaining text is part for the conclusions on air quality although wet deposition was not an important volcanic impact.

“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.” We thank very much for this hint. At page 9097 (PNC) we use the wording ‘not visible’. At page 9102 we found confusing PNC discussion which is corrected – it is mass concentration. In Figure 11b (mass concentration) we found BC at the ordinate and change it into sulphate. At page 9097 we cannot change the sentence ‘There is no significant increase of PNC for particle sizes from 300 nm to 500 nm measured with an optical particle counter (OPC), Grimm, Ainring, Germany’ because there is really no increase. It is a different size range than discussed at page 9102 (100 – 800 nm and 0.1 – 1 μm) also (here mass concentration).

“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.” We change the title into ‘fine particles’. Thank you for the hint with the figure font size. We will ask the Journal staff if this is necessary.

“Section 5, page 9107, lines 7-22. This is repetition from Section 4.” All this is omitted except the comparisons to Saharan dust.

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