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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 #1

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This is a comprehensive and well written paper illustrating the power of using a range of complimentary techniques to analyze the influence of air pollution to a defined area, here the volcanic plume from Island being transported to the northern Alpine region. The paper is well suited for publication in ACP. A few comments to the text:

Chapter 2

You have only one site in Austria (Innsbruck), but in addition there are regional sites like Sonnblick, Illmitz and St. Koloman that could have complimentary measurements? Switzerland is not included in the study, but there are a lot of advanced measurements at Jungfraujoch that should be of interest. At least if there are similar studies with observed increase in the SO2 and PM levels that should be some referred to. Jungfraujoch is mentioned in chapter 4.1, but no reference.

Chapter 3.2.

The SEVERI images can distinguish between ice and ash/dust, but how to be sure you distinguish between regular dust (wind blown mineral dust in particular) and volcanic ash? It is not clear from the text whether the SO2 product from SEVIRI has been combined or used together with the ash and dust product to identify what is really from the ash cloud and not from dust.

Have you looked at any CALIPSO data to see if it is possible to identify any vertical profile of the ash cloud, or was it no overpass in the particular period? Ch 3.4 and Fig 1.

It would help the reader if the same abbreviations used in 3.4 and later in the text and in figure 9 is identified in Figure 1 as well.

Chapter 4.2, line 16-30

Not sure if the paragraph is complete or at least it may be misunderstood. In line 26 it seems you miss the word primary, i.e "urban primary anthropogenic emissions"? You describe formation of UFP from secondary aerosol from anthropogenic sources only using SO2 as an example ? NOx is much more important, especially in urban environment, and VOC. NH3 from agricultural sources could be mentioned as well if you want to describe a more complete picture.

Chapter 4.3.

It is a bit strange division of chapter into who is operation the sites rather than the topic. Therefore the title of the chapter is a somewhat uninformative for the reader. Rather redefine the title of this chapter to measurements of trace elements to estimate PM10 mass enhancement caused by the plume or something similar.

It is a nice chapter utilizing the tool of trace element enrichment. Maybe it would be good to add a few sentences of what type of enrichment we would expect from other sources (relevant industry, traffic –tyre brakes etc) to indicate potential uncertainties in

the methods and the fact that some elements are more suitable for the purpose than others.

Schauinsland (SSL) also has measurements of trace elements in PM10 (UBA Germany). If possible this data should also be included

The PM10 results, are this daily (24h) averages? And at these particular days do the sites exceed the daily limit value of 50ug/m3? If so is it due to the volcano or would it been above anyway? You write in the conclusion that the volcanic ash caused PM10 threshold exceedances in the region. Is that really proved?

Chapter 4.4.3 and 4.4.4.

It is a bit contradiction comparing the two nearby sites where one observes a reduction of SO2 at HPB during precipitation event but not the same at ZSF

You could also use precipitation data from Schauinsland (SSL) for comparison to get a more complete picture on the effect of wet scavenging.

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