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## ***Interactive comment on “Long-term variability of dust events in Iceland (1949–2011)” by P. Dagsson-Waldhauserova et al.***

### **Anonymous Referee #1**

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#### General comments

This manuscript presents long-term records of dust events in Iceland and discusses a topic relevant for ACP. Although there is overlap with a previous publication of the authors (Dagsson-Waldhauserova et al., 2013), the manuscript extends the data presented earlier with observations in S Iceland. Especially the comparisons of visibility and PM<sub>10</sub> measurements in S Iceland have not been discussed earlier. However, they are discussed only briefly in this manuscript. This type of comparison has been done previously in other regions and the results should therefore be discussed in relation to earlier studies such as Wang et al. 2008. Possible explanations for deviations to earlier findings should be discussed. Moreover, I would suggest to also discuss previous model attempts of the authors based on these new fit functions that deviate from the

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model used earlier for NE Iceland (Dagsson-Waldhauserova et al., 2013).

The differences between NE Iceland and S Iceland could be discussed more thoroughly and appear to be partly caused by the difference in measurement method. The distance between stations and nearest dust sources probably affects the results in Table 2 and section 3.2.3 and should therefore be discussed in the manuscript.

Conclusions mentioned in the abstract and/or conclusions section, specifically the use of 04-06 codes and the influence of the SLP oscillation pattern, are not clear from the presented data. The data should preferably be shown in the manuscript, or otherwise these statements, currently presented as conclusions, can only be points of discussion.

Conclusions appear to focus on the occurrence of dust events at low temperatures in S Iceland (and high temperatures in NE Iceland). More attention, however, could be given to the wind direction and speed (and subsequent temperature), as this probably is the driving factor of the dust events. In the current version of the manuscript one may get the impression that temperature foremost affects dust events, but the responsible processes are not discussed.

#### Specific comments

17332L7 concerning SLP: this is hardly shown in the manuscript and could be ignored in the abstract, or an analysis of SLP influence should be added.

17332L12-L15 Prevailing wind direction and wind speed should also be mentioned, as these probably influence dust event occurrence and temperature.

17335L26/27 This could be mentioned in the methods/analysis section rather than data.

17336L4-6 Could you show this in a figure?

17336L6/7 Rephrase for clarity. We included .. in case ...

17337L14 What was the mean visibility during dust events in NE Iceland?

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17337L15 Are the stations placed closer to major dust sources?

17337L24-25 How often do dust events occur in NE and S Iceland simultaneously? (e.g. as a percentage of total number of dust events)

17338L9 Explain what is considered to be a dust event in this manuscript and how long it typically lasts.

17338L10-15 You could add the mean air temperature in NE and S Iceland to give some insight if the mentioned differences are only related to dust events.

17340L3-5 Possibly add “(not shown)”.

17340L13 What is “mean DE velocity”?

17340L25 You could rephrase this sentence to clarify that this is the correlation between the modelled PM10 and measured PM10 values rather than a correlation between visibility and PM10. Furthermore, ‘higher correlation at station . . . than at station . . .’ may be more appropriate than good and considerable correlation. Moreover, add the number of data points at each station and show statistical significance.

17341L2 What does “visibility of all available dust codes” mean?

17341L17-18 Dust day frequency including codes 04-06 can only be compared to studies that also include codes 04-06.

17343L2-5 This should already be mentioned in the measurements description.

17343L24-25 How is this related to the observed dust events?

17344L4-13 Compare the results to earlier studies on this topic.

17344L14-25 This appears to be a topic for the introduction rather than discussion.

17345L3 replace “cold high-latitude areas” with “Iceland”

17345L11 The data that could show that “codes 04-06 should be considered in dust

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studies” were not shown in the manuscript and this can therefore not be stated as a main conclusion.

17349 Table 1 Please indicate the distance to the nearest dust source for each station. What do the bold stations refer to?

17356 Figure 6 Add an explanation of the dashed circles. You could add a wind rose for the complete period (including dust events) for comparison.

17357 It would be informative to add the wind direction and show the relation between wind direction/speed and dust event occurrence and temperature. This could be an extension of the discussion about the effects of SLP pattern mentioned on page 17343.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 17331, 2014.

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