

Interactive comment on “Desert dust deposition on Mt. Elbrus, Caucasus Mountains, Russia in 2009–2012 as recorded in snow and shallow ice core: high-resolution “provenancing”, transport patterns, physical properties and soluble ionic composition” by S. Kutuzov et al.

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We are grateful to the reviewers for their very helpful comments. All the comments have been addressed and corrections made in the text. The point by point corrections and alterations are presented below.

Response to referee #1 comments

C1224

RC General Comments:

Section 2.5: You introduce the MSG SEVIRI AOD product (Brindley and Russell, 2009) here, but no results using this product are shown or discussed.

AC It is indeed misleading, we've corrected this.

RC Section 3.3: What is the main controlling factor on the dust particle size distribution? Is this mainly due to the source type (e.g. source geomorphology) or due to the wind speed distribution during emission and transport?

AC The particle size distribution of mineral aerosols depends on wind conditions during its uplift and also very sensitive to the soil size distribution in source regions. The distribution at the point of deposition will be influenced also by the distance from the source region, conditions during transport and by the deposition type (wet or dry). As stated in the text, there is not much difference between size distributions for different events and, therefore, it is difficult to conclude which factors are important. This outcome was unexpected. We can suggest two possible explanations: either the difference is eliminated by the interplay between the wind speed and distance travelled (e.g. higher wind speed and longer distance for the Saharan events; shorter distance and lower wind speed for the Middle Eastern events) or Saharan and Middle Eastern sources are characterised by similar distributions. These suggestions are speculative at this stage and we prefer not to include them in this text but wait until a larger number of samples is available from the recently extracted deeper core. However, if Reviewer insists, we will include our ideas in the Discussion.

RC Fig. 3 & 4 The parameter “sources/km²” and how it was retrieved remains unclear. Please explain in more detail.

AC The colours represent the kernel density of the dust sources as calculated in ArcGIS 10. The results simply estimate points per unit area and in this case it is the points (dust sources) per km². The explanation has been added to figure caption.

C1225

RC Minor Comments:

RC P1625 L5-6 "c." ?

AC c. stays for circa (Latin, around, about) and means approximately. This is a standard abbreviation.

RC P1625 L18 introduce abbreviation "a.s.l."

AC Done

RC P1627 L20 "snow samples, which did"

AC Done

RC P1630 L13 What is meant by 'sigma units'? Please clarify.

AC In the HYSPLIT, sigma is a height coordinate (pressure at a 'sigma' level), the model top is 25 km, so 0.01 sigma is approximately 250 m. The following text has been added to the text: Each member of the trajectory ensemble is calculated by offsetting meteorological data by a fixed grid factor (one meteorological grid point in the horizontal and 0.01 sigma unit (250 m) in the vertical).

RC P1630 L25-28 Usually, radiances converted to brightness temperatures are used to compile the RGB images. I suppose you are using brightness temperatures here as well. Please clarify.

AC Done.

The following text has been added to the text: The SEVIRI RGB composite images were produced from three thermal infrared channels, 10 (12.0 μm), 9 (10.8 μm), and 7 (8.7 μm), by displaying the brightness temperature differences between channels 10 and 9 as red, 9 and 7 as green and channel 9 as blue (Lensky and Rosenfeld, 2008; Schepanski et al., 2007).

RC P1633 L23 "vary" ?

C1226

AC Corrected

RC P1636 L28 "the west, which"

AC Corrected

RC P1638 L16 "This event was"

AC Corrected

RC P1638 L23 "Mesopotamia, which"

AC Corrected

RC P1643 Do you mean "Banks and Brindley, 2013" instead of "Brand and Brindley, 2012"? Otherwise, the reference for "Brand and Brindley, 2012" is missing.

AC Corrected

RC Figures:

Fig. 7 The scale is somewhat arbitrary. Maybe change to a more intuitive scaling, e.g. 0.25 intervals.

AC The scale has been changed as suggested

Interactive comment on The Cryosphere Discuss., 7, 1621, 2013.

C1227