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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Using the significant dust deposition event on the glaciers of Mt. Elbrus, Caucasus Mountains, Russia on 5 May 2009 to develop a method for dating and provenancing of desert dust events recorded in snow pack" *by* M. Shahgedanova et al.

**Anonymous Referee #3**

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**General comment:**
Shahgedanova et al. present a case study on dust deposition on Mt. Elbrus glaciers. In their study, the authors have identified layers of dust in snow pack records and discuss the potential of these records to investigate long-range dust transport from sources in North Africa and the Middle East. On the basis of satellite data, back-trajectories, and weather reports, the authors discuss the May 2009 dust deposition event over the Caucasus region with regard to dust sources and transport pathways. The authors have

further analyzed the chemical composition of dust deposited on the Mt. Elbrus glaciers.

The manuscript is well written and structured. The authors provide a conclusive documentation on the case supported by the use of various data sets.

**Specific comments:**

1. Although dust horizons from ice/sediment cores have been analyzed with regard to dustiness before (which is outlined in the introduction section), the presented case study nicely demonstrates the ability to used dust records conserved in 'modern' snow packs for the investigation of individual dust events during recent years (rather than providing evidence for dusty decades or centuries). As mentioned by the authors in their conclusion, a comparison with model simulations is anticipated. I am wondering whether it is possible to determine dust deposition fluxes from snow pack records. Measurements on dust deposition fluxes are sparse and it is a very useful information for dust model validation.

2. The authors have examined the chemical composition of dust from their snow core. How comparable is this signature to those retrieved from samples over various source regions? Is it possible that the composition of the deposited dust is affected by the exposure to snow/water?

3. The resolution given for the SEVIRI images in Section 2.3 is misleading. Only the high-resolution channel (broad-band, visible) has a resolution of 1km at nadir (sub-satellite point). The here used channels provide measurements at 3km at nadir. Due to Earth curvature, the area covered by each pixels increases with distance from sub-satellite point. Additionally, the shape of the pixel deforms with distance as well. Thus, over the Caucasus, the pixel's resolution is much coarser.

4. TRMM rainfall estimates indicate high rainfall rates over the Caucasus mountain ridge as well. In addition to rain gauge measurements, the TRMM product



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provides a spatial distribution of the rainfall patter that further supports the evidence for wet deposition of dust on the Mt. Elbrus glaciers. Might be worth considering mentioning it.

**Technical comments:**
Both, 'Mt Elbrus' and 'Mt. Elbrus' is used.
Fig. 2: Although an assignment of colors to atmospheric features is provided in the caption, it is desirable to add that desert surfaces are shown in light green-blueish colors, and elevated terrain appear in violet/pink colors depending on time of the day.
Fig. 3: The bottom of the numbers given beneath the color bar is truncated.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24437, 2012.