

Interactive comment on “Monitoring of the Eyjafjallajökull volcanic aerosol plume over the Iberian Peninsula by means of four EARLINET lidar stations” by M. Sicard et al.

Anonymous Referee #2

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General Remarks:

The paper by Sicard and co-authors is a nice and thorough description and analysis of measurements performed by lidar and sun-photometer over the Iberian Peninsula in May 2020. The manuscript is clearly structured and easy to understand, and the observations will be a valuable brick-stone for the scientific community. Nevertheless, the measurements are not well put into context with other observations (satellite, e.g. SEVIRI, CALIPSO, mm) and model results. See e.g. Comparison to publications showing satellite-retrieved and modeled ash, e.g. also from on 8 May at 04:00 UTC.00 (see Stohl et al., Atmos. Chem. Phys., 11, 4333–4351, 2011 (see Fig. A1,

C14546

<http://zardoz.nilu.no/~sabine/MAY.gif>). Parts of the data have been already shown by Toledano et al. (2011) [AOD and Ångström coefficients from the AERONET sites & one selected lidar scene from Granada], and it should be made clear how the interpretations and conclusions drawn shown by Sicard et al. compare to their results. Although there is a slight repletion of the sun-photometer data set, Sicard use the distinction of AOD in fine & coarse mode from O’Neil, which clearly gives an added value for the discussion.

Specific comments/questions

Abstracts: Question: The layer at 11–12 km, is that already in the stratosphere ? The last sentence describing: ... and “probably did not exceed the value” – this sentence should be rephrased to a more clear scientific statement. ...

Section 1, Introduction:

The event might have contributed relative quickly to the decrease of the global surface temperature since ... Has this been observed for this particular event ? Can you include any reference ?

“On the contrary the residence time of sulfate aerosols is much longer for they can resist in the atmosphere for several months” Is this general in the atmosphere – stratosphere-PBL/moisture, ... ?

Section 2. A topographic map showing the lidar and sun photometer sites in the Iberian Peninsula will be helpful to understand the special variations and typical meteorological situations, as those described in section 3.2 (Over the central plateau. ...)

The 16 trajectory subplot of Figure 2 are too small and should be renewed (crop of the area and remove the lowermost parts).

Figure 3 should be larger as well. The layer in the lidar RSCS are very hard to distinguish

C14547

Section 2.2/4: A discussion on capability of sun-photometer AERONET data to detect ash would be valuable. The authors are using cloud-screened data from AERONET (lev. 1.5). Can ash be miss-classified as clouds and removed by this process (e.g. SEVIRI data show an ash laminae passing over Barcelona, 8 May).

Section 4.1: The hydration thesis is unclear and should, if possible be further analyses (humidity available ?). Can smaller sulfate particles explain the behavior.

Conclusions: One chapter should be added, discussion the measurements in the context with published observations (satellite, e.g. SEVIRI, CALIPSO, mm) and model results.

Technical corrections: - Please, check some of the flowery language in the abstract: the volcanic plume "hit"... "Punctually" on - I would recommend removing the abbreviations VA in section 1 (it's not a standard abbreviation and makes it harder to read)
- Introduction: The sentence: 'We ONLY concentrate on lofted VA plumes, ... , and because the distribution of the VA plumes in the troposphere is of great interest for air traffic.' Also layers in the PBL might be of interest for air traffic, the sentence needs to be rephrased. - Section 2.1 Coordinated measurements ... and intensified "accordingly" with the intrusion. Use another word. . .

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29681, 2011.