

Interactive comment on “Validation of ash optical depth and layer height retrieved from passive satellite sensors using EARLINET and airborne lidar data: The case of the Eyjafjallajökull eruption” by D. Balis et al.

Anonymous Referee #1

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This manuscript describes a the Evaluation of satellite observations of volcanic ash. I recommend publication in ACP after some minor revisions.

Comments:

At various places in the manuscript I would encourage the authors to openly discuss the very small sample sizes and that therefore the presented correlations are rather questionable. Everybody will acknowledge that (perhaps fortunately from the perspective of mankind) the set of available volcanic eruptions is very limited, so discussing this in more detail will do the manuscript no harm.

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p.2 l. 20: replace "Final" by "The last"

p.2 l. 22: Potentially it would be advantageous to state that the classification of a "moderate" event is valid in terms of VEI, but not in terms of economic costs.

p. 4 l.1: Please introduce all abbreviations (SMASH).

p. 4 l.14: Is it possible to give either a citation for the AAI or to shortly describe the fundamental principles of its derivation for those readers who are not familiar with this method?

p. 4 l.17: In fact it is the absorbing AOD which is most dominant in AAI. A high AOD of a non-absorbing aerosol will not at all produce a high AAI. Consequently all AAI results are very sensitive to SSA.

p. 4 l. 27: What are the parameters of the log-normal distributions?

p. 4 l. 30: I would suggest to split the section 2.1.2 into two subsections, one for the UOXF algorithm and one for the ULB one.

p. 5 l. 2: What is the spectral resolution of the Eyja refractive indices? Is there already a publication on these?

p. 5 l. 3: The Pollack database includes pretabulated refractive indices as well as oscillator parameters for modelling these. The pretabulated indices have rather coarse spectral resolution (given the resolution of the IASI instrument). Which of the two sets has been used? And if it is the pretabulated ones, how has the interpolation to the required IASI channels been done?

p. 5 l. 8: What is the mode radius of the log-normal distributions?

p. 5 l. 20: Which meteorological input has been used for the RTTOV calculations? Moreover, to my understanding RTTOV is a radiative transfer model, which provides radiance or brightness temperatures or parameters like that which are simulated from given inputs including meteorology, AOD, PSD and such things. So these parameters

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are input to RTTOV and not provided by the model. Or is there something like an "inverse mode" in RTTOV to obtain these parameters from the radiation field? Then RTTOV would be a suitable retrieval method and no further work would be required...

p. 7 l. 9: Please introduce all abbreviations (PCASP and CAS).

p. 8 l. 13: Would it be possible to provide the 532nm refractive index for the Eyjafjalla ash? Or is there already a publication on this?

p. 9 l. 19-20: When the authors say "dust" and "Volz", do they really mean two different algorithms, or do they rather mean two different complex refractive indices used as input for the same algorithm? Please clarify.

p. 9 l. 29: Give the FOV size of the IASI Instrument, not only thin clouds, but also partially cloudy observation could have an effect.

p. 10 l. 21: To which number does the number of coincidences decrease? Is the calculation of a correlation coefficient still useful then?

p. 15 l. 11: Please replace "excellent" by "very good".

p. 15. l. 17: The same - given the small sample size I would be rather shy about using the term "excellent".

Table II and Table III: Is "Amount of data in days" equivalent to "coincidences"? If not, please provide also the latter number.

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