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Atmospheric Measurement Techniques Discussions

Interactive comment on "Volcanic ash detection and retrievals from MODIS data by means of Neural Networks" *by* M. Picchiani et al.

Anonymous Referee #1

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This manuscript describes a volcanic ash detection and retrieval approach that makes use of Neural Networks theory applied to MODIS thermal infrared data. The analysis seems methodologically sound and the results clearly presented.

The authors present the newly developed approach as a way of quickly detecting and quantifying volcanic ash presence and, therefore, minimizing the potentially large economic losses associated with the disruption of commercial air traffic as recently experienced in the aftermath of the recent Eyjafjallajokull eruption. In their study, the authors conclude that as a consequence of the need of eliminating false positives in the ash identification process, the usefulness of the suggested NN-based technique is limited to cases when the volcanic emission is continuous allowing the detection and

quantification only in the vicinity of the volcano.

This limitation reduces the method's capability of ash detection and quantification thousands of kilometers downwind from the source where the volcanic ash may reach commercial air traffic routes. The authors should mention this shortcoming in both the conclusions section and in the abstract of the manuscript. A careful review of the manuscript by a native English speaker is recommended.

Specific Comments

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Line 3 Use 'ash' instead of 'cloud' The term 'volcanic cloud' implies more than just the ash component.

Line 13 The literature review fails to list the UV aerosol index as a well known method of absorbing aerosol detection and characterization including volcanic ash. Papers by Seftor et al, [JGR, 102, 1997] on the Mt. Pinatubo eruption and Krotkov et al, [GRL, 26, 1999] on Mt. Spurr should be included in the review.

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Line 7 Provide reference for the assumed ocean emissivity value.

Line 13 Discuss the choice of Volz 1973 data on refractive index. Haven't we learned more about the optical properties of ash over the last 40 years?

Line 14 Discuss why the ash density data reported by Neal et al for the 1992 Mount Spurr eruption should be considered representative of the ash density of the 2001, 2002 and 2006 Mount Etna eruptions.

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Line 10 The resulting spatial patterns can be compared to TOMS (2001, 2002) and OMI (2006) Aerosol Index observations as a way of assessing the effectiveness of the

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detection technique.

Line 13 How persistent is the occurrence of false positives? It can be evaluated using an independent method of volcanic ash detection such as the UV aerosol index. Would it be possible to reduce false positives with the Aerosol Index?

Line 16 The line oriented approach severely limit the usefulness of the method. Only ash near the volcanic vent is detected. The long-range transport ash, which is generally associated with air traffic disruption problems described in the introduction goes undetected. The authors could combine UV and Thermal observations.

It would be interesting to try a hybrid approach using UVAI for ash detection and the NN thermal IR for retrieving the volcanic ash mass.

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Line 10. How can the results of this analysis be validated?

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 2567, 2011.