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Interactive comment on “Ash plume top height estimate using AATSR” by T. H. Virtanen et al.

Anonymous Referee #1

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1. This is a good paper, using parallax from the nadir and 55° AATSR data to obtain volcanic ash plume height. In my view, it would be acceptable to publish in AMT after minor revisions; in particular, more careful interpretation of the comparisons in the validation section.

2. P3865, line 14. The following paper might be relevant here, particularly with regards to the identification of ash with MISR:

Kahn, R.A., and J.A. Limbacher, 2012. Eyjafjalljökull Volcano Plume Particle-Type Characterization from Space-Based Multi-angle Imaging. *Atmosph. Chem. Phys.* 12, 9459–9477, doi:10.5194/acp-12-9459-2012.

3. P3871, Equations 3, 4, 5. You use μ_N and μ_F here for mean values, whereas on P3969, you use the same symbols for the view angles. This is confusing, and easy

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to fix. In fact, μ is usually used for the cosines of the angles, and θ for the view or zenith angles themselves.

4. P3875, Section 2.5.4. Does Earth rotation affect the cross-track displacement in the collocated images? This might be a factor in the assessment of cross-track wind speed, and might bear upon the collocation discussion in Section 2.7.4.

5. P3875, line 21. "... due to effects related to the different viewing angles, plume structure, and..." Ash plumes often have non-uniform structure.

6. P3879, line 10. By "pixel" here, do you mean CWS?

7. P3879, lines 24-25. This might also occur for an ash plume very near the surface.

8. P2882, lines 22-23. There is a comparison between MISR plume detection in the visible and several IR techniques in:

Ekstrand, A.L., P.W. Webley, M.J. Garay J. Dehn, A. Prakash, D.L. Nelson, K.G. Dean, T. Steensen, 2013. A multi-sensor plume height analysis of the 2009 Redoubt eruption. *J. Volcanology Geothermal Res.* 259, 170-184.

I realize your technique is based on spatial correlation rather than thermal structure, but I'm wondering whether temperature differences within the plume might affect where within the plume the 11-micron contrast matcher samples. In any case, the vis and TIR spatial contrasts might not be equivalent, and this could affect the comparison. Interestingly, the differences are not uniformly of the same sign. As you also have vis channels, it would be worth making the comparison at similar wavelengths.

9. P3383, Line 25. I think you are using the MINX product (Nelson et al., 2013) rather than the MISR Operational stereo heights (Muller et al., 2002). For MINX, the reference would be:

Nelson, D.L., M.J. Garay, R.A. Kahn, and B.A. Dunst, 2013. Stereoscopic Height and Wind Retrievals for Aerosol Plumes with the MISR Interactive eXplorer (MINX). Remt.

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Sensing 5, 4593-4628; doi:10.3390/rs5094593.

10. P3385, line 14-17. Validation of the MISR technique is provided in the Ekstrand et al. and Nelson et al. papers cited above, which might be helpful in evaluating comparisons between MISR and the 11-micron technique.

11. P3385, lines 17-18. The wind correction might have a significant effect under some circumstances. I'm wondering how much uncertainty in the height determination reported here is caused by the along-track wind.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 3863, 2014.

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7, C800–C802, 2014

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