Atmos. Meas. Tech. Discuss., 8, C65–C66, 2015
www.atmos-meas-tech-discuss.net/8/C65/2015/

Atmospheric Measurement Techniques Discussions

Interactive comment on "A novel retrieval of daytime atmospheric dust and volcanic ash heights through a synergy of AIRS infrared radiances and MODIS L2 optical depths" *by* S. DeSouza-Machado et al.

Anonymous Referee #3

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It is important to continue developing retrieval method to use synergistic multi-sensor satellite measurement to obtain cloud and aerosol information. The authors have a well-established model to retrieve dust/ash aerosol height and optical depth from AIRS infrared spectrum, which can been seen from the good publication record of the authors.

The problem I have with the manuscript is mainly the quality of presentation. Since this is a dust/volcanic ash height retrieval paper, the introduction should focus on the

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importance and current status of satellite retrieval of these particles and gives a proper introduction and/or review on the progress on current techniques. If the new impact of this study is the usage of collocated MODIS data, please discuss the advantage over the traditional chi-square AIRS retrieval. For example: does the retrieved AIRS optical depth (after f-conversion) agree with MODIS retrieval for all the cases? There are many inaccurate statements in the introduction too. For example: On Line 75, "though less sensitive. . .": is this general statement on infrared instrument? It has been shown that AIRS has good sensitivity to very thin ice cloud. And on Line 84: how can more accurate height determinations help improve UV retrieval which is sensitive to aerosol height? Sensitivity to scattering parameters and microphysical parameters of aerosols needs to be shown instead of simple statements in manuscript such as "this impacts the accuracy of the optimal height" etc. Same for statements like "a general flattering of the curve was typically observed, spanning about +/- 1.5km".

Comparisons among different instruments: please add the strength and limitation of these techniques and why they are different.

The case study on Volcanic ash retrieval: the peak at the high altitude can be due to lack of sensitivity. Can authors determine how much of this peak is true (ejecting particles into upper troposphere and lower stratosphere) and how much is due to retrieval or sensitivity problem?

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 443, 2015.