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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Thermal infrared remote sensing of mineral dust over land and ocean: a spectral SVD based retrieval approach for IASI" *by* L. Klüser et al.

**Anonymous Referee #2**

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The paper by Klüser et al addresses an important problem, namely the detection and determination of AOD of windblow mineral dust and how to bypass the influence and effects of surface emissivity. They developed what seems to be a numerical efficient way of doing so. The idea is original, and I can recommend publication following a minor revision.

I have two main comments (partly overlapping with the report of the other reviewer):

1/ The paper is at times hard to follow. Apart from a algorithmic flowchart, I would also suggest to demonstrate the different transformations on one or more spectra (from the original spectrum in BT space to the 42 local maxima and the optical depths tau_eqv,

tau_sv and tau_(1,2), etc..also after one iteration of T_base).

2/ One of the main points of the paper is not well justified, namely the use of the 5 singular vectors. Why do the SV1 and 2 contain most of the surface information and gaseous absorption? Also, why would all the properties of the windblown minerals be gathered in SV3->5? Again a demonstration with spectra along the lines of my first point, would help as it is definitely not obvious from Fig 1. Would be nice to demonstrate it also on spectra (on one with a lot of dust and on one without) with a marked surface emissivity (see eg as in Figure 8 in http://dx.doi.org/10.1117/12.736816 (http://smsc.cnes.fr/documentation/IASI/Results/IASI_SPIE.pdf). I again suggest showing tau_eqv, tau_sv and tau_(1,2) (and even showing these back in brightness temperature space). Even if the results are good, is splitting up the spectrum according to the SV 1/2 vs 3/4/5 not ad hoc? I guess it very much depends on the choice of spectra used in the determination of the singular vectors? It is very important to convince the reader that the present method is able to remove surface emissivity features, as this is main result of the paper. From the figures 2-5 and 8 it seems to do a pretty good job, but would be nice to understand better why it is so. Note that it doesn't remove all emissivity features, as is apparent in Fig 8 (May, West Coast of Africa).

Minor comments:

- A general reference for IASI is missing.

- Figures 2-5 are not as good as they could be. Especially the blackish background makes them difficult to look at.

- There are a few good emissivity databases available. One of the best (in terms of seasonality, is the one by David Zhou et al, see:

http://cimss.ssec.wisc.edu/itwg/itsc/itsc17/session5/5.2_zhou.pdf

http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5523979

http://www.eumetsat.int/idcplg?IdcService=GET_FILE&dDocName=PDF_SURFACE_EMISSIVITY_L2&RevisionSelection



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- I suspect one iteration in the Tbase is not enough. It could be that the general underestimation of the measured AOD as compared to AERONET is partly due to this.

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 461, 2011.