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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.

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The authors thank the anonymous referee #2 for her/his very constructive review of the manuscript. The text of the manuscript will be revisited in order to follow the suggestions of the referee.

Responses to Major comments:

1. We agree with the referee that a flow chart of the algorithm will clearly help identifying the different steps performed. Such flow chart will be provided in the revised manuscript. Also the idea to exemplarily demonstrate the different steps on IASI spectra transformations is acknowledged by the authors and we will provide such a figure

in the revised manuscript in order to help the reader to better understand the basic principles of the method.

2. Comment two seems to be partly connected to comment one, as the example spectra may better justify why the majority of the surface signal (together with ozone and water vapour information) is contained in the leading two singular vectors. Moreover, we have to clarify in the revised manuscript, that not all properties of the dust are covered by SV 3-5, otherwise the correction with the c[1,2] term would not be necessary (despite also present remaining surface influence onto SV 3-5). The provision of spectra demonstrating the effects of the different transformations of spectra and optical depth estimates throughout the retrieval will help to clarify the methodology. We agree with the referee #2 that the splitting into two groups of singular vectors is a bit heuristic. After several different attempts of using the information provided by the singular vector decomposition of the IASI spectra we came to the conclusion that this split up seems to be the most effective way of handling the encountered problems. We will address this point in the revised manuscript together with additional imagery (e.g. the spectra already mentioned) in order to let the reader of the paper better understand, what reasons led to this methodology. The choice of IASI spectra subsets (observation days) used in the singular vector decomposition did not change much the results, as we also tested with different other sets of IASI spectra all containing dusty and dust free scenes over the region, covering land and ocean. We will address this point in more detail in the revised manuscript. The referee is right, that this methodology, although doing generally a good job in reducing the surface emissivity influence on the dust retrieval, is not capable of removing all surface emissivity features. But it largely reduces its impact, which will be discussed in more detail in the revised manuscript, addressing the referees concerns.

Responses to minor comments:

- We will add a general reference for IASI and also a table including the instrument's characteristics.

- We will change the color bars of the figures to highlight the interesting features.

- We will reference existing surface emissivity databases, including those suggested by the referee here. Nevertheless one of the main intentions for this kind of methodology was to stay as independent from a priori data as possible. Thus the only a priori data to be used is the dust extinction spectra, currently taken form OPAC, which can easily be extended by whatever new dataset. We will address this intention more precisely in the revised manuscript motivating why we do not use the existing (and then referenced) databases.

- We had tested more iterations for Tbase but unfortunately the results were not much improved. Moreover every iteration slows down the retrieval a lot, which is nor desirable if the results do not improve significantly. We agree that the underestimation of Tsurface due to the use of Tbase may be one important reason for underestimating AOD especially for cases with heavy dust concentrations. We will address this point in more detail in the discussion.

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