

## ***Interactive comment on* “Characterization of dust aerosols in the infrared from IASI and comparison with PARASOL, MODIS, MISR, CALIOP, and AERONET observations” by S. Peyridieu et al.**

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Answers to Editor's comments

Additional points to consider:

1. Page 23095 line 24: "remote sensing in the IR remains marginal" is a very vague term, please be more explicit about work that has been done elsewhere, however minimal.

→Line 24: one sentence modified: Instead of: “In contrast, remote sensing of aerosols in the infrared domain still remains marginal.”, the new sentence reads :

“After a long period of a relative disinterest in aerosol remote sensing in the infrared (one of the oldest reference is by Legrand et al. (1989) using the low spectral resolution, one window-channel, radiometer on board Meteosat), a marked growing interest in the infrared is now observed with the emergence of hyperspectral instruments as AIRS and IASI (Pierangelo et al., 2004, 2005; De Souza-Machado, 2006; Klüser et al., 2011, 2012).”

Also, 4 references added:

- Legrand, M, Bertrand, J. J., Desbois, M., Menenger L., Fouquart, Y. : The potential of infrared satellite data for the retrieval of saharan-dust optical depth over Africa, *J. Appl. Meteorol.*, 28-4, 309-319, doi: 10.1175/15200450, 1989. - De Souza-Machado, S., Strow, L. L., Motteler, H., and Hannon, S.: Infrared dust spectral signatures from AIRS, *Geophys. Res. Lett.*, 33, L03801, doi:10.1029/2005GL024364, 2006. - Klüser, L., Martynenko, D., Holzer-Popp, T.: Thermal infrared remote sensing of mineral dust over land and ocean: a spectral SVD based retrieval approach for IASI. *Atmos. Meas. Tech.* 4, 757e773. doi:10.5194/amt-4-757, 2011. - Klüser, L., Kleiber, P., Holzer-Popp, T., Grassian, V. H.: Desert dust observation from space- Application of measured mineral component infrared extinction spectra, *Atmos. Environ.*,54, 419-427, 2012.

2. Page 23100: comparison with AERONET. I have some concerns about the ability of AERONET to represent coarse mode aerosol accurately so perhaps some discussion about the limitations of the radius derived from AERONET might be useful here.

A new sentence has been added page 23109, line 8 : “Such comparisons also raise the question of the accuracy of AERONET measurements.” (Ryder et al., 2013; Müller et al., 2012).”

Two references quoted :

Ryder, C. L., Highwood, E. J., Rosenberg, P. D., Trembath, J., Brooke, J. K., Bart, M., Dean, A., Crosier, J., Dorsey, J., Brindley, H., Banks, J., Marsham, J. H., McQuaid, J.

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B., Sodemann, H., and Washington, R.: Optical properties of Saharan dust aerosol and contribution from the coarse mode as measured during the Fennec 2011 aircraft campaign, *Atmos. Chem. Phys.*, 13, 303-325, doi:10.5194/acp-13-303, 2013.

Müller, et al. (2012) already quoted.

3. Page 23102 line 17-20: What physical mechanism would be responsible for the late arrival of the coarse mode compared to the fine mode?

→ It may reasonably be expected that at the start of the aerosol season, with a wind system not yet well established, the largest particles are preferentially removed by gravitational settling, thus not reaching remote areas (see Tsamalis et al., 2013 for the seasonal wind speed and direction over Atlantic Ocean at 3 levels). With the intensification of the winds, this is no longer true and the almost constant mixing of small and large particles is observed throughout the Atlantic.

4. Page 23104 line 30: The point that the MITR model is inappropriate for many regions is important and should be made more strongly.

→ added at the end of the sentence : “due to the heterogeneity of the aerosol types observed in this region (Kaskaoutis et al., 2010).”

One reference added : Kaskaoutis, D. G., Kalapureddy, M. C. R., Krishna Moorthy, K., Devara, P. C. S., Nastos, P. T., Kosmopoulos, P. G., and Kambezidis, H. D.: Heterogeneity in pre-monsoon aerosol types over the Arabian Sea deduced from ship-borne measurements of spectral AODs, *Atmos. Chem. Phys.*, 10, 4893-4908, doi:10.5194/acp-10-4893, 2010.

5. Page 23112 line 10: I find the phrase "a promise for future fruitful works" and in fact the whole of this final paragraph to be too vague. If you intend to advertise the new instrument, please give some more specific ideas of how it will increase IASI performance with reference to your specific results.

→ The last sentence has been modified. It now reads :

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“IASI NG will improve the IASI performances by a factor of two in both the spectral resolution and radiometric noise, leading to major improvements in the accuracy of retrieved aerosol characteristics: AOD, altitude, and, particularly, effective radius.”

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