

Interactive comment on “Operational retrieval of Asian sand and dust storm from FY-2C geostationary meteorological satellite and its application to real time forecast in Asia” by X. Q. Hu et al.

Anonymous Referee #2

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1. General comments

The launching in 2004 of the Chinese geostationary meteorological satellite FY-2C has increased the capacity of observation of the atmosphere over eastern Asia and western Pacific. In this paper, the observations of the radiometer S-VISSR aboard this satellite, are applied to sand/dust remote sensing with the objective of duststorm forecasting using the model CUACE/Dust. This is an important subject for operational meteorology insofar as duststorms forecasting can then be added to the usual forecasting of precipitations, strong wind occurrence and so on. This is a particularly relevant project

for China (and some neighboring countries), regularly crossed over by dust plumes originating in its eastern and northern deserts. From a scientific point of view, this can be also a tool for research and analyses of the suspected feedbacks between dust and precipitations, droughts and other such climatic factors. The four "companion" papers I found at the ACPD website, submitted by the authors of the present paper, are relevant, due to the extensive scope of the project. They are worth reading for a broad view of this project. However in the following, I will restrict my comments to the matter of the present paper as it is practically self-sufficient (a short description of CUACE/Dust, perhaps in the introduction, would be useful yet).

2. Specific comments

I found some points to which improvements and/or clarifications are to be wished. They are numbered hereafter.

1. The authors use the technique of Pavolonis for volcanic ash detection, where volcanic ash is modeled as andesite mineral. However, desert dust is a mixture made up with quartz (silica), clays (silicates), calcite,... Do the authors have considered that this difference of composition could involve significant differences between the complex indices and the optical properties of particles of these materials?

2. In Equation (1), the brightness temperature of the surface T_s should be replaced by $T_{ref} = T_{bb(max)}$: maximum value over the 10-day period of the reference image. Indeed, $T_{ref} = T_s$ without atmosphere (or if atmosphere has no radiative effect). But atmosphere, even without cloud and dust has always a radiative effect due to its aerosol background and water vapor content (expected to be more or less small).

3. Results from measurements and simulations show that the IR split windows technique provides intricate results; the BTD[11,12] having not a simple behavior with respect of the dust amount (Fig. 1), and depending moreover on many parameters related or not to dust. I think this question should be addressed more carefully. It would be very useful to include more detailed explanations on the way the results from this

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technique can be used in the algorithm, as well as on the impact of its application on the final results (determination of the dust extension and amount).

4. In Section 2.3, it is indicated that $RAT[3.7,0.65]$ is calculated from RI and DI images. Does it mean that you calculate also RI and DI in channels at $0.65\mu\text{m}$ and at $3.7\mu\text{m}$? Does these RI and DI are created according to the same method as for channels at $11\mu\text{m}$ and $12\mu\text{m}$?

5. The validation of dust presence in the obtained SDS-IDD, using the visibility, PM10 measurements or/and surface observations, means that dust is transported in the PBL (or that the stations are located in an active source of dust emission). So your validation results seem to imply that dust is generally not transported in altitude over China. Do you agree with this conclusion? Is it also in agreement with the studies on dust occurrence and transport over China?

6. Validations of dust presence using ground-based observations shown in Fig. 5 would be more informative, using magnified images, and/or strengthening the provinces and states border lines and the sea coast.

7. Some words of definition of the TS score could help a lot of readers.

3. Technical corrections

The reading of the paper is often hindered by complicated or incorrect wordings, or by simple misprints. Correcting the manuscript is an important step that determine the quality of the article in its final form. So I urge the authors to spend as much time as necessary to it. The list below of proposed corrections is not complete and I strongly suggest the authors to correct systematically the manuscript, from one hand with the help of a native English-speaking colleague or person, from the other hand by a careful reading in order to find all errors and misprints.

Follow the page/line indications. In " " are the wordings to be corrected.

p. 8387 l. 14: "Cavtenet" is to be replaced by "Cautenet" (also in the reference list); l.

15: in "Legrand et al., 1987", replace 1987 by 1988; l. 16: suppress a "that" in excess;
p. 8399 l. 2: correct "widows" into "window"s; l. 18-28: rewrite the sentence which is too long, intricate and apparently incorrect: I suggest "the absolute value of BTD[11,12] always decreases when the surface visibility increases (meaning less dust)"; l. 24: replace "air dust" by "airborne dust"; l. 26: replace "component" by "composition";

p. 8400 l. 6: "underlying type" is to be completed into "underlying surface type"; l. 21: replace dusts by dust;

p. 8401 l. 15: usually, the wording "single scattering albedo" is preferred to "single scatter albedo" (not mandatory however); l. 16-17: "...with smaller particles having a greater probability of being scattered given an extinction event..." light or photons are scattered by a particle, not the contrary; in addition I am not sure of the meaning of "given an extinction event"; I suggest to replace this wording simply by "...with a higher SSA for smaller particles"; all the text following, up to l. 24 looks loose and should be suitably modified in order to be more concise and clear; l. 26: specify "volcanic ash";

p. 8403 l. 4: "Takalimakan" becomes "Taklamakan" in p. 8403, l. 8, then "Takilimakan" in p. 8407, l. 24; the same spelling has to be kept everywhere in the manuscript;

p. 8404 l. 6: change "above the physical theories" into "the above physical theories"; l. 7: correct "Figure 3 show" into "Figure 3 shows"; l. 14: correct "according the observation" into "according to the observation"; l. 22&23: replace "diurnal circle" by "diurnal cycle";

Remind: this list is not complete (look also at the figure captions, labels and legends).

Last but not least: a special emphasis on the control of the reference list: reference by reference, word after word, looks necessary (it contains many misprints).

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 8395, 2007.

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