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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol seasonal variability over the Mediterranean region and relativeimpact of maritime, continental and Saharan dust particles over the basinfrom MODIS data in the year 2001" *by* F. Barnaba and G. P. Gobbi

Anonymous Referee #1

Received and published: 7 October 2004

The paper by Barnaba and Gobbi uses MODIS aerosol and fine fraction data to estimate the loading of desert dust, continental, and maritime aerosol, over the Mediterranean for 2001. The paper is generally well written, clear, and concise. The results illustrate the state of the art in utilizing MODIS satellite data to distinguish between these aerosol types. Wind filed data is effectively used to demonstrate the reasonable results obtained by the author's analysis of the MODIS data. The paper should be published following some revision.

One page 4290 in section 2 (near line 21) it would be appropriate to inform the readers that two separate algorithms are used by the MODIS team to derive aerosol optical depths over land and water.

In section 2.1 (the Aerosol Mask), I strongly suggest the authors to add a paragraph that discusses the work of Smirnov et al 2002. The use of the FF and AOT data (i.e. the specification of the boundaries of Figure 1) are crucial to the author's analyses, so some background discussion is warranted.

In regard to the Figures in which wind fields are presented, I can not see the wind arrows because they are very small. This is a fault of the journal, and not the author's fault. Yet I had a hard time understanding the explanation given on page 4293, beginning on line 14. Please have several colleagues read this paragraph, and see if it is clear, or in need of additional clarification.

It is also confusing that on page 4294, line 2 that the visible SeaWifs image does not show aerosol, yet the aerosol mask does. What does the original MODIS true-color browse image indicate? What are the magnitudes of the aerosol optical depths of he MODIS data for this particular region?

It is disturbing to read on page 4297, line 15, that ground level and satellite seasonal trends of aerosol are not similar. Has the MODIS science team presented in papers (or other documents) the structure of the "vertical averaging kernel" that apply to the aerosol retrieval (i.e. the function that specifies the relative contribution that each altitude contributes to the aerosol optical depth)? If this information is available, please discuss this information to relation to the differences in the ground based and satellite seasonal trends.

On page 4306, line 1, what are the IPCC variability ranges of acont and amar?

On page 4306, lines near line 13, how do the MODIS estimates of desert dust, continental, and maritime aerosol loading compare to values determined by other observa-

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tional and modeling studies?

One page 4307, lines near line 5: What is the frequency of occurrence of cloud pixels in MODIS data, and based upon this fact, what is an estimate of the underestimation of the dust loading due to this observational bias?

Minor comments

The style of the revised paper is much better than the first version. I do have a few minor suggestions for specific sentences.

Page 4288, line 27:
Change “dominated by such aerosol “fine fraction” (“to “dominated by the fine fraction aerosol (“

Page 4289, line 6:
Change “in addition to the maritime aerosol one” to “in addition to the maritime aerosol”

Page 4289, line 13:
Change sentence to “Estimates of the aerosol mass loading in the ten sectors over the Mediterranean are given in Sect. 3.2”.

Page 4290, line 26:
Change sentence to “A nearly global image is produced daily since the instrument has a scanning range of 110° (i.e. a swath width of 2330 km).”

Page 4291, line 6:
Change to “Moreover, for each L2 file AOT and FF data where jointly analyzed (in co-located 0.1 degree bins) to distinguish. . .”

Page 4292, line 14:
These assumptions would classify dusty conditions with AOT$<$0.3 and continentally-affected conditions with AOT$<$0.3 and FF$<$0.8 to be “maritime” aerosol conditions.

Page 4294, line 26:

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Change to “It is worth noticing that, in contrast to the pollution advection pattern at lower altitude levels, the wind field. . .”

Page 4296, line 19:
Change to “This parameter allows one to calculate. . .”

Page 4297, line 29:
Change to “in Italy, and Thessaloniki in Greece”.

Page 4298, line 4:
Change to “in which sea salt and desert dust aerosol types are not considered”

Page 4298, line 8:
Change to “high values of these constituents”

Page 4298, line 18:
Revise “North-North”

Page 4298, line 23:
Revise typo, to “Figures”

Page 4298, line 27:
Change to “mainly affects Western”

Page 4299, line 26:
Change to “in the summer of 2001”

Page 4306, line 1:
Change to “The two other coefficients”

Page 4310, line 10:
Change to “obtained by binning the original 20 000 sext data values”.

Page 4310, line 19:
Revise to “In particular, lidar measurements collected at the outskirts of Rome, Italy

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(41.8° N, 12.6° E) during 2001 (Gobbi et al., 2004) were. . .”

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 4285, 2004.