

Interactive comment on “An inversion of fine particulate matter (PM_{2.5}) mass concentrations based on the air quality index (AQI) during dust prone periods in Hotan oasis, Sinkiang” by Ju Chunyan et al.

Anonymous Referee #1

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The paper entitled “An inversion of fine particulate matter (PM_{2.5}) mass concentrations based on the air quality index (AQI) during dust prone periods in Hotan oasis, Sinkiang” by Chunyan, J., Zili, Z., Xu, Z. and Qing, H. intends to provide a reference for the inversion of PM_{2.5} mass concentrations from satellite-derived aerosol optical depth (AOD) data in the Hotan oasis area (China) during periods affected by sand and dust events, using a classification based on the air quality index (AQI). To this aim, PM_{2.5} hourly concentrations recorded by air quality stations located in the area under study and AOD values derived from the Moderate Resolution Imaging Spectroradiometer

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(MODIS) aboard the Terra and Aqua satellites during their overpasses over this area in the period March-June 2015/2016 were considered. Firstly, the PM_{2.5} concentrations and AOD values were grouped on the basis of different air quality conditions - assessed using the air quality index (AQI) - and a discussion of their statistics was provided. Then, the correlations between PM_{2.5} and AOD data as a function of the AQI values were investigated. Finally, the linear regression analysis was applied to find the fitting relationship between PM_{2.5} and AOD by considering the total dataset and by dividing it using the AQI values and a discussion of the results obtained was provided.

GENERAL COMMENTS

Although the manuscript addresses a relevant scientific topic such as the atmospheric pollution and is within the scope of NHESS, it does not give a substantial contribution to the understanding of this hazard and its consequences. The scientific approach and the applied method are very weak. The results and their discussion are very confused and there is not sufficient evidence to support the interpretations of the conclusions given. The reference section is also very inaccurate. In general, the work appears of local interest only and I cannot see original and new findings that the scientific community could learn from this study. Moreover, even though I am not a native English speaker, I think that there are a lot of problems with grammar and the use of English that worsen the understanding of the work. To end with, I do not recommend the publication of this paper in its current form on NHESS journal. In the following, some specific comments that supported my decision. Moreover, minor technical comments are also provided.

SPECIFIC COMMENTS

Page 3, line 8: What is the methodology used to identify the sand and dust events?

Page 3, line 9: What is the criterion used to classify the sand and dust events into the three types considered? The article cited as a reference is not easily accessible.

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Page 3, line 11: Why does Figure 2 report the number of dust, blowing sand and dust storm events for the period March-June 2015 only? What happens in 2016? What do the Authors mean when they write “If two types within a day, the more serious class will be taken as the record”? What does “serious class” mean? How do they define a more serious class than the other? Which parameter do they use?

Page 3, line 37: The Authors introduce the AQI without providing a minimal description, assuming that everyone knows what it is. Moreover, they do not specify that it is referred to PM2.5 only.

Page 4, line 5: It is not clear the scientific content of Figure 3. Why do the Authors consider of scientific interest to divide the AOD data into 7 classes according to the AQI? What is the result they want to highlight?

Page 4, lines 4-10: Firstly, it is not clear the scientific content of Figure 3. Then, why do the Authors discuss the AOD in the paragraph dedicated to the PM2.5 data discussion? Why do they consider of scientific interest to divide the AOD data into 7 classes according to the AQI? What is the result they want to highlight? Moreover, the AQI should be based on PM2.5 daily concentrations and AOD data are referred to a specific hour. How do the Authors manage this?

Page 4, lines 11-16: The discussion of the results shown in Figure 4 is very weak.

Page 4, line 18: What does “discrete degree of data” mean?

Page 4, lines 21-22: What do the Author mean when they write: “Among them, PM2.5 mass concentration was significantly higher in the morning than in the afternoon, and the range increased when air pollution increased”? I was not able to find the PM2.5 values supporting this statement.

Page 4, line 32: How do the Authors establish that the AOD has a significant trend?

Page 4, lines 31-40: How do the Authors explain the variability of PM2.5 mass concentrations and AOD values as a function of the AQI classes?

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Page 5, lines 9-10: The Pearson’s correlation values between PM2.5 concentrations and AOD data cannot be found in Table 2. It is quite difficult for a reader to understand that they are referred to the entire dataset and not to its classification as a function of the AQI, especially if the correlation values are reported immediately after mentioning Table 2 in the text.

Page 5, lines 11-15: The results show that the correlation between PM2.5 and AOD increases with the increase of the AQI values. However, the Authors limit themselves to reporting the values shown in Table 2 without providing a scientific explanation only describe the table without providing any scientific interpretation of the results found.

Page 5, lines 16-24: The regression analysis section should be the main part of the article as the Authors aim to provide a reference for the inversion of PM2.5 mass concentrations from satellite-derived AOD data using a classification based on the AQI. This section is incomplete and the discussion, as well as being difficult to understand for the misuse of English, is very weak and limited to a poor description of the data reported in the corresponding tables (i.e. Table 3 and Table 4. Moreover, the latter is never recalled in the text) that are the output of the statistical program used (i.e. SPSS). In addition, although the fitting obtained by subdividing the dataset according to the AQI is better than the one obtained considering the entire dataset, it is not clear what this improvement is linked to. The Authors do not provide a robust explanation.

Page 5, lines 26-31: The Authors say that “the main goal was to study the difference of relationship between PM2.5 and AOD to improve our ability to know quantitatively spatial relationship patterns of PM2.5 and AOD”. No spatial relationship has been found.

Discussion section: Most of the text of this section is a useless repetition of what has already been written and does not add anything to the discussion of the results. This section should be completely rewritten or deleted.

Reference section: A careful review of the reference section is needed. For example, as reported in the general comments, the same article is reported twice differently (e.g.

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page 7, lines 30-32 and page 9, lines 4-6). Alphabetical order is not always respected (e.g. see the reference reported at page 9, lines 19-21) and some articles are mentioned in the text but not in the references section (e.g. Mordukhovich et al.,2015). Moreover, some articles are not accessible by fellow scientists.

MINOR TECHNICAL COMMENTS

Page 1, line 16: The hours are not correctly reported. Moreover, it is not clear if it is local time or UTC. It would be better to express the time in UTC.

Page 2, line 2: Aerosol optical thickness is generally reported as AOT. To avoid confusion, it would be better to use “depth” instead of “thickness” so as to use the acronym AOD throughout the manuscript.

Page 3, line 21: The website reported as <http://106.37.208.233:20035/> is not accessible.

Page 3, line 30: The Authors report: “The time of passing study region of Terra is 13 or 14, and Aqua is 15 or 16”. As said in a previous comment, it would be better to express the time in UTC. Moreover, the time of the overpasses over the region under study should be checked.

Page 12, Table 2: It would be better to use AODT and AODA in place of MOD and MYD.

Page 14, Table 4: Table 4 is not mentioned in the text.

Page 17, Figure 3: The figure reports Chinese symbols.

Page 18, Figure 4: The figure does not report the PM2.5 unit of measurement. Moreover, it would be better to provide a legend of the symbols reported in the figure (e.g. The line in the centre of the box represents the median value, lower and upper boundaries for each box are and the whiskies encompass . . . times the range of the box. Finally, asterisks and empty circles correspond to).

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Page 19, Figure 5: As reported in the previous comment, it would be better to provide a legend of the symbols shown in the figure.

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