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Interactive
comment

Interactive comment on "Leveraging spatial textures, through machine learning, to identify aerosol and distinct cloud types from multispectral observations" *by* Willem J. Marais et al.

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We thank the reviewer for the time spent on reading the paper in detail and providing us with helpful feedback. Here are the response to some of the specific comments:

Grouped comments 1) The introduction is somewhat confusing. It's a mixture between an introduction and a method section and thus needs some restructuring, See my specific comments below. 2) P1, L20: Change "Introduction & Problem Solving" to "Introduction". 3) P3, Fig. 1 and P4, Fig. 2: Both figures should be moved to the

method section. 4) P3, L64: Skip Sub-header "1.1. Objectives". 5) P5, Section 1.2: Skip section header and move most parts of the text to the method sections. In the introduction it is sufficient to just write in a few sentences what 6) P5, L1.3: Skip sub header "1.3 Outline".

Response This introduction is, admittedly, a bit unconventional relative to most other scientific papers. However, given the nature of the topic, we think it is important to give some form of explanation and/or foreshadowing to the reader what the proposed methodology is in the introduction. We assume that the reader wants to assess the value of the paper as soon as possible, and therefore determine if the paper is a worthwhile read. We help the reader achieve this goal by including in the introduction a summary of the results via figures 1 and 2, and by giving a short overview of the methodology.

As a compromise, we request to keep figures 1 and 2 in the introduction and move most of the text in section 1.2 to the methods section. Sub-headers "1.1. Objectives", "1.2 Proposed methodology" and "1.3 Outline" will be removed.

Comment: P6, Section 1.4 This section should be either included in the method section(extra subsection for this is not necessary). Even better would it be to have this Table in an appendix.

Response Since the listed acronyms are used throughout the paper, we would like to make the reader aware of the different commonly used acronyms as soon as possible. This approach is common in many mathematical texts.

Comment: P2, L53 References? Who has developed the CNN method?

Response References are added.

Comment: P6, L114 Add a reference for the FE method?

Response References added.

Comment: P7, L134 ". . .. .with which rank the different methods. . .. .". Sentence not correct, something is missing here. Did you mean . . .." with which "we" rank the different methods"?

Response This is a grammatical error; the sentence now reads: "...from the test dataset a test (generalization) error is computed with which the different methods are ranked based in their error performance (Friedman et al., 2001)."

Comment: P12, L202 The listing is obsolete and mentioning the person to do it is a bit weird here. Therefore, I would suggest to rewrite the sentence as follows ". . ....MODIS/VIIRS images that are chosen are divided into overlapping patches. . .. . .."

Response The sentence is changed; thank you for the feedback.

Comment: P12, L205 "one co-author" obsolete. Simply write "In order to ensure consistent labels for the study, a labeled data set was created ..."

Response We specify "one co-author" to explicitly indicate that (a) all the images were labeled by one person as opposed to an ensemble of labelers and (b) this person is a subject-domain expert. This is salient information given that the creation of this dataset is one of the contributions of the work.

Comment: P12, L207 Why are quotation marks used for clear air?

Response We are of the opinion that an air column is unlikely to be clear of aerosols. Having the words clear air in quotation marks avoids it being read as an absolute claim.

Comment: P12, Section 2.2.2 This section sounds like a user manual. Avoid writing the atmospheric scientist/user. Just describe the process itself.

Response The section is being revised to improve clarity, however, we did feel it necessary to be detailed in order for other researchers to be able to replicate our method.

Comment: P13, L225 ". . ..the following guidelines were followed:" Rephrase sentence to avoid repetition of "follow".

Response The sentence is rephrased.

Comment: P22, L416 Sentence on Fig13 not clear. Please rephrase.

Response The sentence will be rephrased.

Comment: P23, L428 Are studies existing that compare these instruments and/or document these differences? If yes, please add these references.

Response The following citations were added in which comparisons were made between the MODIS and CALIOP instruments and biases were reported. "Improving the CALIOP aerosol optical depth using combined MODISâĂŘCALIOP observations and CALIOP integrated attenuated total color ratio", by Min Oo and Robert Holz, 2011 "Comparison of aerosol optical depth between CALIOP and MODIS-Aqua for CALIOP aerosol subtypes over the ocean", by Man-Hae Kim, Sang-Woo Kim, Soon-Chang Yoon, and Ali H. Omar, 2013

Comment: P23, L447 By design of what? The CNN?

Response The human-labeled training dataset only contained optically thick aerosols. Thus, the CNN method learned only to detect thick aerosols. We will rephrase the sentence.

Comments: 1) P33, Figure 11 caption Some text here belongs rather to the main text since it is describing what conclusions can be drawn from the figures and not what actually is shown. 2) P34, Figure 12 caption: Same here. Shorten the caption text and just write what is shown.

Response The captions are shortened and some of the caption-text was moved to the main text.