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Atmospheric Measurement Techniques Discussions

Interactive comment on "Cloud identification and classification from high spectral resolution data in the far and mid infrared" *by* Tiziano Maestri et al.

Anonymous Referee #1

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General Comments

The manuscript introduces a new algorithm for cloud identification and classification that is used on a simulated dataset for the upcoming ESA mission FORUM. The authors present their intentions and then proceed to explain how the experiment is performed, finally showing results and performance analysis, an important aspect for an algorithm that aims at being operational. The authors also show a good case study, albeit only simulated, for the importance of using the far infrared in conjunction with the usual 4-15 microns interval that is found in most hyperspectral sensors. The topic is certainly of interest and fits within the scope of the journal. Overall, the work is well organized. I recommend it for publication once the comments below have been addressed.

Major Comments

The paper makes an extensive use of acronyms, most of them defined within the manuscript and not always intuitive. This forces the reader to keep searching the text for their meaning, which distract from the content of the manuscript. If possible I would recommend to trim down the number of acronyms and use them only when necessary. In any case, adding an appendix with a list of acronyms can help the reader, who can at least find them in one place instead of scrolling continuously throughout the text.

Section 4

I'm a bit surprised by the findings here for the tropics. I would have expected the TraNCs configuration to be the opposite (i.e. more cloudy than clear spectra) since I'd imagine more cloudy components would help better capture the higher variability of the cloudy spectra. I'd like to hear if the authors have any thoughts on this. Out of curiosity, does this still hold true for mid latitudes and polar regions? in 4.3 the authors say that they generated the midlatitude and polar TraNCs with the same methodology used for the tropics, but it's not clear to me whether you used the same "70 clear/30 cloudy" split. If I understand correctly Table 6, this is not the case and you should at least mention that the tropical case and the non tropical ones are different in their training dataset (cloud/clear ratio).

Section 4.2

I wonder if excluding (some of) the FIR channels close to the CO2 absorption would improve the DP even further. Do the authors have any comments or have they performed any tests with this case?

Minor Comments

Here below a list of typos and other minor corrections:
p1, l20: Please change "sensible" with "sensitive. There are a few other instances of this, listed below. Please, search the text, in case I missed some.

p2, l7: it is shown that **by** using. . .
p2, l10: REFIR-PAD, please define the acronym
p3, l3: this is a forward reference, the text redirect to a section down the line, please define the acronym SID here.
p3, l19: built
p3, 32: inconsistent capitalization
p5, l2: cloud, singular, the plural is determined by the adjective
p5, l2: either change “input” to “inputs” or “are” to “is”
p5, l7: **is** reported
p11, l24: the reference “Turner et al 2005” is incorrect, it should be Turner et al. 2006. Please change it
p16, l5: **In** this regard
p17, l15: either “performance” is plural or the verb “to be” singular
p17, 19: to **perform**
p17, l26: please use period instead of comma as decimal separator
p19, l16: . . . **are** provided for . . .
p19, l24: remove one of the articles: “the the”
p19, l30: depend**s**
p21, table 4: am I missing something or the RETS number don’t add up? the total to me seems 25, not 30. Please explain.
p22, l1: . . . the number of features used in the FIR is reported
p25, l27: When **the** elementary. . .
p25, l33: G**B** the letter B should be capitalized (b: bits; B: bytes)
p25, l34: increase**s**
p27, l2-3: please rearrange the sentence to follow the subject + verb structure (i.e.: where a time complexity lower bound of O(. . .) is found for square matrix multiplication)
p29, l3: change “sensible” with “sensitive:
p29, l7: provide**s**
p29, l11: . . . the clear sky training set, do**es** not significantly modify . . .

p29, l25: spectral band**s**
p29, l29: again, change “sensible” with “sensitive”
p29, l35: **In** this regard

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