Review of 'Differences in cloud microphysical properties between MODIS Collections 5.1 and 6' by John Rausch et al.

The authors describe how the cloud microphysical properties in the latest MODIS Collection 6 differ from those in the previous Collection 5.1 and discuss some of the algorithm changes that are likely responsible for these differences. Since the MODIS products are frequently used for scientific studies, this is a useful contribution to the literature, which I recommend will be published after the following comments have been addressed.

General comments

The title does not completely reflect the contents of the paper. The analysis is restricted to liquid clouds over ocean, and this should be reflected in the title. Also, a large part of the analysis concerns CDNC which is not itself a MODIS product.

The authors focus almost entirely on differences between the two MODIS collections. More information and discussion on the retrieved r_e and CDNC themselves are also needed to place the differences in context. For example, Fig. 5 shows that globally C6 CDNC is about equal for the 1.6 and 3.7 micron channels but lower for the 2.1 micron channel. Can this result be explained? How does this vary regionally (partly covered in Fig. 6)? How does this figure look for effective radius? Does the 'stratification' of effective radius from the three channels (i.e. which is largest, which smallest and which in between?) change between the two collections? An idea would be to include a map showing this stratification (6 possibilities) globally.

Specific comments

P2, L4: Should 'rejection' be 'reflection'?

P2, L7: 'forcing' should be 'effect'

P2, L8: I think 'increasing' should be added before 'also'. Precipitation efficiency is reduced and cloud lifetime increased.

P4, L9 and further: Be consistent in the notation of liquid water content and path. The subscript 'AD' is sometimes added (e.g., L9 and eq. 2) but sometimes not (e.g., eqs. 2 and 3).

P5, Eq. (3): The optical thickness should be to the power 3.

P5, L6: Please explain what 'k' actually is.

P6, L21: I would argue that surface albedo reflectance belongs to the ancillary data (either assumed fixed or calculated from Cox & Munk). The retrieval LUTs need surface reflectance as input, right?

P7, L1: Do you have any reference of the mentioned effect of the change in surface reflectance?

P7, first paragraph: Do you have any explanation for the increase in $r_{e,1.6}$ at high northern hemispheric latitudes? Maybe a general remark could be added (if you agree) that the effect of the CTP change will be largest in the tropics and smaller toward the poles because it depends mainly on water vapour.

P7, L16-21: The information on this case study does not clarify anything, so I suggest to either expand it (e.g., with a figure) or leave it out. I appreciate it is difficult to separate out the effects of the individual changes quantitatively, but can you perhaps more generally explain the pattern of $r_{e,3.7}$ differences in Fig. 2?

P8, Section 3.3: It is not very clear to me what we actually learn from the independent pixel comparison, especially since few explanations are provided (i.e. for the sign and seasonal variability of differences between independent and common pixel sampling).

P9, L13-19: I suggest to mention here the optical thickness / effective radius retrieval effects of above cloud aerosol, which can be very strong in this region, depending on the SWIR channel used.

P9, L15: This is not the biomass burning season for whole Africa but for southern Africa. Also, I would argue that June to October is a better reflection of the average burning period.

P9, L17: From Fig. 6a it seems that there is *no* discernable difference at 3.7 micron.

P16, Fig. 2: To put these difference plots in context, please add effective radius from C6 from the three channels as separate maps.

P16, Fig. 2: For comparability it would be better to use the same color scale for all difference plots. It seems -2 to +2 micron is ok for all plots.

P17, Fig. 3: To put these difference plots in context, please add CDNC from C6 from the three channels as separate maps.

P19, caption Fig. 5: Add 'Collection 6'.

Technical comments

P1, L21: remove brackets

P2, L3: replace ':' by '.'

P2, L10: Suggest to add 'number' after 'droplet' and introduce abbreviation CDNC (since that has not yet been done in the main text)

P2, L16: Remove 'properties of'

P2, L24 and further: check use (or not) of brackets with the references

P3, L2: check sentence; what are 'cloud microphysical estimates'?

P3, L21: Add 'are' after 'results'

P4, L18: Add comma after 'properties'

P5, L1: 'therefor' should be 'therefore'?

P5, L22 and further: Be aware that 'difference less than -1 micron' is confusing. It actually implies the opposite of what you try to express. Similar phrases occur later in the text.

P6, L8: 'differences are different' reads strange; can you rephrase?

P7, L9: Suggest replacing 'brighter' with 'higher'

P7, L18: 'appear' should be 'appears'

P7, L23: Suggest changing 'Finally, an additional' to 'A final'

P8, L4: 'reveals' should be 'reveal'

P9, L10: Add 'liquid' before 'cloud'

P9, L17: Replace 'at this' with 'with a' and add 'of' after 'CDNC'.

P9, L18: Add 'burning' after 'biomass'.

P9, L20-22: Sentence is not correct.

P9, L24: Suggest to use the word difference here rather than bias.

P9, L25: Add 'is' between 'micron' and 'in'

P10, L6: Replace first 'a' with 'this'.

P10, L6: Add 'to' after 'compared'.

P10, L18: Typo 're'

P11, L10: Add 'are' after 'here'.

P13, L20: African starts with a capital.