Atmos. Chem. Phys. Discuss., 13, C1270–C1273, 2013
www.atmos-chem-phys-discuss.net/13/C1270/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "CLARA-A1: the CM SAF cloud, albedo and radiation dataset from 28 yr of global AVHRR data" *by* K.-G. Karlsson et al.

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Received and published: 15 April 2013

We thank the referee for the nice words about the manuscript. Here are our replies to the specific comments (repeated):

1. In Figure 5, I see no change during the NOAA-16 period when the 1.6 micron channel (3a as you refer to it) was used in CPP? Was there a correction applied here? Also, I see no impact of the inclusion of METOP which has the 1.6 micron and occurs at a different time of day.

Fig. 5 is based on NOAA-16 ch3a data for the period January 2001 until April 2003. Actually, careful inspection of Fig. 5 shows that the mean LWP during this period is somewhat lower than in the years before and after. Thus, there is some impact, but

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averaged over this domain (the tropics) it is not very large. Fig. 5 does not include METOP data; only afternoon satellites were used to create this figure (see caption).

2. Where the MODIS results in Figure 5 from the 2.1, 1.6 or 3.75 micron channels?

The MODIS results in Fig. 5 are based on the standard product, i.e. the 2.1 micron channel. We will add in the caption of Fig. 5: '... the MODIS Aqua (MYD08, LWP based on the 2.1-micron channel) product ...'

3. I was curious if there was any attempt to link the cloud properties used in MAGIC to those derived from the CPP algorithm in CLARA-A1? Would a user see a inconsistencies in the two products?

It is correct that MAGIC is not using the derived results from the CPP-products as input to the algorithm so there might be some inconsistencies. But as long as the algorithm is using the derived cloud mask information (basic input to cloud amount products) we believe that these problems are quite limited. But we are aware of this problem and will consider the effects of it and potential improvements in future releases.

4. The CCI project is not mentioned directly but there is reference to paper about CCI? Will CM-SAF cease to exist in favor of CCI or are they in fact the same project?

ESAs Climate Change Initiative projects could definitely have been mentioned in the manuscript (because of some rather similar activities going on) but we chosed to leave it out (the paper is already long as it is). Also, the relevance is not entirely clear since for some of the products (e.g. surface albedo and surface radiation products) there are currently no direct CCI counterparts. For the future of the CLARA dataset as such, we thought it was more important to emphasize that we have a long-term commitment in the CMSAF project to provide at least one new (maybe two) edition within the next five years. Regarding the future of CM SAF one could say that there is a long term commitment from EUMETSAT to support the SAF project structure in two new project phases (Continuous Development and Operations Phase 2 2012-2017 and Continuous

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Development and Operations Phase 3 2018-2023). The funding for these two project phases is secured and the planning for a continuation beyond that time frame is also ongoing. Regarding CCI, this project has a finite lenght and covers only six years (2011-2016). ESA has no ambition to start any new long-term operational monitoring service by itself. The CCI initiative is a way of getting ESA data better used in existing and future climate monitoring programmes. The continuation of data usage beyond the CCI project will have to take place in other ways. The operational role has to be taken over by e.g. the Copernicus (formerly GMES) services (jointly defined by European Union and ESA). Exactly how this will be organised is still to be discussed. The role of the CMSAF here is not clear but a good guess is that existing infrastructures should be utilized rather than to build new services from scratch. Regarding the climate monitoring of cloud parameters, it is quite clear that the results of the ESA-CLOUD-CCI project will affect the planning and organisation of the CMSAF activities in the period beyond the CCI projects.

5. The trend in cloud amounts is very interesting. This PATMOS-x data is referred to as coming from NOAA and therefore most likely uses NOAA reanalysis data where the CM-SAF uses ERA data. Can trends in the reanalysis impact the derived AVHRR cloud amounts?

It is correct that the PATMOS-X is using NCEP reanalysis data and not ERA data like CLARA-A1. So, potentially, different trends in the two different reanalysis datasets can be picked up by the PATMOS-x and CLARA-A1 datasets. However, studies made so far indicate that the reasons for the trends are rather linked to changes in the observation frequency or sampling itself and not to ancillary data (like input from Re-analysis datasets). For example, if just sub-sampling the dataset to separate daytime and nighttime observations we have seen that trends almost disappears if just looking at the daytime and the nighttime results separately. However, what is clear is that nighttime results (including twilight) show a systematic negative bias, i.e., less clouds are detected at night compared to during day. Thus, if we start to use a relatively seen larger

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fraction of night-time or twilight-made observations we should anticipate that resulting cloud amounts will start to go down. And that is exactly what is happenning during the last ten years of the dataset. More and more satellites are added simultaneously and at the end of the period we are using up to four satellites simultaneously (well illustrated in Figure 13, bottom panel). If you consider that three of the four satellites (NOAA-15, NOAA-17 and METOP-A) are morning satellites (with observation times around sunset/sundawn when cloud detection is problematic) one can understand that cloud amounts may go down artificially because of a higher relative frequency of observation conditions close to twilight. These dependencies on the observation sampling rate are detrimental and we have to investigate the impact of this in dept in relation to the release of the next CLARA-A2 dataset. That's why we are cautious about making too firm conclusions about the visible trends in the figures of this paper. It is clear that much more research on this and about ways to mitigate are necessary. We will strenthen the discussion on this to make it even clearer.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 935, 2013.