

Response to reviewer 2 comments.

We would like to thank the reviewer for the very valuable comments and suggestions. We believe that the implementations of these have improved the paper significantly. In the following the reviewer comments (black) and our responses (blue) and comments are given.

(General comment from the authors: This review, incl. page and line numbering, seem to refer to the initially submitted version of the manuscript. Some of the review points were already addressed before publication in ACPD, which is indicated in the point-by-point response below.)

General comments:

The paper introduces a novel 8-year long dataset of cloud properties derived from the observations of the METEOSAT SEVIRI instrument. For potential users of this dataset, it provides a good overview of the underlying methodology, as well as presenting some results obtained as applications of the dataset, specifically the use of this dataset to quantify sampling uncertainties for polar-orbiting instruments, and to study differences in mean cloud properties over two regions. While the paper is useful as a reference for users of the dataset and suitable for publication in ACP, I do think that the paper needs some additional work to fix its rough edges, specifically regarding its language/phrasing. While some specific instances are pointed out below, these are by no means complete, so the authors are strongly urged to carefully revise the manuscript to improve the presentation/language and make it suitable for publication.

Comments/technical corrections:

Abstract:

-L6: "were intercalibrated" => intercalibrated with what?

The visible and near-infrared channels were intercalibrated with MODIS. This explanation has been included already in the manuscript revision for ACPD.

-L6: "Including latest development components of two state-of-the-art ...". Please rewrite this sentence, not sure what "development components" etc means. Also, using the latest versions does not ensure high accuracy by itself.

OK. This sentence will be changed to "Applying two state-of-the-art retrieval schemes..."

-L10: collecting per-timeslot histograms

The histograms contain information collected within a month. It seems the current formulation is misleading. Thus the corresponding sentence will be changed to "In particular the per-month histogram information...."

-L18 "optical thickness and cloud water path" => "cloud optical thickness and water path"

In the manuscript revision for ACPD, this sentence was already changed to "...cloud optical thickness and cloud water path..."

-P5: the 15 minute scans only apply to the primary SEVIRI service (not the rapid scan service). Also, SEVIRI's nadir optical resolution is not 3km, but 4,8km according to Schmetz et al (while sampling resolution is indeed 3km).

In the manuscript revision for ACPD, we already added a sentence about the existence of rapid scan modes, which are carried out for limited time periods and sub regions of the disk.

Wrt. the spatial resolution, the following explanation will be added:

"The SEVIRI ground resolution (footprints) near the sub-satellite point (SSP) can in a first approximation be assumed to be of rectangular shape. The spatial resolution is 1.67 km for the HRV and 4.8 km for all other channels. The pixels are oversampled leading to sampling distances for nadir view of the pixels of 1 km (HRV) and 3 km (all other channels), respectively."

-P6, L4: "this is an inherent feature of each SEVIRI instrument". I do not agree with this phrasing ("inherent feature"), as the positions of the satellites are controlled externally.

In the manuscript revision for ACPD, this sentence was already changed to "This is an important feature to consider for each SEVIRI instrument."

-P7, L13: why state again that this is done for each timeslot?

"..., also for each individual SEVIRI time slot." will be deleted.

-P7, L17: probabilistic cloud masks exist and contradict this statement.

This is correct. We will replace the following sentence "For passive imagers the information content, however, often only allows a binary decision (cloud, clear-sky)." by "Binary and probabilistic cloud masks exist for passive imagers. In our framework the applied cloud mask produces a binary decision cloudy/clear-sky, of which the cloudy case covers the two levels cloud-filled and cloud-contaminated. The subsequently listed cloud properties are processed in all cloudy pixels (cloud-filled and cloud-contaminated) with the exception of fractional low-level clouds, as reported in the section 3.1. For higher level products this binary cloud mask information is transferred to cloud fractional coverage by averaging in space and time."

-P8, L1: distinguished from what?

The sentence "Thermodynamic phase (CPh): For passive imagers, detecting the phase at the cloud top is often limited to three classes: liquid, ice, and mixed (of which the mixed class can often not be distinguished) will be changed to "Thermodynamic phase (CPh): For passive imagers, detecting the phase at the cloud top is often limited to two classes: liquid and ice. However, few schemes also attempt to distinguish a mixed class from those two classes. This is not done in the schemes used for the presented CLAAS dataset."

-P10, L27: what angle is used to exclude sunglint?

The following sentence will be added: "The sun glint is identified by the computed glint angle. Areas with glint angles below 25° were assigned sun glint."

-P13, L8, "available 24 time steps", vs. P12, L14, "containing all 24 hour slots": please clarify, does the dataset use all available time slots, or only time slots on the hour? I'd suggest to add the information on temporal sampling also to Table 1.

For this dataset we used hourly data, thus 24 time slots per day. We will align the two formulations mentioned by the reviewer (and add them to the caption of Table 1).

-P17, L19: "are very present" => what does this mean?

Will be modified to: "...are present..."

-L20: "cylce" => cycle

Will be corrected.

-L21: "is very matured": not sure what this means

In the manuscript revision for ACPD, this sentence was already changed to "The composition of histograms of cloud properties on short time scale is feasible by the high temporal sampling of SEVIRI."

-L26: "in particular over the ... with values up to 90%." What does "values" refer to (I guess that 90% of clouds have COTS below 3.6)? Please also consider using cumulative histograms in figure 5c/d to better illustrate these estimates.

The sentence will be modified to: "From panel (a) in this figure it becomes clear that for many

regions clouds with COT lower-equal 3.6 dominate, in particular over the Atlantic (except stratocumulus regions), Indian Ocean, Mediterranean Sea and some spots over South America. The relative occurrence of such clouds partly amount to 90% in these regions.”

Furthermore, cumulative histograms will be added to Figure 5, as suggested by the reviewer.

-P18, L9-10: This investigation indicates ...“ this sentence is not really informative, and somewhat logically flawed. (cloud variability is never characterized by the first statistical moment!). Please be more concrete by specifying the applications studied. Also, "good“ should be "well“ as it is an adjective,

This sentence will be rephrased. Please see reply to reviewer 1 comments.

-L11: "convolving“ This term is misleading, this is not a convolution in the mathematical sense.

“Convolving the temporal occurrence of COT with CTP facilitates...” will be changed to “Combining the temporal occurrence of COT and CTP facilitates...”

-L13: "account“ => "provide“

The sentence will be modified to “The CLAAS JCH as introduced in Section 4.4 provides this valuable information on high spatial resolution as well as high resolution in COT and CTP space.”

-P19, L2 "and their characteristics“ => "and their associated cloud types.“?

In the manuscript revision for ACPD, this sentence was changed to “The joint histograms can also be used to characterize certain weather states and their characteristics, as reported in Rossow et al. (2005) and Oreopoulos et al. (2011).”

We will delete “and their characteristics” because the weather states already include the cloud characteristics in CTP and COT space, which we had in mind here.

-L9: Why do you include 12UTC for CFC/CTP (and how do you get to 8 samples per day by including one additional sample)? I cannot see any justification for choosing a different sampling strategy for some of the variables, I strongly urge the authors to keep this identical for all the panels of Fig.8.

The current formulation seems to be misleading. What we meant was that for the CFC and CTP investigations, we not only sampled the retrieval results during daytime but also during night time, e.g. 9AM and 9PM, 11AM and 11PM. This is done with respect to the fact that these two cloud variables can also be retrieved during night time, for our SEVIRI algorithms as well as for polar-orbiting instruments such as MODIS, AVHRR.

We will rephrase this sentence: “Since retrievals of CFC and CTP are also possible during night time, the constructed monthly means are based on 2 (2,14 UTC), 4 (2,11,14,23 UTC), 8 (2,4,9,11,14,16,21,23) samples per day per grid box.”

Also, as requested by reviewer 1, we will also add this information in the figure captions of Figure 8.

-Fig8: Why use the acronym CTO for cloud top pressure here? Please use consistent acronyms.

This will be changed to “CTP” to be consistent.

Summary and Conclusions:

Generally, this section could use some more polishing,

Will be done.

specifically -p20, L11: "of which" not clear what this refers to.

The sentence “The dataset spans the time period from 2004 to 2011 using the satellites Meteosat-8 and Meteosat-9, of which the SEVIRI visible and near-infrared measurements were inter-calibrated.” Will be changed to “The dataset spans the time period from 2004 to 2011 using SEVIRI measurements onboard the satellites Meteosat-8 and Meteosat-9 satellites. Visible and near-infrared measurements were inter-calibrated with MODIS.”

Here we now also added the information that they were inter-calibrated with MODIS, as asked for

the abstract in the first comment of this reviewer.

-L20: "shown": maybe "demonstrated"?

Will be changed to "demonstrated".

-L22: "does not show": either "does not show up as" or "does not cause"

Will be changed to "does not cause"

-L6 "in the" => "within the"

Will be changed as suggested.

-L10: "the continues" => "the continued"

OK. Will be changes as suggested.

-L15: last sentence is incomplete

In the manuscript revision for ACPD, this sentence was already changed compared to the initially submitted version, which had an incomplete sentence. The revised sentence is "Ongoing collection of user feedback will also impact the selection of cloud properties as well as their technical characteristics in the next dataset edition."