Dear AMT Editors and Reviewers,

Thanks for starting the review process and for the precious comments and suggestions provided. In what follows we list the comments expressed by the handling associate editor (paragraphs written in blue color), provide our answers (paragraphs written in black color) to the raised points and explain how we addressed each point in the revised manuscript.

Comment by the handling associate editor :
Dear authors,
interesting work! I decided to go ahead and start the review and discussion. Nevertheless, I want to point out two things which you might consider in the revised version, once the reviews are available:
(1) concerning figure 2 it is mentioned that "most" of the artefacts were excluded from the analysis. Why only "most" and why did you not exclude them from figure 2?

Authors' reply :
In the initial version of the manuscript, figure 2 shows simulations A1, A4, A7. In the edited version of the manuscript, we now replace simulations A4 and A7 with A6 and A11, respectively, for consistency with figure 6 (that becomes figure 5 in the revised manuscript), showing the simulations for the cumulus case, and figure 1.
In this respect in section 2.1, lines 109-110 (pp. 4) (lines 126-127 – pp. 5 in the revised manuscript) we replace the following phrase :
« Figure 2 shows simulations of some of the successive CLOUD observations corresponding to acquisitions A1 (far from nadir), A4 and A7 (close to nadir). »
with the following one :
« Figure 2 shows simulations of some of the successive CLOUD observations corresponding to acquisitions A1 (far from nadir), A6 (close to nadir) and A11 (far form nadir and on the diametrically opposite view to A1 with respect to nadir). »

In this respect in section 3.1.3, lines 195-197 (pp. 12) (lines 280-283 – pp. 16 in the revised manuscript), we replace the following sentence:
« Figure 2 shows 3DMCPOL simulations for the acquisition A1 (T 0 ), off nadir (top three figures), acquisition A4 (T 0 + 60 s) (middle images - closer to nadir) and acquisition A7 (T 0 + 120 s) approximately at nadir (bottom figures), respectively. »
with the following one:
« Figure 2 shows 3DMCPOL simulations for the acquisition A1 (T 0 ), off nadir (top three figures), acquisition A6 (T 0 + 100 s) (middle images - approximately at nadir) and acquisition A11 (T 0 + 200 s) off nadir but on the diametrically opposite view to A1 with respect to nadir (bottom figures), respectively. »

The calculations presented in this paper, namely those shown in figure 8, 9(b), 11(a) and 12, were obtained using acquisitions A5 and A6, close-to-nadir views. With regard to such simulations, we use only the central part of the image as shown in the input images (see figure 8 - step 1 and figure 11a - step 1). Although some artifacts associated to the cyclic conditions used in the Monte Carlo code are visible, this non realistic effect does not affect the results obtained.

For more clarity, in section 2.1 lines 116, 117 (pp. 7) (lines 135-137 – pp. 7 in the revised manuscript) we replace the following sentence :
« Finally, there are image artifacts, mostly visible in the close-to-Nadir views (A4, A7), which are associated to the cyclic replication of the cloud field via the Monte Carlo code. »
with the following one :

« Finally, there are image artifacts, mostly towards the periphery of the images and especially visible in the close-to-Nadir view (A6) and the off-nadir acquisition (A11), which are associated to the cyclic replication of the cloud field via the Monte Carlo code. »

Still in the same section 2.1, lines 117-119 (pp. 7) (lines 137-139 – pp. 7 in the revised manuscript), we replace the following sentence :
« Most of these artifacts are excluded from the calculations presented in this work, specifically when performing stereo processing. This is achieved by opportunely setting the boundaries of the region of interest (ROI) of the images to a replicated domain. »
with the following phrase :
« The calculations presented in this paper, namely those corresponding to Fig. 8, 9(b), 11(a) and 12, were obtained using acquisitions A5 and A6. For such calculations, the region of interest (ROI) used for stereo processing corresponds to the central part of the images (see input images in Figure 8 - step 1 and Figure 11a - step 1). Although some artifacts, due to the cyclic conditions of the Monte-Carlo simulations, are visible, they do not affect in any way the results obtained. »

For more clarity, we also add in the caption of figure 8 the following sentence: « These calculations were obtained for acquisition A5. ».

Comment by the handling associate editor :
And (2) I would like to have some motivation why two completely different approaches were chosen (MesoNH + 3DMCPOL, SAM + Matsuba). I assume that the 3DMCPOL calculations are expensive, but in fact the should be cheaper for the cumulus case than for the deep convective case. The text wasn't very clear about how many scenes were calculated with 3DMCPOL and I would suggest some comments at a more prominent place, like the abstract and the summary/conclusions.

Authors' reply :
The realistic simulations presented in this paper have been obtained using the same principle, LES simulations coupled with a radiative transfer model. However, the tools used for simulating the two test cases presented are different. This is due to the time required for the development of the RT model and, in particular, the embedding of the geometric camera models in the 3DMCPOL code. Therefore, the first simulated test case is the one obtained with Mitsuba, readily available at the beginning of this works. If on the one hand Mitsuba allows to easily obtain a correct rendering of the images, on the other hand it relies on simplified optical properties (Henyey-Greenstein phase functions). Furthermore, the interface of 3DMCPOL with the geometric camera models allows to simulate observations for realistic orbits (calculated via Euclidium) and in a future version to take into account camera distortions. This will allow to test the algorithms under even more realistic conditions. For both cloud cases, 3DMCPOL calculations are highly time consuming. For this reason and due to time constraints, re-simulating the cumulus case was not possible. However, we think that presenting both test cases was worth it as it allows to show that the 3D reconstruction of the cloud envelope is not dependent from the type of cloud scene.

For more clarity, we swap section 3.1 with section 3.2 for consistency with the chronological order in which simulations were carried out.

Accordingly, we also modify in the abstract, in the introduction of section 3.2 and in the conclusions what specified as follows:

In the abstract lines 6-8 (pp. 1) (lines 6-8, pp. 1 in the revised manuscript), the following sentence:
« The latter are obtained via the radiative transfer model 3DMCPOL, for a deep convective cloud case generated via the atmospheric research model Meso-NH, and via the image renderer Mitsuba for a cumulus case generated via the atmospheric research model SAM. »

was replaced with:

«The latter are obtained via the image renderer Mitsuba, for a cumulus case generated via the atmospheric research model SAM, and via the radiative transfer model 3DMCPOL, coupled with the outputs of an orbit, attitude and camera simulator, for a deep convective cloud case generated via the atmospheric research model Meso-NH. »

In the introduction of section 3, for clarity, we add :
As no real data are available, in order to develop and test the cloud envelope and cloud development velocity retrievals, we simulate C3IEL observations for two test cases (11x3=33 images for each case). The first case is a cumulus case generated via the atmospheric research model SAM and the image renderer code Mitsuba. The second test case, a deep convective cloud, was simulated via the atmospheric research model Meso-NH and the radiative transfer model 3DMCPOL. The latter allows to exploit more realistic phase functions and was coupled with the outputs of an orbit, attitude and camera simulator. This second simulation is thus more realistic than the first one and in the future will allow to account for image distortion and satellite orientation error. However, time constraints associated to the high computational cost of the 3DMCPOL runs did not allow to re-simulate the cumulus cloud.

In the conclusion section we replace the following sentence, lines 448-450 (pp. 33) (lines 506-508, pp. 35 in the revised manuscript):
“These were obtained via Meso-NH and the radiative transfer code 3DMCPOL for a deep convective cloud case and via SAM and the image renderer Mitsuba for a shallow cumulus case.”
with the following sentence:
“These were obtained via SAM and the image renderer Mitsuba for a shallow cumulus case and with Meso-NH and the 3D radiative transfer code 3DMCPOL, coupled with an orbit and geometric model simulator, for a deep convective cloud case.”

at the end of the conclusion section, lines 469 (pp. 33) (lines 529 – pp. 35 in the revised manuscript), we also add:

“The cumulus case was not simulated via 3DMCPOL because of time constraints associated with the high computational cost of such calculations. However, in the future, to generalize our results, we plan to test our methods for other cloud types, scenes and solar geometries. This will be done by taking into account radiometric noise and image distortion as well as satellite orientation and position errors. This will allow to quantify the degradation of the results here obtained for “perfect simulations.”.