

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-61

Anonymous Referee #2

Referee comment on "3D cloud envelope and cloud development velocity from simulated CLOUD (C3IEL) stereo images" by Paolo Dandini et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-61-RC2>, 2022

This paper describes a method to estimate the 3D cloud envelope and development velocity using simulated images of a triplet of small satellites in a sun-synchronous orbit at 600 km height. The focus lies on trade wind cumulus and deep convection, while the methodology relies on stereo analysis and tracking to compute the 3D points of the cloud envelope and subsequent cloud motion estimation. The study assesses the feasibility and accuracy of the proposed mission design.

The paper is well written and structured and the study is thoroughly conducted and the topic is scientifically relevant. I suggest publication after the following points have been addressed:

1. Fig. 1:

Could be a bit more detailed. Just a few more numbers and lines if possible. For example the height of and the distance between the individual satellites might be good for directly understanding the geometric setup, which is important for stereo analysis and triangulation.

2. Line 106:

"consequently simultaneously". Sounds a bit strange. Maybe just leave the "consequently" out.

3. Was it described somewhere what axis the along-track direction was (x or y)? Maybe add it to one of the initial figures so that analysis later is easier.

4. Line 115 + 116:

For a tilted view shouldn't the track resolution be decreasing as a larger area is projected to a smaller image area? The same with the Ground Sampling Distance. Shouldn't it increase for a tilted view? Maybe just a misunderstanding.

5. Line 185:

I think the field of view is always constant as it depends on the camera. If the angle representing the image projection of the ground area is meant then it should be smaller with tilted view, shouldn't it?

6. Line 278:

You write that the cameras are affine for a small tile of an image. Considering the field of view in this simulation of 1 degree, the cameras already are very weakly perspective. Does an additional tiling matter?

7. Line 279:

Maybe shortly describe what an epipolar line is and why it's useful.

8. Line 279 / Fig. 8:

You describe that you conduct a stereo image rectification in order to make the stereo analysis easier, aren't you? In that case the y-component is usually zero (which you write in line 285). Is that correct? Also the disparity (parallax) should have values between 0 and infinity (or negative). But in Fig. disparities are both negative and positive. A negative disparity would mean that the observed point is behind the cameras. Or do I miss something?

9. Fig. 10:

What explains the large differences in Fig. 10F for A10 and A11? Shouldn't the differences at least be symmetrical / similar to A1/A2? Similarly Fig. 10b. What could be a reason?

10. Sec. 5.3, comment: It is good that you mention possible differences due to the different distance estimation methods.

11. Fig. 12:

A sigma of 22.85 m/s in Fig. 12a for V_z seems a bit large considering the histogram.

12. Line 443:

"attitude" "altitude"?