

Reply to comments by Anonymous Referee #3

on the manuscript "Cloud fraction determined by thermal infrared and visible all-sky cameras" by Aebi et al., submitted to Atmospheric Measurement Techniques.

We would like to thank the referee for the constructive comments that contributed to the improvement of the manuscript. Detailed answers to the comments are given below (bold: referee comment, regular font: author's response, italic: changes in the manuscript).

This manuscript introduces a new infrared sky camera and an applied cloud detection algorithm and a comparison with visible sky cameras. It represents a substantial contribution to scientific progress within the scope of AMT. The image processing method, based on down-welling longwave radiation, to estimate the amount of cloud cover is a unique approach, as is the determination of cloud type. I recommend that the manuscript be published, with consideration of the following comments.

1. **Page 2, Line 33: The TSI is indeed probably the most common all-sky camera but the Solmirus ASIVA or Reuniwatt Sky InSight may currently be more common than the WSI.**

Thanks for this comment. We included a short description about the Reuniwatt Sky InSight cloud imager in our introduction (p. 3, l. 26ff.):

Relatively new on the market is the Sky Insight thermal infrared cloud imager from Reuniwatt. The Sky Insight cloud imager is sensitive in the 8 μm - 13 μm wavelength range and its layout and software is similar to the prototype instrument presented here.

We also slightly adapted the paragraphs discussing the TSI, WSI and the Solmirus ASIVA:

p. 3, l. 8f.:

The most common all-sky camera is the commercially available total sky imager (TSI) (Long et al., 2006). Another pioneering hemispherical cloud detection instrument is the whole sky imager (WSI) (Shields et al., 2013).

p. 3, l. 19ff.:

Another instrument, the Solmirus all-sky infrared visible analyser (ASIVA) consists of two cameras, one measuring in the visible and the other one in the 8 μm - 13 μm wavelength range (Klebe et al., 2014).

2. **Page 6, Line 23: A better description is needed for "IRCCAM frame". Does this include the camera, arm, and wire ropes?**

Yes, the term "IRCCAM frame" includes the camera, arm and wire ropes. We clarified this in the text (p. 7, l. 7ff.):

This image mask contains local obstructions such as the IRCCAM frame (camera, arm and wire ropes) as well as the horizon, which in the case of Davos consists of mountains limiting the field of view of the IRCCAM.

3. 3. Page 6, Line 20, Page 8, Line 2, and Page 8, Line 20: The horizon mask appears to be independently defined for each image and for each of the three cameras. Using the same horizon mask for all images would yield a better comparison.

There is only one horizon mask per camera (we clarified this now in the text). Because the resolution and the location of the three cameras is slightly different, we decided to define one horizon mask per camera system and not using the same for all systems.