

Interactive comment on “Sky camera geometric calibration using solar observations” by B. Urquhart et al.

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This is an interesting paper which should serve as a useful reference when camera geometries require calibration. This occurs in other areas of research outside of the solar energy industry. The summary of the practical issues relating to image distortion and its subsequent correction are carefully discussed with considerable clarity. The paper presents theoretical background plus an example of the calibration process.

The title is appropriate and the references helpful.

The paper is publishable but I would like to see the incorporation of some thoughts concerning the comments below.

So far as the presentation of this paper is concerned, to the extent that it is in the

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context of sky monitoring for the forecast of renewable power generation, I would have liked to be told early on what error levels were required for the system, rather than discovering (page 27) “For the application.these error levels are satisfactory at present.”. What would have been unsatisfactory? In other words, do we care that the rms error is around 1 pixel? Is that good enough? Is it overkill?

After, a very interesting and informative first half of the paper, I was left wondering about some things of an implementation nature in section 3 onward.

The practical calibration is based on using the solar disk with its saturated pixels and halo of scattered sunlight. I don't think that we are told whether pixels outside the disk saturate but figure 2 shows large solar-illuminated areas whose symmetry is not discussed. These are presumably due to aerosol scattering and no comment is made about the possibility of selecting both clear and Rayleigh-only days.

It is acknowledged that the solar disk is distorted towards the horizon by atmospheric refraction ('the apparent solar zenith angle must be corrected accordingly' page 16, 'the sun diameter changes with solar zenith angle' page 29) but it appears to be assumed that the center of the 'disk' remains in the appropriate solar direction. This is not likely to be true.

I feel that a fundamental problem with calibrating using the solar path (a natural enough strategy) is that one samples a very limited range of the image plane, which does not quite extend to the zenith outside tropical locations. This may be fine for radially symmetric distortions, but may not be so good for tangential issues. Since the detector saturates on the half degree solar disk, maybe the use of stars or the moon would be useful in filling the image space.

On page 22 line 3, how do you know that you have a global minimum?

There are some ill defined judgement levels which did not feel comfortable: “values that were obviously incorrect” “falsely large skewness” “kn are very close to bn”

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