

Interactive comment on “Auroral meridian scanning photometer calibration using Jupiter” by Brian J. Jackel et al.

Anonymous Referee #2

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This manuscript concerns using observations of Jupiter for calibrating groundbased meridian scanning photometers (MSP).

Using stars for geometrical calibrations of auroral imagers is well-established since a couple of decades. Using stellar spectras for absolute calibration is not as common. Relating such calibrations to laboratory calibrations with LBS is not frequently done.

The task of calibrating auroral instruments is extremely important and the authors suggest considerable improvements to existing practices. This paper should therefore be accepted after a minor revision.

Detailed minor comments and suggestions:

"1. Introduction": Well written and easy to follow but it could be improved by referring

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to earlier work in the field. This is done on page 29, maybe consider moving this part here? Using stars for geometrical calibration dates back to (at least) the 1970s, several attempts has also been made over the years to use stars for absolute calibration. (Generally speaking this paper is well-referenced apart from the introduction).

page 3 line 17: "several extremely bright lines and bands from atomic oxygen and molecular nitrogen" "extremely bright" is maybe exaggerating a bit. Relatively speaking it is correct, but not even the brightest line of atomic oxygen is "extremely bright", not to mention first negative at 427.8 nm Please consider rephrasing this.

page 5, line 4: What does "luminosity" stand for here? Please clarify. Total energy emitted by the object?

page 5-6 1.2.1 Geometric: Please add suitable references to this section.

page 7, line 9 "Photometry" Please consider using "Radiometry" instead. Photometry is easily confused with photometric units, which are irrelevant here.

page 7 Eq(8): Something is wrong here. Radiance has units watts per (squaremeter steradian). Either sr is missing or the authors intended something else. The symbol L is commonly used for radiance. Please correct or clarify. See also below. How is radiance of a point-source defined?

page 7, equation (10) The column emission rate is $4\pi L = \int_0^\infty \dots$ (see Hunten 1956)

page 7, line 19: "has units of radiance" is the apparent radiance. (See Baker& Romick 1976)

This section (1.2.3) could maybe be clarified by starting with the basic quantity radiance (L) of an extended source (aurora), then discuss the Rayleigh and proceed to irradiance (E) at the detector. Then treat the case of a point source and $1/r^2$.

page8, lines 18–19: "Only the brightest stars can produce count rates comparable to background contributions such as airglow. " Incorrect! Typically hundreds of stars per

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image are normally used for geometrical calibration of images from imagers equipped with narrow-band interference filters.

page 9 table 2: $[s\text{m}^2 \text{nm}]^{-1}$ is centered above [J] and [#] looks strange.

page 10 lines 14–15: "...is still a hundred times brighter than the brightest aurora."

IBC-IV aurora (1 MR at 557.7 nm) is often compared to the luminous intensity of the full moon (0.1 Lux for a human observer) . This doesn't make sense with "a hundred times brighter"

page 17 Eq. (30): No reason to use the inverse of Eq(29).

page 28, Eq(34): This equation is central to the paper and should be discussed in greater detail.

page 29 line 12 – page 31 line 7: Please consider moving (parts of) this text to the introduction.

page 32 lines 6–8 "An arc moving from the horizon to zenith will become brighter, not because of any change in precipitation, but simply due to reduction in total airmass between auroral altitudes and a ground-based observer." Correct, but please also consider number of photons integrated when looking along the magnetic field-line instead of across it. This is the main cause of the intensification.

page 33 conclusions: Maybe summarize a bit better, and/or include a small table of the most important results. Future outlook?

Table 8: clarify units.

Figure 1: reproduces badly and lacks site mnemonics (RANK, GILL, etc.)

Figure 2: Keogram empty in printout. Looks good in PDF.

Figure 8. x and y labels in the figure could be improved.

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