

Dear Dr. Svalgaard:

We have had your manuscript "Objective Calibration of Sunspot Numbers" (2010GL045307), reviewed for both scientific content and GRL-specific criteria. Based on this evaluation, I cannot consider your manuscript further for publication in Geophysical Research Letters.

Attached below are the review comments, which you may find helpful if you decide to revise the paper and submit it to another journal. Both reviewers mention potential biases in the analysis and interpretation of the data, as well as a lack of significant new findings to warrant publication in GRL.

GRL has heavy demand for limited publication space, which means that we must unfortunately reject many potentially good papers, including some for which the specific issues raised by the reviewers could eventually be addressed by the authors.

I am sorry that I cannot be more encouraging at this time. Thank you for your interest in GRL.

Sincerely,

Benoit Lavraud
Editor
Geophysical Research Letters

Reviewer #1 Evaluations:
Science Category: Science Category 3
Presentation Category: Presentation Category A

Reviewer #1 (Comments to Author):

The author reports that the 10.7 cm radio flux from the sun was higher than expected relative to the International Sunspot Number during solar cycle 23 and speculates that this might be the result of a reduced visibility of sunspots. He notes, and presents a figure showing, the results of Penn and Livingston that suggests that sunspot magnetic fields are weakening and their central brightness is increasing.

I cannot recommend publishing the letter in its current form. The odd behavior of 10.7 cm flux vs. International Sunspot number during the decline of solar cycle 23 was previously noted by Hathaway (Living. Rev. Solar Phys. 2010). In that same paper he also shows that in spite of this behavior sunspot area vs. sunspot number remained normal as did other indicators of solar activity. The peculiarity seems to be with the 10.7 cm flux. I also find it odd that the author brings in a plot from someone else's work but doesn't

include them as coauthors. Furthermore, the results of Livingston and Penn are not well established and can probably be attributed to selection effects and solar cycle variations in the number of large sunspots. Schad & Penn (Solar Phys. 262, 19, 2010) obtained statistics on sunspots from 1993 to 2004 and found no change in the relationship between umbral magnetic field and spot radius. Sunspot areas have a log-normal distribution (Bogdan et al. ApJ 327, 451, 1988)

with many more small spots than large - yet the Livingston and Penn plot shows a dearth of weak field/high intensity measurements prior to 2005. If the author is to convince the reader that 10.7 cm flux gives an objective calibration of sunspot numbers then he should provide more evidence than just a change in the relationship between 10.7 cm flux and sunspot number.

Reviewer #2 Evaluations:

Science Category: Science Category 4

Presentation Category: Presentation Category C

Reviewer #2 (Comments to Author):

Referee report of the manuscript "Objective Calibration of Sunspot Numbers" by L. Svalgaard.

In this manuscript the author repeats Waldmeier's original idea to use solar radio flux to calibrate sunspot numbers derived by various observers. The author shows that in the recent 15 years the relation between sunspots and radio flux is changed from the first years of radio flux observations, and suggest that this change may be related to a change in sunspot calibration or to the reduction of sunspot visibility (increase of temperature) observed by Penn and Livingston.

Unfortunately, despite the challenging title, no calibration of sunspot numbers was made in this paper, neither objective nor subjective. Also, the fact that the recently modified sunspot properties have changed the relation between sunspots and several solar parameters, not only radio flux, is known for about two years (and has been discussed in publications not mentioned here). The author includes a revised figure of observations by Penn and Livingston (which would, to my taste, validate their co-authorship) but the paper includes nothing new about this, admittedly rather curious fact. Also, the change in the relation between sunspots and radio flux is not quantified. The author suggests that the modified sunspot properties, if found valid, could have led to modified relations even earlier, e.g., during Maunder minimum. However, no effort was made to use this possibility to discuss, e.g., the "objective calibration" of sunspot numbers in the past.

Concluding, this manuscript includes nothing original or even new and remains only a sketch of research to be possibly done later. I see not reason why this paper should be published in Geophysical Research Letters (or any other valid journal) in anything of the present form.

Hmmmph. Well, my first reaction is that GRL is a dumb journal anyway, but I think the referees were able to score some points even though I am sure that they do not appreciate the rigor here.

Referee #2 is clearly a know-nothing who just does not want to be bothered. From his review, though, one could recognize that including a Penn-Livingston figure is overkill here, since the main point is the relationship between F10.7 and SSN.

Referee #1 sounds like Dave Hathaway. Again the way around his arguments is to demote the Livingston-Penn to a paragraph or so in the conclusions, perhaps, along with other suitably speculative notes. This referee also tosses in the log-normal distribution which has nothing to do with your work. The Schad & Penn work looks very interesting to me but I haven't read it yet.

The Hathaway article in Living Reviews does not do what the referee says, namely "In that same paper he also shows that in spite of this behavior sunspot area vs. sunspot number remained normal as did other indicators of solar activity. The peculiarity seems to be with the 10.7 cm flux".

Your work clearly shows that the peculiarity is not in the 10.7 cm flux. I am not sure what the relationship between sunspot area and sunspot number has to do with this issue.

Hathaway showed that sunspot number and area sort of follow each other. This is to be expected if the L&P is at work. BTW, David's correlations are invalid in their significance as he commits the deadly sin of correlation smoothed values [evident from the graphs but also substantiated by my own analysis of both smoothed and raw values].