

Review of Heslin-Rees et al. (2025)

The authors have done a commendable job of revising their manuscript. They have satisfied my main concern about quantitative statistical metrics and quantitatively demonstrating the relationship between NPF and solar insolation and CS. They now use the ratio of SUNFLUX to CS as a proxy for NPF in addition to their ROI which adds robustness to their methodology. They now use a binary classification for each hour and calculate daily averages instead of weekly percentages and interpolation thus alleviating one of my concerns. The authors also give some nice recommendations for the use of the Aliaga et al. method in the Arctic, which will be valuable for the community going forward. Their use of descriptive statistics now better describes the connection between the ROI and NPF. This is an important improvement as I found simply averaging ratios to be problematic. Without considering sample sizes, averaging ratios can indeed be misleading. For example, simply averaging the ratios 0.5 and 0.90 gives 0.7. Although if the fractions are 1/2 and 90/100, summing the numerators and denominators then taking the ratio gives a value of 0.89. Without proper descriptions of their methods readers could draw incorrect conclusions, in this case 'it is not what it is' to paraphrase the authors' response. They now mask Fig. 8 for bins that contain less than 1 data point. Their changes now better reflect how the ROI relates to NPF. They have adequately addressed my minor comments.

My only remaining main concern is the selection of the 30 day window size for the rolling mean.

The authors have nicely demonstrated the effect of the window size on the agreement between the SUNFLUX/CS and event frequency. They discuss how this relationship plateaus after 14 days in the main text and state in the supplement 'We argue that 10-20 days of averaging/smoothing ensures that the features (characteristic/seasonal peaks) remain present above the variability, and the data is not smoothed too much.' So I am curious why a large window size of 30 days was still applied. Is there a specific justification for this selection?

Suggested improvements

Their use of measurements from Beck et al. (2021) also adds interesting results about the importance of acids in the first part of summer vs HOMs at the end as well as the ions contributing to NPF. This could be worth mentioning in the abstract or conclusion.

Lines 1126-1127: Could the authors give the R^2 value of this agreement and reference Fig. S28.

S10.2: Fig. S28 is referenced here but should this be Fig. S26?

Fig. 12 caption seems to end abruptly.

Fig S24. Please indicate what the dotted line represents and what the circles represent. The date labels could be improved for clarity.

Figs. S30-S37: The y-label for the two middle panels appears below the lower panels. Why is this label not below the axis it refers to? Could this be corrected?