

Interactive comment on “Signatures of red-shifted footpoints in the quiescent coronal loop system” by Yamini K. Rao et al.

Anonymous Referee #1

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The work presented here deals with Doppler shifts in quiescent loops using observations from SDO and IRIS. There are some interesting results here, however, I believe that more work needs to be done to the paper before I think it can be published. The major concerns that I have at the minute are that: - The paper misses supplementary information in key places - It is not particularly clear the significance of the results - The discussion of the results is somewhat lacking - The writing style could be improved in places to make the paper more readable.

I will go through specific sections to highlight these issues in turn and will point out some questions that should be answered/considered prior to acceptance.

Introduction: You state: “Moss region being the subset of plage regions” What do you mean here? Note this could be a case of poor writing leading to confusion.

Observational Data and Analyses

Firstly, the heading of this section should be changed to something like “Observational Data”. At present the heading is grammatically wrong, and you do not actually discuss any data analysis techniques here, only what the data was used and some small comments on how these images were prepared.

Secondly, you are missing key details here in regard to methods used. For example, how do you align IRIS and SDO images to each other? How accurate was this process? How do you deal with the varying image resolution in the two instruments? As you are using AIA images to determine the location of the moss to find the signatures in Doppler images with IRIS, you need to have the images accurately co-aligned. Presuming you’ve done that, you should therefore specify how you did and how successfully aligned the images are.

You use “w.r.t” frequently here. Please do not concatenate the phrase here and keep it as “with respect to” as “w.r.t” is not formal English.

You state: “Doppler velocities for different spectral lines Ni I; formation temperature: $\log(T / K) = 4.2$, Mg II k (2796.20 Å; $\log(T / K) = 10.4$), C II (1334.53 Å; $\log(T / K) = 4.3$), and Si IV (1393.78 Å; $\log(T / K) = 4.8$) have been calculated.” Please consider rewording this to make it more legible. At the minute, the way this is presented is difficult to read meaningfully.

Observational Results

You state: “various loop arches anchored at 171 Å wavelength of SDO/AIA.” How do you know that they are anchored at the height of 171? This seems like a rather speculative comment at present

You state: “predominantly indicates highest emission representing the moss region.” I’m a little confused here, and by Fig 1 in terms of the color choices. The wording here should be different as “highest emission” does not specify anything in particular. I would

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suggest using something like “highest intensity” as it is more specific, as “emission” could refer to something else.

Also, you state that the green colors represent moss. How can you know that for certain? To me at least it looks like you have put the image in a color table which shows up some potential moss in it based on intensity, but that doesn't necessarily mean that everything green is moss as other intensity enhancements will show up in the color table. For example, to the right and middle of the image you see green coloring in the base of a loop which does not appear to be associated with the moss in the boxed region. I imagine this intensity enhancement is due to some process at the bottom of this loop and not moss. Likewise, there is a similar case in the boxed region, so I would consider either rewording this bit or adding in the detected moss regions to the Figure to reinforce the point.

You state: “The intensity threshold has been set which is shown by contours overlying on the different filters”. You do not at any stage explain how the intensity thresholding was performed. Please do that. This is important as it is an important step in how you isolate the moss regions. Also, more information allows the process to be repeatable by someone else.

How did you come to select the 5 regions that you looked at closer? At the moment there is very little to explain your selection criteria and why these regions were selected over another moss region.

You state: “are dominated by emissions from the temperatures ranging from 0.7 to 1 MK.” Can you provide a citation for this temperature range to verify this statement?

You state: “The Doppler velocity of the Ni I line has negligible values indicating almost no flows (0.27 to 0.70) km s⁻¹ corresponding to photospheric region.” This statement is confusing and I don't know what you mean here. In general here, there is little discussion on the formation heights of the lines that you use, which has significance for how you interpret the doppler velocities you observe. I would suggest adding a bit

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more on that as well within the text.

Conclusions

In general within the conclusions, I find that the discussion of the results is slightly lacking, and is not adequately covered in the preceding section. Traditionally conclusions are a section to make more general conclusions from the results you presented in previous sections. You should have stated these conclusions previously within the results and/or a discussion section, with the conclusions summarizing the key results. You discuss Doppler velocities in different lines in the previous section without much discussion on the significance of these values and their role in the conclusions that you come to.

You state: “These observations thus agree with the coronal loops heated up by low-frequency nanoflares via impulsive heating mechanism.” How do you know that? You have not presented the evidence in such a way that confirms this conclusion. I would suggest going into more detail on this in the previous section, discussing your results in the context of other similar studies.

You state: “Though, asymmetry in the spectral profile has not been observed in our results”. Can you prove that, and for all lines? I am doubtful that you have a purely symmetrical line profile across all lines for the duration of your observations. Therefore, there is a chance that this could have an effect and you should provide some evidence backing up your claim.

Also, please have a look at the grammar etc. in this paper very closely. I won't go into full details here as there are quite a few, but you should work to improve it. For example, a common problem you have is in the use of “the” throughout the text. In a lot of instances it is unnecessarily used e.g., “Our study of the flows at the quiescent coronal loops shows the similar characteristics as the dynamically active loops” would be better written as “Our study of flows in quiescent coronal loops display similar characteristics to dynamically active loops”. In general with regards to “the”, sometimes the overuse

of the word in the text effects the flow of the text and makes it more difficult to read. There are other instances in the text so please carefully consider the text in general from a grammatical perspective.

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