Response to Editor and Reviewer Comments on HESS submission

Evaluation of reanalysis soil moisture products using Cosmic Ray Neutron Sensor observations across the globe

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General Response:

We express our great thanks to the editor and reviewers for dedicating their time to review the revised paper and for accepting our revisions.

We have revised the few figures according to the reviewer's technical correction suggestions. Detailed responses to all comments are provided as follows. The revised text is highlighted in <mark>yellow</mark>.

1) Figure 2: Please clarify the Figure and clarify the caption. It is unclear if the black errors indicate "good" or "poor performance" and for which metrics this is the case. The caption reads..."reversed" - it is unclear reversed to what? Are the other metrics pointing to "worse" then? Also it is not clear for which metrics or arrows the labels "Good performance" and "poor performance" on the Figure are referencing. This must be clarified or labels even removed. I can also imagine a small text box within the Figure.

   Revised. We have added the text explanation in the figure and also clarified in the caption of this figure. For all metrics, the black arrows indicate the good performance (i.e., the lowest value of *MSE*, *ubRMSE* and *Bias* or highest correlation). The misleading word 'reversed' has been removed. The revised figure and its caption can be found below.
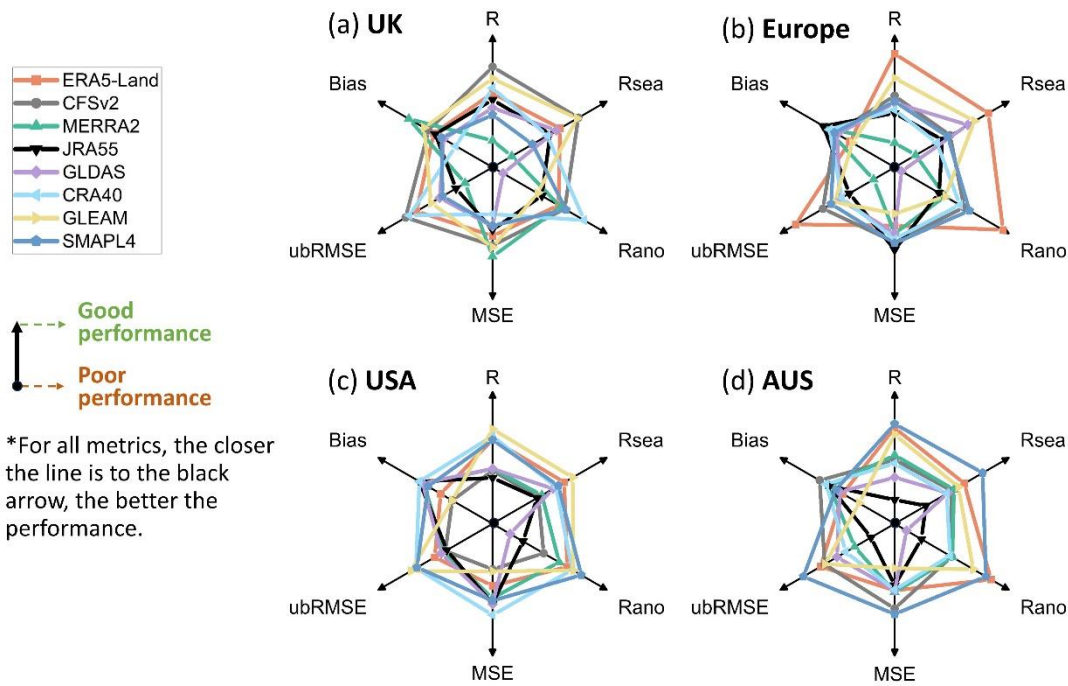
Figure 2: Brunke ranking results for a total of 8 products performance in terms of 6 statistical metrics across different regions, i.e., (a) UK, (b) mainland Europe, (c) USA and (d) Australia (AUS). Each coloured line represents a reanalysis product. For all metrics, the farther away of the line in this plot from the centre (i.e., closer towards black arrow) indicates good performance (i.e., the lowest value of *MSE*, *ubRMSE* and *Bias* or highest correlation).

2) Figure 3: Add black circles around each colored marker. As such, the markers are not clearly visible e.g. bright colour on white background.
   Revised. The black circles have been added to each marker in this figure. The similar plots for the rest metrics (Figure S6 and Figure S7) in the supporting information also have been revised.
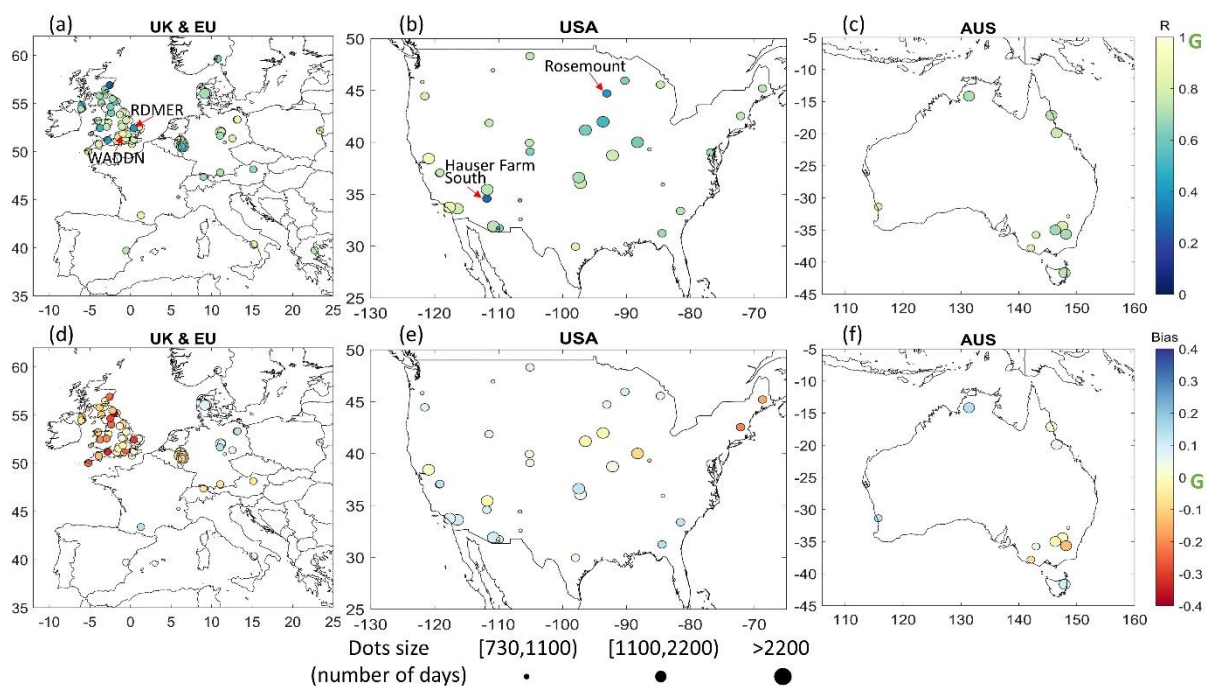
3) Figure 8: Extremely hard to read. Fig 8(e) - min(y)=0.03 and not 0.00. Consider using green instead of bright yellow or see next line.
   Revised. We have changed the colour for representing 'Temperate' from bright yellow to dark orange. Using dark orange instead of green is to keep the colour scheme consistent with the aridity spatial map in Figure 1. We have adjusted the min(y)=0.03 in Figure 8(e) and also increased the symbol size.
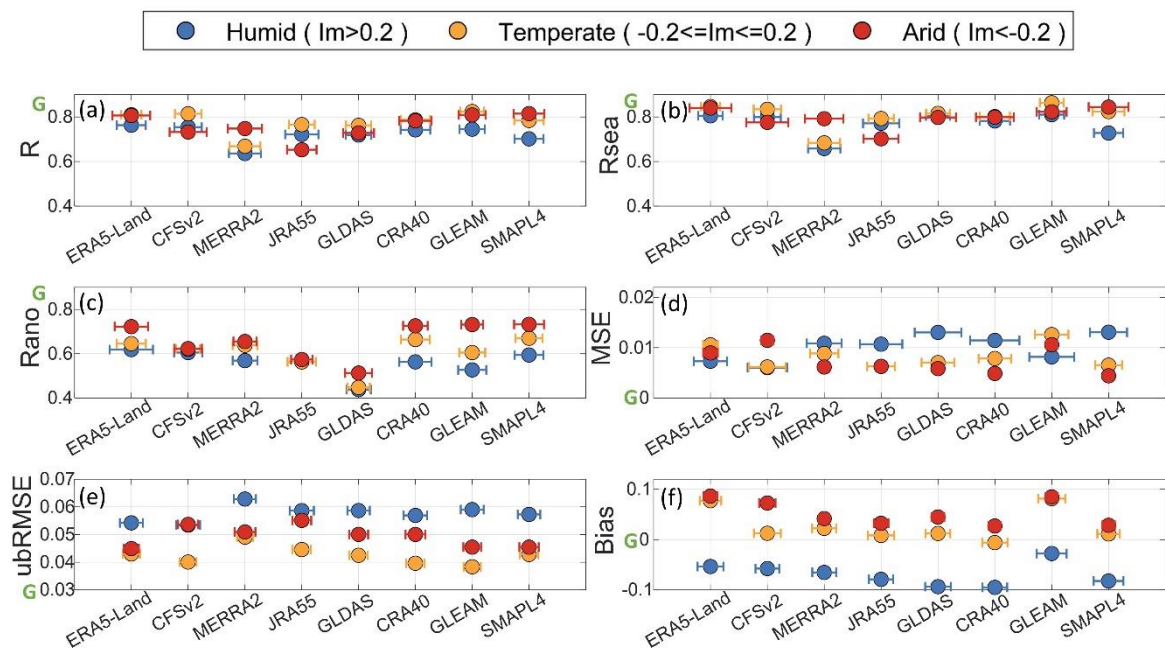

Figure 8: Statistical metric performance for all products under three climate conditions (Humid: 53 sites; Temperate: 42 sites; Arid: 40 sites). The values of the dots represent the median metric values of the sites in a given climate zone, while the error bar of each dot denotes the variability of the metric values. The green letter G stands for the good performance of the statistical metric values. Im denotes the aridity index, which is described and shown in Figure 1.

4) Figure 9: Same, hard to read. Fig9e: consider ymin=0.03 and changing colors. Increasing symbol size or boxplots might be an option.
   Revised. We have changed the colour to this figure. We have modified Figure 9(e), setting the minimum value of y to 0.03 and enlarging the symbol size accordingly. Moreover, we also revised Figure 7 to keep consistent with these figures. The revised Figure 9 and Figure 7 is presented as follows.
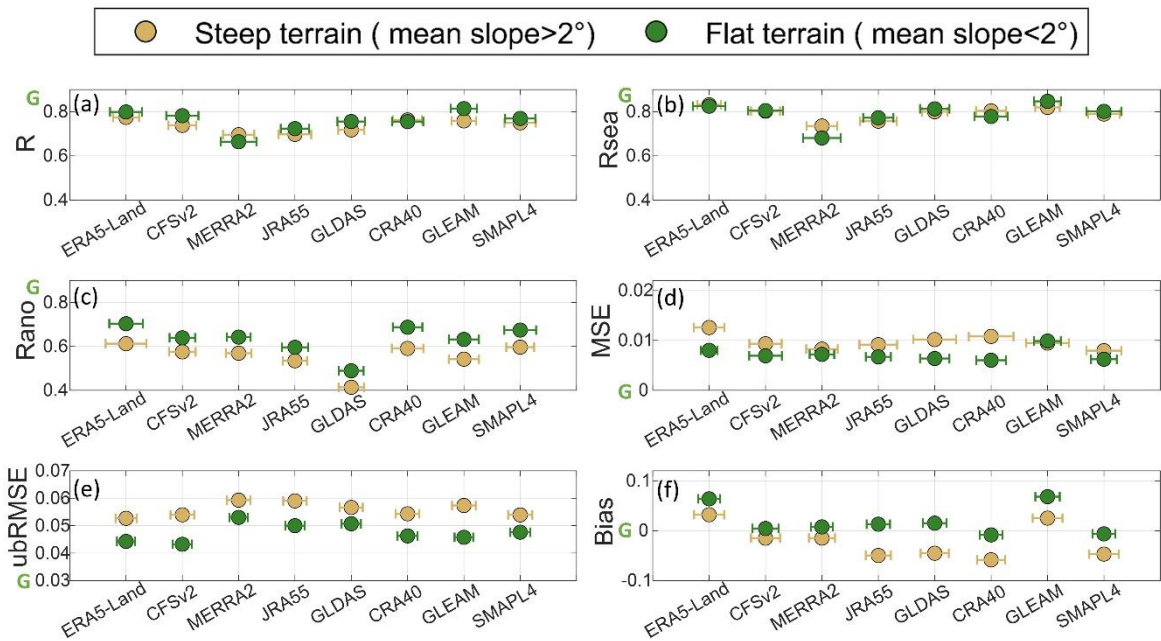
Figure 9: Statistical metric performance for all products under different topographic slopes (steep terrain: 55 sites; flat terrain: 80 sites). The values of the dots represent the median metric values of the sites in a given terrain slope, the error bar of each dot denotes the variability of the metric values. The green letter G indicates the good performance of the statistical metric values.
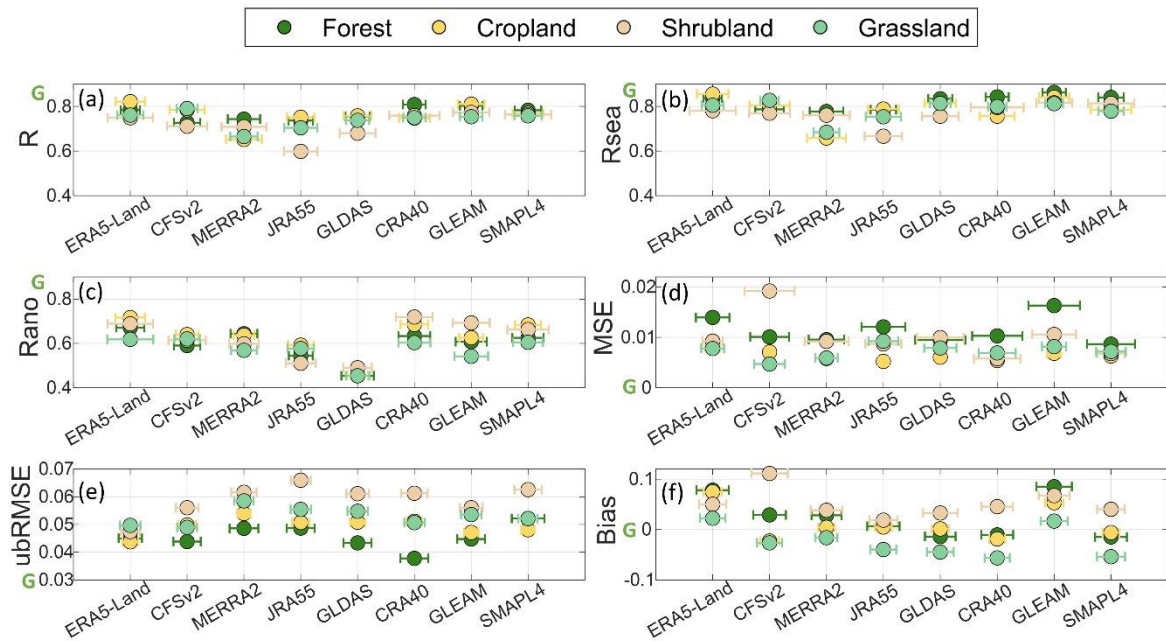

Figure 7: Statistical metric performance for all products under four land cover types (Forest: 33 sites; Cropland: 41 sites; Shrubland: 20 sites; Grassland: 41 sites). The values of the dots represent the median metric values of the sites in a given land cover type, the error bar of each dot denotes the variability of the metric values. The green letter G stands for the good performance of the statistical metric values.