



EGUsphere, referee comment RC1  
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## **Comment on egusphere-2022-138**

Anonymous Referee #1

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Referee comment on "An improved method of the Globally Resolved Energy Balance Model by the Bayes network" by Zhenxia Liu et al., EGU sphere,  
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The manuscript "An improved method of the Globally Resolved Energy Balance Model by the Bayes network" by Liu et al. discusses a Bayes network approach to simulate global temperatures given some climate forcing boundary conditions such as solar radiation, cloud cover or water vapor. While the subject matter is interesting and should be considered for publication, the manuscript is largely unintelligible and should not get published. There are far too many aspects in this manuscript that would need substantial revisions. I recommend to reject this manuscript with an opportunity to resubmit a substantially revised analysis. Details below.

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Major points:

(\*) Clarity: The manuscript lacks clarity on the methods, results and aims on many different levels. It is essentially unintelligible for the reader to understand what has been done, what the results are and how we did get there. Below are a few more points that may help the authors to improve on this.

(\*) GREB model: The authors seem to use the term GREB model as a general concept of how to simulate the global temperatures based on some boundary conditions (e.g. solar radiation). At the same time the term GREB model also refers to a model published by Dommenget et al.. This is confusing. It is unclear what the GREB model by Dommenget et al. has to do with the Bayes network approach the authors use. It seems they are essentially unrelated models.

(\*) Language: The authors use terms that are not commonly used and are therefore hard to understand. Examples:

"the change law of climate system"

"the average accuracy variation trend chart"

(\* ) IMPM model: What is the IMPM model? It says it is "improved". Improved based on what? It seems to imply that it is based on the GREB model by Dommenges et al., but I do not see how. From the text it seems to have nothing to do with the GREB model by Dommenges et al..

(\* ) "classification of climate elements is 5, 7, and 9": It is unclear what climate element classifications are. It is in particular unclear what a GREB model 5,7, and 9 would be in contrast to IMPM 5,7, and 9.

(\* ) Accuracy: How is accuracy defined?

(\* ) "Nodes" vs. "classification of climate elements is 5, 7, and 9". The authors define several nodes in the GRBE model (.e.g. water vapor, winds, etc.) and they later discuss "classification of climate elements is 5, 7, and 9". Are these entirely unrelated concepts? It needs substantial revisions to explain this better.

(\* ) Fig.2,3 : What is shown in this figure? The figure is largely unclear. What are the colors? What are the units? What is shown on z-axis labeled "Seasons" 0 to 80? Does this figure has something to do with surface temperature [Celsius]?

(\* ) Fig.7: What is "accuracy variation trend"? It is largely unclear what "trend" could refer to.

(\* ) GREB model surface temperature: The GRBE model by Dommenges et al. is a flux corrected model that by construction has no biases (errors) in the simulation of the surface temperature. Then, how can the IMPM model be better at simulating surface temperature than the GRBE model, when the GREB model is by construction perfect?

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Other major points (as they appear in the text):

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line 55 "... these two average state variables includes most of the climate processes of the GREB ..": Why? Why not water vapour? It is not obvious why water vapour would not be important.

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line 189-191 "The tropospheric height of the poles is lower and the tropospheric height of the equator is higher, and which phenomenon leads to the result that temperature of the troposphere at the same height is higher in the poles.":

This statement appears to have nothing to do with the analysis presented. It certainly has nothing to do with the GREB model by Dommenges et al., as there is no such thing a tropospheric height, as it is a one-layer model.

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line 202 "The all average accuracy of different situations from 1985 to 1994 ...": Does this imply the model is simulated for each year? Assuming they are different each year?

How would this work in the GREB model by Dommenges et al.? This model is not simulating internal variability, but only the response to changes in external boundary conditions.

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Other minor points: not listed, as there are too many major points that need to be addressed first.