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Interactive comment on “Sensitivity of high-temperature weather to initial soil moisture: a case study with the WRF model” by X.-M. Zeng et al.

Anonymous Referee #1

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Sensitivity of high-temperature weather to initial soil: moisture: A case study with the WRF model

General comments

This manuscript presents simulations of surface air temperature with a weather research and forecast model using different soil moisture conditions as input variables. The aim is to study how the soil moisture conditions ranging between $\pm 50\%$ of those obtained from satellite measurements. In addition, the authors study the effect of moisture on the processes effecting the weather simulations e.g. latent and sensible heat

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fluxes and their effects on atmospheric air circulation.

I evaluated the manuscript mainly from the point of view of presentation quality, because I am not able to evaluate the methods and models behind the simulations. I am not a meteorologist, thus I am not able to estimate the novelty aspect of the study and the validity of model simulations and assumptions behind. This would require substantial understanding on the structure, function and assumptions behind the meteorological model used in this study.

I would suggest letting a native English speaker to carry out language edition for the manuscript, because the text was at some points difficult to understand, even though the grammar may be technically correct. Also, the authors should pay attention to the text flow in the manuscript. The text could be condensed in many parts. Below, I have pointed out some parts where the text has repetition or where the sentences and logic are difficult to follow.

Here are my detailed comments concerning the manuscript.

Abstract 11666 L4 hot event -> hot weather event

Introduction

The aims of the study are rather general and no hypotheses are presented. You should explain in the aims of the study more specifically the simulations you are going to carry out. For example, it is not mentioned until the results and discussion that you actually used the WRF model also to simulate soil water conditions in different soil layers.

In addition, there are results on geopotential heights, latent and sensible heat fluxes etc. in the results and discussion section. The concepts to be presented in the results and discussion section should already be presented in the introduction, aims and hypotheses of the study. Otherwise the structure of the text becomes difficult to follow and is inconsistent. Therefore I suggest that the concepts presented in the paragraphs of the results and discussion section should be presented also in the intro and aims

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of the study. Also, you should explain in the material and methods section what and how you simulated. Otherwise the different paragraphs are not consistent with each other. In the current manuscript, there are lot of concepts and results in the results and discussion section which pop out from nowhere.

The lines 6-10 on P 11671 do not provide much information on the actual substance/aims of the study. I would rather delete those and instead present the above-mentioned concepts and research aims in the introduction chapter.

P11669 L6 Explain acronym WRF when first used. P11670 L5 observations -> Observations P11670 L8 skill -> performance or accuracy P11670 L11 skill -> performance or accuracy P11670 L20 arise several questions in the following->arise following questions P11670 L24 delete "in the comparison" P11670 L26 understanding of -> understanding on, help us improve -> help us to improve P11670 L27 Delete "through better soil moisture initialization in the models." It is redundant. P11671 L1-4 You should explain here in more detail what you are going to do. For example, it is not mentioned until the results and discussion that you actually used the WRF model also to simulate soil water conditions in different soil layers. In addition, there will be results on geopotential heights, latent and sensible heat fluxes etc. in the results and discussion section. The concepts to be presented in the results and discussion section should already be presented in the introduction, aims and hypotheses of the study.

P11671 L4-6 This sentence should be in the methods section.

P11671 L6-10 This sentence does not provide much information on the substance.

P11671 L20 Explain acronym "gpm".

P11672 L3 Explain acronym SAT when first time used in the main text.

P11672 L7-10 Complicated sentence. Please re-word. Preferably, split into two separate sentences.

P11672 L13 "Approximated" may not be a correct word in this case. It is rather "ex-

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tended to over 2 months".

P11672 L20-22 I would rather formulate this as follows: I would rather say "...We investigated the sensitivity of the temperature predictions produced by the Advanced Research WRF model to initial soil moisture..."

P11674 L12 I do not understand the "amplitude" here.

Results and Discussion

P11678 L23 – P11679 L5 This part I do not quite understand. Does the model also simulate soil moisture conditions? I assumed that the SMOIS values were given as input for the model. Based on this sentence it looks like the SMOIS is simulated by the model.

P11679 L 13-21 The results presented here seem to be somehow redundant, because the same information was basically given on the previous page. Here you only report the differences in temperature simulations whereas on the previous you give the absolute simulated values? The manuscript is now quite long, so I would perhaps present either the absolute simulated values or the differences.

P11682 L5-8 You should indicate in the material and methods and aims of the study that you also simulate the soil water content. This is not clearly stated in the text yet.

P11682 L22 General comment concerning paragraph 3.2.2. The text should be streamlined and condensed. It contains repetitive information. Many of the sentences are too complex and difficult to understand. I have pointed out the most difficult ones.

P11683 L12-L17 Complicated and long sentence. Please reword.

P11683 L17 SMIOS->SMOIS

P11683 L23-L26 This sentence partly has the same information as the sentence on lines 12-16. There is some repetition in this section, and the text could be condensed to improve the readability.

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P11684 L26-L29 The text here is partly repetition to the text on the previous pages. The whole section should be condensed to improve the readability and text flow.

P11685 L13-18 This sentence is too complicated, and nearly impossible to follow. Please reformulate. I am not very enthusiastic about presenting bi-directional results in the same sentence. The sentences where the words "increase (decrease)" are indicating two directions of the effects are rather confusing to follow. And they are throughout the manuscript which makes it difficult to read the text. I would suggest streamlining the text so that you express the bi-directional effects in separate sentences throughout the manuscript. Or replace them with " and vice versa" in the end of the sentence.

P11686 L1-L4 This sentence is also too complex and nearly impossible to understand. I do not understand the logic in the sentences. Please split it into several sentences and streamline the structure of the sentences to improve the readability.

P11686 L8 surface->surface

P11686 L7-9 I do not understand what is the connection here to deforestation.

P11686 L18 This doesn't say anything to a reader who does not have background in meteorology. Please explain what it means in practice.

P11686 L20-25 I would suggest avoiding the use of these bi-directional expressions and replace them with "vice versa" in the end of the sentence.

P11687 L8-15 Too long sentence. Needs to be cut into several shorter ones.

P11691 L1 General comments concerning the summary and conclusions. It is way too long. It cannot be 3 1/2 pages long. It should be condensed and reduced in length by at least 50%. You do not need to present any more methods results in this chapter. Present only the big lines and conclusions. There is also no need to have citations and discussion to literature any more in this paragraph.