

***Interactive comment on “Sensitivity of North Patagonian temperate rainforests to changes in rainfall regimes: a process-based, dynamic forest model” by A. G. Gutiérrez et al.***

**Anonymous Referee #2**

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**General Comments**

This paper examined the impact of rainfall regimes shifts on some hydrologic factors and forest growth in North Patagonian temperate rainforests using a dynamic forest model and a rainfall time series generator. My feeling is that the paper is potentially interesting and the authors made a reasonable effort but insufficient descriptions of the model and its validation caused something like unreliability of this paper.

Again, the paper is potential but I cannot believe all things in this paper because of lack of the model validity. So, I recommend to resubmit this work after a thoroughgoing improvement. Additional comments and suggestions for improvement include:

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**Abstract:**

L9-: Did not you compare the model results with field measurements at OG?

L19: What are “changes in climatic parameters”?

Each paragraph in this paper tends to be too long. Please reconsider the structure of the text throughout the paper.

P6298L1-: Please show important equations in the model and schematic representation of the model structure.

P6299, equation (2) is wrong. This should be changed to  $\theta = s \cdot n$ .

P6300: Could be values of  $\alpha$  and  $f$  obtained by observations?

P6301L8: What is “the soil hydraulic conductivity of the given soil at field capacity”? Unclear.

P6301, equation (8): How did you obtain the value of WUE? This information is critical in this paper, and just showing the reference is insufficient. WUE is a constant in this model? If so, please show reasons why that assumption is OK. How did you obtain  $A_d$ ?

P6302, equation (10) is a Penman-Monteith expression in case of “aerodynamic conductance” (relatively) « “canopy conductance” or just “equilibrium evaporation”.

equation (11) need not to be described (this is a common sense).

P6303L1:  $\theta_{fc}$  did not appear in equation (12).

P6303L12-: According to equation (8),  $T_d$  cannot be directly controlled by soil moisture. Show how  $T_d$  is controlled by soil moisture.

P6303L3: “the mean amount of daily rainfall” is incorrect.

P6303L5-: Please give a description about the validity of the generated climatic factors.

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P6305L15-: How depths were the measurements? How did you derive  $s$  from those potential data? This derived  $s$  is needed for the model validation.

P6307L1-: The data about OG were not shown.

P6307L15-: The comparison with OG data must be important in this paper, so describe elaborately the OG observations.

P6307L23-: Please give a detailed description about relationships between  $\eta$  and  $1/\lambda$  when you change  $\eta$  or  $1/\lambda$  for the simulation.

P6308L15: Under what conditions was the “model performance”? Give detailed information.

P6309L7: Table 5 should be Table 4.

P6309, 3.2 Sensitivity to changes in climatic parameter: It should be noted that all computations in this section have not been validated throughout this paper. For example, you might have insisted that you validated the AGB computations, but I could not judge whether this computations were reliable or not because of lack of validation of some ecosystem processes such as  $T_d$  and  $A_d$ .

P6310L19: Note that Table 4 cannot be a model validation.

P6312, 4.3 Model limitations and research needs: It looks that you emphasized “constant WUE method” is useful. If so, you must show the reason in this paper. Just showing reference is not enough.

P6313L14: Where is this reference “Rodriguez-Iturbe et al., 2007”?

P6315L6-7: You did not show it explicitly, because you did not discuss about potential shift in rainfall regimes in this century in this paper.

Table 1: What is EBSD?  $1/\lambda$  and  $\eta$  are very important parameters in this paper, and so you must give detailed information about (1) long-term data from EBSD, (2) how

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to determine these parameters, and (3) how to derive the time series of rainfall from the rainfall generator with these parameters.

Table 2: The time period 1998-2009 is very short for making the rainfall generator. At least. You have to give information of characteristics of variations in rainfall. And give total amount of rainfall for each season.

Table 3: Change “N” to “Trees”. 80-80 and 0.5-0.5 were from one report? And 0-0 means no report? These are awkward.

Table 4 did not show the model validation. You did not compare the model estimates with real field data.

Fig.5: In this paper, whether  $s$  was properly reproduced is critical and the major premise to proceed further analysis. However, this figure cannot be the model validation. I suggest (1) derive soil physics parameters from simple comparison between fig5a and b like a  $\theta$ - $\psi$  curve, and examine the soil parameters are realistic or not. (2) change measured  $\psi$  (fig5b) to  $s$  using a real  $\theta$ - $\psi$  curve.

Fig.6 and 7: Here, changes in rainfall regimes apparently mean drought. You should make it clear in the manuscript. Fundamentally, simulation plan, for what you conducted these computation, and concrete findings from these computations are unclear.

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