

Geosci. Model Dev. Discuss., referee comment RC2  
<https://doi.org/10.5194/gmd-2021-157-RC2>, 2021  
© Author(s) 2021. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## **Comment on gmd-2021-157**

Anonymous Referee #2

---

Referee comment on "Improvement of stomatal resistance and photosynthesis mechanism of Noah-MP-WDDM (v1.42) in simulation of NO<sub>2</sub> dry deposition velocity in forests" by Ming Chang et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-157-RC2>, 2021

---

### **General comments**

As a whole, the paper is interesting as it compares the performance of various combinations of stomatal conductance models and nitrogen-limited photosynthetic schemes. I think the paper should be published as it brings new and useful information to the scientific literature. However, the presentation has to be improved before publication. The authors should pay attention to details (see below). On the other hand, I am concerned about the fact that the authors did not show results of the Aphalo and Jarvis (1993) scheme (simulation BN-31-BN-33) on Figures 4-7 despite the fact that this scheme present among the lowest bias (MBM-3 in Figure 3). It would be interesting to include results from Aphalo & Jarvis model in Figs. 4-7 as well. Finally, the discussion section is absent and more interpretation of the results should be done including uncertainties and knowledge gaps.

From the point of view of the English language, the authors should ask the help of a native English speaker to review and correct the manuscript because at times we see poor English. Moreover, proof editing is needed since there are a lot of typographical errors in the submitted manuscript.

### **Specific comments**

- In the methodology section it is necessary to make clear that model output interpolated at one point (at the measurement tower site) is not necessarily comparable with a measurement point.

- A discussion section should be added to discuss several weakness and uncertainties of

inputs and results. For example, tower measurement is made at one location not necessarily spatially representative of a whole model grid tile (whereas model output are average over a bigger area). The authors should also mention the resolution (grid spacing) of the model used and should discuss the validity and uncertainties of measurement versus model. What about scale dependency of dry deposition ?. A discussion section should be added to review the results and provide further interpretation and describe uncertainties and knowledge gaps in a better way.

-Lines 93-97: not clear to what refers option 1. For those not very familiar with this model, it is hard to follow. More details are needed concerning options description and model characteristics.

-Section 2.2 Coupling of stomatal resistance scheme. Not clear how the coupling is done. Please explain.

-Stomatal resistance or stoma resistance ? Throughout the document you should use stomatal resistance or stomatal conductance. E.g. line 13 please replace stoma resistance à stomatal resistance

-In models of stomatal conductance,  $G_s = k A \cdot RH / [CO_2]$ , inputs for RH and A are available but how did you obtain  $[CO_2]$  ?. By measurement ?  $CO_2$  is usually not available from numerical models. Please clarify.

- Line 233-234 "smallest simulation deviation". This is poor English.

-The reference to simulation BN1-BN76 should also be better explained there in reference to Table 3. I suggest putting the name of the simulation (BNx) in Figure 3 (just below the bias values). It would become clearer for the reader and allow a direct comparison and consistency with the following figures 4-7 where simulation name BN are used.

-Table 3 and Figure 3 are presented in different order (columns and rows are inverted). Please transpose the matrix in Table 3 to be consistent with Figure 3.

-Figures 4-7. Why not putting results of simulation from Aphalo and Jarvis (1993) model in the figures (Sim BN31-BN36) ? It would have been interesting to present also simulation of BN31-BN33 in your figure since they show the lowest bias in Figure 2.

**Minor**

Line 9 and 11 Nitrogen-limitings -> nitrogen-limiting

Line 34 deviation -à ??? standard deviation ?

Lines 42 and 44 typo. Please correct.

Lines 45 Equ. -à Eq.

Figure 5,6 and 7. Units needed in the legend (s/cm ? or s/m?). Please specify.

Line 169, 170. 212 Typos. Please correct.

Line 205 typo. 0.05 cms à 0.05 cm/s

Line 215, 234, etc.: deviation ? you mean standard deviation of what ? please clarify.

Line 216 need space between number and units (typo)

Lin 226 English could be improved, e.g. The black line in Fig 4 is BN-11 and the green line is BN-23 à The black line in Fig. 4 **corresponds** to experiment BN-11 and the green line to BN-23, **respectively**.

Line 227 This sentence does not make sense. "Vd simulation upward" à "simulated Vd values are increased".

Line 227-230 badly worded. Please re-write.

Line 233 smallest deviation (standard deviation ?)

Line 234 bias 0.001 cm/s ? where does it come from ?

Line 245 s/m or s/cm ? in other parts of the manuscript s/cm units are used. Why here use s/m ? Please be consistent with units used elsewhere in the document. Do not mix units it is confusing for the reader. Either s/m in the whole document or s/cm but not both.

Section 3.4.1 badly written

Line 126. Later, the method of Lohammar et al (1980). This does not make sense. The authors just previously talk about a reference Leuning (1990). Year 1980 comes before 1990 not later. This poor English. Please reword.