

Interactive comment on “Vegetation distribution and terrestrial carbon cycle in a carbon-cycle configuration of JULES4.6 with new plant functional types” by Anna B. Harper et al.

Anonymous Referee #2

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This paper presents a new version of the JULES land surface model with an increased number of plant functional types and some important changes to its vegetation dynamics parameterizations and to its nitrogen cycle. The model output is essentially evaluated on the global scale, partly per biomes. The paper is well written and clear. It is short enough to be a not too painful read, yet it contains all the essential information it requires to serve its purpose, that is, to be used a reference paper for this and probably future versions of JULES using the same vegetation dynamics parameterizations. I have only a few minor suggestions for this paper.

- Line 148: Please refer to Table 2 already here

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- Line 259: Could be written more clearly. Equilibrium vegetation mean $dv/dt = 0$ in eq (1), which directly yields eq. 17. Please use Sum symbol in eq. 17 (as done in eq 16), no need to keep eq 16 which is almost identical.

- To this point, it should be stressed that the disturbance parameters are tuned such that the equilibrium vegetation is OK. Therefore the relatively good results in fig 1 and 2 should not be too surprising. Please state this clearly also in the discussion. Are these disturbance parameters realistic? Any chance to evaluate them?

- Line 327: Small differences between the results with CRUNCEP and HadGEM-ES climate. Is this due to the fact the the HadGEM-ES climate is so realistic, or does this suggest that JULES is not very sensitive to climate differences for some reason, except for some specific PFTs mentioned explicitly?

- Figure 2: Hard to evaluate the differences between the different model configurations with the naked eye. Could one add an error statistic for each of the biomes and model configs? You could consider adding the PFT names (that is, spelling out their acronyms) in the legend, might be helpful.

- Carbon spinup: The carbon spinup figure in the supplement shows that some PFTs are quite far from equilibrium at the end of the accelerated spinup, and that large instantaneous adjustments follow after that, which seem to have consequences over the whole transient period. Please discuss potential impacts on the soil carbon evaluation and discuss briefly.

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