

## ***Interactive comment on “Improved representation of plant functional types and physiology in the Joint UK Land Environment Simulator (JULES v4.2) using plant trait information” by Anna Harper et al.***

**Anonymous Referee #1**

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The paper "Improved representation of plant functional types and physiology in the Joint UK Land Environment Simulator (JULES v4.2) using plant trait information" present several improvements of the JULES DGVM. these improvement are first based on increasing the number of PFTs from 5 to 9 to better represent the different types of leaves in the leaf economic spectrum including deciduous and evergreen trees and a separation between climate zones. Second improvement was done in estimation of leaf photosynthesis from leaf nitrogen and improvement of phenology considering a more realistic leaf longevity.

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This is an important paper that allow to follow recent developments of the JULES model and perfectly fit to the objective GMD. The changes are sufficiently important to justify the publication of a paper. The paper is well written with a convincing evaluation of new model performances both at site level and at global scale. The results show a clear improvement of the model at different scales. For all these reasons I recommend the paper for publication. Here after are just some minor comments that could help to improve the manuscript:

- There is no real justification of the choice of 9 PFTs except as a minimum to represent the main leaves forms. Obviously, for technical reasons, the number of PFTs cannot be increase indefinitely and then a compromise should be find but it would be interesting to see if including a higher number of PFT should also give higher performances ? One way could be to look to the differences between simulated GPP and NPP and respectively Jung and MODIS maps for each pixels and each PFT. Then we could see if there is spatially coherent systematic bias that could show possible new PFT separation.

minor comments on figures:

- Figure 7: what represent the grey zone ?

- Figure 8: The figure is difficult to read mainly because this is tiny figures. Should it be possible to split it to have larger figures ?

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