

## ***Interactive comment on “Biogeophysical impacts of forestation in Europe: First results from the LUCAS Regional Climate Model intercomparison” by Edouard L. Davin et al.***

**Anonymous Referee #2**

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The paper addresses relevant scientific questions. There was a strong effort of several groups in order to provide modeling results and evaluate the modeling physics of several systems. The inter-comparison of the surface and atmospheric modeling systems and the two experiments (i.e. total FOREST x GRASS) provides an interesting tool for modeling improvement, mainly on the understanding the LSM impacts and feedbacks. The modeling results provide a new original contribution. The methodology is appropriated for the goals of the project. It provides variable Land Surface Systems and various atmospheric options. The paper structure has a good flow and fluency. See some questions & suggestions below. The results show that there were several differences among the modeling systems used on the inter-comparison. I think on the

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methodology more information should be provided by the authors, mainly on the soil types and vegetation parameters such as the maximum/minimum stomatal resistance, vegetation height, and roots depth. Those parameters could allow improvements on the major conclusions. Furthermore, it could help the reproduction of the numerical experiments. The results discussions on the maps of temperature, don't provide analysis of map MMM (e.g. Figs 1 to 6). What are those maps? Mean of all modeling systems? Precipitation maps should be better analyzed in order to improve the conclusions on the temperature fields. Surface changes are likely to change the precipitation fields and as a feedback, the precipitation distribution is likely to have an impact the balance of radiation (downward and upward) and surface conditions, such as soil moisture and temperature. Furthermore, maps of precipitation could help on the interpretation of the discrepancies among models because this variable controls the vegetation transpiration, downward and upward short wave radiation, among others. Forest versus grass simulations for the Amazon, for instance, shows a strong change on the precipitation distribution caused by the transpiration (e.g. Ramos-da-Silva et al., J. Climate 2008). The authors should provide some insights on: how the forestation affects the major synoptic systems that move across Europe? Are these atmospheric systems enhanced or weakened? To improve the results analysis and discussion, known LSM model bias from previous studies could help on the results interpretation (e.g. Chen et al., JGR 2014). Some figures should be improved. Better legends could help the readers to quickly understand the presented images. For instance, what is MMM on the maps? Furthermore, in some figures, the fonts needs to be higher to permit a better reading (e.g. Figures 7, 8, 9 and 10). Figure 7 should have a higher threshold for net radiation. It is not clear the maximum on some cases. Further minor text corrections: Table 01 – Lateral boundary in the last column should be exponential (not expotential) Discussion – line 235-236 should be evapotranspiration (not evaporation).