Comment on egusphere-2022-291
Anonymous Referee #1

Referee comment on "Climate Response to Severe Forestation: A Regional Climate Model Intercomparison Study" by Olivier Asselin et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-291-RC1, 2022

General Comment

This study uses three regional climate models, albeit two of them are very similar (CRCM5 and CRCM6), to assess the biogeophysical impacts of forestation in North America (NA). The methodology follows the protocol designed in the first phase of the CORDEX flagship pilot study Land Use and Climate Across Scales (LUCAS) and described in Davin et al. (2020). The study also contextualises its results for North America with those already published for Europe, and explores the transferability of results between the two continents. The work is well within the scope of the journal and provides a substantial contribution to the field.

Major Comments

- The title and abstract are a little misleading. This study does not present new results for Europe, nor is Europe its focus. This study focuses primarily on North American and contextualises these results in the framework of the CORDEX LUCAS work for Europe. The results for Europe have been presented previously in Davin et al. (2020) and elsewhere, which is correctly referenced throughout the manuscript. In this regard, it is strongly recommended to (a) include North America in the manuscript’s title, and (b) revise some of the sentences in the abstract and introduction to show that the focus is North America.
- It would be beneficial to see a confirmation of the authors hypothesis that the difference between NA and Europe in winter is due to the presence of Evergreen Needleleaf forests and snow cover at lower latitudes in NA compared to Europe.
- It is important to compare the biogeophysical impacts in NA and Europe during spring in addition to the winter. In Europe, the snow albedo effect is strongest in spring when the colder regions of Northern Europe have snow and sufficient solar radiation to
observe the snow-albedo effect. It would be reasonable to expect that NA and Europe would have similar results during this season.

- The paper would benefit from being restructured. It would be clearer if the results focused first on the biogeophysical impacts of forestation in NA and finish by contextualizing these results with the previous work in Europe i.e., section 3 should be just before the conclusions and discussions.
- Section 3 focuses more on comparing the results from NA with Europe. This is good but given the large intermodel variability and the availability of an ensemble for each region, it is recommended that the ensemble for each region is used to improve the robustness of the results in this section.
- It is important to recognize in the conclusions, and perhaps the paper more broadly, that the ensemble size for NA is quite small.