Overall, this study has interesting components and would be a nice contribution to the literature applying ML approach on wildfire prediction. The paper is well-written, and I think that the authors’ are in a strong position to introduce stochastic ML method, which is a relatively new concept, to the wildfire modeling community. There are a few aspects that could be further addressed before the paper is suitable for publication.

1. This study used SHAP values to compare importance between predictors for the entire period as a global perspective and for each Ecoregion. But, how about the importance changes for temporal aspect (e.g. dry/wet season or extreme fire events)? It is interesting that none of the results in this study actually show significant importance for wind speed, although it is a key factor of fire spread.

2. The discrepancy of the year 2020 (Figure 11) can be further analyzed with input predictors. Although the scale of AAB 2020 is out of the range during the training period, it can be associated with abnormal pattern in climate/vegetation or sudden changes in human induced predictors. The authors may considered this further.

3. Why ‘Southness’ is selected rather than other directions? Also, interesting since it is included in the top 10 important predictors for the size model (Figure 12 and 13). It would be nice to further describe the role of ‘Southness’ in this study domain.

4. A typo in L361 : ‘are modeled’