Summary and Recommendation

This work assesses the impact of model horizontal resolution on the simulation of local wave activity in the PRIMAVERA over the Northern hemisphere and Euro-Atlantic region. They classified each model to lower resolution (LR) and higher resolution (HR) versions, and then compared the ensemble mean of these two groups. They found no evident improvement of transient wave activity simulation for higher resolution. However, the conclusion based on the ensemble mean is questioned because the lower and higher bounds of model resolutions have a great heterogeneity (see the major comment). I recommend the authors to perform a major revision and reorganize the results by considering the comments listed below.

Major comment:

One of the goals of this work is to assess the impact of model resolution on the simulation of local wave activity. However, the classification of the model resolution onto HR and LR is questioned based on two reasons. On the one hand, the range of atmospheric and oceanic resolutions among different models are quite large. For example, the atmospheric resolution of LR in ECMWF-IFS is 50 km but the atmospheric resolution of HR in CNRM-CM6, EC-Earth3, HadGEM-GC31 is 50 km. On the other hand, the dynamics of LWA is dependent on spatial scales of atmospheric eddies. I thus suggest the authors to reorganize the results according to the range of atmospheric resolution: 250 km (Lower Resolution), 100 km (Standard Resolution), 50 km (Higher Resolution), 25 km (Highest Resolution) as in Scaife et al. 2019.

Minor comments:

a. The authors are also encouraged to add results based on more models in this project if the data are available. This may be helpful to reduce the impact of single model on the ensemble mean.
b. In Figs. 5-6, 8-11, I suggest to plot the wave activity anomalies instead of total field to make consistency with the stream function anomalies. In Fig 7, the spatial correlation should be correlation of the anomalous LWA between observation and models, since the high correlation in the current figure has contributions from the climatological pattern.
c. The right bracket was missing before “and Montgomery”.
d. For Figs. 9-11, the captions can be changed to “As in Fig. 8 but for NAO-, SB, AR”.
e. Line 167: please delete the “DOI???”.
f. Line 270: please correct the phrase “in the four 4 WR”.

References:

Scaife, AA, Camp, J, Comer, R, *et al*. Does increased atmospheric resolution improve seasonal climate predictions? *Atmos Sci Lett*. 2019; 20:e922. https://doi.org/10.1002/asl.922