Reply to Editor

I would like to thank the authors for their revisions, which I believe address the comments raised by the reviewers.

I have one request for the revision in L110 ("with the objective of acquiring certain degree of freedom (González-Rojí et al., 2022) ". Could you please rephrase or add an explanation to this.

Reply: The authors thank the editor for reading the manuscript and taking the time to review it, helping us to improve the quality of the manuscript.

In this study WRF was used to conduct regional climate simulations at very high spatial resolution. At this scale, the nesting methodology follows the same rules as at lower resolutions (Giorgi, 2019; Rummukainen, 2010). Some authors, such as Lucas-Picher et al. (2021), suggest that the update frequency of boundary conditions should be higher when we increase the spatial resolution. ERA5 provides hourly data so we could use data at that frequency to feed the model. However, since our objective is to perform climate simulations (not forecast), the use of boundary conditions at this frequency may be impractical due to the amount of storage and computational resources required. For this reason, in this case an update frequency of ERA5 every 6 hours was selected which seems acceptable for this study following the approach of Gonzalez-Rojí et al. (2022). In that case, the authors argued that they use data every six hours in order to allow the model to reach a certain degree of freedom by a lower update frequency of boundary conditions.

We have rewritten the paragraph to clarify the explanation as suggested by the editor, which we have marked in blue as was done in the previous revision. Please see L110-L114 in the new version of the revised manuscript.

"*WRF was updated every six hours using the fifth-generation European ReAnalysis (ERA5, Hersbach et al., 2020), the latest reanalysis product from the European Centre for Medium-Range Weather Forecasts, which has been shown to be effective for regional climate downscaling. Although ERA5 provides hourly data, we opted for a six-hour update frequency* to allow the model a certain degree of free evolution *(González-Rojí et al., 2022). Additionally, using hourly data for a 32-year climate simulation would be impractical due to the high storage and computational demands."*

References:

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González-Rojí, S. J., Messmer, M., Raible, C. C., and Stocker, T. F.: Sensitivity of precipitation in the highlands and lowlands of Peru to physics parameterization options in WRFV3.8.1, Geosci. Model Dev., 15, 2859–2879, https://doi.org/10.5194/gmd-15-2859-2022, 2022.

Lucas-Picher, P., Argüeso, D., Brisson, E., Tramblay, Y., Berg, P., Lemonsu, A., Kotlarski, S., and Caillaud, C.: Convection-permitting modeling with regional climate models: Latest developments and next steps, WIREs Climate Change, 12, e731, https://doi.org/10.1002/wcc.731, 2021.

Rummukainen, M.: State-of-the-art with regional climate models, WIREs Climate Change, 1, 82–96, https://doi.org/10.1002/wcc.8, 2010.