Responses to final comments from the Associated Editor

WES-2025-172

Dear Associate Editor Dr Julie Lundquist,

Thank you very much for your positive feedback on our research.

Below, we respond to the point you raised, which includes one correction in blue that has refined the final version of our work.

Requested correction:

Lines 29-35 seem to imply that mesoscale modeling at 10-km resolution is currently used for wind resource assessment. Please acknowledge that when mesoscale models are typically run for wind resource assessment, they are usually run at convection-permitting scales (not the 10-km resolution suggested by the current text in lines 29-35). For example, the Wind Toolkit dataset from NREL/NLR is run at 2-km resolution (Draxl et al. 2015, https://www.sciencedirect.com/science/article/pii/S0306261915004237), and the NOW-23 dataset from NREL/NLR is also at 2-km resolution (Bodini et al. 2023). Further, the most recent Global Wind Atlas version was run at 3-km resolution (Davis et al. 2021, https://journals.ametsoc.org/view/journals/bams/104/8/BAMS-D-21-0075.1.xml). Please modify the text in lines 29-35 to acknowledge that other wind resource assessment datasets are available at finer than 10-km resolution and include one or two of these references.

R//: Thank you very much for pointing out this important clarification, which helps to improve the context and background of the work.

Following this, we have included, in lines 33–35 of the current manuscript, an acknowledgement of the predecessor products you mentioned for wind resource assessment, which are run at a spatial grid spacing comparable to that of the Convection-Permitted Models (CPMs) we used here. We highlighted that the CPMs we used not only operate at this fine resolution, but are also run in convection-permitting mode, which allows processes linked to convection to be resolved explicitly rather than relying on parameterisations. Specifically, we have added in lines 33-35:

"….wind behaviour and extremes (Soares et al., 2012; Prein et al., 2015; Prein, 2023). For wind resource assessment applications specifically, recent operational datasets have adopted similar fine-scale resolutions (2–3 km grid spacing), including the Global Wind Atlas (Davis et al., 2023), the Wind Toolkit for the continental United States (Draxl et al., 2015), and the offshore-focused NOW-23 dataset (Bodini et al., 2024). In contrast, Convection-Permitting Models (CPMs) provide high-resolution simulations with grid spacing ≤ 4 km, in which deep convection is explicitly resolved rather than parameterised (Prein et al., 2015; Schär et al., 2020), thereby offering an alternative to the limitations of GCMs and RCMs. Originally …"

Many thanks again to the Associate Editor for her detailed review; her comments have improved our work.