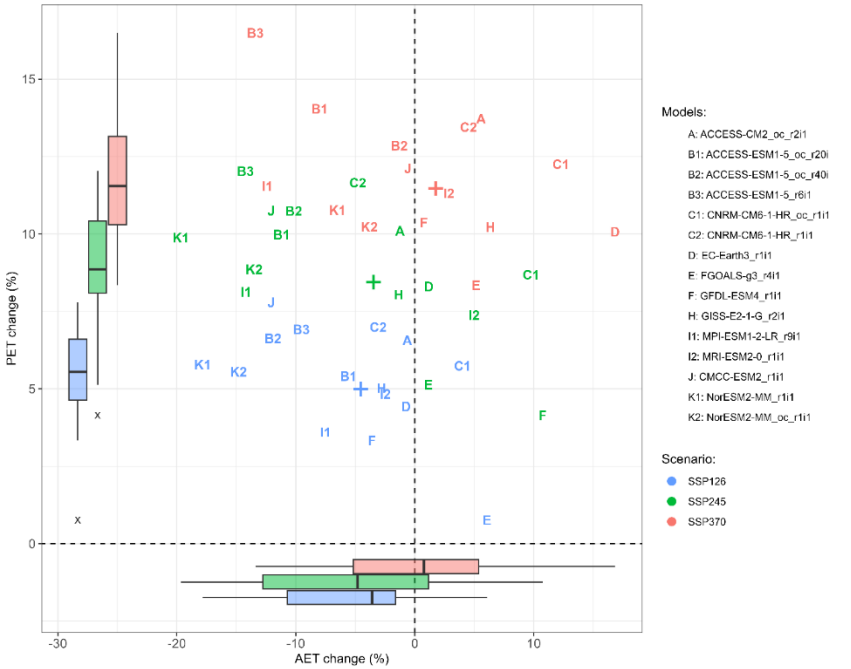
Response to Reviewer's comments for manuscript entitled "Projections of actual and potential evapotranspiration from downscaled high-resolution CMIP6 climate simulations in Australia" [MS No. egusphere-2025-498] submitted to HESS

ID	REVIEWER COMMENT	RESPONSE	STATUS
Reviewer #2			
R2.1	The manuscript uses dynamically downscaled CMIP6 datasets as input to estimate Actual Evapotranspiration (AET) and Potential Evapotranspiration (PET) under historical and various future climate scenarios. It also employs a random forest approach to identify key driving factors influencing projected changes in AET and PET. In addition, the study evaluates multiple datasets against site observations, providing a valuable reference for selecting appropriate AET or PET products. I appreciate the authors' efforts in conducting these evaluations and projections. However, several issues should be addressed before the manuscript is suitable for publication.	Thank you very much for your review and constructive comments. We appreciate the time you have spent reading, reviewing and writing this report. Below we outline how we plan on addressing each of your comments.	NA
R2.2	1. Justification of CMIP6 model selection The authors should clarify the rationale behind the selection of specific CMIP6 models and ensembles. Why were these models chosen? Do other CMIP6 models not provide the relevant variables? A brief explanation would help readers understand the basis for the selection.	We will include additional details in the methods section to justify the CMIP6 model selection: *"The ensemble of CMIP6 models chosen for downscaling in this work was selected considering the models with best skills representing the Australian historical climate, while capturing the future spread in the climate change signal from the full ensemble of CMIP6 models, and prioritizing independent models (Trancoso et al., 2023). The analysis was based on the Kling-Gupta efficiency (KGE) for temperature, precipitation and sea surface temperature and the future climate change signal. An overall skill score for historical simulations was calculated for every ensemble, which was then used to select the best performing ensemble runs across the future envelope of changing temperature and precipitation."*	To be implemented

R2.3	2. Consistency of projections among models The manuscript uses the mean values from multiple CMIP6 projections. However, it is unclear whether the individual models indicate consistent changing trends (e.g., all showing an increase or decrease). Are there any models that suggest an opposite direction of change, which may have been masked by averaging? This should be discussed to provide a clearer picture of the uncertainty and variability in the projections.	To assess the consistency of the projections, we will include an additional figure (Figure 5 below) outlining the spread of the projections from all models for all emissions scenarios across Australia by the end of the century for both AET and PET. We will also update our spatial maps of projected changes to include the signal-to-noise ratio to highlight where the climate change signal emerges from the noise of the ensemble of climate models. In accordance with these changes, we will revise our results section as below. *"For AET, there are a few areas where the signal-to-noise ratio is greater than 1, most notably along coastal eastern and northern Australia. Generally, model agreement is greater in DJF than in JJA, and greater for the high emissions scenario (SSP370) than the moderate or low emissions scenarios. By contrast, PET can be seen to have generally had a widespread model agreement according to the signal-to-noise ratio across the whole country, with a few minor exceptions. These differences relate to the very clear increases noted for PET due to increasing temperatures, which are not reflected in AET due to the majority of Australia being water-limited rather than energy-limited.* *While there is a clear sign of an increase in PET across Australia by the end of the century for all the models considered across all emissions scenarios (Figure 5), the magnitude of the changes can be seen to vary among individual model members. By contrast, for AET, there is disagreement among the individual model members on the sign of the change. For example, for SSP126 while most models show a decreasing signal, there are two models which project increases. For the moderate emission scenario (SSP245) most models project decreases, whereas for the high emission scenario (SSP370), most models project increases. Even when using the same emissions scenario, the projected changes in AET can differ significantly among models, highlighting a key aspect of climate modelling uncertainty and variability in the projections."* And:	To be implemented

		"After bias correction the model agreements have been improved for AET, particularly for SSP370 in DJF season and ANN (see the more stippling areas in Figure S1 rows 1-3). For PET, bias correction also improved the model consistency in some regions, as the signal-to-noise ratio was noted to be greater than 1 across nearly the whole country (Figure S1 rows 4-6)."  *Figure 5: The percentage change in annual AET and PET for the individual downscaled CMIP6-CCAM models across Australia for SSP126, SSP245, and SSP370 (1995–2014 compared to 2080–2099). The box and whisker plot shows the interquartile range (box), and the median (bar), while the whiskers extend from the box to the furthest datapoint within 1.5x the interquartile range. The symbol "+" shows the ensemble*	

		average and the symbol "x" indicates the outliers from the marginal boxplots.	
R2.4	3. Definition of CCAM The abstract mentioned CCAM without defining it. The full name should be provided upon first mention.	We will remove reference of "CCAM" in the abstract which we instead term "downscaled CMIP6 models" in order to reduce complexity. We introduce "CCAM" with its full definition in the main text, where we can explain the model without space constraints.	To be implemented
R2.5	4. Improving logical flow in the Introduction. The introduction could benefit from improved coherence. While the authors have evaluated both AET and PET, the transitions between topics are sometimes abrupt. For instance, around line 55, the discussion shifts from AET to PET and then back to AET, which disrupts the logical flow. Strengthening the narrative structure would enhance readability.	The Introduction will be revised to improve logical flow and readability. We will add more information about PET (e.g., control factors and PET applications) to improve the transitions between AET and PET. Also, we will restructure the Introduction accordingly to strengthen the narrative structure and enhance readability.	To be implemented
R2.6	5. Figure 1 caption clarity The caption for Figure 1 does not explain the meaning of the solid and dashed lines, which makes it difficult to interpret the boundaries of the eight Natural Resource Management (NRM) regions. Although the regions are numbered, a clearer description of the line styles is needed.	We will include an additional sentence in the caption of Figure 1 to explain the meaning of the solid and dashed lines as suggested: "*The solid lines represent the boundaries of the eight Natural Resource Management (NRM) regions, and dashed lines represent the boundaries for Queensland*."	To be implemented