

<RESPONSE TO REFEREE #3>

- **Title: CAMELS-KR: Catchment attributes, meteorology, and streamflow for large-sample hydrology in South Korea**
- **Authors: Songyun Lee, Guchang Jung, and Kuk-Hyun Ahn**

((Acknowledgment))

We thank Reviewer #3 for their thoughtful and constructive comments. We have addressed each point below.

Specific Comment

((Comment #1)) The Introduction section needs to be reworked to avoid repetition. I urge the authors to carefully go through this section again to remove sentences that are repeating what has been stated earlier.

((Response #1)) Following your recommendation, we have reviewed the Introduction and removed or condensed repetitive statements concerning the importance of large-sample datasets, reproducibility, and the components and objectives of CAMELS-KR. These changes are reflected in the Introduction of the revised manuscript.

((Comment #2)) The other concern that I have is around the usage of the word ‘reconstruction’. The context in which the authors are using the word reconstruction can be a bit confusing for the readers as the word is typically used to infer generating data prior to the pre-instrumental period at a gauge or, in some cases, could refer to gap filling. I think the authors here refer it to ‘simulating/modelling streamflows over observed period’.

((Response #2)) Thank you for highlighting the potential ambiguity of the term “reconstruction.” We agree that its intended meaning should be clarified. However, the observed streamflow records differ in temporal coverage among catchments, whereas the model-generated series cover the common period from 1 January 1981 to 31 December 2025. Therefore, these time series include both simulations during periods with observations and extensions beyond the available observational records for individual catchments. Describing

them solely as “simulations over the observed period” would not fully capture their temporal scope.

We have retained the term “streamflow reconstruction” and clarified its meaning in the revised manuscript. The models were developed using available observations within the period from 1 January 1981 to 31 December 2015 and evaluated against available observations over the independent period from 1 January 2016 to 31 December 2025. The resulting series can also serve as model-based benchmarks for comparison with other hydrological models, with performance assessed against observed streamflow where available.

((Comment #3)) Line 16: might be helpful to mention that the reconstructed streamflow is produced for the same length of dataset as the observations. The word reconstruction is often understood as estimates of time when we do not have instrumental records. Better to be clear at the outset as to what you mean.

((Response #3)) We agree. We have revised the Abstract to explicitly state that the reconstructed daily streamflow series cover 1981–2025.

((Comment #4)) Line 36: What do you mean by ‘harmonised’ and how was this achieved?

((Response #4)) Thank you for requesting clarification. Here, “harmonized” refers to processing data from different sources into consistent units, temporal resolutions, and formats so that they can be used together and compared across catchments. We have revised the sentence to make this meaning explicit.

((Comment #5)) Line 84: The second objective is not very clear as to what exactly unique it is doing. It seems very vaguely written. In principle, when you ‘present’ CAMELS dataset, as you say under your first objective (Line 81), you are also characterizing it. Not sure how the second objective is unique and different from the first.

((Response #5)) We agree that the original second objective overlapped with the presentation

of the dataset under the first objective. We have therefore integrated the description of catchment characteristics into the first objective and revised the paragraph to state two objectives: presenting the dataset and its characteristics, and providing benchmark hydrological products. The change is reflected in the Introduction of the revised manuscript.

((Comment #6)) Line 85: instead of ‘diversity by the 282 CAMELS-KR catchments’, it should be framed as ‘diversity for the 282 CAMELS-KR catchments’. Please check.

((Response #6)) The sentence containing this phrase has been revised in response to Comment #5 to clarify the objectives and remove overlap. Consequently, the phrase “diversity by the 282 CAMELS-KR catchments” no longer appears in the revised manuscript.

((Comment #7)) Lines 105-111: Delete the caption of Figure 4 within the caption of Figure 1.

((Response #7)) Thank you for pointing out this error, which was also noted by the other referees. We have removed the inadvertently included Figure 4 caption from the caption of Figure 1 in the revised manuscript.

((Comment #8)) Line 142: the word ‘resulting’ is missing a ‘t’ in its spelling.

((Response #8)) We have corrected this in the revised manuscript.

((Comment #9)) Line 169: I’m not sure about what the authors mean by ‘the main panel’. I’m assuming they are referring to the spatial map on the left. In that case, in the same line, when the authors say ‘the colours indicating the length of the available discharge records’, they should actually be saying that the colours indicate the catchment area. Please clarify.

((Response #9)) “The main panel” refers to the spatial map on the left (Figure 3a), where the colors indicate catchment area, rather than the length of the available discharge records. We have replaced “the main panel” with “Figure 3a” and corrected the description of the colors in

the revised manuscript.

((Comment #10)) Table 2: how exactly is the ‘amplitude’ calculated for the attribute ‘prec_seasonality’?

((Response #10)) We admit that the original description as “amplitude” was incomplete. The attribute `prec_seasonality` describes the seasonality and timing of precipitation relative to temperature, estimated by fitting sine curves to their annual cycles following Eq. 14 in Woods (2009). We have revised the description in Table 3 and added the reference to clarify the calculation method.

((Comment #11)) Table 2: how was the definition of ‘high_q_freq’ and ‘low_q_freq’ decided?

((Response #11)) Thank you for this question. We adopted the definitions used in CAMELS-US (Addor et al., 2017, Table 3) to maintain consistency and facilitate comparisons across CAMELS datasets. Specifically, high-flow days are defined as days with discharge exceeding nine times the median daily discharge, whereas low-flow days are defined as days with discharge below 20% of the mean daily discharge.

((Comment #12)) Line 390: when the authors say ‘both models’, which two models are they referring – are they HBV and LSTM or HBV with Penman-Monteith-based PET and HBV with GLEAM-based PET? Please clarify.

((Response #12)) Thank you for highlighting this ambiguity. “Both models” refers to the LSTM model and the HBV model using Penman–Monteith-based PET. We have replaced this phrase with the explicit model names in the revised manuscript.

((Comment #13)) Line 393: panel (e): it might be better to use white as the colour representing 0. At the moment it looks like 0 and some values to the left of 0 are some shade of yellow, which can be bit confusing.

((Response #13)) We have revised the color scale in panel (e) so that zero is represented by white, making the distinction between positive and negative values clearer.

((Comment #14)) Line 397-398: it would help if you could mention the direction of location of these catchments, such as north/south/north-west etc. In Figure 1, you don't show where the coast is so it is difficult to put this in perspective.

((Response #14)) We have revised the text to specify that these catchments are located in the southern and southeastern coastal regions of South Korea. We have also clarified the correspondence between the catchment names and their existing labels in Figure 1: 41 for the Seomjin River South Sea basin, 51 for the Tamjin River basin, and 23 for the Hoeya-Suyeong basin, helping readers identify their locations more easily.

((Comment #15)) Line 448: please also state what does the dotted grey curved line in Figure 7b represent.

((Response #15)) The dotted gray curve represents the Budyko curve. We have added an explicit description of the curve to the caption of Figure 7.

((Comment #16)) Line 449: Not sure what the authors mean by 'gray symbols represent catchments from all other basins.' Please clarify.

((Response #16)) In each basin-specific plot in Figure 7b, the large colored symbols represent catchments belonging to the highlighted major river basin, whereas the small gray symbols represent CAMELS-KR catchments belonging to the remaining major river basins. These gray symbols provide a reference for comparison. We have revised the caption to clarify this distinction.

((Reference))

- Addor, N., Newman, A. J., Mizukami, N., & Clark, M. P. (2017). The CAMELS data set: Catchment attributes and meteorology for large-sample studies. *Hydrology and Earth System Sciences*, 21(10), 5293–5313.
- Woods, R. A. (2009). Analytical model of seasonal climate impacts on snow hydrology: Continuous snowpacks. *Advances in Water Resources*, 32(10), 1465–1481.