

## **Reviewer 1 – Yi He**

This manuscript presents a major and valuable update to the CAMELS-GB large-sample hydrological dataset. The inclusion of extended daily records, national-scale hourly rainfall and flow data, groundwater level time series, dynamic land-cover attributes, and enhanced hydrometric and human-influence metadata represents a substantial contribution to the hydrological and Earth system science communities. The manuscript is well written and clearly structured. The dataset is openly available, well documented, and likely to see wide uptake. I recommend acceptance subject to minor revisions.

**Many thanks Yi for the positive assessment of the paper and your helpful comments. Please see our detailed responses below.**

Major comments

### 1. Visibility of key methodological details

Several important methodological aspects are described in the Supplementary Information, including propagation and prioritisation of quality-control flags; identification and documentation of suspected outliers and datum changes in groundwater level time series; inter-comparisons between meteorological products at daily and hourly scales. Some of this information is essential for correct dataset usage and could be more explicitly signposted in the main manuscript, to ensure users are aware of these important safeguards and limitations without needing to discover them independently.

**Thanks, we agree that this needs to be more explicitly signposted and have now added text throughout Section 3:**

*“This section describes the CAMELS-GB v2 timeseries in detail including the source datasets and differences between products. Further details on quality flags, comparisons between datasets and identification of outliers can be found in the supplementary information (Figures S1-8, text S1 and Tables S1-4).”*

*“A national comparison of the different products are shown in Figure 1, while a more detailed comparison of the different products for two catchments can be found in Figure S1 and S2.”*

*“Below, we describe the source datasets of the hourly hydrological timeseries, how the timeseries were produced and the quality control applied to the dataset. Further details on the quality flags can be found in the Supplementary Information (Text S1, Figure S6 and Tables S1-3).”*

## 2. Guidance on choice between alternative data products

The dataset provides multiple alternative products for rainfall and PET (e.g. CEH-GEAR vs HadUK-Grid; CEH-GEAR1hr vs GRaD-GB(1H1K)), which is a clear strength. The manuscript and Supplement provide quantitative comparisons between these products. But the manuscript would benefit from more explicit user guidance on dataset selection. For example:

Which products are recommended for long-term trend analysis versus event-based or flood-focused studies?

Are any products preferred for hydrological modelling consistency with derived attributes?

Are there specific applications for which users should exercise caution due to known biases or structural differences?

**Thanks, in response to several of the reviewers comments we have added a new Section 3.3 that provides user guidance on the selection of CAMELS-GB hydro-meteorological datasets.**

## 3. Interpretation of extrapolated peak flows and discharge uncertainty

The manuscript explains (L354-357) that discharge uncertainties were recalculated using longer streamflow time series but the same methodological framework as Coxon et al. (2015). However, it remains unclear why the uncertainty estimates are described in L369 as being based on an 'older set of gaugings', and why newer gauging information was not incorporated. Please clarify this distinction and its implications for peak-flow analyses.

**The uncertainty bounds come from Coxon et al (2015) which were calculated from stage-discharge measurements collected in 2013 for the purposes of that analysis. The maximum flow gauging is obtained from the National River Flow Archive, where stage-discharge measurements are updated on a regular basis. It was beyond the scope of CAMELS-GB v2 to re-do all the uncertainty analysis from Coxon et al (2015) alongside undertaking a thorough review of all the stage-discharge measurements. While this will cause some discrepancies between the maximum flow gauging provided and the calculated uncertainty bounds at high flows, we don't expect these differences to have a significant impact for most gauges.**

Please clarify how the percentage of time exceeding the maximum gauged flow is calculated (e.g. proportion of valid daily/hourly timesteps) in Fig5.

**The percentage of time exceeding the maximum flow gauged flow is derived by calculating the proportion of the timeseries where the daily/hourly flow timeseries in**

**CAMELS-GB v2 is higher than the maximum gauging flow. Only NaNs are excluded from the calculation with all other daily/hourly flow values included.**

Minor Comments

L111 " Mean daily averages calculated from 1st October 1970 – 30th September 2022 for the 671 CAMELS-GB catchments." , ‘mean’ and ‘average’ are synonymous. Do the authors mean daily averages that were then averaged again? The sentence also misses a verb.

**Thanks. We have revised this to:**

*“The average of the mean daily flows are calculated....”*

L323 “increasing land cover over time” should be “increasing urban land cover over time”

**Thanks. We have revised this sentence as suggested**

L369-371: The sentence is difficult to follow. I suggest clarifying that the uncertainty bounds are derived from an older gauging dataset and may not fully capture uncertainty at extreme flows.

**Thanks, we have revised this sentence to:**

*“the discharge uncertainty estimates provided in CAMELS-GB v2 are based on an older set of gaugings so there may be some inconsistencies between the maximum flow gauging and where uncertainty bounds can be calculated”*

L386-387: The sentence structure seems odd and needs rephrasing.

**Thanks, we have revised this sentence to:**

*“CAMELS-GB v2 uses new, open-source datasets to quantify abstractions and discharges in each catchment and provides new reservoir attributes characterising the size and location of the reservoirs.”*

L444-445: It states that ten catchments have a normalised upstream capacity greater than 0.25. However, based on the released file “camels\_gb\_v2\_humaninfluence\_attributes.csv”, only nine catchments >0.25. Please check and correct this number to ensure consistency between the manuscript and the dataset. The threshold of 0.25 used to highlight catchments with large normalised upstream capacity is not explained. Please justify the choice of 0.25.

**Thanks for spotting the inconsistency between the dataset and the text! We have updated this threshold to 0.2 as Salwey et al (2023) find that highest degree of**

**alteration where the normalized upstream capacity is more than 0.2. The text has been revised to:**

*“Twelve catchments have a normalised upstream capacity greater than 0.2 where the highest degree of alteration is typically found in the UK (Salwey et al, 2023).”*