The authors introduce a global landform classification dataset (GBLU) that represents a significant advancement in resolution compared to existing global geomorphological data. Their three-levels classification system with 26 distinct landform classes demonstrates an approach to categorizing Earth's surface features. The use of 1 arc-second DEMs provides unprecedented detail at the global scale, and their methodology of combining geomorphological ontologies with key derivatives appears to effectively balance noise reduction while preserving important landform characteristics.
However, a notable limitation is the lack of a fully documented methodological scripting procedure (even an example code would be helpful) to enable complete reproducibility of the results. Several Python libraries, such as rasterio, pyjeo, xarray, and numpy, along with GRASS GIS modules, offer matrix filtering procedures and cumulative cost analysis that could facilitate the replication of the methodology in a more transparent way.
The full methodology (AS, TIN, SUI) is novel; however, several issues arise during the processing phase due to the absence of a computational scripting framework that would enhance the rigor of the geocomputation procedure.
Response: Thank you for your recognition and comments. In our previous work, we implemented the workflow using ESRI ArcGIS Pro, but due to version differences, some tools may not function consistently across different systems, limiting reproducibility. To address this, we are actively adapting our workflow to open-source alternatives where feasible. We have constructed a Github repository and uploaded a part of tool incorporating Whitebox Geospatial Tools, GRASS GIS, and other open-source software and libraries to enhance accessibility and reproducibility. Due to time constraints, we have not yet provided all the tools, but we will continue to update them in the future. More details can be found in https://github.com/nnu-dta/GBLU-code.For transparency and usability, we have also provided a more detailed explanation about the workflow, including the rationale for constructing the new factor and the detailed calculation processes, in the revised manuscript. (Lines 159-186 and Lines 214-235)

Below are some geocomputation issues identified in the manuscript:
Data pre-processing
To reduce projection distortion, the authors state:
"Data from latitudes below 70° are transposed onto the Behrmann projection, while data above this threshold are projected onto the Lambert azimuthal equal-area projection."

This approach is reasonable; however, an overlap between the two projection zones is necessary to avoid border effects.

Response: Thank you for your reminder. To mitigate border effects, we have implemented an overlapping strategy in our processing. Specifically, we processed the DEMs in 11° × 11° tiles, ensuring that the main 10° × 10° area is used as the final output. This approach helps maintain consistency and minimizes distortions at the transition between projection zones. Related explanation has been added in the revised manuscript. (Lines 136-141)

Methodology

Figures 1, 2, and 3 are well designed and effectively illustrate the methods. However, they are not supported by a scripting procedure that can be followed step by step. Additionally, several thresholds (e.g., Tas, Tss) are defined in the methodology but appear to be based on empirical, subjective decisions. It would be preferable to define them using statistical or mathematical criteria.

Response: For ease of scripting, we have created a GitHub repository (https://github.com/nnu-dta/GBLU-code) and will continue to update the related tools based on open-source libraries. Additionally, we have supplemented the description of the calculation processes in the revised manuscript. Furthermore, as you mentioned, using statistical or mathematical criteria to define thresholds is an excellent approach. However, given the complex and diverse nature of surface morphology in our study, we attempted histogram-based and mathematical methods but found it challenging to establish a unified standard.

Figures 5–7 are well presented, but it would be beneficial to show the GBLU classification results alongside a transect, similar to Figure 3c, but using real relief data.

Response: Thank you for your suggestion. In the revised manuscript, we have optimized the visual appearance of these figures.

Due that the post-processing includes several aggregation/smoothing procedure do you really need to use a 1 arc-second DEM?

Response: This is an interesting question. Regarding the use of a 1 arc-second DEM, there is no contradiction between the aggregation procedure and spatial resolution. The aggregation is applied to reduce scattered noise without altering the boundaries generated in our classification. Thus, the final data resolution remains consistent with the original 1 arc-second DEM.

Would be more effective to use 3 arc-second MERIT Hydro in combination with the stream-network Hydrography90m to have a landform classification more in line with existing DEM-derived products?

Response: Thank you for your suggestion. While combining 3 arc-second MERIT Hydro with the 90m stream-network Hydrography90m could potentially improve consistency with existing DEM-derived products, the effectiveness remains uncertain due to differences in spatial resolution. Our primary goal is to develop a 1 arc-second landform classification map, and currently, there are no globally available and publicly accessible 30m (1 arc-second) stream network datasets that align with our resolution requirements.

Projection

The manuscript states: "Data from latitudes below 71° are transposed onto the Behrmann projection, while data above 69° are projected onto the Lambert azimuthal equal-area projection." However, WGS84 (World Geodetic System 1984) is a geodetic datum and can be represented using either a geographic coordinate system (latitude/longitude, expressed in degrees) or a projected coordinate system (e.g., UTM). The final tif files appear to be stored in the latter, but no specific explanation is provided in the manuscript.

Are the final tif files stored under two separate projections, or have they been homogenized into a single projection? Either approach is valid, but this should be explicitly stated in the manuscript and in the README.txt file available in the Zenodo repository.

Response: Thank you for your suggestion. In our processing workflow, we used the Behrmann projection for latitudes below 71° and the Lambert Azimuthal Equal-Area projection for latitudes above 69°. For consistency and ease of use, the final TIFF files have been reprojected into a single coordinate system (EPSG:3857). We have stated this in the manuscript and update the README.md file in the Zenodo repository accordingly.

Additionally, the processing appears to be done in 10° × 10° tiles. What happens at the tile borders? Is there an overlapping procedure in place?

Response: As the response above, we have implemented an overlapping strategy in our processing flow. We used DEMs in 11° × 11° tiles, and the main 10° × 10° area is used as the final output. For the boundary, we have manually checked and modified it.

tif files

The inclusion of tif file overviews (*.ovr) and a color table palette is appreciated, as they facilitate fast and visually informative rendering. However, it would be useful to include the code legend as metadata within the tif files themselves or at least document it in the README.txt file.

The .aux.xml files store statistical information about the tif files (e.g., mean, median). However, since the tif files contain categorical variables, this statistical information is not particularly useful.

I suggest increasing the grid tile size of the final tif files to 2° × 2° (or even 4° × 4°) to reduce the total number of files. This would simplify tile management, especially for large-scale downloads.

Response: Thank you for your reminder. In this version, we have uploaded the README.md file, which now includes explanations of the code meanings and colormap. While the .aux.xml file (which contains statistical information) is not essential for most applications, it is necessary in ArcGIS Pro for rendering data in unique value mode, which enhances usability. Additionally, we have mosaicked the data into 10° × 10° tiles and organized them into folders based on latitude for better accessibility