Review of the manuscript No. essd-2023-363 '*A global dataset of the shape of drainage systems*' submitted to *ESSD*.

Recommendation: ACCEPT

Focus of the paper: The manuscript presents datasets on drainage basins which delineate Earth's land surface into individual water collection units.

Relevance: The presented study is the original primary research within the scope of the journal.

Abstract is well written and clearly describes the undertaken study.

Structure: The article is well organized with structured sections.

Introduction presents a background, defines research goals and provides a clear statement of research problem. It presents the purpose of the research investigation which is supported by the pertinent literature. Literature is well referenced and relevant.

Research questions and goal are identified. Objectives are relevant to the study aim.

Research gaps and weakness in former works are described: The authors presented a high-resolution global dataset for the boundaries and geometry of basins which is still missing.

Motivation is explained: this study contributes to fill in the gaps in the existing lack of comprehensive database on hydrological watershed basins. The importance of watershed basins is that they determine water and sediment dynamics, affect landscape evolution and connectivity between ecosystems and freshwater species.

English language: fine.

Data used in this study are described: Methods described with sufficient information: The authors used a 90- meter resolution digital elevation model, measured the areas, lengths, widths, aspect ratios, slopes, and elevations for basins over 50 km2 globally.

Methods: The authors calculated the lengths and sinuosities of the longest river channels within these 0.67 million basins. The workflow is well structured.

Results are reported: The authors built a new global dataset, Basin90m, to present the basins and rivers, as well as their morphological metrics.

Discussion interpreted the major outcomes of this study: to highlight the use cases of Basin90m, the authors explored the correlations among morphological metrics, such as Hack's law. . The advantages of the obtained results are described.

Conclusion The authors concluded their study bycomparing with HydroSHEDS, HydroATLAS, and Google Earth images. They demonstrated the high accuracy of Basin90m. Basin90m, available in Shapefile format, whcih can be used in various GIS platforms, including QGIS, ArcGIS, and GeoPandas.

Actuality, novelty and importance of the research is clear: Basin90m has substantial application prospects in geomorphology, hydrology, and ecology.

Figures Figures are of acceptable quality, easy to read, relevant and suitable.

Recommendation: This manuscript can be ACCEPTED based on the detailed report above.

With kind regards,

- Reviewer.

10.01.2024.