

Natural disasters have been occurring since the inception of this planet, manifesting in various ways. Among these, drought stands out as a unique phenomenon, demonstrating to the Earth's inhabitants how the absence of a single drop of water can devastate humanity. Its widespread implications span multiple domains, ranging from critical dehydration in human biology to severe disruptions in global agricultural food production.

Drought can be subdivided into categories based on the specific field or objective of interest. For example, it is commonly classified as surface water drought, groundwater drought, or meteorological drought. Although these subdivisions share the root term "drought," their operational contexts and foundational definitions differ significantly based on how they are perceived and reported.

In this research, the authors focus specifically on meteorological drought, which they define based on the ETCCDI (the maximum number of consecutive dry days with precipitation below 1 mm within one year) framework and characterize as the absence of rainfall. Although this constraining threshold of 1 mm is not fully aligned with the measurement precision of modern instruments like rain gauges and other advanced precipitation measurement systems, the authors guide the reader through four distinct pathways to comprehensively investigate meteorological drought in Germany. These pathways utilize various datasets across different spatial resolutions. Finally, the authors draw multiple conclusions based on the 2018 rainfall events in Germany, as they consider this specific year to be the best reflection of severe drought conditions across Europe.

Based on the current version of this research article, the following points are brought forward for consideration:

1. Lines 26–27: The authors state that meteorological drought—defined here as the absence of rainfall—can induce a cascading effect leading to agricultural, surface water, and groundwater droughts. While the authors cite a manuscript to support this claim, the definition provided contradicts the consensus on meteorological drought in current literature. A clear distinction between "rainfall" and "precipitation" must be established to ground the definition used in the current version of the manuscript.
2. The study's analysis relies on the ERA5 reanalysis, convection-permitting model (CPM) simulation, the radar-based precipitation reanalysis RADKLIM, and HYRAS station-based gridded rain gauge measurements [Lines 46–50]. If one considers radar observations, for instance, these datasets capture total atmospheric precipitation rather than liquid rainfall exclusively—a fact correctly indicated by the dataset names themselves (e.g., RADKLIM precipitation reanalysis). Therefore, attempting to align a strict "absence of rainfall" definition [Line 26] with datasets that measure total precipitation suggests a fundamental oversight. The authors must address these hydrological nuances rather than applying these terms interchangeably without considering their underlying technical definitions.

3. Moreover, given that the authors cite a specific manuscript to justify this unusual definition of meteorological drought, it becomes the responsibility of the handling editor to review the cited work [Line 27]. It is critical to verify whether that referenced study actually supports the authors' statement or if it has been misinterpreted in the current manuscript.
4. Lines 46–47: The authors state that the convection-permitting simulations of COSMO-CLM are driven by the boundary conditions of ERA5 at a 3 km resolution. However, based on the current version of the manuscript, ERA5 is natively produced at a spatial resolution of approximately 31 km, whereas COSMO-CLM operates at 3 km [Lines 46–47]. It is currently unclear how the 31 km ERA5 data was processed or downscaled to serve as boundary conditions for the 3 km CLM simulation.

Given that COSMO-CLM is one of the four core datasets used to investigate meteorological drought in Germany, the authors must provide a few clarifying lines to explicitly explain the nesting or downscaling procedure implemented during the production of this dataset. Furthermore, this methodological clarification should be contextualized alongside lines 31–33, noting what has been widely reported in the literature: that ETCCDI extreme climate indices are largely smoothed out or lost at coarser resolutions.

5. In the text, the authors state that CDD values span a wide range of 7 to 100 days across the datasets (Line 68). However, the colorbar scale reported in Figure 1 is limited to a maximum value of 60. This artificial constraint conceals the exact geographic locations where the highest CDD values (above 60 days) occur across the datasets. Therefore, the scale in Figure 1 should be adjusted up to 100 days to align with the text statement in Line 68 and properly reflect the full spatial variability of extreme values.
6. A closer examination of the subplots in Figure 1 reveals stark discrepancies in the areas just outside the primary domain of interest (the digitized polygon boundary), particularly toward the Northwest (NW) region. Because the colorbar scale is currently capped at 60, it is difficult to trace the exact numerical variation in these boundary grid cells. However, the coarser-resolution datasets—ERA5 (31 km) and COSMO-CLM (3 km)—appear to exhibit exceptionally high values in this zone, likely reaching or exceeding 60 days. In sharp contrast, the finer-resolution datasets, HYRAS (1 km) and RADKLIM (1 km), show virtually zero CDD in the exact same peripheral region, appearing completely white. The authors need to address what physical mechanism, data processing step, or domain-masking artifact has introduced this pronounced, distinct variation among the datasets in the NW boundary region.

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PROFESSIONAL SUMMARY

Computational Hydrologist, Systems Architect, and Environmental Modeler with a proven track record of engineering high-velocity software and mathematical solutions to complex catchment anomalies. Expert in continental-scale hydrological datasets, Physics-Informed Machine Learning, and high-resolution gridded watershed frameworks. Core contributions include solo-engineering the foundational spatial integration of the multi-million-element USGS NHDPlus dataset into the United States national grid using Soil and Water Assessment Tool (SWAT), and serving as the principal technical architect behind the 3D mathematical physics modeling for Singapore's sovereign urban stormwater initiatives.

CORE TECHNICAL COMPETENCIES

Hydroinformatics Frameworks: Expert in orchestrating multi-scale water frameworks and hydroinformatics pipelines using engines like SWAT.

Geospatial Engineering: Full-stack development across ESRI enterprise ecosystems and advanced open-source spatial stacks.

Intelligent Modeling: Design and deployment of Physics-Informed Machine Learning models.

Advanced Analytics: Production-grade integration of spatio-temporal statistical pipelines, custom APIs, and advanced clustering matrices.

CONCISE CAREER TRAJECTORY & IMPACT

- **One Tool Any Country (OTAC) Global Framework (Ongoing):** Conceptualized and independently developing a multi-year global Python framework fusing surface/groundwater, water quality, and climate science with GCMs, satellite imagery, and advanced ML pipelines.
- **Continental-Scale Big Data Integration:** Executed the integration of the multi-million-element **USGS NHDPlus** watershed dataset into the United States national grid using the **SWAT**.
- **Enterprise Software Engineering Support:** Engineered custom codebase workarounds for enterprise clients directly at **ESRI Headquarters (Redlands, CA)**.
- **Sovereign Infrastructure Modeling:** Modeled 3D rain garden physics at the **National University of Singapore (NUS)**, directly defining Singapore's National Bioretention Guidelines.
- **Academic Instruction:** Delivered advanced undergraduate engineering curriculum covering core disciplines in hydrology, hydraulics, and fluid mechanics.

SCIENTIFIC SERVICE & GOVERNANCE

- **Interactive Scientific Peer Review:** Contribute analytical commentaries within the interactive open-access review platforms of **Hydrology and Earth System Sciences (HESS / European Geosciences Union)**, driving technical accountability in climate and hydrological literature (e.g., *hess-2023-275*).
- **Selected Peer-Reviewed Publication:** Mylevaganam, S., Srinivasan, R., & Singh, V. (2015). Ecohydrologically Driven Catchment Evaluation and Prioritization. *Open Journal of Applied Sciences*, 5, 325-334.

EDUCATION & CREDENTIALS

M.S. in Spatial Science (Hydrology) | Texas A&M University, USA

- MS GPA: 4.0/4.0 | Doctoral Coursework GPA: 3.78/4.0

M.Eng. in Water Engineering and Management | Asian Institute of Technology, Thailand

- Coursework GPA: 3.83/4.0 | Research GPA: 4.0/4.0

B.Sc. Eng. in Civil Engineering | University of Moratuwa, Sri Lanka

- GPA: 3.86/4.0 | First Class Honors