

Decades of theoretical advancements, paired with rapid technological progress, have driven researchers to develop mathematical frameworks capable of addressing complex problems across numerous disciplines. Because these problem domains are inherently dynamic rather than static, there is a continuous need to evaluate existing methodologies and pioneer new models with advanced functionalities.

In this context, the authors claim that current urban canopy models fail to adequately resolve the three-dimensional configuration of buildings and vegetation within urban environments. To overcome this limitation, the authors introduce a novel model to the scientific community named URAY (Version 1.0). Based on the current version of the manuscript, the following evaluation points are brought forward.

1. The manuscript states that building footprints and heights are transferred from a GIS environment into a 3D model where buildings are represented as explicit surface geometry (Lines 88–90). However, the exact workflow and technical methodology for this process are missing. The manuscript merely states *that* it was done, rather than explaining *how* it was executed. The authors should explicitly clarify the underlying mechanisms: did they utilize existing extensions within proprietary software (e.g., Esri products), or did they develop custom, open-source code from scratch?
2. The analytical necessity of translating GIS data into explicit 3D surface geometry remains unclear. For example, consider a simple building with a 10×10 footprint and uniform wall heights of 10. Extruding this shape yields four vertical surfaces of 10×10. Because the model ultimately represents these buildings as flat surface geometries [line 90-91], this translation appears to loop back to the initial dimensional inputs. The authors need to clearly justify the necessity of this 3D conversion and explain what unique analytical value the explicit surface representation adds.
3. In Line 156, the authors state that URAY records whether each photon is absorbed by the ground, a wall, or a roof for each radiation component and time step, but the exact methodology supporting this statement is entirely missing from the current manuscript. Because the radiation tracking process is treated as a black box, it remains unclear how the model actually derives and tracks these specific absorption values without explicit detail on the underlying algorithms or tracking mechanisms.
4. In its current form, the manuscript functions more like a conceptual framework than an operational model. Too many technical details are omitted, rendering the model a "black box" and leaving readers with insufficient information to fully understand, evaluate, or replicate the work.
5. Section 2.0 is dedicated to model development, where readers expect a precise, step-by-step workflow and implementation methodology. However, several statements appear out of place. For instance, the discussion of the Guangzhou application in Line 86 belongs in a model application or case study section rather

than under model development. The authors should restructure this section to separate core model logic from its empirical application.

6. Figure 1 illustrates the workflow of the proposed URAY model. The left side of the diagram positions "model development" and "model validation" as simultaneous inputs feeding into the model. Conceptually, this sequence is flawed. Model validation is a post-development evaluation process used to verify that a completed model behaves as expected. Validation cannot act as an input to the model it is meant to test. The authors must revise the flowchart sequences to accurately reflect standard modeling logic.
7. The mathematical formulations for A_g , A_w , and A_r in Equation (4) are incomplete. The authors have omitted the definitions for the core variables I_0 and I_d . All variables introduced in equations must be explicitly defined in the surrounding text.
8. The definitions of F_j^d and Q^d represent distinct variables in the manuscript, where F_j^d denotes the number of diffuse photons absorbed by a specific surface class and Q^d represents the total diffuse photon counts terminating in absorption by urban surfaces or tree crowns. Clarification is required to determine whether summing all individual F_j^d values yields Q^d , and how Equation (5) relates mathematically to Equation (3).
9. Equation (7) appears to be highly repetitive of Equation (4) [Line 73]. It seems that Equation (7) is simply a generic or compact version of Equation (4), rendering its inclusion redundant. The authors should either clearly justify the theoretical necessity of formulating Equation (7) or remove it entirely to streamline the mathematical presentation.
10. The handling editor should closely evaluate the co-author contribution statements outlined in Lines 552–555. Given the numerous clarity issues, missing details, and structural oversights in the current text, the claimed contributions regarding "reviewing and editing" from the secondary authors are questionable. If this draft is indeed the final product of a rigorous review by multiple co-authors, it raises concerns regarding the overall quality control of the team's collaborative process.

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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