Emmanuel Okiria

Centre for Climate Change Adaptation, National Institute for Environmental Studies, Tsukuba, Japan

[okiria.emmanuel@nies.go.jp](mailto:okiria.emmanuel@nies.go.jp)

[okiriaemmah@gmail.com](mailto:okiriaemmah@gmail.com)

Noda Keigo

Graduate School of Agricultural and Life Sciences, The University of Tokyo, Tokyo, Japan

[nodakeigo@g.ecc.u-tokyo.ac.jp](mailto:nodakeigo@g.ecc.u-tokyo.ac.jp)

Shin-ichi Nishimura: Nishimura

Faculty of Applied Biological Sciences, Gifu University, Gifu, Japan

shinichi.s1@f.gifu-u.ac.jp

Yukimitsu Kobayashi:

NTC-International Co., Ltd., Tokyo, Japan

[y.kobayashi@ntc-i.co.jp](mailto:y.kobayashi@ntc-i.co.jp)

The editor, ,

On behalf of the co-authors, I am pleased to submit our manuscript “TopEros Model: A Novel Conceptualisation of the Hydro-Erosion Process.”

This work presents significant advancements in the modelling of soil erosion processes at large catchment scales by addressing the problem of adequately representing soil erosion processes at these scales (catchment scales). We developed TopEros, a new hydro-erosion model that integrates a TOPMODEL-based hydrological framework with three distinct soil erosion models. By zoning select grid cells into areas with and without gully formations, TopEros enables the application of appropriate soil erosion models within their correct domains, thereby enhancing the representation of the soil erosion process.

We went ahead to apply TopEros to the Namatala River catchment in eastern Uganda, demonstrating its effectiveness in capturing the variability of sediment yield at sub-grid scales. Our findings show that using topographic index thresholds to identify gulley formations within grid cells provides a more detailed understanding of soil erosion dynamics. This approach not only improves the conceptualisation of water erosion at catchment scales but also facilitates the identification of hotspot areas for targeted intervention measures.

We believe that our manuscript is well-suited for publication in Catena] due to its relevance to the field of hydrology and soil erosion modelling.

Sincerely,

Okiria Emmanuel