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Editorial: "*Ariston men hydor – Ἄριστον μὲν ὕδωρ*"

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The current Special Issue of European Water with title "Ariston men hydor – Ἄριστον μὲν ὕδωρ" consists of three (3) papers selected from the 15th Conference of the Hellenic Hydrotechnical Association on Water Resources and Environment. The Conference was held in Aristotle University of Thessaloniki, Thessaloniki, Greece in June 2022 at the premises of "Aristotle University Research Dissemination Centre".

Co-chairs of the Conference were the Professors Dimitrios Karpouzos and Konstantinos Katsifarakis from Aristotle University of Thessaloniki. The purpose of the Conference was to present innovative research, applied research and technical studies by scientists on the areas of Water Resources Sustainability and Protection. The authors of the selected papers were requested to significantly expand the initial manuscripts and finally, the papers were accepted for publication after Journal's double blind review process.

In the first paper (Botsis et al., 2023) the feasibility of three different Machine Learning Algorithms, namely Artificial Neural Networks (ANN), Long Short-Term Memory (LSTM) and Support Vector Regression (SVR), are applied in order to simulate the relationship between recharge wells rates and chloride concentrations in the aquifer of Nea Moudania, Chalkidiki. To obtain the necessary data related to the output of the models, multiple surrogate models were developed, using identical sets of input (injection rates) and output (chloride concentrations) patterns obtained by a transient groundwater flow and mass transport model. The main aim of this study is to investigate whether machine learning models can effectively replace the mathematical model regarding the effect of artificial recharge on the expansion of sea front, while, at the same time, reducing the computational burden. The performance evaluation results clearly indicated that the prediction accuracy of SVR surrogate models is superior to both ANN and LSTM models, making them more attractive in order to be utilized as a proxy of the complex numerical model.

In the second paper (Findanis and Loukas, 2023), lumped runoff – rainfall models are analyzed for the simulation of runoff. These models require a single time series of precipitation to simulate the runoff at the outlet of a watershed. When two or more precipitation gauge stations are available at different locations of the basin, their observations must be integrated into spatial average time series. Application of various methods of spatially averaged precipitation, affects the estimation of areal precipitation and the performance of lumped models. In this case study, the suitability of different averaging methods is evaluated, by calibrating and validating five lumped models and comparing these results to the computed information drop. Furthermore, the informational content of models' input data is computed, and its relationship with the modeling performance is studied.

The third paper, (Rozos and Dimitriadis, 2023) introduces the use of machine learning models not as a substitute for hydrological models, but as an independent tool for repurposing hydrological models to be used in early warning systems. The hydrological model underwent an independent calibration process, including standard stages of calibration and verification. Both the inputs (precipitation and evapotranspiration) and the outputs (simulated discharge) of the hydrological

model were utilized as inputs for the ML model, resulting in a significant improvement in the detection of extreme events, such as the exceedance of a predetermined discharge threshold, and more accurate estimation of their likelihood. A novel approach employed in this study involved utilizing different thresholds during the training and test periods, which effectively enhanced the training of the ML model.

REFERENCES

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