

EGU21-568

<https://doi.org/10.5194/egusphere-egu21-568>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Assessing local and spatial uncertainty with HER method

Stephanie Thiesen and Uwe Ehret

Karlsruhe Institute of Technology, Institute of Water Resources and River Basin Management, Karlsruhe, Germany
(stephanie.thiesen@kit.edu)

Uncertainty analysis is a critical subject for many environmental studies. We have previously combined statistical learning and Information Theory in a geostatistical framework for overcoming parameterization with functions and uncertainty trade-offs present in many traditional interpolators (Thiesen et al. 2020). The so-called Histogram via entropy reduction (HER) relaxes normality assumptions, avoiding the risk of adding information not available in the data. The authors showed that, by construction, the method provides a proper framework for uncertainty estimation which accounts for both spatial configuration and data values, while allowing one to introduce or infer properties of the field through the aggregation method. In this study, we explore HER method in the light of uncertainty analysis. In general, uncertainty at any particular unsampled location (local uncertainty) is frequently assessed by nonlinear interpolators such as indicator and multi-gaussian kriging. HER has shown to be a unique approach for dealing with uncertainty estimation in a fine resolution without the need of modeling multiple indicator semivariograms, order-relation violations, interpolation/extrapolation of conditional cumulative distribution functions, or stronger hypotheses of data distribution. In this work, this nonparametric geostatistical framework is adapted to address local and spatial uncertainty in the context of risk mapping. We investigate HER for handling estimations of threshold-exceeding probabilities to map the risk of soil contamination by lead in the well-known dataset of the region of Swiss Jura. Finally, HER method is extended to assess spatial uncertainty (uncertainty when several locations are considered together) through sequential simulation. Its results are compared to indicator kriging and benchmark models available in the literature generated for this particular dataset.

Thiesen S, Vieira DM, Mälicke M, Loritz R, Wellmann JF, Ehret U (2020) Histogram via entropy reduction (HER): an information-theoretic alternative for geostatistics. *Hydrol Earth Syst Sci* 24:4523–4540. <https://doi.org/https://doi.org/10.5194/hess-24-4523-2020>