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Towards the best Representative Elementary Scale for distributed models.

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Spatial distributed models provide a unique tool for process understanding and decision support systems. Despite the advances in computer science and the increasing availability of data, however, the predictive capability of these models is still limited by different sources of uncertainty.
In this context, the Representative Elementary Scale concept (RES) proposed by Refsgaard et al. (2016) provides a simple and effective framework to identify the spatial resolution for the specific model applicability. The framework was also recently extended to identify possible trade-off in the spatio-temporal space (Baroni et al., 2017).
In the present contribution we further discuss the RES concept by using the Shannon's measure of information to constrain the spatio-temporal scale. By that, the RES is defined as a compromise between the decreasing in the uncertainty in the model prediction and the increasing in the information losses. As such, a more objective RES scale could be identified.
We test this hypothesis based on simulations carried out using the distributed hydrological model mHM at the upper Neckar catchment (Germany), as example. Results showed how the approach could be used to better identify the spatial and temporal scales of model applicability. The main challenge in the framework remains the correct characterization of the different sources of uncertainty.

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