



## **A new non-parametric method for the joint spatio-temporal disaggregation of daily rainfall and temperature**

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Hydrological predictions require long observed time series that match the space-time scales of the hydrological processes under investigation. In most regions across the globe, the lengths of daily observations exceed the length of sub-daily observations. Daily temporal resolution is however often not suitable from a scale related perspective, for example for predictions in small catchments. The issue can be overcome by disaggregating the long daily observations into sub-daily values. While the number of proposed algorithms for the disaggregation at single locations is sufficient, comparatively little work has been done with regard to the more complex disaggregation in space and time. Moreover, spatio-temporal disaggregation algorithms have been proposed for rainfall only. We present a new non-parametric method for the joint spatio-temporal disaggregation of rainfall and temperature. We call the new method Spatial Method Of Fragments (S-MOF). It complements the low number of available spatio-temporal disaggregation techniques and is suitable for various applications in water resources research with acceptable method related bias. We also took a step further and coupled S-MOF with state-of-the-art daily stochastic weather generators to test its performance in hydrological predictions. Furthermore, we included scenarios of data scarcity, i.e. when the number of daily locations significantly exceeds the number of sub-daily locations.