

Dissertation Release

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New methods to improve the usefulness of environmental data

Title of the dissertation	Towards more useful water information – methods for fine-scale spatial estimation
Contents of the dissertation	<p>The world is facing unprecedented environmental issues caused by global environmental change. Knowledge about these issues is often created with the use of global environmental models. The solutions to the issues, however, need local-scale actions, and information at the local scale can be scarce. There is, therefore, a need to bridge the gap between the coarse model outputs and the local use case. Many advanced methods have already been developed to understand processes and quantities at fine spatial scales, but which may require resources – time, money, data, or expertise – not directly available. This dissertation develops and describes three methods based on different ways of obtaining useful local information from much larger datasets, which are useful, reliable, and feasible under resource constraints.</p> <p>The first method uses a combination of geographically weighted principal component analysis and a composite index to build understanding of the spatial variability of processes explaining water poverty in Laos. Here, fine-scale understanding is based on spatial sampling strategies. In the second method, advanced areal interpolation methods are used to correct systematic spatial errors in downscaled estimates of runoff. In the third method, the routing component of an ensemble of distributed hydrological models is replaced with a higher-resolution alternative to obtain useful streamflow estimates. This strategy is based on partially higher resolution process modelling.</p> <p>The methods increase the potential of identifying dominant processes driving water scarcity and increase the usefulness of existing global hydrological data products in local contexts for various research and decision-making scenarios.</p>
Field of the dissertation	Geoinformatics
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Place of the defence	Aalto University, School of Engineering, Department of Built Environment, Otakaari 1, 02150 Espoo, Finland, Auditorium M1 and remotely in Zoom at https://aalto.zoom.us/j/5674476759
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