



A low cost sensor network approach to investigate spatio-temporal patterns of stream temperatures and electrical conductivity

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Understanding water and energy fluxes at the stream and catchment scale remains a challenging task. Within the CAOS-project-framework it is our aim to investigate spatiotemporal patterns of stream temperature and to deduce understanding about the underlying hydrological system.

A low cost sensor network was installed in summer 2015 to monitor stream temperature and EC patterns in time and space. 90 HOBO temperature sensors, which were modified to additionally measure EC, were installed at 30 confluences across the Atert catchment (288 km²) in Luxembourg. The design of the sensor network allows for the investigation of three research questions: a) spatial patterns of stream temperatures and EC and their dynamics across the region b) estimation of relative streamflow contributions and their temporal dynamics by using simple mixing models and c) estimation of heat transport. The data will thus provide valuable insight in runoff contributions from different sub-catchments, and a combined analysis with distributed measurements of soil moisture and shallow groundwater will improve our process understanding by linking hillslope scale processes with stream responses.

First results indicate that streams in different geologies show distinct temperature and EC patterns throughout the observation period. Differences are also found with respect to temporal dynamics both for longer periods as well as diurnal fluctuations. These differences are likely to be caused by differences in flow paths on the one hand (e.g. amount of groundwater contribution) and exposure to direct radiation on the other hand.