

A low cost sensor network approach to investigate spatio-temporal patterns of stream temperature and EC

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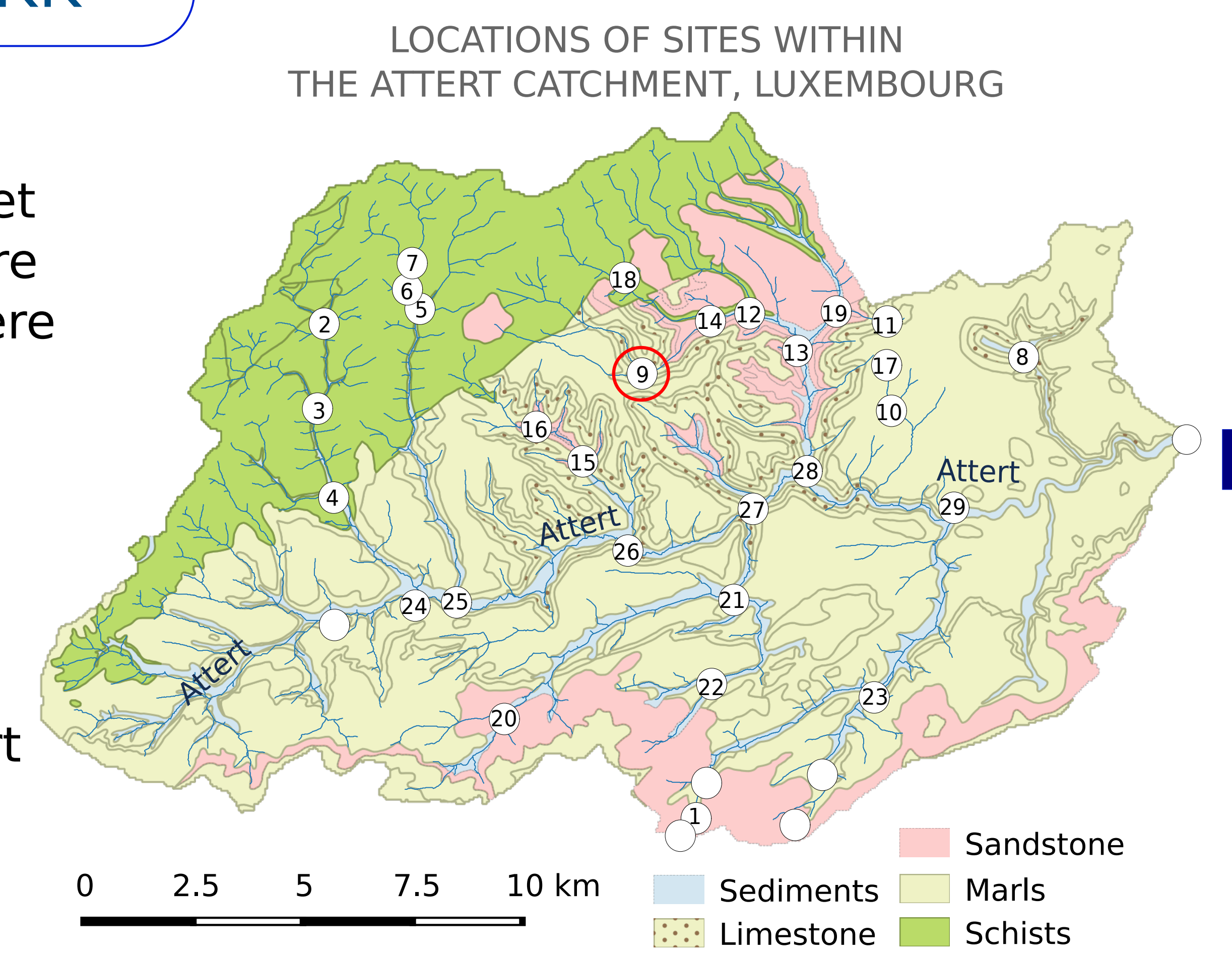
MOTIVATION

- (I) Understanding water and energy fluxes at the stream and catchment scale
- (II) Investigating spatiotemporal patterns of stream temperature to deduce understanding about the underlying hydrological system

SENSOR NETWORK

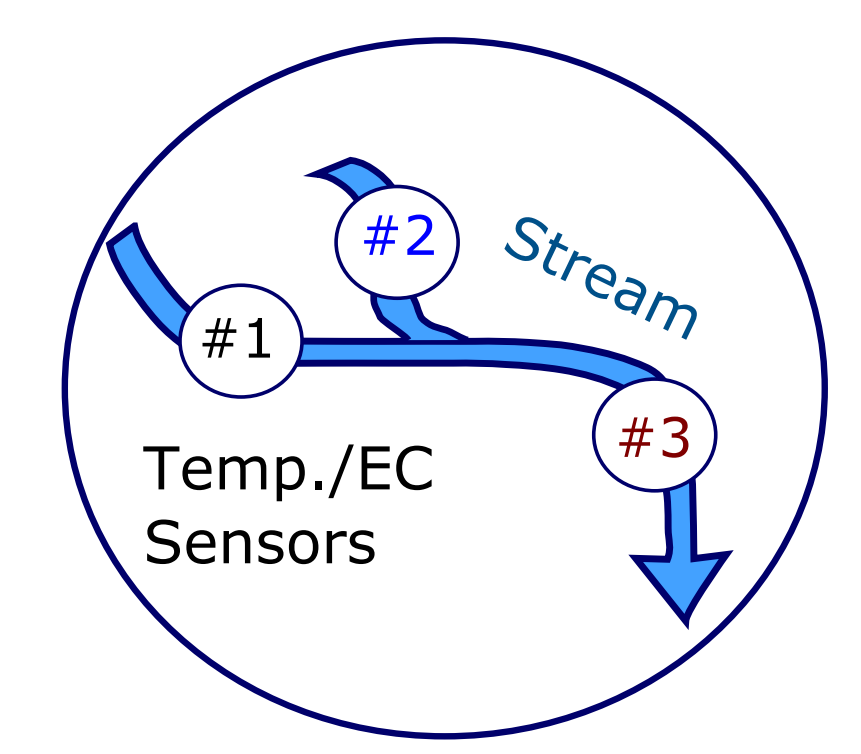
The sensor network consists of 93 low-budget Onset HOBO temperature sensors. The sensors were modified to additionally measure electric conductivity (EC).

Starting June 2015, the sensors were placed in streams within the Attert catchment (288 km²), Luxembourg.



Overall, 29 confluences and 6 single sites were instrumented to monitor spatial and temporal patterns of stream temperature and EC. The network covers different geologies, land uses and catchment sizes.

CONFLUENCE MONITORING DESIGN

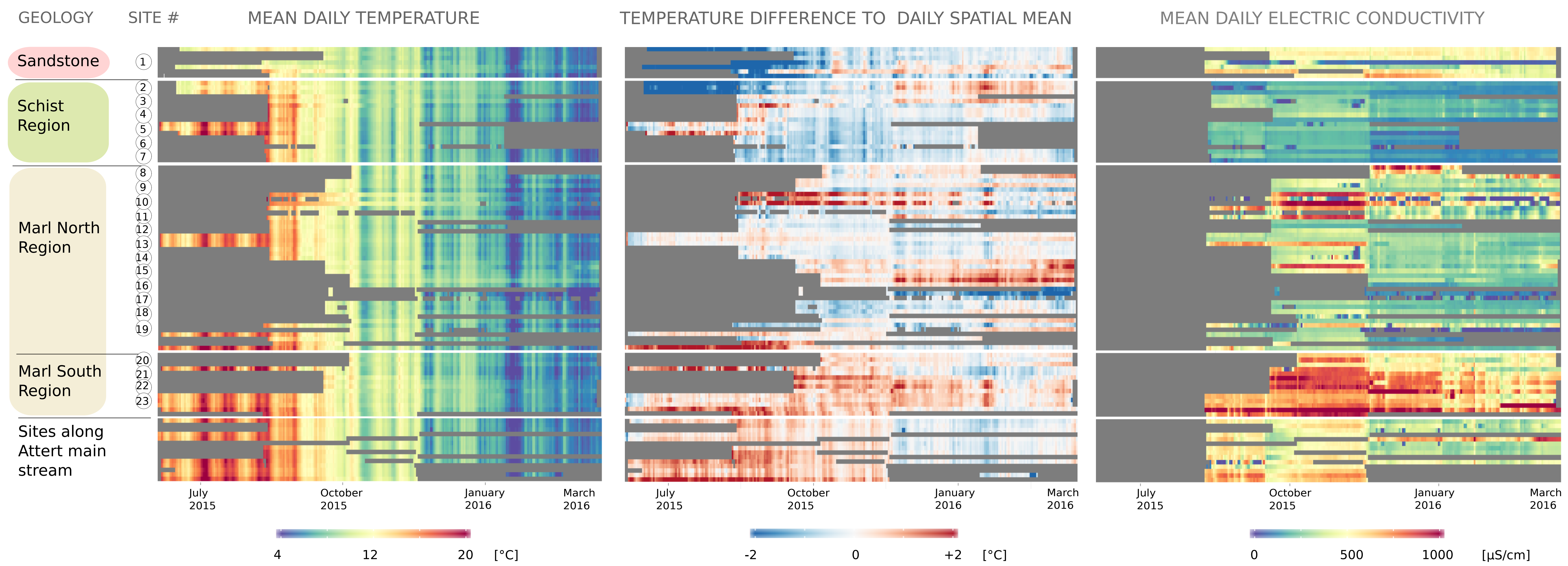


Each confluence is set up with 3 sensors to monitor relative contributions of tributaries by using a simple mixing model.

ACKNOWLEDGEMENTS

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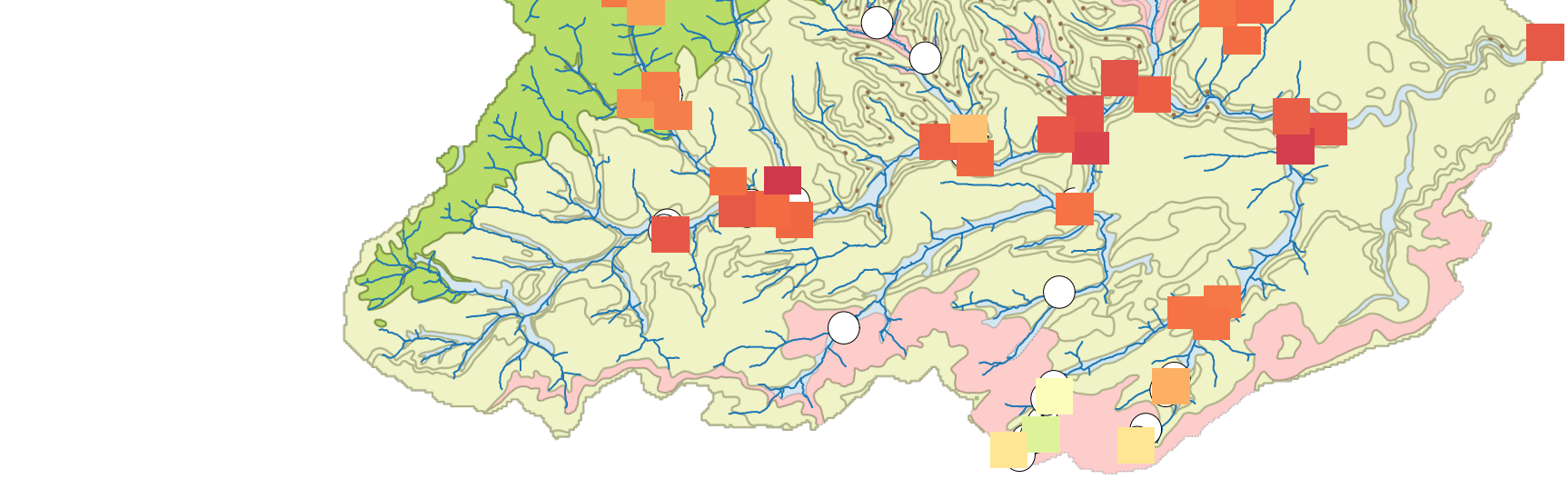
SPATIO-TEMPORAL PATTERNS IN TEMPERATURE AND EC



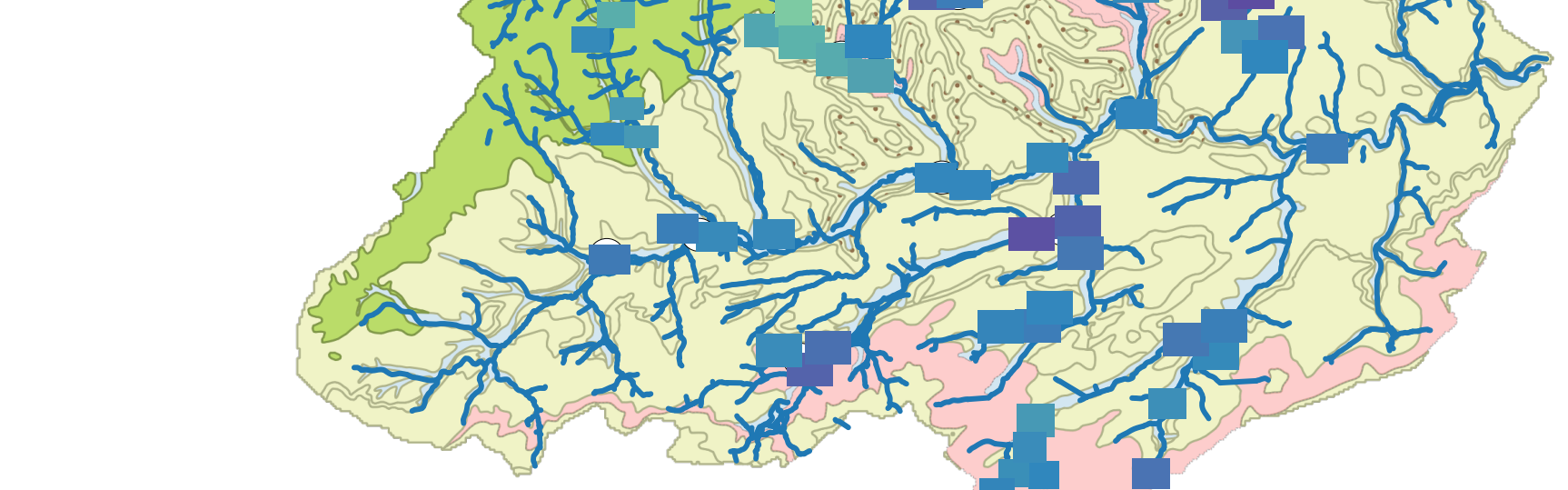
CONCLUSIONS (I)

SNAPSHOT OF STREAM TEMPERATURES IN SUMMER & WINTER

SUMMER: 15.08.2015



WINTER: 15.02.2016

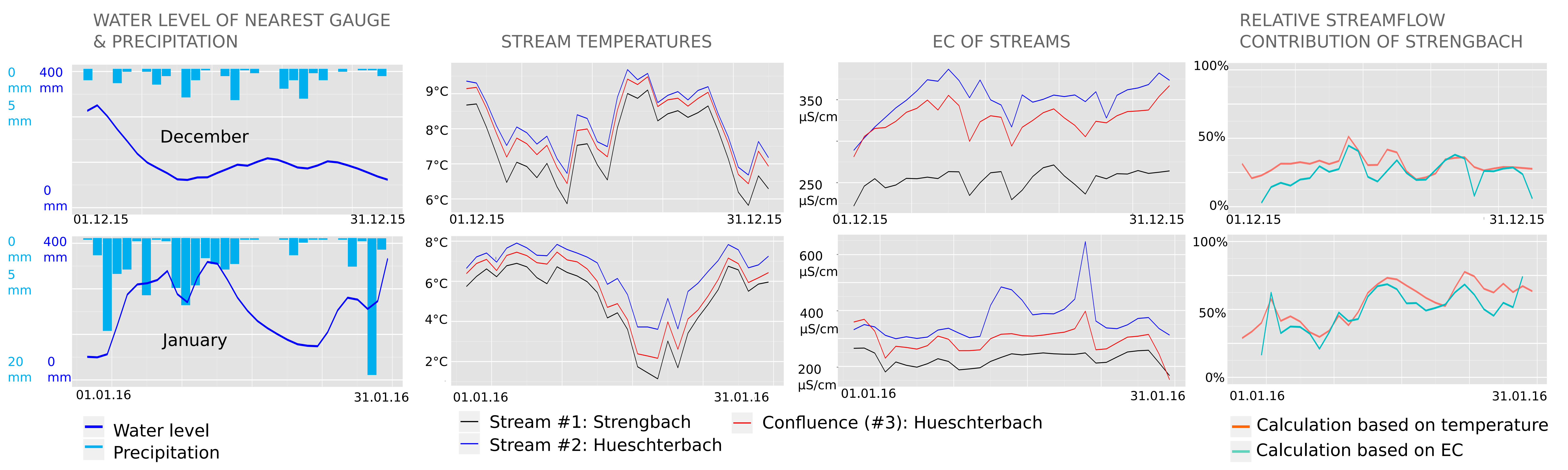


The data shows distinct patterns of electric conductivity and temperature related to geological units.

With the network of sensors we can link point measurements to derive hydrological understanding over larger spatial units.

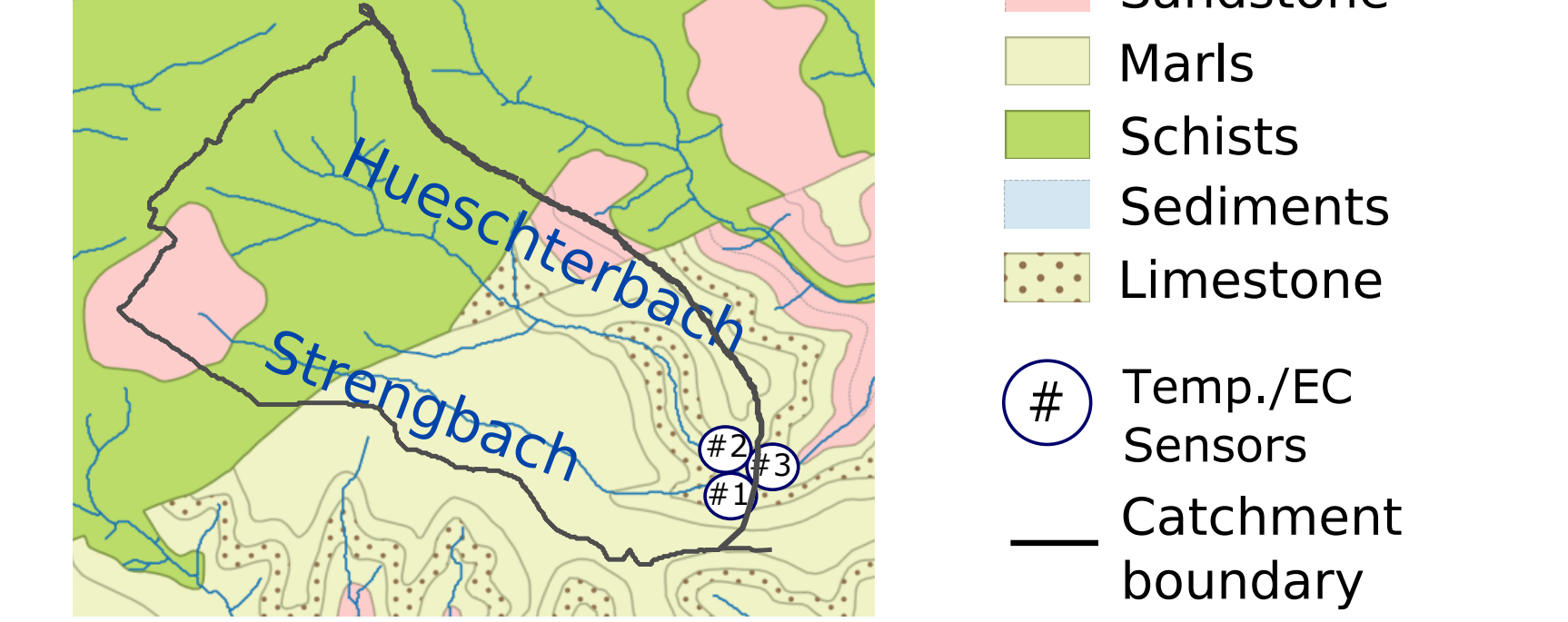
In the next step we will investigate different spatial and temporal scales and account for other clustering variables.

RELATIVE STREAMFLOW CONTRIBUTIONS - EXAMPLE: SITE #9



CONCLUSIONS (II)

GEOLOGY AND LANDUSE OF SITE #9



Both temperature and electric conductivity allow for calculation of relative streamflow contributions.

In the next step we will include rainfall and runoff data into the analysis and investigate the role of subcatchment and channel properties on hydrological response.