

Investigating the effect of surface water–groundwater interactions on stream temperature using Distributed Temperature Sensing and an instream temperature modelling

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Abstract Surface water–groundwater interactions at the stream interface influences, and at times controls the stream temperature, a critical water property driving biogeochemical processes. This study investigates the effects of these interactions on temperature of Stream Elverdamsåen in Denmark using the Distributed Temperature Sensing (DTS) system and instream temperature modelling. Locations of surface water–groundwater interactions were identified from the temperature data collected over a 2-km stream reach using a DTS system with 1-m spatial and 5-min temporal resolution. The stream under consideration exhibits three distinct thermal regimes within a 2 km reach length due to two major interactions. An energy balance model is used to simulate the instream temperature and to quantify the effect of these interactions on the stream temperature. This research demonstrates the effect of reach level small scale surface water–groundwater interactions on heterogeneous behaviour of stream temperature.

Key words surface water–groundwater interaction; stream temperature model; Distributed Temperature Sensing; Denmark