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Investigation of the impact of extreme air temperature on river water temperature: case study of the heat episode 2013.

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Water stream temperature is a relevant factor for water quality since it is an important driver of water oxygen content and in turn also reduces or increases stress on the aquatic fauna.
The water temperature of streams is determined by the source and inflow water temperature, by the energy balance at the stream surface and by the hydrological regime of the stream. Main factors driving the energy balance of streams are radiation balance and air temperature which influences the sensitive and latent heat flux.
The present study investigates the impact of the heat episode of summer 2013 on water temperature of two lowland rivers in south eastern Austria.
Within the scope of the project BIO_CLIC routine measurements of water temperature at 33 locations alongside the rivers Pinka and Lafnitz have been performed since spring 2012. In addition meteorological measurements of global shortwave and longwave radiation, air temperature, wind and air humidity have been carried out during this time. For the same time period, data of discharge and water levels of both rivers were provided by the public hydrological office.
The heat episode of summer 2013 started, according to the Kysely- definition, on 18 July and lasted until 14 August. The highest air temperature ever recorded in Austria was reported on 8 August at 40.5°C. In Güssing, which is located within the project area, 40.0 °C were recorded.
In the lower reaches of the river Pinka, at the station Burg the monthly mean water temperature of August 2013 was with more than 22°C, 1°C higher than the mean water temperature of the same period of the previous years. At the same station, the maximum water temperature of 27.1°C was recorded on 29 July, 9 days prior to the air temperature record.
Analysis shows that at the downstream stations the main driving parameter is solar radiation whereas at the upstream stations a better correlation between air temperature and water temperature is obtained.
Using the extensive data set and information on river morphology, validations and intercomparisons of the physical based water temperature model HEATSOURCE and of empirical water temperature models are performed.