



Impact of heatwaves on river water temperature in Switzerland

Annunziato Siviglia (1), Sebastiano Piccolroaz (2), and Marco Toffolon (2)

(1) Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zurich, Zurich, Switzerland (siviglia@vaw.baug.ethz.ch), (2) Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy (marco.toffolon@unitn.it, s.piccolroaz@unitn.it)

Air temperature records show that multi-day heatwaves are becoming more frequent in Europe during summer months. Future projections depict scenarios in which this trend could be even more probable, likely bringing to severe impacts on human, economic, and natural environment.

In this work, we analyse the correlation between daily averaged anomalies of air temperature and river water temperature considering a database of 15 Swiss rivers covering a period of 30 years (1984-2013). We find that the response of the natural rivers is strongly correlated with air temperature, while anthropogenic impacted rivers affected by hydro- and thermo-peaking (due to hypolimnetic release of water from reservoirs) tend to show a null or very mild dependence, especially during summer months. In all cases, the response is approximately linear, thus allowing for a clear distinction between the two types of rivers on the basis of the proportionality coefficient. We specifically focus on the two most intense heatwaves (June-August 2003 and July 2006) that produced severe effects in the European Alpine region, and show that the alteration of the river thermal behaviour due to hydropower production may mitigate the effects of these extreme events.