

Interactive comment on “How effective is river restoration in re-establishing groundwater – surface water interactions? – A case study” by A.-M. Kurth et al.

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Dear reviewer Thank you for your precise comments. I will answer your comments in the following: 1) Ideally, a spatial variability in exchange rates, i.e. areas with and without groundwater-surface water interactions, would be achieved by river restoration. We will extend our definition of hydrogeological success. 2) The maps display the investigated section of the streams and the number of houses, i.e., indirectly, the land use. Would you mind providing examples of what could be improved in the maps? The resolution of the maps is maximal and it would be difficult to increase the size of the maps (as the space is limited). 3) The state of the reference streams, i.e. nat-

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ural or near-natural, refers to the state of the stream bed, i.e. morphology. We will extend the description accordingly. 4) Measurements were both active and passive. We included this in the experimental section, but will add a remark to the section with the DTS method. 5) The restoration of the Chriesbach was performed in consecutive steps, starting in 2006. The investigated section of the Chriesbach was only restored in the autumn and winter of 2013/2014. Hence, the unrestored data of the Chriesbach was therefore collected in March 2013, the winter before restoration in this section commenced. Measurements had to be taken in winter, as for the measurements it is crucial that the surface water temperatures are as low (or high) as possible, to have a maximum temperature difference between the ground- and surface water. We will add a sentence or two to clarify that. 6) All DTS methods measure the cable temperature, independent of where it is installed. However, the buried fibre-optic cable is not susceptible to sunshine or climatic conditions. Nevertheless, there should be no bias as to the installation method. 7) Unfortunately, there are no piezometers or wells in the area for reference measurements of the groundwater temperature. 8) The maximum surface water temperature was 7.6 °C. The higher temperature in the colour scale was included for consistency, as all the other diagrams have 10 colours as well. 9) We will provide more detail in this section. 10) Noise caused by algae and debris (in this case a piece of plastic) only occurred at the location where a reference temperature logger was affixed to the cable. Hence, these effects are always localised. As the cable is checked during the day, these issues are generally noticed and removed as soon as possible. 11) Unfortunately, we cannot compute precise volumes for “significant”, without, e.g. tracer, tests. Hence, we define “significant” as volumes large enough to continuously change the water temperature. 12) As in all natural settings, the measurements only reflect the situation at the time of the measurements. Changing conditions, such as a significant rise or fall of groundwater levels, will have a significant impact on the whole scenario. In case of the Rothenbach, these influent conditions change to effluent conditions in summer, when extensive pumping of groundwater leads to a significant drawdown in groundwater levels. At the Chriesbach, a rise of groundwater levels of about 30 cm

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might change conditions from effluent to influent. However, this has not happened so far. We hope to have answered your questions to your full satisfaction. Kind regards
Anne-Marie Kurth

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