Hydrol. Earth Syst. Sci. Discuss., 10, C1894–C1895, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C1894/2013/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Contrasts between chemical and physical estimates of baseflow help discern multiple sources of water contributing to rivers" *by* I. Cartwright et al.

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Received and published: 23 May 2013

General comments This is a timely paper that contributes to our understanding of the groundwater-surface runoff processes and to the interpretation of the separation of river flow into surface runoff and baseflow. Until recently, this separation has been carried out by graphical separation methods or digital filter techniques denoted as physical techniques in the Cartwright et al (2013) paper. As shown in the example provided in the paper, these techniques appear to significantly overestimate the contribution to river flow from high salinity groundwater relative to the salinity measured in the river.

Given this increased understanding of physical and chemical modelling of low flows in streams, are we now at a time that, when time-series of chemical data (e.g. EC) are available at a stream gauging station, we should attempt to partition the physical baseflow estimates as calculated by one of the physical techniques into two components: 1) high EC water, often from regional groundwater and from other sources of high EC sources, and 2) low EC water from more local sources. The high EC component would exhibit long storage delay times mainly from regionally connected groundwater-stream systems, whereas the low EC component would be for storages with short storage delay times including riparian storage and local groundwater water which is made up of delayed overland flow, interflow, and bank flow. Thus, the difference between physical baseflow time-series estimates and the time-series based on chemical data could be considered to be baseflow derived from local groundwater. For water managers, whether involved in water resources or environmental flow management, such information would be of value.

Specific comments P5955, Ls 12-13: Given there are relatively large areas of surface saline discharge (Figure 1), should not this estimate be increased to account for these? P5955, Ls 13-17: I can accept that an increase in EC due to river evaporation may not be measurable, but not that "... evaporation in the river does not increase E values". Maybe the authors would like to comment here.

Technical comments P5948, L6: replace "is" by 'are' P5951, Ls8-19: I assume these data are for Winchelsea. It would be helpful for this to be indicated in this sentence. P5955, L1: Some readers may not know what is meant by "conservatively" in this context.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 5943, 2013.