

Interactive comment on “Characterizing interactions between surface water and groundwater in the Jialu River basin using major ion chemistry and stable isotopes” by L. Yang et al.

Anonymous Referee #2

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Review of the Manuscript: “Characterizing interactions between surface water and groundwater in the Jialu River basin using major ion chemistry and stable isotopes” by L. Yang, X. Song, Y. Zhang, D. Han, B. Zhang, and D. Long [Paper # Hydrol. Earth Syst. Sci. Discuss., 9, 5955–5981, 2012]

General Comments

The manuscript presents two data sets of major ion and stable isotope composition

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characterizing the water resources in the Jialu River basin, surveyed during two synoptic sampling campaigns in July and September 2010. The data set consist of groundwater, lake and river water samples which show unique characteristics each. They present a very interesting picture how human activities change/impact water quality of surface water and groundwater resources variably in space and time. Therefore, I think the data set is valuable, but there are several points that require more clarification prior to publication.

In general, the detailed description of the study area and the data acquisition is technically sound, but the interpretations and conclusions of the data are not adequately supported by the evidence. Most of the points discussed by the authors are based on guessing how some of the observed values might be caused (e.g. high concentrations of Na^+ and Cl^- are likely to be caused by urban sewage water), but there is no quantitative evidence presented in the manuscript.

However, when reading the manuscript I did not find the title reflected in the content of the article as much as I expected it to be. There is only one section (5.2) in the manuscript discussing the interactions between the Jialu River and groundwater. Due to the large distances between the river and the wells the analysis could be done for only one observation well compared to the total of nine groundwater sample locations. Additionally, I consider the method used to estimate percentages of river water in the groundwater requires as not valid for the data analyzed in this study. The most important precondition of this estimation method is the assumption of constant fluxes of all end-members during the time of observation. The isotopic and chemical signature of river water is highly variable during flooding events. We know that the fraction of event and pre-event water is changing over time depending on rainfall and catchment/storage characteristics. Therefore, and with regard to the magnitude of commonly observed groundwater flow velocities, it is not adequate calculating fractions of infiltrated river water for a specific event using only one sample for each end-member. A data set sampled during base flow conditions will likely be better applicable for this purpose.

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I think the analysis presented in this paper needs a lot of substantial improvements to be publishable in HESS.

I would recommend changing the title and the focus of the manuscript into sth. like: "Characterizing anthropogenic impacts on water resources in the JR Basin by synoptic sampling campaigns of major ion chemistry and stable isotopes" and I would suggest following the recommendations of Reviewer #1 and make a speciation using PHREEQC. By being able to distinguish between geochemical processes and anthropogenic impacts on groundwater quality a more differentiated picture of the groundwater resources can be shown.

Some quantitative information on urban pollution (e.g. number/size of treatment plants or population access to sewer systems (%)), the type of agriculture and on the hydrological cycle such as runoff, evapotranspiration and recharge are needed as well, to explain to what extent the water cycle and the resources are impacted by human activities. Estimations of evaporation might help to better explain the observable deviations of isotope concentrations from the LML and to analyze the differences between samples collected in July and September.

All Figures could be improved by using some colours: The location of lakes and reservoirs is very hard to identify on the maps. By adding a colour scale to figures 4 and 5 a spatial assignment of sample locations could be done. A seasonal hydrograph of the JR showing the timing of the sampling campaigns might help to better understand observable in-stream concentrations.

After restructuring and rewriting the manuscript I recommend additional grammar and spell checks, which may improve the readability.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 5955, 2012.