

Interactive comment on “Using geochemical tracers to distinguish groundwater and parafluvial inflows in rivers (the Avon Catchment, SE Australia)” by I. Cartwright and H. Hofmann

Anonymous Referee #2

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The manuscript presents a very interesting application of environmental tracers to locate and quantify groundwater and parafluvial inflows to an unregulated river in southeast Australia. Despite the use of radon-222 and chloride is common in studies of groundwater-surface water interactions, here they have been used, coupled with streamflow measurements and mass balance models, to estimate the importance of parafluvial inflow to total river discharge and the flood-generated geomorphologic changes of the riverbed causing a spatial and temporal shift of the gaining reaches. This study adds another tessera to the complex mosaic of hydrological processes at interfaces. In particular, the approach and the description of every methodological passage is careful and detailed and could be very helpful for future similar studies.

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The experimental design focuses mainly on the use of radon-222 as a hydrogeologic tracer of groundwater and/or parafluvial inflows. The main critical point of the applied approach is the definition/measurement of an average groundwater value for radon and major ions, especially chloride. In the study, the authors have measured radon specific activities and major ions concentrations in 8 boreholes, finding big discrepancies among values likely due to the sampling in the riverbank. It would have been very important for such kind of studies to enlarge the sampling network to boreholes surely unaffected by river water and also to reconstruct the morphology of the water table to identify gaining river reaches. The title is sharp and meaningful. The abstract should include also a brief description of the applied methodological approach. The description of the methodology is clear and thorough and well evidences the critical points. The discussion of the shifting inflow reaches (paragraph 5.1) has to be improved and reorganized, since the reader has poor and fragmented information about that. In conclusion, the manuscript if improved according to the reviewer's suggestions could be a good contribution to the hydrogeologic research of surface water-groundwater interactions by means of multi-tracers approach. It can be accepted for publication in HESSD only if major revisions are applied to the received draft. The specific comments can be found in the attached document.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/12/C6229/2016/hessd-12-C6229-2016-supplement.pdf>

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