Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-6-AC2, 2018

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Stable isotope investigation of groundwater recharge in the Carpathian Mountains, East-Central Europe" *by* Carmen-Andreea Bădăluţă et al.

Carmen-Andreea Bădăluţă et al.

carmenbadaluta@yahoo.com

Received and published: 25 April 2018

We would like thank the referee for the fast response and to the recommendations and we are grateful for the comments on how it can be further improved. We provide below a point by point response to the reviewer's comments/suggestions.

Comment: As the manuscript address regional circulation patterns, this should be also reflected in the title. Response: Both the title and the keywords will be modified to reflect the (improved) new structure of the text.

Comment: For Table 1 the abbreviations used for columns should be explained in the

Printer-friendly version

Discussion paper

caption of the Table. Response: For Table 1 the abbreviations used for columns will be changed to more descriptive ones (O = δ18O, H = δ2H) or explained in the caption (d = d-excess, Q = liquid flow, RR = Rarău station, SV = Suceava station, SVR = Suceava River, SOL =SoloneÈŻ River).

Comment: Mention if the calculated mean yearly isotopic compositions are amount weighted or not. Response: No, they are not. We generally favor the usage of raw data as much as possible. Further, we are also providing the precipitation amount, and as such, readers interested can calculate their own amount-weighted values.

Comment: For the Figure 3 Legend and Plot: In the Legend, below the figure, left column, there is a red filled point explained as representing GMWL. The red point is not GMWL, please explain the meaning of the red point correctly. Avoid using each time "linear" for explanations in the Legend. There are two abbreviations within the plot, SVMWL and RMWL, but just one blue line is displayed. Also these two abbreviations are not mentioned in the Legend. For river waters, I admit that there is mainly a linear regression trend. For well waters there is not a single regression, the pattern is more complicated, probably you was sampling several aquifers situated at various depths. This should be insert in the discussions as well. The blue line indicating local meteoric water line is not reflecting the regression for the blue filled points (local precipitations), check data. After checking once more the position of the local meteoric water line (LMWL), discuss the data plotting left of the local meteoric water line. Which should be the reason(s) for this? Response: this is just an artifact of drawing the GMWl. We have plotted a couple of points along a line defined by the GMWL's equation (ïĄď2H = ïĄď18O+10) and then plotted the liner fit to these points. This linear fit is the GMWL Figure 3 is a zoomed-in version of the original, larger, figure, and as such, one of the points is shown. We will delete it. Further, in the final manuscript we will avoid using each time "linear" for explanations in the Legend, this will be replaced with abbreviations, which will be explained in the caption of Figure 3. RMWL (Rarau Meteoric Water Line) represent the dark blue line but it almost perfectly overlaps the red line (GMWL),

while SVMWL (Suceava Meteoric Water Line) is the light blue line. We wil use colors to make all lines visible. Indeed, the groundwater was sampled at various depths and from aquifers located in different lithologies – as such, drawing a linear fit does bring confusion, rather than clarification. We will remove it. The points located above (left) the LMWL reflect samples evaporated in summer (evaporation of falling raindrops in dry atmosphere).

Comment: In the introduction you mention “The links between the stable isotope distribution of O and H in water and climate are well understood in general principles and these can be locally applied to distinguish between different moisture sources and tracks, seasonal contribution to river and groundwater recharge (ref), post-precipitation processes (e.g., evaporation) etc. However, so far, no such studies have been performed in our study area, and, as a matter of fact, in Romania, except for a few studies aimed at understanding the stable isotope composition of precipitation in Western Romania(Bojar et al., 2009; Bojar et la. 2017; DrăguÈŹin et al., 2017).” This is not correct; please look once more at the papers of Bojar et al., 2017 and DrăguÈŹin et al., 2017. Both papers are investigating and discussing the relationship between precipitations and groundwaters for clastic and karstic aquifers, respectively. The investigated area in your manuscript is situated like 600 km away from those areas and according to your data show a different moisture circulation pattern. Please remodel the paragraph in thelight of these facts Response: We will remodel the paragraph to balance the contribution of the studies by Bojar et al. (2017) and DrăguÈŹin et al. (2017) – the later of which was also made by our research group.

Comment: You have the data necessary in order to insert in the text, for precipitation, the Dansgaard equations between temperature and isotopic compositions. In the reference list Dansgaard paper is included but a reference to that paper is missing from the manuscript text Response: We will include Dansgaard in text in the Introduction section (page 4, line 2), where we have left only “ref” in the main text.

Comment: The statement in the Conclusion “the main precipitation sources are located

eastwards from the sampling site (in the East-European Plain and the Black Sea)" is not supported by the data shown in Table 3. Also the role of local recycling is missing, I suggest Table 3 should be interpreted in a more moderate style. Response: In table 3 we have combined locally recycled moisture with the Easterly (which we named "continental") sources. We have separated these in table 3 now and have rephrased the text accordingly. Our data now shows that easterly sources (see the orange trajectories in Fig. 7) account for ca. 20 % of moisture, on par with Atlantic ones, with Mediterranean ones coming third in importance. The Black Sea and locally recycled moisture are coming fourth in importance, but with a larger variability from year to year. The text will include all this information.

Comment: In Table 3 caption, please include a short statement about the method you used in the calculation of the precipitation source percentages. Also add an explicit paragraph in the Methods about this topic. Response: For calculation of the precipitation source percentages we have calculate the sum of amount of precipitation from one direction for each analyzed month. For this we used the next formula: PSP = (*100)/Pmonth where, PSP - precipitation source percentages PS – amount of precipitation in one direction Pmonth - monthly total rainfall in a month.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-6, 2018.

Printer-friendly version

Discussion paper