I read this article with pleasure. Regarding its content, 10 observations caught my attention.

Contents

1.- The reviewed article (*1) constitutes an original and unpublished investigation.

2.- The work focuses on the question of the hydrogeological functioning of a thermal aquifer system that is almost in a natural regime.

3.- The Alhama de Aragón aquifer is probably the most important in the Iberian Peninsula, at least for its hydraulic resources.

4.- The Alhama spring is one of the largest thermal springs in Europe and supports an important spa industry.

5.- On the other hand, the authors have compiled all the existing information.

6.- In addition, numerous previous studies on different topics are used (deep geophysics, detailed geology, etc.).

7.- The work has been complemented with field work that has lasted several years (inventory of water points, monitoring of isotopic hydrogeochemistry, etc.).

8.- All the information has been integrated and used to design the hydrogeological conceptual model.

9.- The flow model has been simulated with a numerical model.

10.- And finally, the results of the numerical model have confirmed the conceptual model and the origin of the springs.

(*1) “The origin of Alhama de Aragón and Jaraba thermal springs. Numerical modeling of the regional flow of the geothermal systems, Almazan Basin, Iberian range, Spain”

Personal assessment.

In my opinion, this is a work that is of interest to the international hydrogeological community.

11.- Perhaps the greatest interest of the work is the methodology.

The use of quality data and robust tools has made it possible to locate the recharge area.

12.- This work lays the foundations for the protection of important springs.

13.- Furthermore, the study is timely. The aquifer is not exploited. It is possible to apply sustainable management.

Recommendations

I recommend publishing it with some minor modifications. Some bugs need to be fixed.

14.- In the legend of figure 1, put “Pyrenees” instead of Pyrenees.

It has been corrected. You can check it in the final manuscript where your comment has already been taken into account.

15.- The toponymy mentioned in the text must be included in the figures. It will make the text easier to understand.

* Ibdes (line 107) It has been included in Figure 1. You can check it in the final manuscript where your comment has already been taken into account..

* Sierra del Solorio (line 120, 270, Figure 3) It has been included in Figure 1. You can check it in the final manuscript where your comment has already been taken into account.

* El Raido (line 211) It has been included in Figure 1. You can check it in the final manuscript where your comment has already been taken into account..

* Calmarza (lines 684, 704 and 710). I suggest including the toponym in figure 3, box D. It has been included in Figure 1. You can check it in the final manuscript where your comment has already been taken into account.

16.- Line 307, put the number 3 as super index (hm^3) It has been corrected.. In addition, a general review of the manuscript is made to check that there are no more typographical errors such as the one indicated. You can check it in the final manuscript where your comment has already been taken into account.

17.- Lines 358 and 360. Reference is made to (T). What does (T) mean? It's confusing. Typographic error. It is eliminated. You can check it in the final manuscript where your comment has already been taken into account.

18.- Table 4. You must include proper nouns in capital letters. Table 4 is updated including proper nouns in capital letters. You can check it in the final manuscript where your comment has already been taken into account.

19.- Hocino Springs does not have an H. Indeed, this error is corrected. You can check it in the final manuscript where your comment has already been taken into account.

20.- The word 'roof' is frequently used. It seems to me that the appropriate term would be 'overhead'. Confirm, please. We think “roof” is the appropriate term. We have consulted it in order to confirm it

21.- Figure 4-C. Indicate in the figure caption that it is a draft that shows the structural analysis carried out, using the dimensioning technique. Based on Referee #2's review, we have removed the entire figure.

Suggestions

The work would benefit if the information were briefly expanded in some aspects:

We appreciate these suggestions, although we are going to answer a little more extensively:

22.- The absence of Jurassic is a key observation to understand the origin of thermal springs. It would be appropriate to add some data to support this fact.

After the paragraph, on the line275 we could add:

“Toward the north, these gradually lose thickness, which is evident on the eastern edge, to such an extent that, in Jaraba, the thickness is minimal and has practically disappeared in Alhama de Aragón. From this locality, and all along the edge of the Aragonese branch up to the periclinal closure of the Cardejón anticline, the Jurassic is not present either. It is from Jaray onwards that they appear again and outcrop along the Rituerto polje as far as the Sierra de la Pica. Below the Tertiary of the Almazán Basin, and according to reflection seismic data and hydrocarbon exploration boreholes (Maestro, 2004), such as the Gredal borehole, the Jurassic does not exist in almost the entire Almazán Basin within the study area, except in the vicinity of the border with the Castilian branch. Between Arcos de Jalón and Jaraba, and according to the aforementioned reflection seismic, the Jurassic seems to have disappeared less than 5 km north of the contact between the Tertiary of the Almazán Basin and the Mesozoic of the Castilian branch. In hydrogeological exploration boreholes it has been detected about two kilometers south of Alconchel de Ariza and Cabalafuente (Zaragoza) (CHE, 2023)”

Could more details be given about the origin of the karstification associated with the Tertiary - Quaternary?

You can check it in the final manuscript where your comment has already been taken into account.

24.- Could you explain how the upward erosion of the Jalón River has contributed to the capture of the thermal aquifer and its underground transfer to the Ebro Basin?

After the the line 435, the following could be added to the article:

“Referring to the karstification of the Cretaceous limestones during the Neogene-Quaternary, and according to Rodríguez García (2008), after the elaboration of the Intra-Miocene Erosion Surface, corrosion of the created planes occurs, the formation of small cavities and deposits of terra rossa during the middle-upper Miocene. Subsequently, the sedimentation of lacustrine carbonates occurs in more humid conditions, probably thanks to the greater intensity of the dissolution

processes on the Mesozoic mountain edges. The upper Miocene-Ruscinian would be characterized by a decrease in the base level due to the exorheic opening of the basin and the action of tensional tectonics. This entails a stage of generation of poljes and corrosion surfaces, as would be the case of the poljes of Araviana (Sanz, 1987), Cañada Hermosa (Echeverría, 1989), Rituerto and Noviercas, in the upper Rituerto basin to the north (Sancho Ruiz, 2019). With the Ibero-Manchegan tectonic phases, during the Pliocene and favored by the associated fracturing, the main stage of poljes formation takes place in the southern mountains, such as the Layna poljes (Gracia et al., 1996).

Regarding the geometry and deep structure of the Almazán basin, it must be said that on this northern edge of the Aragonese Branch at the contact with the Almazán Basin, the structure has a general NW-SE orientation, unlike the edge with the Castilian branch, which is dominated by a W-E direction. At depth and based on the ground water contour of the Tertiary base obtained from reflection seismic surveys, oil drilling, and the support of gravimetric studies, the geometry at depth of the Almazán Basin, and specifically of the Cretaceous calcareous aquifer, can be deduced (Maestro, 2004). The structure of the basin is characterized by folds with NW-SE to E-W directions, associated in some cases with north-vergence thrusts. Two sectors are considered to the west of the Almazán-Soria meridian, the fold axes are E-W, while to the east, as they approach the Aragonese branch, they acquire NW-SE directions typical of this unit of the Iberian Range. In the eastern sector of this basin, three areas with different structures can be distinguished:”

You can check it in the final manuscript where your comment has already been taken into account.

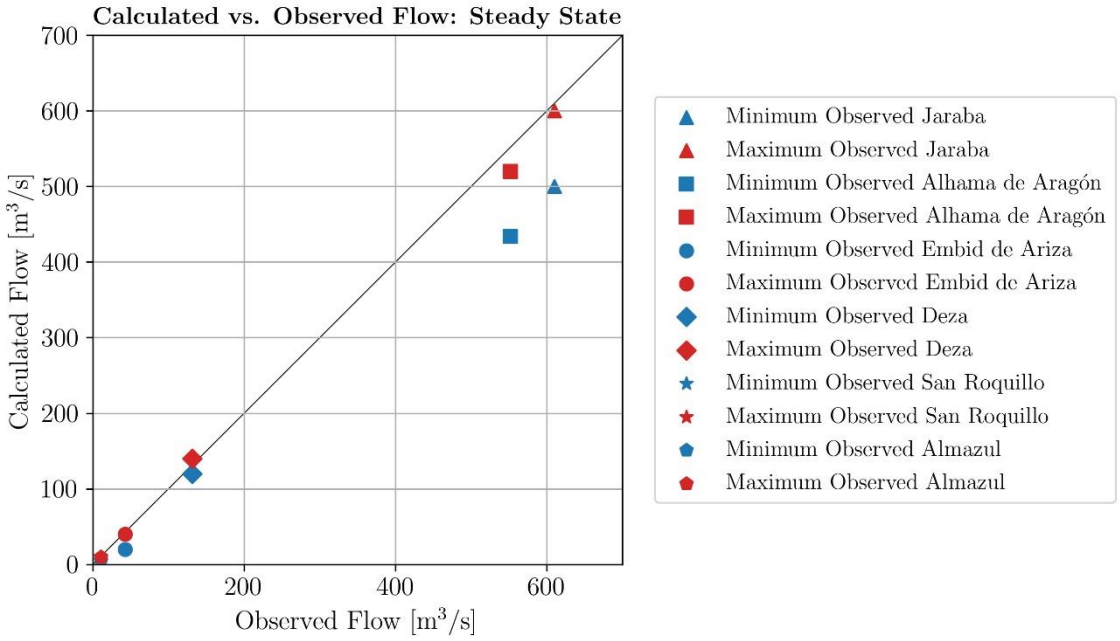
25.- Figures 15 and 16. Why are two springs shown in Deza? It is necessary to clarify this duplicity.

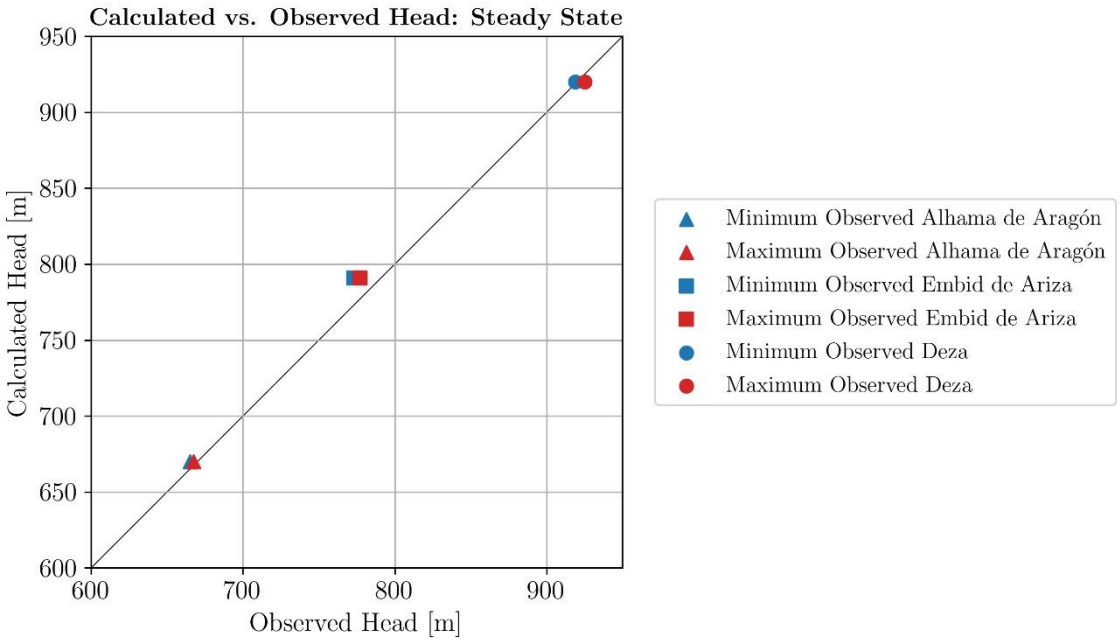
Deza has a series of springs along the outcrops of the Cretaceous limestones, which correspond to the lowest points. In the model, 2 "DRAIN" boundary conditions have been modeled since there are two different areas of springs relatively close.

26.- Figures 17 and 18. It is advisable to put different symbols for each spring and include them in the legend. The figures are confusing.

With the intention of improving the quality of the figures, we have improved them significantly, including all the advice you have provided us. It is appreciated. You can check it in the final manuscript where your comment has already been taken into account.

I show you below how the updated figures have turned out.





.27.- Line 814. The text 'fig16' is repeated. It is a typographic error. It should we said “Table 2 and Fig.15). In addition, a general review of the manuscript is made to check that there are no more typographical errors such as the one indicated. You can check it in the final manuscript where your comment has already been taken into account.

28.- Almost all figures include text with a very small font size. It is difficult to read.

A general review of the Figures of the manuscript is made to check it.