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Discussions

Interactive comment on "The millennium old hydrogeology textbook "The Extraction of Hidden Waters" by the Persian mathematician and engineer Abubakr Mohammad Karaji (c. 953–c. 1029)" *by* Behzad Ataie-Ashtiani and Craig T. Simmons

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Interactive comments on "The millennium old hydrogeology textbook "The Extraction of Hidden Waters" by the Persian mathematician and engineer Abubakr Mohammad Karaji (c. 953–c. 1029)" by Behzad Ataie-Ashtiani and Craig T. Simmons S. Majid Hassanizadeh (Referee) I enjoyed reading this manuscript. It gives a thorough description of Karaji's work, its scientific as well as historical significance, and its practical value. It

is definitely a valuable addition to this issue of HESS. I believe the manuscript needs to be improved as some statements are not accurate (please see below for examples). Also, the text needs improvement; I have provided quite a few suggestions in the annotated pdf file. - I would like to suggest including a figure showing a sketch of a qanat and its various elements. This will be beneficial for the reader, and will it easier for the author when explain a qanat (in subsection 1.2, lines 83-90). - The description of figures provided at the end of the manuscript is somewhat superficial and does not really help the reader to understand the figures and their importance. It is also not possible for most readers to read the Arabic text accompanying figures. Aren't these pages translated into English by Schade? If they are, I suggest the authors provide give copies of pages from Schade's book instead of the original Arabic pages. - Qanats were not in use only in arid areas of the Iran, as suggested in line 77. They were in use everywhere in Iran, including mountainous regions in northern (except for the Caspian Sea coast) and western parts of Iran, with plenty of water. - In referring to the qanat tunnel, various words have been used (aqueduct, channel, tunnel) without being clear to the reader that they are all the same thing. I suggest using one word (e.g., tunnel) in all cases. In particular, I suggest avoiding the use of aqueduct, as it is too closely associated with the Roman aqueducts. - Actually, the qanat technology went to Northern Africa before going to Spain. In other words, one could say: "A second major diffusion of Qanat technology occurred with the conquests of Islam into Northern Africa, the peninsular Spain, and the Canary Islands." Also, it is worth mentioning that qanats are found in India as Southerly as Kerala and in Chinese Turkmenistan. - I am not sure the procedure described in lines 173-178 has been really an effective way of water filtration (as suggested in line 177). For water to lose its salinity and heaviness, due to passage through neat ground soil [Isn't this double? ground soil? Why not just soil?], an ion exchange process must occur. So, it must be a soil with some special characteristics. Also, I can't see how water would lose a portion of its salinity and heaviness when leaking from a new pot! Perhaps the authors should elaborate on the potential of this procedure for reducing salinity. - I do not think the presentation in lines

212-220, linking the laws about water rights and safe distances between wells and qanats to Islamic laws, the script, and the prophet Muhammad's practice, is justified. There existed wells and qanats in Iran before Islam and cities and villages had laws and customs ruling such things. Also, I wonder whether exact numbers given by Karaji (lines 214 and 215) can be found in Islamic records. Moreover, I don't see the value of linking Karaj's writings to Islamic laws. If this is needed, I think a more detailed investigation with references, in order to document such a link, should be provided. - Protection zone of wells and qanats is a term used in relation to contamination (i.e. protection from pollution) and not to the use and extraction of water (which is the context in line 212). I think the proper terms here are ownership limits and well boundaries.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-407/hess-2019-407-RC3-supplement.pdf

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