

Researchers: Sierra Nevada is home to the oldest underground water recharge system in Europe

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A multidisciplinary group of scientists from the Geological and Mining Institute of Spain (IGME) and the Universities of Granada, Cologne, and Lisbon has demonstrated that the traditional careo underground aquifer recharge system used in Sierra Nevada is the oldest in Europe. This

finding is the outcome of various research techniques conducted by experts from different fields including archaeology, sedimentology, geophysics, and hydrogeology.

The results of this study have been published in the *Journal of Hydrology*, in a paper entitled "The oldest managed [aquifer](#) recharge system in Europe: New insights from the Espino recharge channel (Sierra Nevada, Southern Spain)."

The "sowing and harvesting" of water is the managed process by which human beings intentionally channel water to seep via the subsoil (sowing) so that it can be collected (harvested) at some point in the future. For centuries, this practice of recharging mountain aquifers has been conducted in several regions of our planet, although the most-documented cases are found in the high-Andean regions of Peru and Ecuador.

In Sierra Nevada, water is sown and harvested by means of the so-called acequias (irrigation channels) de careo. These acequias, dug out of the ground, are used by mountain stock farmers and acequeros (the individuals with expert skills in water catchment and allocation) to channel the meltwater so that it seeps down through the high part of the valleys. Once the water has percolated through the subsoil, it trickles down the mountain slopes to, eventually, feed the rivers and springs. This increases their flow during the dry season, when it is most needed.

The archaeological and historical research conducted on this project has shown that there were acequias de careo operating in Sierra Nevada as early as the 11th Century. However, the innovative dating techniques used in the study went a stage further, calculating how long the grains of quartz sediment that were dragged here by the early acequias have remained buried. These calculations show that the practices of sowing and harvesting water on Sierra Nevada date back about 1,300 years. That

means this system was first implemented during the transition period between the end of the Visigoth period and the beginning of the period associated with al-Andalus.

The study centered on the River Bérchules basin (Granada), which is the easternmost tributary of the River Guadalfeo in the Alpujarra. The IGME, in collaboration with the Junta de Andalucía and in accordance with its policy of scientific dissemination, has also published an informative booklet entitled *Careos: Siembra y cosecha del agua en la cuenca del río Bérchules (Sierra Nevada, Granada) (Careos, Sowing and Harvesting Water in the River Bérchules basin (Sierra Nevada, Granada))*.

This booklet describes how the careo water management technique works. Five fascinating routes through the massif are also suggested, in which water, acequias, Sierra Nevada, and its people are the main protagonists.

More information: S.Martos-Rosillo, et al. The oldest managed aquifer recharge system in Europe: New insights from the Espino recharge channel (Sierra Nevada, southern Spain). *Journal of Hydrology*, Volume 578, November 2019, 124047.
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