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ISOTOPICAL CHARACTERIZATION OF THE HYDRODINAMIC FUNCTIONING OF RUIDERA LAKES (SPAIN)

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Abstract
Ruidera lakes are one of the most emblematic of the Biosphere Reserve of the "Mancha Húmeda" in the upper basin of the Guadiana River. Is a protected area consists of 15 lakes in a chain, developed along the river bed of the Guadiana River, from its birth, a few meters upstream from the first one. The lagoons are greatly affected by the dynamics and quality of the grounwater body of Campo de Montiel aquifer in which they are located, so to understand its operation is required to have an overview of the processes that occur in whole.

El Campo de Montiel is a free aquifer of about 2600 km2, with clearly defined boundaries to the west and south by the contact of limestone and dolomite Jurassic Triassic clays and gypsum mainly by mechanical contacts or fractures. Runoff on the limestone plateau is almost zero, which recharge occurs mainly by direct infiltration of rainwater and discharge by evapotranspiration and through numerous springs. The springs present Ruidera lakes are not associated with Triassic-Jurassic contact but originate from cutting the topography of the water table. Level declines in the aquifer of Campo de Montiel cause the springs inside the head of Ruidera lakes, dry out and the hydraulic connection between the lakes are reduced.

The objective of this characterization has been twofold: (a) to determine the renewal of groundwater using tritium concentration measurements. (b) To determine the possible connection of Laguna San Pedro with two available sources in the Colgada Lake, 3.2 km apart.

The study was done based on two seasons of testing and sampling carried Ruidera lakes in the months of July and October of 2007. The methodology of work involved in conducting chemical analysis, determination of concentrations of tritium in groundwater sampling to determine variations of oxygen-18 and Deuterium, and finally, conducting a test injection tritium in the San Pedro lagoon in order to analyze its hydraulic connection to the Colgada Lake.

The results with respect to the period of renewal of groundwater indicate that the average time of renewal is 30 years, implying that the charge would amount to about one thirtieth of the aquifer storage capacity. It also highlights the positive results obtained in testing interconnect show an underground connection to the San Pedro lake with underwater springs of Colgada lake. Through a simple mass balance has been determined that the contribution of the San Pedro lake to the rate of flow Colgada 1, was 37% in July, 2007 while in October, 2007 was 52%. In the spring of the Colgada 2, the contribution of the San Pedro lake was 67% and 83% respectively.

Keywords:
Ruidera lakes, hydrodynamic functioning, groundwater, Tritium, Oxygen-18 and Deuterium.