

New Findings Using Noble Gases Isotopes in The Guarani Aquifer System in South America

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The Guarani Aquifer System (GAS) is the most important aquifer within the South American continent. The hydrogeology of the GAS has been studied since the 1970's, a time frame that coincides with the wider use of isotope hydrology tools in the region. Recent analytical efforts in the GAS confined areas focused on the use of noble gas (NG) and the use of the combined Kr and He chronometers. Sampling campaigns were performed totalizing 80 field days between 2015 and 2019, covering 30.000 km and generating results in about 100 GAS samples. Representative wells with known constructive logs and aligned according to regional flow lines as established by the current conceptual model were selected. Partial NG components were estimated with Inoble 2.7, generating estimates on terrigenic 4He , excess air component and recharge temperatures. The quantification of the residence times was performed using the calculation of in-situ accumulation rates, continental crustal basal flows and basal flow calibration modeling. Pre-determined Kr age determinations were used for the calibration and error minimization procedures for each one of the blocks used to group NG and Kr results. Paleoclimatological insights were also given through stable isotopes and recharge temperatures. The use of NG as carried out in this research inaugurates new approaches for the understanding the dynamics of the GAS.