

Dating Groundwater in the western Great Artesian Basin, Australia

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The Great Artesian Basin (GAB) of Australia is one of the world's most iconic groundwater basins. Its relatively low hydraulic gradient and long flow paths provides ideal conditions for testing new isotope techniques for dating old groundwater. Our study area is located in the western margin of the GAB the most arid part of the basin where rainfall is generally less than 100 mm/yr. Data from the Finke recharge zone down gradient through the Dalhousie spring complex and beyond represents the most comprehensive study undertaken on ⁸¹Kr to date. We present our ⁸¹Kr data and compare with previous studies on other age indicators such as ³⁶Cl and ⁴He. The ⁸¹Kr method provides the most reliable indicator of groundwater residence times as it does not suffer complications such as large subsurface production and the need for reliable estimations of the input function. As a result under certain hydrogeological conditions it may now be possible to obtain a reliable chronology of groundwater dating which may be used along with other tracers such as the stable isotopes of the water molecule to understand climate conditions in the range of 50,000 to 1 million years, something previously not possible.