

STABLE ISOTOPES AND SALINITY: USING $\delta^{18}\text{O}$ IN CALCITE CEMENT TO ESTIMATE PORE WATER SALINITY IN THE SAN JOAQUIN VALLEY, CA

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ABSTRACT

In the San Joaquin Valley (SJV), CA, saline produced water from oil and gas activities is being injected into the shallow subsurface. The distribution of high quality groundwater resources in California is unknown, therefore, there is the concern that oil and gas wastewater is being injected into usable groundwater resources, defined by the US EPA as water with less than 10,000 ppm total dissolved solids (TDS). To locate this usable groundwater, the relationship between salinity and stable isotopes of oxygen can be used. Previous work has established a positive relationship between stable isotopes and salinity in several North American sedimentary basins, including the SJV. Another study showed that for the SJV, $\delta^{18}\text{O}$ is fractionating in a temperature controlled exchange reaction between pore water and calcite cement. Sampling of sediment cores containing calcite cements from SJV oil wells with TDS data provided by the USGS from the production zone will be polished and analyzed for stable isotopes via NanoSIMS. Therefore, the hypothesis is that stable isotopes in calcite cements sampled from oil well core, can be used to estimate the salinity of pore water in the SJV. Successful completion of this project will result in the ability to map salinity in the SJV subsurface, identifying the location of California's protected groundwater.

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