# Groundwater residence times based on Chlorine-36

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The objective of our study is the estimation of the groundwater residence times using the radioactive isotope tracer $^{36}Cl$. Study subject is the Umm Er Radhuma (UER) aquifer underlying southwestern Oman on the Arabian Peninsula. The time the water has been in the system as well as current and past recharge rates are important information when the exploration of aquifers is considered.

Ten wells along a principal flow path were sampled for the analysis of $^{36}Cl$ in the beginning of the year 2012. $^{36}Cl$ was measured relative to the stable isotopes, $^{35}Cl$ and $^{37}Cl$, by acceleration mass spectrometry (AMS). $^{36}Cl/Cl$ decreases along the flow path and is interpreted as radioactive decay of $^{36}Cl$ along the groundwater flow direction (Fig 1). This confirms the conceptual idea of the Najd groundwater flow system with a groundwater flow direction from the Dhofar Mountains in direction north-east.

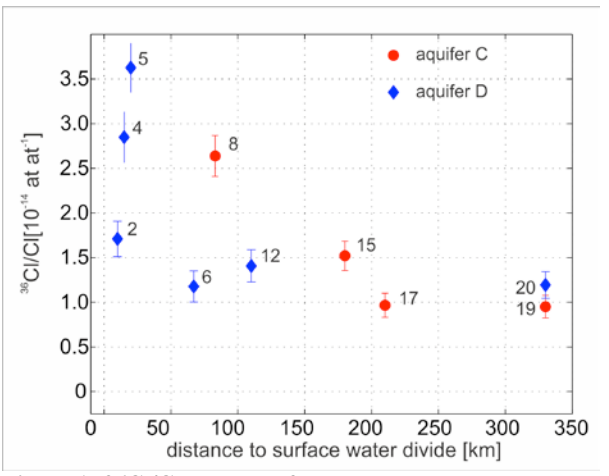


**Figure 1: 36Cl/Cl along the flowpath**

The calculated residence times are significant larger than estimated by previous studies based on the radiocarbon ($^{14}C$) approach. The results of the different age patterns of the Najd groundwater will be discussed with respect to previous age dating results and the perspective of the UER aquifer as an important water resource for the region.