Determination of Subsurface Residence Time, Migration Rate, and Extent of Fluid-Rock Reaction for Carbon-Rich Fluids Using Noble Gas Radionuclides

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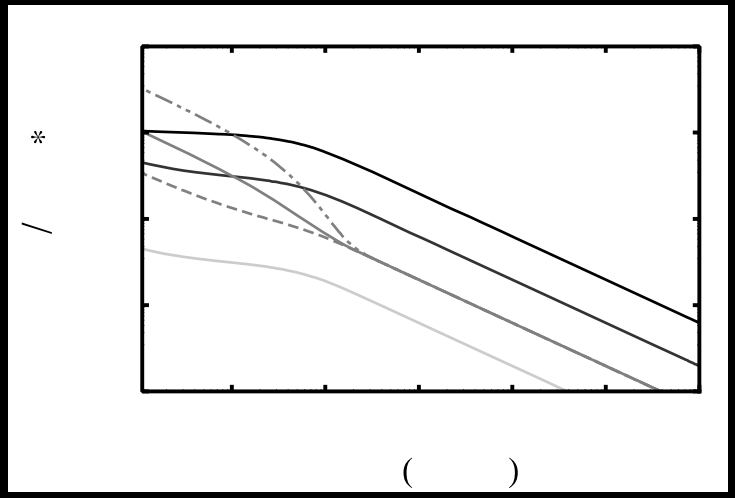
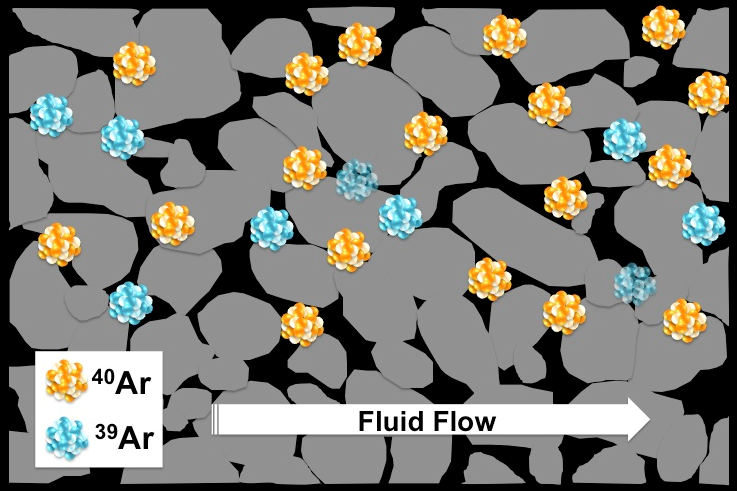
***Noble Gas Radionuclides**:* Chemically inert radioactive isotopes of noble gases with various half lives are ideal tracers of physical processes occurring in the reservoir rocks that host crustal fluids. We aim to investigate the isotopic abundances of noble gas radionuclides, ^{37}Ar, ^{39}Ar, ^{85}Kr and ^{81}Kr in crustal fluids, for the first time, in order to determine the subsurface residence time and migration velocity of crustal fluids.





An important result of our geochemical model investigation is that the isotopic ratios of non-radiogenic Ar isotope in crustal fluid evolve in a relatively simple way, and ^{39}Ar is useful for tracing a much wider time range (up to million years) than what is expected (1000 yrs) from its half-life. Our next goal will be to complete the optimization of the field sampling apparatus, obtain and analyze actual crustal gas samples.