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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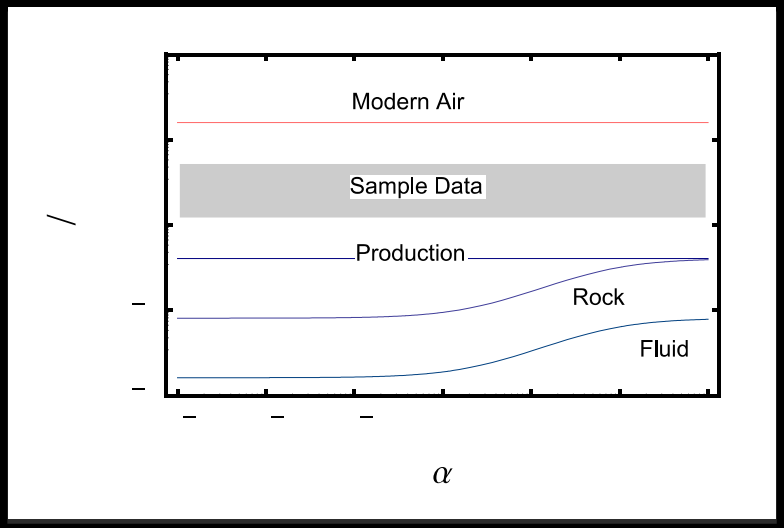
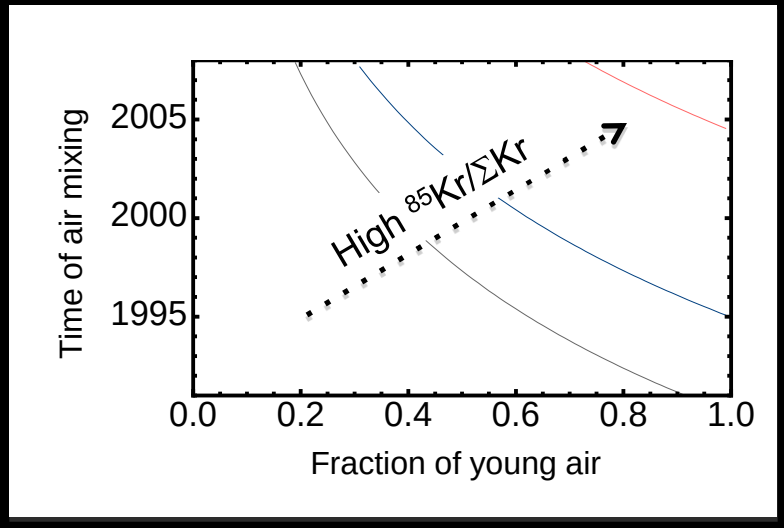
***Noble Gas Radionuclides**:* Chemically inert radioactive isotopes of noble gases with various half lives are ideal tracers of physical processes occurring in the reservoir rocks that host crustal fluids. We aim to investigate the isotopic abundances of noble gas radionuclides, ^{37}Ar, ^{39}Ar, ^{85}Kr 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 data analysis is that the $^{85}Kr/^{39}Ar$ ratios of crustal fluid is an excellent proxy of young atmospheric contribution against in-situ production in the reservoir rocks (Left), but an additional quantitative indicator to ^{85}Kr is necessary in order to identify the ventilation age and the fraction of the young component, which leads to an accurate crustal residence time of the fluid prior to the mixing. Our next goal will be to complete the optimization of the field sampling apparatus, obtain and analyze more crustal gas samples.