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Radiokrypton dating with Atom Trap Trace Analysis[1] WEI JIANG, JAKE ZAPPALA, KEVIN BAILEY, Argonne National Laboratory, ZHENG-TIAN LU, Argonne National Laboratory, University of Chicago, PETER MUELLER, THOMAS O'CONNOR, Argonne National Laboratory — The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for old water and ice in the age range of 10^5 – 10^6 years, a range beyond the reach of ^{14}C. ^{81}Kr-dating, a concept pursued over the past four decades by numerous laboratories employing a variety of techniques, is now available for the first time to the earth science community at large. This is made possible by our development of the Atom Trap Trace Analysis (ATTA) method, in which individual atoms of the desired isotope are captured and detected with superior selectivity in a laser-based atom trap. Thus far, ATTA has been used to analyze ^{81}Kr, ^{85}Kr, and ^{39}Ar, which have extremely low isotopic abundances (10^{-16} to 10^{-11}), and cover a wide range of ages and applications. In collaboration with earth scientists, we are dating groundwater in major aquifers around the world as well as polar ice from Antarctica.

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