

Plenary Talk

PV IX Thu 9:45 PV-Rooms

Atom Trap, Krypton-81, and Global Groundwater — •ZHENG-TIAN LU — Argonne National Laboratory, Lemont, USA — The University of Chicago, Chicago, USA

The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for water and ice with ages of 10^5 - 10^6 years, a range beyond the reach of ^{14}C . ^{81}Kr -dating, a concept pursued over the past five decades by numerous laboratories employing a variety of techniques, is finally available to the earth science community at large. This is made possible by the development of the Atom Trap Trace Analysis (ATTA) method,

in which individual atoms of the desired isotope are captured and detected. ATTA possesses superior selectivity, and is thus far used to analyze the environmental radioactive isotopes ^{81}Kr , ^{85}Kr , and ^{39}Ar . These three isotopes have extremely low isotopic abundances in the range of 10^{-16} to 10^{-11} , and cover a wide range of ages and applications. In collaboration with earth scientists, we are dating groundwater and mapping its flow in major aquifers around the world. We have also demonstrated for the first time ^{81}Kr -dating of old ice.

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