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Identifying Old Ice and Water with Atom Trap Trace Analysis

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The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for old water and ice with ages of 0.1 –1 million years, a range beyond the reach of ^{14}C . ^{81}Kr -dating, a concept pursued over the past six decades, is now 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 ^{85}Kr , ^{39}Ar , ^{41}Ca , and ^{81}Kr . These isotopes have extremely low isotopic abundances in the range of 10^{-17} 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, and dating old ice from the deep ice cores of Antarctica, Greenland, and the Tibetan Plateau. For an update on this worldwide effort, please google “ATTA Primer” .

Student Submission

No

Primary author: Prof. LU, Zheng-Tian (University of Science and Technology of China)

Presenter: Prof. LU, Zheng-Tian (University of Science and Technology of China)

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