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Radio-argon dating and its application in the ocean

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Cosmogenic Ar-39 dating is an emerging technique in tracing groundwater flow, dating mountain glacier ice, and mapping ocean circulation. With a half-life of 268 years, its dating range covers from 50 to 1800 years. Atom Trap Trace Analysis (ATTA) is a laser-based method that trapping and detecting individual neutral isotope atoms in a magneto-optical trap, with high selectivity and sensitivity. We have realized an ATTA system of Ar-39 in environmental samples. The system is capable of analysing small (1 - 5 kg) environmental water or ice samples, and achieves a count rate of 100 atoms/h for Ar-39 at the modern isotopic abundance level of 8E-16. These advances allow us to determine the Ar-39 age in its dating range with precisions better than 15%. Case studies in the Western Pacific and the South China Sea were applied to trace the ocean current. And, a new age scale was conducted by Ar-39 in Guliya Glacier on Tibet Plateau.

Student Submission

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