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Exploration of ^{41}Ca dating

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The cosmogenic isotope ^{41}Ca with a half-life of 99,000 years can serve as a dating tracer for environmental processes. Employing the atom-trap trace analysis (ATTA) method, we realized a precision of 10% on the $^{41}\text{Ca}/\text{Ca}$ ratio at the level of 10^{-17} with the lowest measured $^{41}\text{Ca}/\text{Ca}$ ratio standing at $(1.99 \pm 0.34) \times 10^{-17}$. For ^{41}Ca exposure dating, we have developed a ^{41}Ca production model, which is based on the CRONUScalc program and LSDn scaling model, enabling the calculation of instantaneous ^{41}Ca production rates at any given geographical location and historical period. Integrating $^{41}\text{Ca}/\text{Ca}$ measurements and the ^{41}Ca production rate, we conducted a demonstration application of ^{41}Ca exposure dating of glacial moraines in the eastern Tibetan Plateau.

Regarding burial dating, we are exploring its feasibility for marine environmental samples. We have mapped the global spatial distribution of ^{41}Ca in the ocean and conducted tests on a series of foraminifera and coral samples.

Student Submission

No

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