

New frontiers in radiosulfur measurements and their applications

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High-sensitivity measurements of radiosulfur (cosmogenic ^{35}S ; half-life: 87.4 days) at natural abundance using ultra-low-level liquid scintillation counter (LSC) techniques were developed and optimized in the last decade, providing new details in atmospheric and hydrological sciences. These LSC techniques are heavily relied on instruments conventionally equipped with 650-kg lead blocks that passively shield cosmic and environmental background radiation, but this type of instruments is not commercially available anymore. Here, we report an alternative method for high-sensitivity ^{35}S measurements using a new-type LSC equipped with mathematic-based active shielding techniques. Our method allows the continuing utility of ^{35}S measurements using this new-type LSC for a deeper understanding of atmospheric sulfur cycle and its influences on environment, climate and public health, even though this new-type LSC was not initially designed for such studies. New applications of radiosulfur measurements in understanding astronomical high-energy events and extreme climate events will be also shown and discussed.