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New Frontiers for ^{81}Kr-Dating

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^{85}Kr, ^{39}Ar, and ^{81}Kr are ideal tracers for environmental water samples, such as groundwater, sea water, polar ice and mountain glacier ice. Combined with ^{14}C, these tracers cover a wide age range from a few years to 1.3 million years. Several interesting studies featuring this novel tracer have been published in recent years. In this talk we will report the latest developments on radiokrypton dating in our laboratory at the University of Science and Technology of China (USTC).

As for ^{81}Kr-dating, we would like to show developments in two frontiers. Firstly, we have improved high precision ^{81}Kr-dating method. The analytical certainly of relative abundance of ^{81}Kr now approaches 1% for groundwater samples between 10 ka and 230 ka. The high precision ^{81}Kr-dating requires a minimum sample of 10 μL STP Kr, which is a few times more than the sample needed for the regular analysis (2-3 μL STP Kr). Secondly, we have developed an all-optical ATTA method based on a metastable Kr atom production scheme using a home-build bright Vacuum Ultraviolet (VUV) source. The new method has reduced the cross-sample contamination significantly. As a result, analysis with only 1 kg of ice samples is now possible.