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New evidence of AMS 14C/δ13C for rock desertification in the rock vanish organics in the SW China

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Human activity-induced soil erosion and rock desertification in southern China's karst areas is a severe problem for the local economy and stability of ecosystem. However, it is challenge to quantitatively link the human activity-induced soil erosion to the local rock desertification by traditional geochemistry methods. In this study, we explored pyrolysis-combustion technology to partition rock varnish organics on exposed rock surface due to soil erosion into pyrolysis labile-recalcitrant and pyrolysis inert organic molecules for accelerator mass spectrometry (AMS) 14C dating analysis to investigate their relationship in Zhenfeng karst region in the Guizhou Province. This study focuses on the high-precision AMS 14C dating and δ13C analyses for better understanding the evolutionary history of rock desertification in this region. The conceptual model posits that soil erosion increases rock exposure, facilitating varnish formation that is a thin layer of hard organic membrane on exposed rock surfaces. It could be a novel research material because it captures landscape evolutionary events. The results of AMS 14C dates and δ13C values of pyrolysis labile and pyrolysis inert organic carbon molecular groups show that human activities virtually impact on soil erosion, karst geomorphology evolution, and the local desertification. This study provides valuable database through novel technology to explicitly examine the long-debated research problems in the rock desertification field in world karst geographic areas.

Student Submission

Yes

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