URANIUM-LEAD DATING OF PALEOSOL CARBONATE AND ITS APPLICATION TO DIRECT DATING OF SEQUENCE BOUNDARIES

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The key to sequence stratigraphy study is to identify sequence boundaries which are indentified as significant erosional unconformities. Numerous studies have demonstrated the utility of paleosols for marking sequence boundaries and subdividing thick stratigraphic successions into genetic sequences and solving local and even global correlation problems. However, paleosols can show significant lateral changes and correlation of paleosols based on thickness, color, or morphology can be misleading. U/Pb dating of primary pedogenic carbonates provides a new constraint on the age of pedogenesis, and thus provides a more precise chronostratigraphic framework for paleosol horizons which can help solve correlation problems raised in many sequence stratigraphic and field studies.

The purpose of this study is to test the applicability of direct U/Pb dating of pedogenic carbonates by examining the calcisol-rich Cretaceous alluvial sequence in the Qamdo basin, southwest China. The alluvial section is 1050 m (3445 ft) thick and contains more than 30 separate and well-developed calcisol horizons.

The application of U/Pb dating of carbonates had been limited due to the lack of a priori way to know if a sample has a viable U/Pb ratio. Here, we will apply a newly developed method of using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) to quickly assess the U/Pb ratios of different carbonate phases in a sample to determine (1) if the sample has potential for dating; and (2) which area has the most favorable U/Pb ratio for further Thermal Ionization Mass Spectrometry (ID-TIMS) analysis.

AAPG Search and Discovery Article #90249 2015 Grants-in-Aid Projects