

Testing the application of single grain K-Ar and Rb-Sr dating of glauconite for constraining the time scale of sea level variations

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Abstract

Glauconite is an authigenic, green to black grain of marine clay that forms in shallow marine environments, and appears to be associated with sea level rise. K-Ar and Rb-Sr ages of glauconite constitute the most widely applied radioisotopic measurement of the Geologic Time Scale for the past 250 million years. Traditionally the isotopic measurements were made on large (thousands of grains) samples, and the ages reported are slightly younger than estimates based on high temperature chronometers from volcanic ash layers, so the method has fallen out of favor. Patrick Smith and others from University of Toronto have demonstrated that by dating individual grains, it is possible to better constrain the time of deposition. I propose to develop a strategy to measure carefully selected individual grains of glauconite for paired K-Ar and Rb-Sr dating. Glauconite is widely distributed in shallow marine sediments, and a method that would allow precise and accurate dates (with cross checks from two isotope systems) would provide powerful constraints on the time scale with particular emphasis on the variation of sea level.