10 k.y. depositional cycles or precession? Estimating the “geological” errors for Ar/Ar ages of tuffs from the Green River Formation

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The Eocene Green River Formation is considered a classic example for cyclic lacustrine sediments. Meter scale sedimentary cycles, described in Wyoming, Colorado and Utah, were interpreted as precession and eccentricity cycles (e.g. Bradley, 1929; Fischer 1986; Roehler, 1993). Recent Ar/Ar dating enabled to test this hypothesis for the first time, but also yielded two competing views about the origin of the cyclicity. Pietras at al. (2003) claim that the short sedimentary cycles average 10 k.y. in duration and therefore are not precession cycles. Ar/Ar dating (Machlus et al., in prep), using a different method, suggests larger errors and slightly younger ages, and thus confirms orbital forcing as the origin for the observed cycles (Machlus et al., 2003a). The key issue lies in estimating correctly the errors of the reported ages, a problem that permeates the interpretation of all ancient climatic records.