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THE FULL SPECTRUM OF MILANKOVITCH PRECESSION-RELATED PERIODICITIES IN TRIASSIC AGE LACUSTRINE STRATA OF EASTERN NORTH AMERICA: FROM 10 K.Y.\ TO 3.5 M.Y.

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The pioneering work of Van Houten in the 1960's (1) first established the Milankovitch character of lake level fluctuations in the tropics of central Pangea and laid the foundation for quantitative analysis of core and outcrops in the 1990's (2,3). Based on our multitaper spectral analysis, moving window Fourier analysis, and wavelet analysis, as well as new independent constraints on accumulation rates, giant rift lakes in the region from about 3${}ˆ\circ$ to 10${}ˆ\circ$N latitude fluctuated to the classic Milankovitch periods of precession-related forcing of approximately 20, 96, 128, and 404 ky, as well as longer period cycles of 1.75 and 3.5 M.y. The latter correspond to periods of g$_{4}$-g$_{3}$ of eccentricity related precessional forcing and the secular resonance, theta (2(g$_{4}$- g$_{3}$) - (s$_{4}$-s$_{3}$)), of combined precessional and obliquity related forcing, but differ from the modern values because of chaotic drift in the orbital behavior Earth and Mars (3). We attribute the forcing of lake depth largely to modulation of the strength of tropical convergence and hence the Monsoon system. The coal-bearing Late Triassic rifts located from 0${}ˆ\circ$ to 3${}ˆ\circ$N latitude show similar frequency patterns, except with a strong tendency towards a doubling of the climatic precessional frequency (4,5,6). The strength of the expression of the long-period cycles of 1.75 and 3.5 M.y.\ is much larger than expected by direct insolation forcing and has a strong effect on the

long term accumulation rate in these rift basins suggesting that they may be amplified by a greenhouse gas feedback such as weathering-related CO_2 fluctuations.

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