

Olsen, P. E. and Fedosh, M. S., 1988, Duration of the early Mesozoic extrusive igneous episode in eastern North America determined by use of Milankovitch-type lake level cycles. Geological Society of America, Abstracts with Programs., v. 20, no. 1, p. 59.

№ 20831

DURATION OF THE EARLY MESOZOIC EXTRUSIVE IGNEOUS EPISODE IN EASTERN NORTH AMERICA DETERMINED BY USE OF MILANKOVITCH-TYPE LAKE CYCLES

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Strata of Early Jurassic age in the rift sequences of the Newark Supergroup consist of cyclic mostly lacustrine sediments with interbedded tholeiitic extrusive basalts. Jurassic sedimentary cycles are identical in hierarchical pattern and interpreted environments to lake cycles tied to Milankovitch-type climate forcing in Triassic rocks in the Newark basin and, likely owe their origin to the same cause. The short (Van Houten) cycles, of 21,000 yr duration allow estimation of the duration of the sedimentary interludes between basalt flows. The phase relation of the Van Houten cycles to the longer 100,000 and 400,000 yr compound cycles allow estimation of the duration of the "missing" section represented by the lava flows.

These cycles allow absolute correlation of Jurassic age sections between basins. Most dramatic are the virtually identical sequences seen unambiguously in A.C.E. cores of the Towaco Fm. of the Newark basin and continuous road cuts of the East Berlin Fm. of the Hartford basin and spectacular river exposures of the Turners Falls Ss. of the Deerfield basin. This similarity is easily explained by synchronous regional climate control. Also profoundly similar are the Midland Fm. of the Culpeper basin the Feltville Fm. of the Newark basin, and the Shuttle Meadow Fm. of the Hartford basin. The Boonton Fm. and lower Portland fms. of the Newark and Hartford basins, respectively, correlate precisely, based on A.C.E. core data.

Based on these cycles, the onset of extrusive activity from Nova Scotia to Virginia was synchronous within 21,000 yrs, the last extrusions were synchronous in the Newark and Hartford basins, and the total duration of the extrusive episode was 550,000±50,000 yrs. The uncertainty is due mostly to poor exposure in the lower East Berlin Fm. and one uncored interval in the middle Feltville Fm.