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A Triassic Geochronology Controversy: Milankovitch Versus Zircon Radioisotope Time Calibration of the Latemar Platform Cycles

Two principal techniques for high resolution dating of the stratigraphic record, namely, U-Pb dating of single zircons in volcanoclastic interbeds and statistical analysis of orbitally forced sediments, were recently applied to the Anisian-Ladinian Latemar Limestone of northern Italy, a succession of more than 500 meter-scale platform cycles, each of which records a low amplitude sealevel oscillation. Unfortunately, the results of the two techniques are in serious conflict. Evidence for strong Milankovitch forcing of the cyclic succession indicates a depositional duration for the Latemar Limestone of 10-12 million years, whereas U/Pb-dated zircons from volcanoclastics in coeval basinal Buchenstein beds indicate only 2-4 million years. This conflict has led to a scientific impasse: either the approach used to determine a Milankovitch origin for the cycles is wrong, or the interpretation of the results from the zircon dating is wrong, or both are wrong. A clear-cut solution of the Latemar dating conflict will have far reaching consequences for the high resolution dating of other stratigraphic successions. Both zircon dating and Milankovitch calibration have led to significant revisions of the ages of major Phanerozoic stratigraphic boundaries, but neither technique has been applied to the same stratigraphic interval. The Latemar thus stands as a critical test case of these two chronostratigraphic approaches. Here we critically discuss all of the chronostratigraphic data related to this still developing debate, and close with recommendations that might help lead to a resolution of the "Latemar controversy.