COMBINING RADIO-ISOTOPIC AGES AND CYCLOSTRATIGRAPHY


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Establishing multiple constraints for the duration of short-term geological processes by independent methods is rarely achieved but highly desirable, as illustrated by the spectacular example of the supposedly orbitally governed succession of the Middle Triassic (ca. 240 Ma) Latemar carbonate platform (W Dolomites, N Italy). Based on spectral analyses resulting in distinct peaks resembling superimposition of orbital signals, and cycle counts, previous studies (Hinnov and Goldhammer, 1991, Pretto et al., 2001) proposed a time span of ca 12 Myr for the deposition of the entire cyclic portion of the Latemar carbonates. Zircon-bearing, primary volcanic ash falls within the platform succession offer a unique opportunity to independently test this hypothesis. It is important to note that only single-crystal preparation and dating techniques are able to reveal the complexities displayed by zircon populations in these ash layers, whereas analyses of multi-grain samples can fortuitously yield apparently precise but inaccurate, and thus misleading, ages, because they tend to integrate the effects of Pb loss and/or xenocrystic contamination. Our measurements on three of the Latemar ash falls yield ages ranging from 242.6 to 241.2 Ma (uncertainties at the 0.2 to 0.5% level), which, corroborated by biostratigraphic constraints, suggest that the time span for the deposition of the entire succession is <6 Myr (extrapolated to the base and the top) and thus is significantly less than previously suggested. New spectral data, however, indicate that cyclicities resembling Milankovitch characteristics are likely to exist, but on an entirely different time scale (Zühlke et al, in press, Terra Nova 2003). Our results challenge previous models, which are based on the interpretation of frequency spectra alone, and call for verification by independent quantitative tools.