Sub-Milankovitch and Milankovitch Forcing on a Model Mesozoic Carbonate Platform - The Latemar (Middle Triassic, Dolomites, Northern Italy)

Rainer Zühlke and Thilo Bechstädt*
Geologisch-Paläontologisches Institut, Ruprecht-Karls-Universitaet Heidelberg
mailto:thilo.bechstaedt@urz.uni-heidelberg.de

and

Roland Mundil
Berkeley Geochronology Center, Berkeley, CA 94708, USA

The Latemar, a small carbonate platform of Mid-Triassic age, is famous because of its cyclicity. Based on spectral analyses other studies proposed a model of Milankovitch forcing: five basic shallowing upward cycles (~18 ka, precessional forcing) constitute a thinning upward trend and build a megacycle (~100 ky, eccentricity forcing). Because of the numbers of cycles, this would imply a time interval of about 12 ma. This model is at variance with our results, which indicate much shorter termed basic cyclicities, their origin probably related with paleoceanographic/-atmospheric climatic changes.

Cyclostratigraphy: The number of cycles ranges between 619 and 745 (min., max.). Geometries and lack of progradational features clearly indicate allocyclic control. The cycles show moderate lateral variations in thickness, facies and diagenetic overprint.

Chronostratigraphy: Single-zircon $^{206}Pb/^{238}U$ ages from three ash-fall horizons intercalated with the platform-interior strata constrain the average time interval of individual cycles to 3.1-3.7 ka. Even if maximum errors are applied (5.5-6.6 ka/ cycle) the cycles cannot be reconciled with precessional tuning.

Biostratigraphy: Due to recently found ammonites, the Latemar cyclic series covers only little more than a single biozone (*Secedensis*-zone).

Spectral Analyses: The data indicate sub-Milankovitch and Milankovitch cyclicity with □t of basic cycles set at 4.2 ka.

General implications: A 1:4-5 bundling of basic cycles is no evidence for precession and eccentricity forcing and Milankovitch model-dependent time calibrations alone might not allow reliable time estimates. Therefore, model-independent calibrations such as bio-, magneto- and chronostratigraphy are essential.