

Cyclostratigraphic tuning of the Albian–Cenomanian stages

Gambacorta, G.^{1,*}, Malinverno, A.², Erba, E.¹

1) *Dipartimento di Scienze della Terra “A. Desio”, University of Milan, Milano, Italy,*

**E-mail: gabriele.gambacorta@guest.unimi.it*

2) *Lamont-Doherty Earth Observatory, Columbia University, Palisades, New York, USA*

We applied a cyclostratigraphic analysis to the early Albian – early Turonian time interval in four Tethyan sections from the Umbria-Marche Basin, Italy (Furlo, Contessa, Le Breccie and Monte Petrano). Starting from high-resolution (cm- to mm-scale) lithological logs (GAMBACORTA et al., 2016), simulated calcium carbonate contents were used as input data for a probabilistic cyclostratigraphic analysis. The orbital tuning used short eccentricity and obliquity and was tied to an absolute age of 93.9 My at the Cenomanian/Turonian boundary (MEYERS et al., 2012). We joined our Monte Petrano Cenomanian $\delta^{13}\text{C}$ record (GAMBACORTA et al., 2015) with published Albian $\delta^{13}\text{C}$ record (TIRABOSCHI et al., 2009; GIORGIONI et al., 2012) to produce an astronomically dated composite $\delta^{13}\text{C}$ record for the whole Albian to Cenomanian time interval. According to our sedimentation rate model, we were able to convert into time the carbon isotope record, thus allowing the dating of the C-isotopic anomaly associated with OAE1d and MCE I as well as their duration.

According to our results the OAE1d lasted from 101.21 ± 0.15 My to 99.72 ± 0.15 My with an approximate total duration of about 1.49 My. We obtained an astronomical tuned age of 96.96 ± 0.15 My to 96.77 ± 0.15 My for the MCE I with a total duration of the event of about 200 kyr. Our data provide an estimate of the total duration of about 12.65 My and about 5.23 My for the Albian and Cenomanian stages respectively. In particular, the Aptian/Albian boundary lies at 111.78 ± 0.15 My and the Albian/Cenomanian boundary at 99.13 ± 0.15 My. A detailed review of available literature on the application of cyclostratigraphy to this stratigraphic interval shed light on the main reasons behind the differences in the stage durations absolute ages estimates. In particular, differences in data types, signal analysis methods, and in the definitions of the chronostratigraphic limits and time scale assumptions plays a major role in determining the observed results variability.

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