



Synchronizing the timing of anoxia, volcanism and the pacing of the Earth's orbit in the Early Cretaceous

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Recurrent acceleration of the hydrolysing cycle, so-called Episodes of Environmental Changes, occur in the Early Cretaceous. As the geologic time scale show large uncertainties, the pacing and the chronological relationship of these events remain still obscure. We present here new radio-astrochronologic data from the Neuquén Basin (Argentina) anchored to the Tethyan realm. The new time scale of the Valanginian-Hauterivian provides ages of ammonite zones with an uncertainty of ± 0.2 myr and provides a much more precise age for the start of the Weissert Event. The age of the start of the Weissert Event is at 134.5 ± 0.2 Ma, which is exactly synchronous with the main phase of the Paraná-Etendeka large igneous province activity. Most recent estimates for duration and age estimates from the Berriasian to the Barremian are compiled and differ from the Geological Time Scale 2016 by several million years. As a result of this new time scale, belemnite $\delta^{13}\text{C}$ are recalibrated in age and show a strong pacing with a period of 2.4 myr, which corresponds to the long-eccentricity cycle. Higher amplitudes of the 2.4-myrcycle are observed at the time of large igneous province emplacement, which may be due to accelerated hydrolysis cycle following CO_2 input to the atmosphere from the volcanic activity.