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New integrated stratigraphic data from Hungary and a global carbon isotope stack across the Jurassic-Cretaceous boundary

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Late Jurassic–Early Cretaceous carbon isotope stratigraphies derived from measured sections in the Bakony and the Gerecse Mts. (Hungary), constrained by ammonite, belemnite and calpionellid biostratigraphy together with magnetostratigraphy are presented. We evaluate whether a consistent pattern in carbon (and oxygen) isotope variation can be established, particularly with respect to the Jurassic–Cretaceous boundary. We also assess the possible controls on carbon isotope variation and the correlation potential.

Oxygen isotopes point to warming through this interval. We observe a decrease in carbon isotopes through the Late Jurassic, consistent with carbon isotope stratigraphies of the Western Tethys. A change to more positive carbon isotope values in the Early Cretaceous is manifest in the Valanginian Weissert event, potentially reflecting a change to increasingly nutrient-rich conditions and enhanced carbon cycling. Biostratigraphic and magnetostratigraphic data allow us to accurately place the low point seen in the carbon isotope curve within these schemes. Locally a carbon isotope minimum appears in the upper part of magneto-subzone M19n2n and towards the middle of calpionellid Zone B (i.e. the Alpina Subzone), but not resolved in the carbon isotope stack from across Tethys and the Atlantic.

In comparison, the composite Late Jurassic–Early Cretaceous carbon isotope curve in GTS 2012 shows little more than the Valanginian Weissert event and slightly elevated values in the Late Tithonian. A largely unvarying carbon isotope profile through this interval within the GTS 2012 appears at odds with the records summarized herein. Aside from the well-defined Valanginian event, chemostratigraphic correlation across the Jurassic–Cretaceous boundary using the carbon isotope record is challenging due to relatively stable carbon isotope values resulting in a curve with a slope too slight.