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High resolution Early Jurassic (Sinemurian–Early Pliensbachian) isotope variation, Dorset UK

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We present a high-resolution carbon and oxygen isotope record for the Early Jurassic based on well-preserved marine molluscs (belemnites) from Dorset, UK. Our new data show a number of carbon isotope excursions, starting with the Sinemurian–Pliensbachian boundary Event followed by lesser negative excursions showing in the Polymorphous, Jamesoni and Masseanum-Valdani Subzones. The recognition of the Sinemurian–Pliensbachian boundary Event in this study and elsewhere suggests that observed carbon-isotope trends are likely to represent a supra regional or global perturbation of the carbon cycle. A prominent positive carbon isotope event is also seen within the Pliensbachian Ibex Zone. This event is also clearly evident in the data from belemnites from Spain, but rather puzzlingly not within carbon isotope records derived from bulk carbonate from Portugal. This carbon isotope excursion is not, however, coincident with inferred peak temperatures. The oxygen isotope and Mg/Ca data allows the determination of 2 pronounced Pliensbachian cool events within the Taylori and Brevispina Subzones. From the low point in the Brevispina Subzone, oxygen isotopes become more negative coupled with an increase in Mg/Ca values culminating in an Early Pliensbachian thermal maximum during the Davoei Zone. Taken with existing data it appears that the Pliensbachian is characterised by 2 major warmings, firstly within the Davoei Zone followed by warming beginning in the latest Pliensbachian and peaking in the Early Toarcian.