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Evaluating CO2 as a primary driver of Mesozoic climate change

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There is a general consensus that changes in atmospheric carbon dioxide are a major driver of global temperature and climate change. Many studies also agree that changes in atmospheric carbon dioxide and temperature over geological time are also linked. However, some estimates of past temperatures, derived from isotopic analyses of marine calcitic fossils have been shown to have limited correlation with the estimates of past atmospheric carbon dioxide. This apparent mismatch is particularly striking in the Mesozoic. The data point to rising carbon dioxide levels but falling temperatures. Hence this apparent negative relationship between temperature and carbon dioxide has been used as a central argument of those sceptical of current global warming and anthropogenic greenhouse gas issues. The isotope data (used a temperature proxy) from which interpretations and conclusions have been drawn has been derived from the analysis of a range of different fossil groups. The Mesozoic data are derived largely from belemnites which potentially poorly reflect marine isotopes and temperatures. As a consequence this may have led to the apparent mismatch. This research examines the isotopic composition of brachiopods in order to constrain temperature. Although severely affected by the Late Permian extinction event brachiopods are frequently common and locally abundant during the Mesozoic. Our new data, combined with the few published studies provide a crucial test of the current Mesozoic data and provide critical input into the debate on what are the main drivers of climate change.