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High-resolution paleoseasonality records across the Late Maastrichtian Warming Event (Late Cretaceous) as revealed by oyster shells from the Maastrichtian type area (SE Netherlands, NE Belgium)

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Because our modern world is characterized by climate change, it is useful to study climate conditions of past greenhouse worlds in order to obtain a better understanding of what a similar world would entail. An example of such a past greenhouse climate is represented by the Late Maastrichtian Warming Event (LMWE), a global temperature increase of approximately 2.5-5°C that occurred 300-100 kyr prior to the Cretaceous-Paleogene boundary meteorite impact and the ensuing mass extinction. This warming event has traditionally been linked to a major pulse of Deccan Traps volcanism. Previous research has also recorded the LMWE in the Maastrichtian type region (SE Netherlands, NE Belgium), where this event is marked by characteristic blooms of the dinoflagellate *Palynodinium grallator* and a sudden appearance of hermatypic corals. A recent study using clumped-isotope analyses on fossil bivalves has shown that the LMWE was characterized by a 5 degrees warming in average annual sea water temperatures in this region (40° paleolatitude). However, little is known about changes in seasonality across this warming event, as high-resolution paleoseasonality reconstructions have not been previously attempted. Here, we present a seasonal, stable-isotope record through the LMWE for the Maastrichtian type area (SE Netherlands, NE Belgium), using stratigraphically well-constrained oyster specimens. This new record contributes to our understanding of the effects of a global warming event on seasonality in a mid-latitude shelf sea. Consistent with previous results, we have found a decreasing trend in $\delta^{18}O$ values in the interval corresponding to the peak of the warming event, followed by an increase during the cooling-down period. Our results show that the LMWE also had profound effects on the seasonality in the Maastrichtian type area. The $\delta^{18}O$ seasonality temporarily decreased at the onset of the event, suggesting that winter temperatures warmed disproportionately. Possibly, this could have allowed the previously recorded establishment of hermatypic corals in the region. Subsequently, seasonality increased again through the warming event, with the highest seasonality recorded in the later part of the event. Over the coming months, additional oyster specimens will be assessed for both stable and clumped isotopes to obtain a more complete record of seasonality throughout the LMWE.