



Supplement of

Reduced carbon cycle resilience across the Palaeocene–Eocene Thermal Maximum

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Figure S1: Sensitivity analysis of EWS rolling window metrics of benthic δ^{18} O (left) and δ^{13} C (right) in the run-up to the PETM for AR(1) coefficient, detrended fluctuation analysis h-value, standard deviation, skewness (absolute), and kurtosis. 'Default' results (black) are compared with non-interpolated (blue), 25 % rolling window (red), and 75 % rolling window (green) results.



Figure S2: Sensitivity analysis of EWS rolling window metrics of benthic δ^{18} O (left) and δ^{13} C (right) across the PETM and ETM2 for AR(1) coefficient, detrended fluctuation analysis h-value, standard deviation, skewness (absolute), and kurtosis. 'Default' results (black) are compared with non-interpolated (blue), 25 % rolling window (red), and 75 % rolling window (green) results. Absolute skewness increases across each event in this rolling window analysis, but true skewness is in fact negative (and therefore decreasing) as shown in Table 1.



Figure S3: Sensitivity analysis of rolling window length for AR(1) coefficient (left) and SD (right) across all 4 datasets. Each metric is rerun with the rolling window size incremented by one data-point between 25% and 75%, and the Kendall τ plotted against rolling window size (blue lines) with the 50% analysis marked by the red line. Most 50% analyses lie close to the maximum Kendall τ (justifying its use as the standard rolling window size), but for some metrics there are unusual features missed by the 50% analysis (e.g. the shift to positive Kendall τ above ~55% for LPEE δ^{18} O SD and the narrow positive peak for PETM δ^{18} O AR(1) at ~70%).



Figure S4: Kendall τ histograms of the sensitivity analysis of rolling window length for AR(1) (left) and SD (right) across all 4 datasets. Each metric is rerun with the rolling window size incremented by one data-point between 25% and 75%, and the Kendall τ for each binned and plotted with the 50% analysis Kendall τ marked by the red line. Most 50% analyses lie close to the median Kendall τ (justifying its use as the standard rolling window size), but for some metrics this misses unusual features (such as the bimodality of LPEE δ^{18} O and δ^{13} C).



Figure S5: Plot of dataset time-steps, showing the gap to each subsequent data-point across the entire palaeorecord (benthic δ^{18} O and δ^{13} C). The mean time-step is 3.3 kyr with no marked systematic shift in this mean or variability throughout the record, but there are a number of outliers that weaken the assumption of relatively constant time-steps in our analyses.