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☐ Initial submission ☒ Revised version ☐ Final submission

Life Sciences Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form is intended for publication with all accepted life science papers and provides structure for consistency and transparency in reporting. Every life science submission will use this form; some list items might not apply to an individual manuscript, but all fields must be completed for clarity.

For further information on the points included in this form, see Reporting Life Sciences Research. For further information on Nature Research policies, including our data availability policy, see Authors & Referees and the Editorial Policy Checklist.

Experimental design

1. Sample size

Describe how sample size was determined.

Sample size was determined using standard population sizes for micropaleontological datasets (e.g., Buzas, 1990, J. of Paleo) except for samples which contained fewer than 300 specimens. These were all in the transitional unit, and were only analyzed for the proportion of 2 overall groups (survivors vs. non survivors; Guembelitria vs. everything else) and thus did not require the 300 specimen count needed for more advanced ecological analysis. We show this by reporting binomial confidence intervals for these data in Tables S2 and S3

2. Data exclusions

Describe any data exclusions.

We did not include benthic foraminifera in the %survivors foraminifer dataset (i.e., it is only %planktic survivors out of the total population of planktic foraminifera). Benthics did not experience an extinction at the KPg boundary, so *all* benthics are technically survivors and we felt this would bias the data.

3. Replication

Describe whether the experimental findings were reliably reproduced.

It is hard to judge the reproducibility of paleontological samples, as the act of picking foraminifera from sample changes the remaining population. However, we had several replicate samples from the same depth interval, and these produced very similar proportions of the groups measured (e.g., %benthics, % Parvularugoglobigerina, %Chilguembelina, etc.). Analytical runs for geochemical samples included standards of known composition to constrain error and ensure reproducibility. (see discussion in Methods section).

4. Randomization

Describe how samples/organisms/participants were allocated into experimental groups.

Samples were taken at a regular interval throughout the core. Foraminifer samples were split with a microsplitter to obtain a representative subsample for population counts (when the population was >300); nannoplankton were counted in fields of view along a complete transect.

5. Blinding

Describe whether the investigators were blinded to group allocation during data collection and/or analysis.

No blinding was utlized in this paleoecological/geochemical study.

Note: all studies involving animals and/or human research participants must disclose whether blinding and randomization were used.

6. Statistical parameters

For all figures and tables that use statistical methods, confirm that the following items are present in relevant figure legends (or in the Methods section if additional space is needed).

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement (animals, litters, cultures, etc.)
☐	☒	A description of how samples were collected, noting whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☒	☐	A statement indicating how many times each experiment was replicated
☐	☒	The statistical test(s) used and whether they are one- or two-sided (note: only common tests should be described solely by name; more complex techniques should be described in the Methods section)
☒	☐	A description of any assumptions or corrections, such as an adjustment for multiple comparisons
☐	☒	The test results (e.g. *P* values) given as exact values whenever possible and with confidence intervals noted
☒	☐	A clear description of statistics including central tendency (e.g. median, mean) and variation (e.g. standard deviation, interquartile range)
☒	☐	Clearly defined error bars

See the web collection on statistics for biologists for further resources and guidance.

Software

Policy information about availability of computer code

7. Software

Describe the software used to analyze the data in this study.	Data were input and plotted in Excel.

For manuscripts utilizing custom algorithms or software that are central to the paper but not yet described in the published literature, software must be made available to editors and reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). *Nature Methods* guidance for providing algorithms and software for publication provides further information on this topic.

Materials and reagents

Policy information about availability of materials

8. Materials availability

Indicate whether there are restrictions on availability of unique materials or if these materials are only available for distribution by a for-profit company.	Our own sample materials will be available by request; additional core material from Exp. 364 will be housed at the IODP Gulf Coast Repository in College Station, TX and will be available for sampling.

9. Antibodies

Describe the antibodies used and how they were validated for use in the system under study (i.e. assay and species).	N/A

10. Eukaryotic cell lines

a. State the source of each eukaryotic cell line used.	N/A
b. Describe the method of cell line authentication used.	N/A
c. Report whether the cell lines were tested for mycoplasma contamination.	N/A
d. If any of the cell lines used are listed in the database of commonly misidentified cell lines maintained by ICLAC, provide a scientific rationale for their use.	N/A

Animals and human research participants

Policy information about studies involving animals; when reporting animal research, follow the ARRIVE guidelines

11. Description of research animals

Provide details on animals and/or animal-derived materials used in the study.	N/A

Policy information about studies involving human research participants

12. Description of human research participants

Describe the covariate-relevant population characteristics of the human research participants.	N/A