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Dear members of the Editorial Board,

Please consider our manuscript entitled “**The fate of South America’s endemic mammalian fauna in response to the most dramatic Cenozoic climate disruption**”, that we are pleased to submit as a Research Article in *Proceedings of the National Academy of Sciences of the United States of America*.

The Eocene-Oligocene Transition (EOT, *ca.* 34 Million years ago, Ma) is regarded as the most dramatic Cenozoic climate event. It has been associated with a pronounced turnover among mammalian faunas from many parts of the world, and recent advances recognized it as a mass extinction event. However, to date, the biotic repercussions of this climatic hinge have been poorly investigated in the case of the endemic South American mammals (SAM), representing a unique fauna that evolved in an insular semi-tropical context. In this study, using a densely-revised fossil database, resulting from decades of intense fieldwork, we shed light on the diversification dynamics of SAM throughout the Eocene-Oligocene interval (*ca.* 56-23 Ma) to understand their response to this period of drastic environmental changes.

Relying on cutting-edge Bayesian methods, we failed at characterizing any mass extinction among SAM at the EOT. Instead, we illustrate that SAM experienced a gradual diversity decline in the Eocene related to the climate cooling subsequent to the Early-Eocene Climate Optimum, followed by an Oligocene waxing-and-waning related to the Andean orogeny. A prominent role of diversity-dependent effects arose from our analyses of the two time periods. Interestingly, we challenge the implication of grassland expansion in these macroevolutionary patterns, yet frequently invoked to explain the emergence of key traits among herbivore clades. Last, remarkably, we show that tropical and extratropical lineages exhibited very distinct macroevolutionary histories, providing support for the historical tropical stability hypothesis formulated by Wallace in 1875.

For the first time, our study provides quantitative insights into the macroevolutionary past of the iconic extinct mammals from South America, with evidence for a complex interplay between abiotic (*i.e.*, climate and mountain building) and biotic (*i.e.*, diversity-dependent effects) factors in shaping SAM diversification dynamics, meanwhile denying the occurrence of a worldwide mass extinction of mammals at the EOT. Our framework relies on a fossil occurrence database cleaned with an unprecedented level of details, being the outcome of the joint effort of several experts of respective taxonomic groups, that we make entirely available, in conjunction to our analytic pipeline. Also, we took our results very carefully and conducted several sensitivity analyses before drawing any conclusion. We believe that the content and originality of our study will appeal a broad audience, including evolutionary biologists, macroecologists, paleobiologists and any people interested in the interplay between biodiversity and climate. Hence, we think that our work fits the scopes of *Proceedings of the National Academy of Sciences of the United States of America*, and suggest the NAS editorial board member **Dr. Nils C. Stenseth** (Univ. of Oslo) (Univ. of Chicago) as relevant Editor to handle this submission.

Also, we would like to recommend some reviewers that we think could be relevant to evaluate this study:

*Neotropical diversity through geological times and paleoenvironments*

- Prof. **Carlos Jaramillo**: Smithsonian Tropical Research Institute, Ancón, Panamá. Contact: [jaramilloc@si.edu](mailto:jaramilloc@si.edu)
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*South American mammal paleontology*

- Pr. **Darin A. Croft**: Department of Anatomy, School of Medicine, Case Western Reserve University, USA. Contact: [dac34@case.edu](mailto:dac34@case.edu)
- Dr. **Francisco J. Goin**: Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Argentina. Contact: [fgoin@fcnym.unlp.edu.ar](mailto:fgoin@fcnym.unlp.edu.ar)
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*Macroevolutionary analyses and eventual applications to mammals*

- Dr. **Juan L. Cantalapiedra**: Museo Nacional de Ciencias Naturales, Madrid, Spain. Contact: [jcantalapiedra@mncn.csic.es](mailto:jcantalapiedra@mncn.csic.es)
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We hope you will share our excitement for the present work.  
Best regards,

Lucas Buffan, on behalf of all my co-authors