**Cover letter**

Dear editors of Evolution,

My co-authors and I are pleased to submit our manuscript titled “*Global climate influenced the evolutionary history of brain size increase in some mammalian lineages, but not in hominins*” for review by Evolution. To our knowledge, this represents the first study that directly tests the proposed relationships between several aspects of global climate (trend, variability, rate of change) and mammalian brain size evolution in a statistically rigorous procedure that accounts for potentially confounding factors such as temporal autocorrelation.

Cranial capacity of fossil specimens (n = 227), as well as ancestral cranial capacities computationally reconstructed from extant taxa (n = 299), were used as complementary independent datasets. We found that some taxa (e.g. Perissodactyla, Carnivora) did indeed show evidence of relationships between the deep-sea core oxygen isotope records (as a proxy for global temperature/aridity) and evolutionary changes in cranial capacity. However, importantly, hominins (n = 189 individuals) demonstrated no evidence of such brain-climate interactions once data had been properly detrended to account for temporal autocorrelation. These results counter previously proposed hypotheses of paleoclimate being a primary driver of brain size increase and behavioral flexibility in hominin evolution. Furthermore, we have provided an R script and the necessary raw data so that others may replicate all analyses and plots presented in this manuscript, allowing for automatic reproducibility of the study in its entirety. We believe that this study provides a much-needed statistically rigorous test of long standing hypotheses of brain-climate interactions in mammalian evolution.

Thank you very much for your time and consideration. We look forward to the opportunity to publish in Evolution.

Many thanks,

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**Please tell us in 50 words or less how your study advances the field of evolutionary biology.**

This study represents the first statistically rigorous test of the hypothesis that global climate influenced the evolution of brain size in six mammalian taxonomic groups. Importantly, contrary to previous claims the results of this study found no supporting evidence that global climate was a driving factor in hominin brain evolution.