Dear editors of Evolutionary Biology,

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 Evolutionary Biology. 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.

The work presented in this manuscript is not currently under consideration by any other journal and has been reviewed and approved by all co-authors in its final version. All persons entitled to authorship have been included as co-authors. Thank you very much for your time and consideration. We look forward to the opportunity to publish in Evolutionary Biology.

Many thanks,

The co-authors of the submitted manuscript *(names and affiliations omitted per Author Guidelines)*

**Main document word count**: 5,633