**Supplementary Information for:**

**Climate change influences brain size in humans**

Jeffrey M. Stibel

Email: [jeff@BryantStibel.com](mailto:xxxxx@xxxx.xxx)

**This file includes:**

Supplementary Results

Figures S1 to S2

Table S1 to S3

**Other supplementary materials for this manuscript include the following:**

Supplementary Data 1

Supplementary Results

**Testing for evolutionary effects.** Cubic models detect a difference between coeval climate change and brain size, as can be seen in Figure 1. Time series regressions highlight these differences and show how they begin to converge over time when regressing across 5kyr, 10kyr, and 15kyr time periods (Fig. S1). As the climate record moves from present day back temporally, the time series trends more closely align with brain size trends over time, as would be expected in an evolutionary adaptation as opposed to acclimation.



**Fig. S1. Time series trends in *Homo* brain size (g) and global average temperatures (changes in Antarctic surface temperature (°C) relative to the mean for the last millennium).** Black lines represent linear trends; red lines represent cubic trends; gray lines indicate 95% confidence intervals around the observations; and dotted gray lines represent the confidence intervals for each LSR model.

A significant relationship persists as brain sizes are compared to climates that extend back 5kyr, 10kyr, and 15kyr prior to each specimen’s coeval time period(Fig. S2A, Table S1). When averaging climates over longer time periods, the significant relationship between brain size and climate persists. (Fig. S2B).



**Fig. S2. Standardized coefficients of *Homo* brain size (g) as compared to global average temperature differences at different prehistoric time periods.** Error bars represent the standard error of each standardized coefficient.

While it is difficult to ascertain the generational delay for adaptations to occur, the impact of climate appears to asymptote roughly 10kyr prior to the change in brain size, or after approximately 400 generations (using 25 years as an average generational unit for *Homo*) (Table S1).



Inclusion of sex and latitude using ANCOVA significantly increased the predictability of the model, with peak explanatory power of roughly 42% at 10kyr and 42% at 10kyr averages (Table S2).



**Exclusion of modern skull sample**. Because there are a disproportionate number of recent skeletal remains (181 of 298 crania, or 61%, are from the past 500 years), the sample is heavily biased toward modern and warmer *Homo* specimens. Removal of the modern sample did not change the directionality or significance of the above results (all tests, P < 0.001, ANOVA (n = 117) and ANCOVA (n = 76), see Table S3). In contrast, predictive power increased slightly in all cases as compared to the models using the entire sample.

