**Enquist et al. On the importance of megabiota to the functioning of the biosphere**

To recreate the Madingley model simulations performed for this paper, please refer to <https://github.com/Madingley/C-sharp-version-of-Madingley>. This repository contains:

STATE\_R\_SCRIPTS

* **State\_Heterotrophic\_Biomass:** R script to calculate mean annual grid cell heterotrophic biomass from the output Madingley state file.
* **State\_Heterotrophic\_Metabolism:** R script to calculate mean annual grid cell heterotrophic metabolism from the output Madingley state file.
* **State\_Heterotrophic\_NutrientDiffusivity:** R script to calculate mean annual grid cell heterotrophic nutrient diffusivity from the output Madingley state file.

SIMULATION\_OUTPUT

* **GRID\_CELL\_OUTPUT:** For each set of simulations or world, the following grid cell output is provided. All results are calculated as a grid cell mean from the last 12 time steps of model simulations, or one year. Sim\_10000, Sim\_1000 and Sim\_100 refer to the Pleistocene, Modern and Future worlds respectively.
  + **HeterotrophBiomass\_Map\_gkm2**: Mean annual grid cell heterotrophic biomass (g/km2) for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophBiomass\_Map\_gkm2\_MEAN**: Mean annual grid cell heterotrophic biomass (g/km2) averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EndMap\_kJday:** Mean annual grid cell endotherm metabolism (kJ/day/km2) for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EndMap\_kJday\_MEAN:** Mean annual grid cell endotherm metabolism (kJ/day/km2) averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EctMap\_kJday:** Mean annual grid cell ectotherm metabolism (kJ/day/km2) for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EctMap\_kJday\_MEAN:** Mean annual grid cell ectotherm metabolism (kJ/day/km2) averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophNutrient\_Map\_km2day**: Mean annual grid cell endotherm nutrient diffusivity (km2/day) for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophNutrient\_Map\_km2day\_MEAN**: Mean annual grid cell endotherm nutrient diffusivity (km2/day) averaged for Pleistocene, Modern and Future simulations.
  + **AutotrophBiomass\_Map\_gkm2**\_**MEAN:** Mean annual grid cell autotrophic biomass (g/km2) averaged for Pleistocene, Modern and Future simulations.
  + **Pleistocene\_abd:** Mean abundance per grid cell across all trophic groups for one Pleistocene simulation.
  + **REGIONAL\_OUTPUT:** This folder contains heterotroph biomass data pertaining to the six regions used in figure S3.
* **MASS\_BIN\_OUTPUT:** For each set of simulations or world, the following mass bin output is provided. All results are calculated as a global mean from the last 12 time steps of model simulations, or one year. Sim\_10000, Sim\_1000 and Sim\_100 refer to the Pleistocene, Modern and Future worlds respectively.
  + **HeterotrophicBiomass\_MassBins:** Mean annual global heterotrophic biomass (g) summarised into 25 logged mass bins for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophicBiomass\_MassBins\_MEAN:** Mean annual global heterotrophic biomass (g) summarised into 25 logged mass bins and averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophicMetabolism\_MassBins:** Mean annual global heterotrophic metabolism (kJ/day) summarised into 25 logged mass bins for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophicMetabolism\_MassBins\_MEAN:** Mean annual global heterotrophic metabolism (kJ/day) summarised into 25 logged mass bins and averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophicNutrient\_MassBins:** Mean annual global endotherm nutrient diffusivity (km2/day) summarised into 25 logged mass bins for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophicNutrient\_MassBins\_MEAN:** Mean annual global endotherm nutrient diffusivity (km2/day) summarised into 25 logged mass bins and averaged Pleistocene, Modern and Future simulations.
  + **NutrientDiffusivity\_Sensitivity:** Mean annual global endotherm nutrient diffusivity (km2/day) summarised into 25 logged mass bins and averaged Pleistocene, Modern and Future simulations using three scaling coefficients for gut passage time. Details of the scaling coefficients are outlined in Supplementary Material II.
* **TROPHIC\_GROUP\_OUTPUT:** For each set of simulations or world, the following trophic group output is provided. All results are calculated as a global mean from the last 12 time steps of model simulations, or one year. Sim\_10000, Sim\_1000 and Sim\_100 refer to the Pleistocene, Modern and Future worlds respectively.
  + **Global\_TrophicGroup\_HeterotrophicBiomass:** Mean annual global heterotrophic biomass (g) summarised into trophic group for individual Pleistocene, Modern and Future simulations.
  + **Global\_TrophicGroup\_HeterotrophicBiomass\_MEAN:** Mean annual global heterotrophic biomass (g) summarised into trophic group and averaged for Pleistocene, Modern and Future simulations.
  + **Global\_TrophicGroup\_HeterotrophicMetabolism:** Mean annual global heterotrophic metabolism (kJ/day) summarised into trophic group for individual Pleistocene, Modern and Future simulations.
  + **Global\_TrophicGroup\_HeterotrophicMetabolism\_MEAN:** Mean annual global heterotrophic metabolism (kJ/day) summarised into trophic group and averaged for Pleistocene, Modern and Future simulations.
  + **Global\_TrophicGroup\_NutrientDiffusivity:** Mean annual global endothermic nutrient diffusivity (km2/day) summarised into trophic group for individual Pleistocene, Modern and Future simulations.
  + **Global\_TrophicGroup\_NutrientDiffusivity\_MEAN:** Mean annual global endothermic nutrient diffusivity (km2/day) summarised into trophic group and averaged for Pleistocene, Modern and Future simulations.
* **END\_ECT\_OUTPUT:** For each set of simulations or world, the following global endothermic/ectothermic output is provided. All results are calculated as a global mean from the last 12 time steps of model simulations, or one year.
  + **HeterotrophBiomass\_EndEct:** Mean annual global heterotrophic biomass (g) summarised into endothermic and ectothermic components for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophBiomass\_EndEct\_MEAN:** Mean annual global heterotrophic biomass (g) summarised into endothermic and ectothermic components and averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EndEct:** Mean annual global heterotrophic metabolism (kJ/day) summarised into endothermic and ectothermic components for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophMetabolism\_EndEct\_MEAN:** Mean annual global heterotrophic metabolism (kJ/day) summarised into endothermic and ectothermic components and averaged for Pleistocene, Modern and Future simulations.
  + **HeterotrophNutrient\_EndEct:** Mean annual global endothermic nutrient diffusivity (km2/day) summarised into endothermic and ectothermic components for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophNutrient\_EndEct \_MEAN:** Mean annual global endothermic nutrient diffusivity (km2/day) summarised into endothermic and ectothermic components and averaged for Pleistocene, Modern and Future simulations.

FIGURE\_R\_SCRIPTS

* **MANUSCRIPT\_FIGURES:** R scripts to generate figures used in the main manuscript. This includes:
  + **HeterotrophicBiomass\_map:** Creates figure 5.
  + **HeterotrophBiomass\_plot:** Creates figure 5.
  + **HeterotrophMetabolism\_plot:** Creates figure 5.
  + **HeterotrophNutrient\_plot:** Creates figure 5.
* **SUPPLEMENTARY\_FIGURES:** R scripts used to generate figures used in the supplementary document II. This includes:
  + **Metabolism\_graph:** Creates figure S2.
  + **Regional\_plots:** Creates figure S3.
  + **HeterotrophMetabolism\_maps**: Creates figure S4.
  + **HeterotrophNutrient\_maps:** Creates figure S4.
  + **AutotrophicBiomass\_maps:** Creates figure S4.
  + **TrophicGroupBiomass\_graph:** Creates figure S5.
  + **NutrientSensitivity\_plot**: Creates figure S6.
  + **HeterotrophAbundance**: Creates figure S7
  + **HeterotrophBiomass\_percentagechange:** Creates figure S8.