**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.
  + **HeterotrophNutrientDiffusivity\_km2day**: Mean annual grid cell endotherm nutrient diffusivity (km2/day) for individual Pleistocene, Modern and Future simulations.
  + **HeterotrophNutrientDiffusivity\_km2day\_MEAN**: Mean annual grid cell endotherm nutrient diffusivity (km2/day) averaged for Pleistocene, Modern and Future simulations.
* **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.
* **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:
  + **HeterotrophBiomass\_Maps:** Creates figure 5.
  + **HeterotrophBiomass\_MassBins\_Fig:** Creates figure 5.
  + **HeterotrophMetabolism\_MassBins\_Fig:** Creates figure 5.
  + **HeterotrophNutrient\_MassBins\_Fig:** Creates figure 5.
* **SUPPLEMENTARY\_FIGURES:** R scripts used to generate figures used in the supplementary document II. This includes:
  + **Metabolism\_graph:** Creates figure S2.
  + **Regions\_massbins:** Creates figure S3.
  + **HeterotrophMetabolism\_maps**: Creates figure S4.
  + **HeterotrophNutrient\_maps:** Creates figure S4.
  + **AutotrophicBiomass\_map:** Creates figure S4.
  + **TrophicGroup\_graph:** Creates figure S5.
  + **Nutrient\_graph**: Creates figure S6.