**Data analysis 1 - general dissimilarity models (GDM)**

The R scripts in this section aim to analyse significance and shape of diversity responses to spatial and temporal LUI changes (with general dissimilarity models, GDM).

Scripts to fit and test the GDM models for temporal and spatial datasets, alpha and beta-diversity for plants, arthropod herbivores and secondary consumers/predators. The scripts are organized in two steps with each one folder per step.

Step 1 – Fitting GDM models

**Folder: 1. Fitting GDM models**

Note that the scripts for fitting GDMs are twin scripts, with identical code for each combination of diversity type (alpha, beta), trophic group (plants, arthropod herbivores and secondary consumers/predators) and type of LUI gradient (spatial, temporal).

- alpha diversity: space and time in one script:

1. Plants

**Script: 1\_GDM\_alpha\_plants\_scaled\_yall\_space.R**

1. arthropod herbivores

**Script: 2\_GDM\_alpha\_herb\_scaled\_yall\_space.R**

1. arthropod secondary consumers/herbivores

**Script: 3\_GDM\_alpha\_pred\_scaled\_yall\_space.R**

- beta diversity: space and time in separate scripts:

1. plants
   1. space: **Script: 4\_gdm\_beta\_plants\_space\_LU\_scaled.R**
   2. time: **Script: 5\_ gdm\_beta\_plants\_yall\_LU\_scaled.R**
2. arthropod herbivores
   1. space: Script: **6\_ gdm\_beta\_insHERB\_space\_LU\_scaled.R**
   2. time: Script: **7\_ gdm\_beta\_inHERB\_yall\_LU\_scaled.R**
3. arthropod secondary consumers/herbivores
   1. space: Script: **8\_ gdm\_beta\_inPRED\_space\_LU\_scaled.R**
   2. time: Script: **9\_ gdm\_beta\_inPRED\_yall\_LU\_scaled.R**

Step 2 – Estimating significance of GDM models

**Folder: 2. Significance of GDM models**

P-values are calculated by permutation with function varIMP adjusted for temporal replicates. Note that the scripts for estimating the significance (p-values) of GDMs are twin scripts, with identical code for each combination of diversity type (alpha, beta), trophic group (plants, arthropod herbivores and secondary consumers/predators) and type of LUI gradient (spatial, temporal). LUI is included in each script as LUI index and its components (MOW – mowing frequency, GRA – grazing intensity, FER – fertilization intensity). The tests of functionality of the adapted varIMP function is also documented in a separate file (**Script: GDM\_varIMP\_test\_varimp.edit\_function.R**). The permutation part of the varIMP function runs very slowly and should be considered to be run on a high-performance computer.

- alpha diversity: space and time in one script

1. plants: **Script: 1\_GDM\_VarIMP\_plant\_alpha\_scaled.R**
2. arthropod herbivores: **Script: 2\_ GDM\_VarIMP\_herb\_alpha\_scaled.R**
3. arthropod secondary consumers/herbivores: **Script: 3\_ GDM\_VarIMP\_pred\_alpha\_scaled.R**

- beta diversity: space and time in one script:

1. plants: **Script: 4\_ GDM\_VarIMP\_plants.R**
2. arthropod herbivores: **Script: 5\_ GDM\_VarIMP\_herb\_scaled.R**
3. arthropod secondary consumers/herbivores: **Script: 6\_ GDM\_VarIMP\_pred\_scaled.R**