Herbivores mediate the response of plants to climate change

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Introduction

Climate change already affects species worldwide, and further increases in temperature are expected during this century and beyond. In order to make reliable predictions about how species will be affected by climate change, multispecies models considering both ecological and evolutionary processes are necessary.
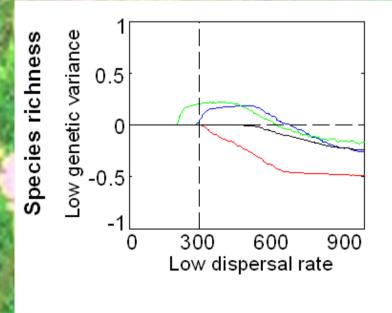
Aims
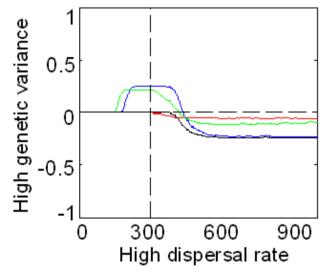
To develop a theoretical framework and investigate if;
… presence of herbivores alter the response of plants to climate change?
… the response of plants to climate change varies with dispersal rate and genetic variance?

Results

- Presence of herbivores significantly alters the response of plants to climate change

- Herbivory mitigates the destabilizing effect of climate change, reducing the impact of genetic variance and dispersal on plant responses to climate change
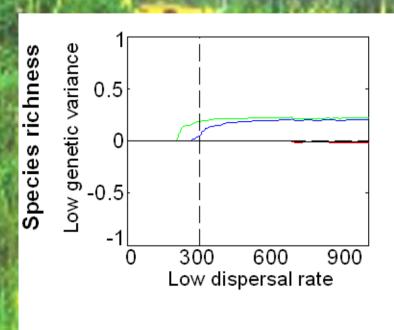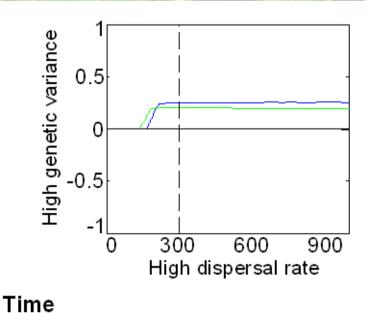
Plant response without herbivory

Plant response with herbivory

Figures showing changes in species richness during climate change (end indicated by dashed vertical line) and the following stabilization period, in relation to species richness before climate change (dashed horizontal line). Blue line indicates polar region, green temperate region, red tropical region and black indicates changes in global species richness.

Conclusions

- It is very important to take species interactions – both within and between trophic levels – into consideration when predicting species response to climate change

- Single-variable models not incorporating the interplay between species interactions, evolution and dispersal are insufficient when studying species response to climate change

Key references

Norberg et al. (2012) Nat. Clim. Change, 2, 737-740; Blois et al. (2013) Science, 341, 499-504; Gilman et al. (2010) TREE, 25, 325-331.

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