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#### ▶ To cite this version:

Jonathan Bonfanti, Jérôme Cortet, Mickael Hedde, Sophie Joimel, Paul Henning Krogh, et al.. Collembolan trait patterns with climate modifications along a European gradient: the VULCAN case study. International Conference of Ecological Sciences Sfécologie-2016, Oct 2016, Marseille, France. , 2016,  $10.13140/\mathrm{RG}.2.2.11717.45280$ . hal-01624911

HAL Id: hal-01624911

https://hal.science/hal-01624911

Submitted on 16 Apr 2024

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# Collembolan trait patterns with climate modifications along a European gradient: the VULCAN case study

Jonathan Bonfanti<sup>a</sup>, Jérôme Cortet<sup>a</sup>, Mickaël Hedde<sup>b</sup>, Sophie Joimel<sup>b</sup>, Paul Henning Krogh<sup>c</sup>, Henning Petersen<sup>d</sup>

a. Centre d'Ecologie Fonctionnelle et Evolutive - CEFE UMR 5175, Montpellier, France b. UMR ECOSYS, INRA, AgroParisTech, Université Paris-Saclay, Thiverval-Grignon, France c. Aarhus University, Department of Bioscience, Silkeborg, Denmark d. Natural History Museum, Mols Laboratory, Ebeltoft, Denmark



Biomass

Pop. density

Ind. weight

Sp. richness





# Introduction

What are the links between collembolan functional traits and climatic gradients at a large scale?

Gradients as temperature are known to play a role in collembolan communities sorting. For example, in the VULCAN project, long-term adaptations have been shown in the taxonomic structure of collembolan communities (Fig. 1).

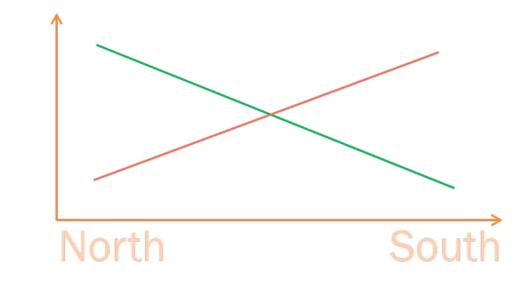


Fig. 1 – Latitudinal cline in taxonomic structure of collembolan communities (from Pestersen 2011).

## **Work hypothesis**

- ☐ We shall be able to establish functional profiles in collembolan communities along a North to South climatic gradient.
- ☐ At a large scale, climatic filtering will drive functional profiles characteristics.
- ☐ In the most constrained areas, functional profiles will converge and functional richness will decrease.



# Methods

### The VULCAN sites

- Shrublands
- Fauna samples include plant leaves, soil surface and soil
- 61 collembolan species
- North/South opposition in climate and in soil characteristics

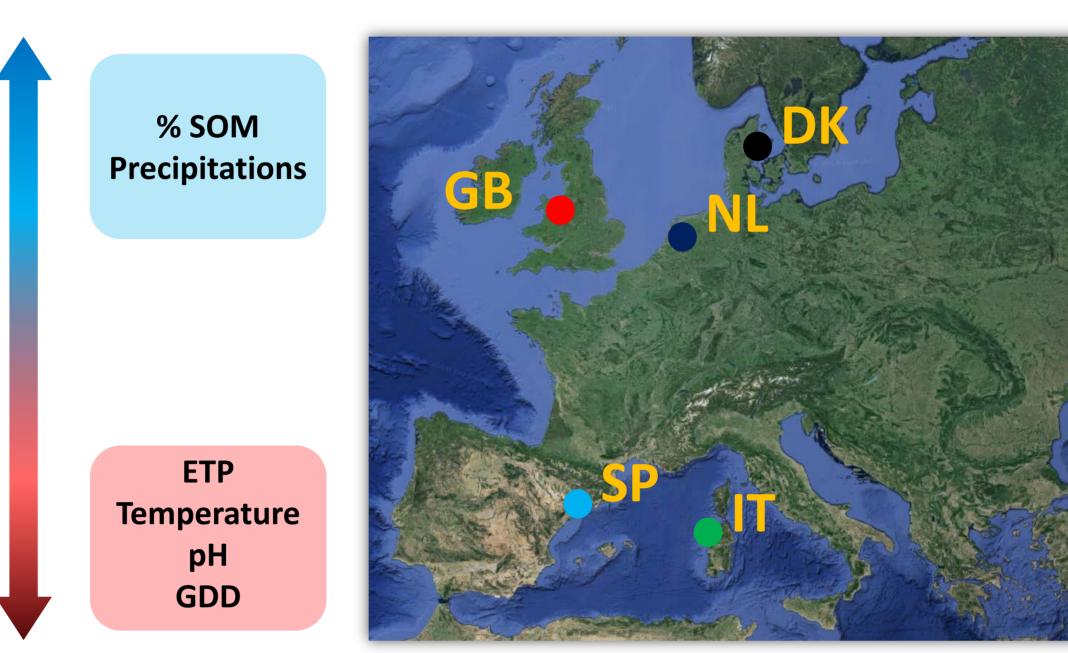


Fig. 2 – Location and main characteristics of the five VULCAN sites (from Beier *et al.*, 2009).

## The trait-based analysis

2 collembola traits databases were used:

- BETSI.cesab.org
- SoilBioStore.au.dk

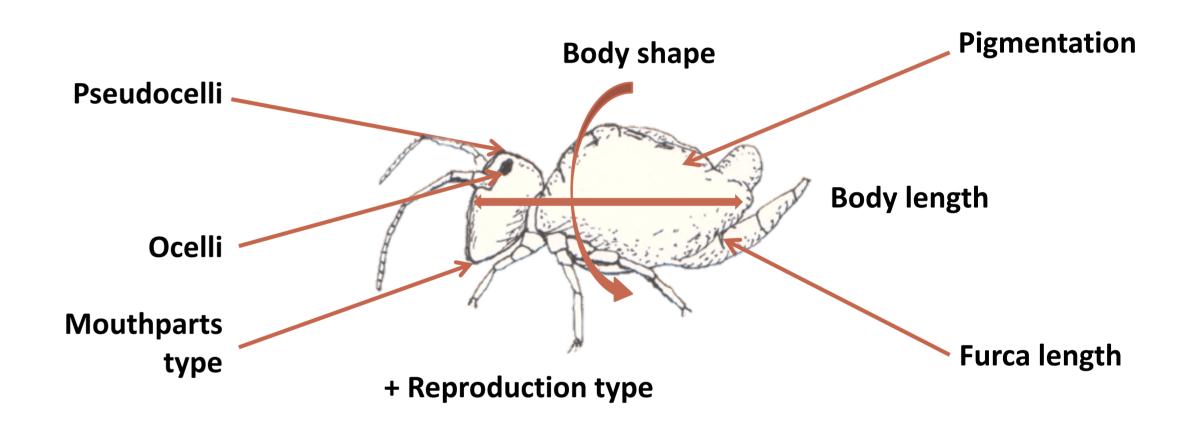


Fig. 3 – Traits collected from the databases and used in the analysis.

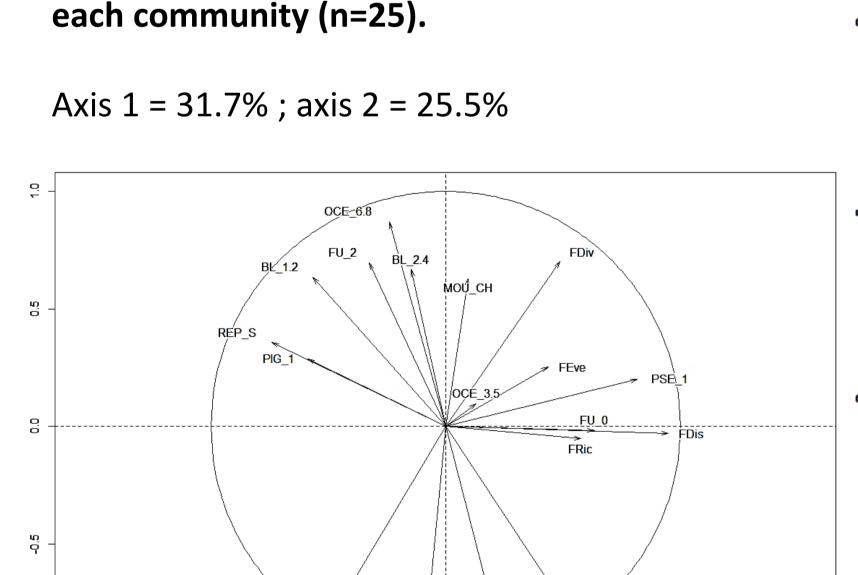


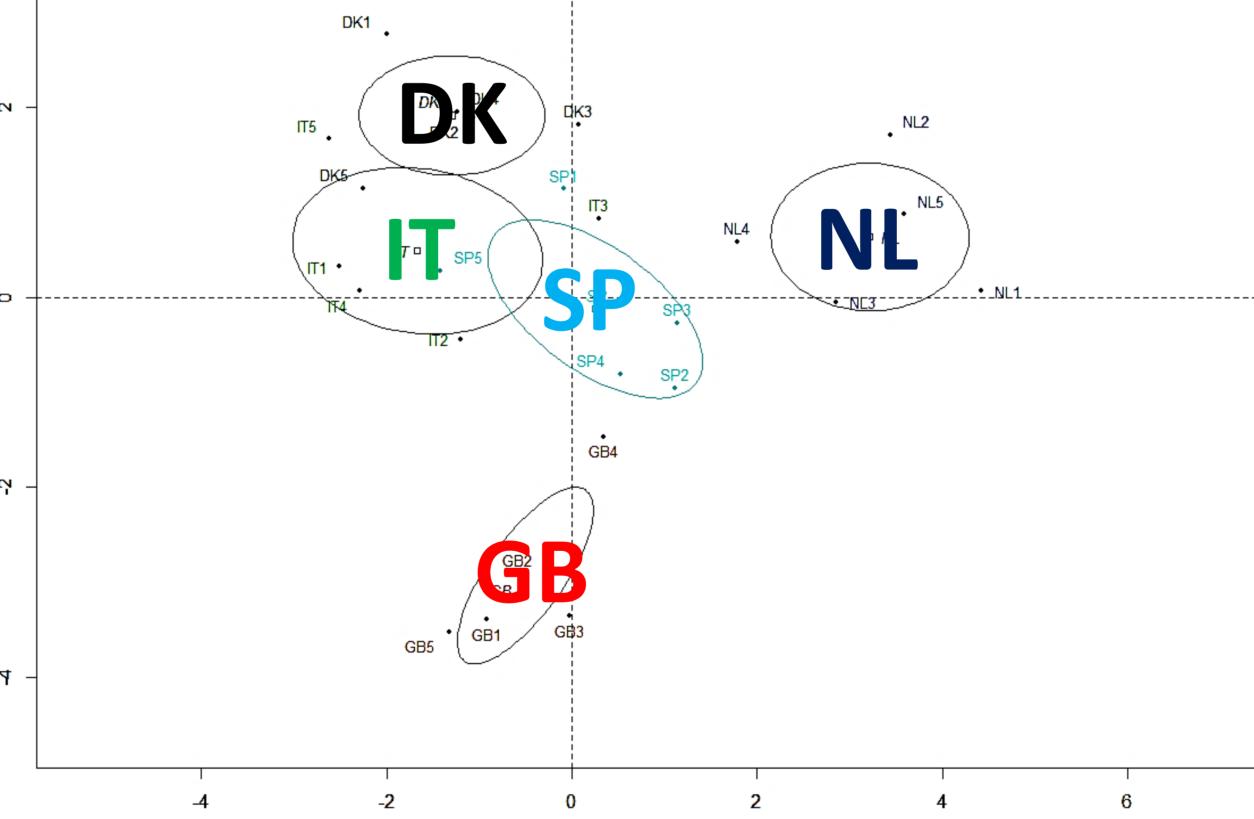
## Results

representing Community Weighted Mean (CWM)

of each trait and functional indices calculated for

Principal Component Analysis (PCA)





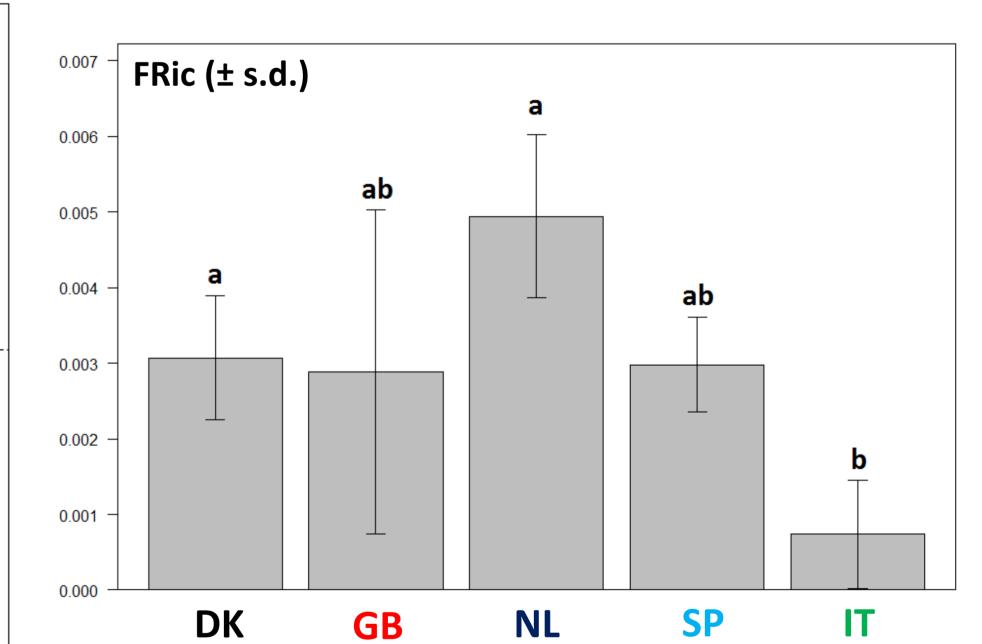


Fig. 5 – Mean value (± s.d.) of the Functional Richness (FRic) for each VULCAN site, ordered from North (left) to South (right). Significance level = 5%

# Conclusions and prospects

- > Highlighting different functional profiles was possible for each site at a community level.
- The North/South opposition remains unclear, and we observe a distortion of the functional profiles distances regarding to geographical distances.
- ➤ As expected, the more constrained sites (SP and IT) present the closest functional profiles, and FRic tends to decrease in these areas.
- Southern sites appear as subsets of northern-sites functional potentialities.
- > Ongoing work: Exploring the trait shifts through collembola soil vertical distribution; linking these results with vegetation traits.

## **Aknowledgments**

- To the VULCAN project holders, for data accessibility
- To the BETSI database contributors, and the Tebis network (<a href="www.reseau-tebis.fr">www.reseau-tebis.fr</a>)
- To the SoilBioStore.au.dk database contributors

Contact

jonathan.bonfanti@univ-montp3.fr