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## Taxonomical, size structure and genetic responses of cladoceran communities in subalpine lakes to 150 years of human perturbations

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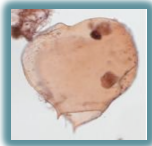
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## Taxonomical, size structure and genetic responses of Cladoceran communities in subalpine lakes to 150 years of human perturbations



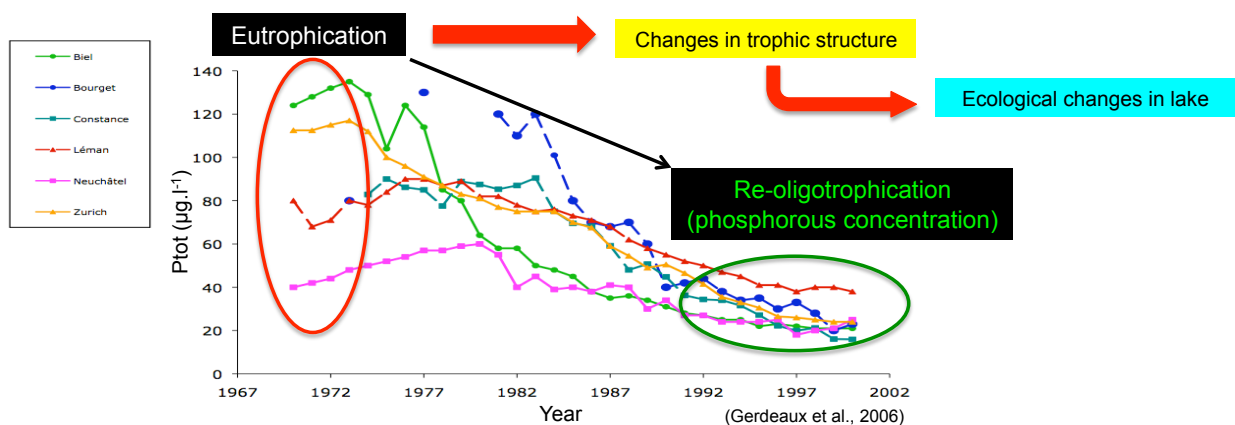
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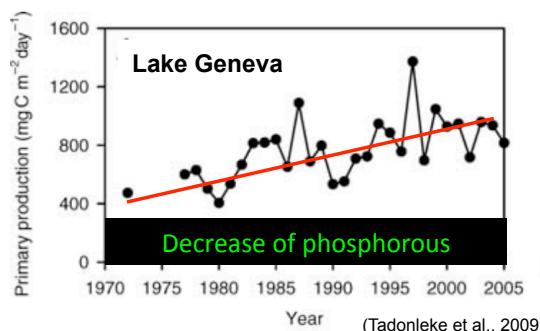
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### Understanding community trajectories in a context of multiple perturbations



### Unexpected trajectory of biological communities



Phosphorous is not the only driver

+ local scale: fisheries management

+ global scale: climatic change

→ Towards a paleo-ecological approach

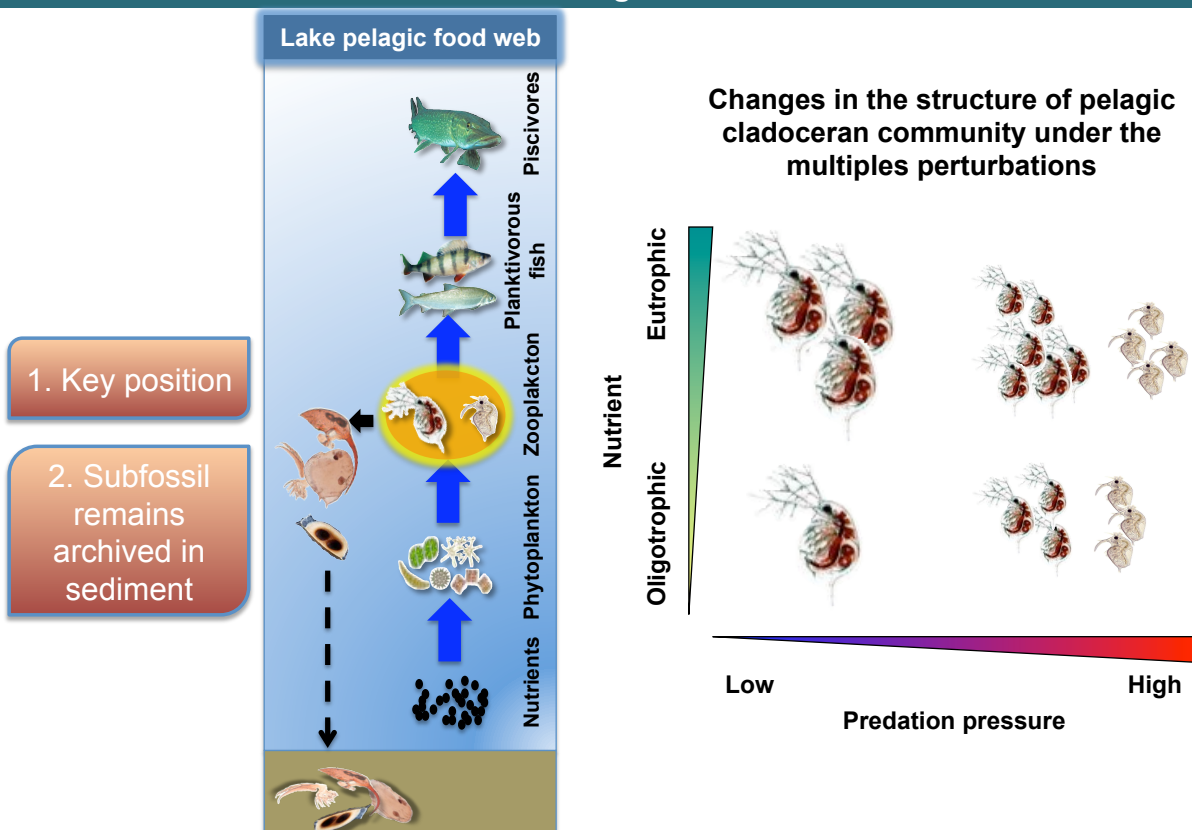
## Objectives

**What is the role of human-made changes (changes in nutrient level and fish communities in a context of climate change) on the trajectory of biological communities over the last 150 years in three French deep subalpine lakes?**

1. What is the trajectory of biological communities?

2. What is the contribution of both 'bottom-up', 'top-down' and climatic changes in structuring of biological communities?

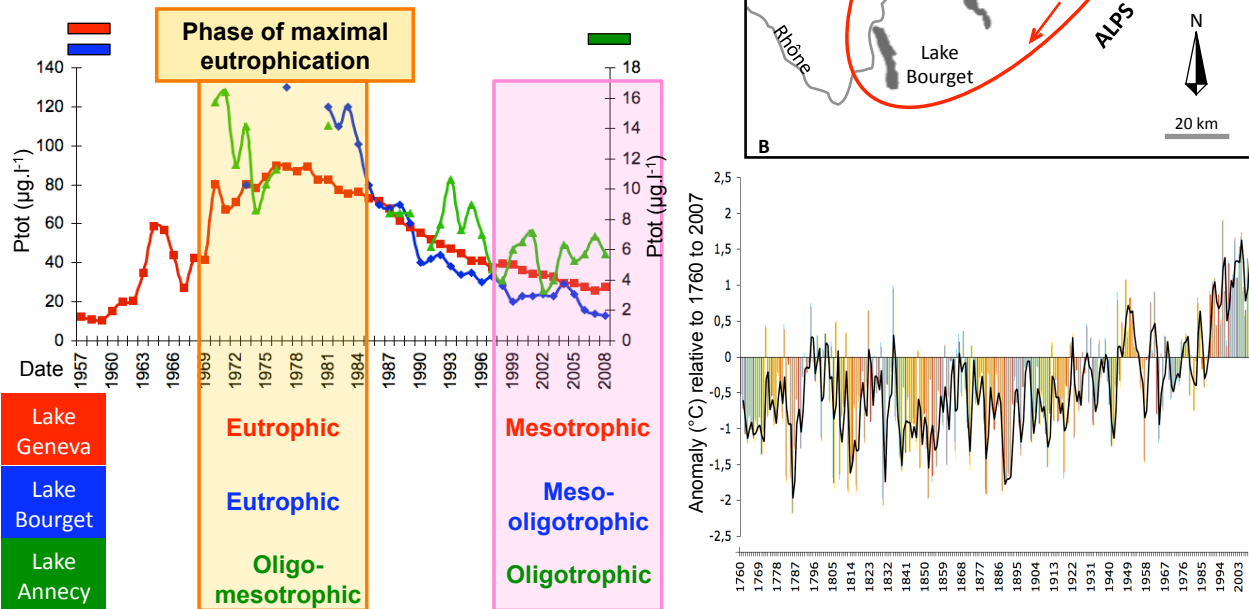
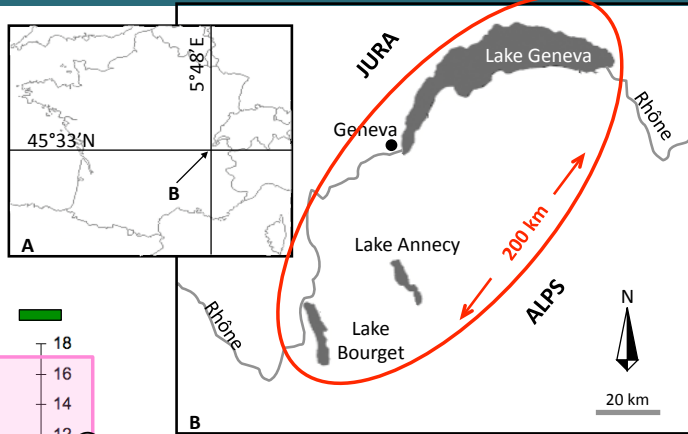
**Cladoceran and their subfossil remains as an integrator of pelagic food web over the long term**



## Study sites

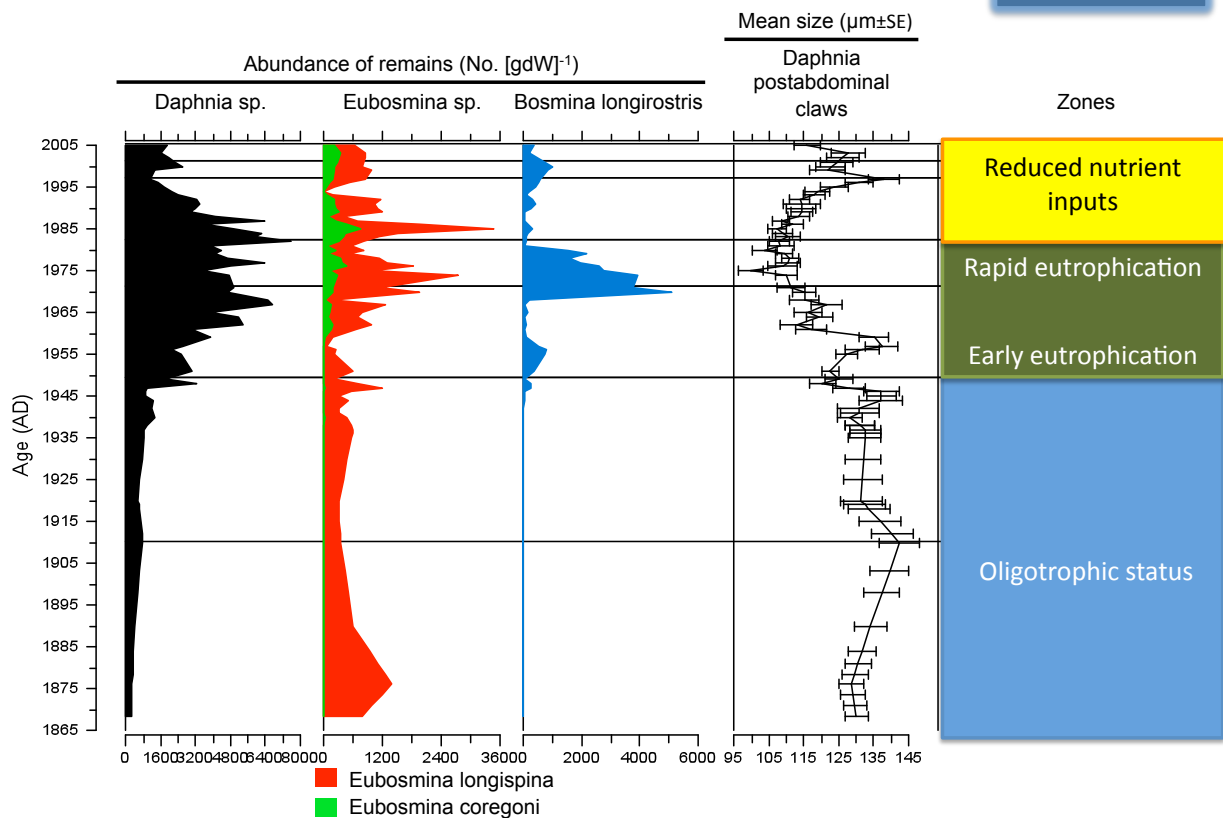
### Characteristics of lakes:

- Same eco-climatic context
- Fish community similar
- Eutrophication → different intensity between the lakes

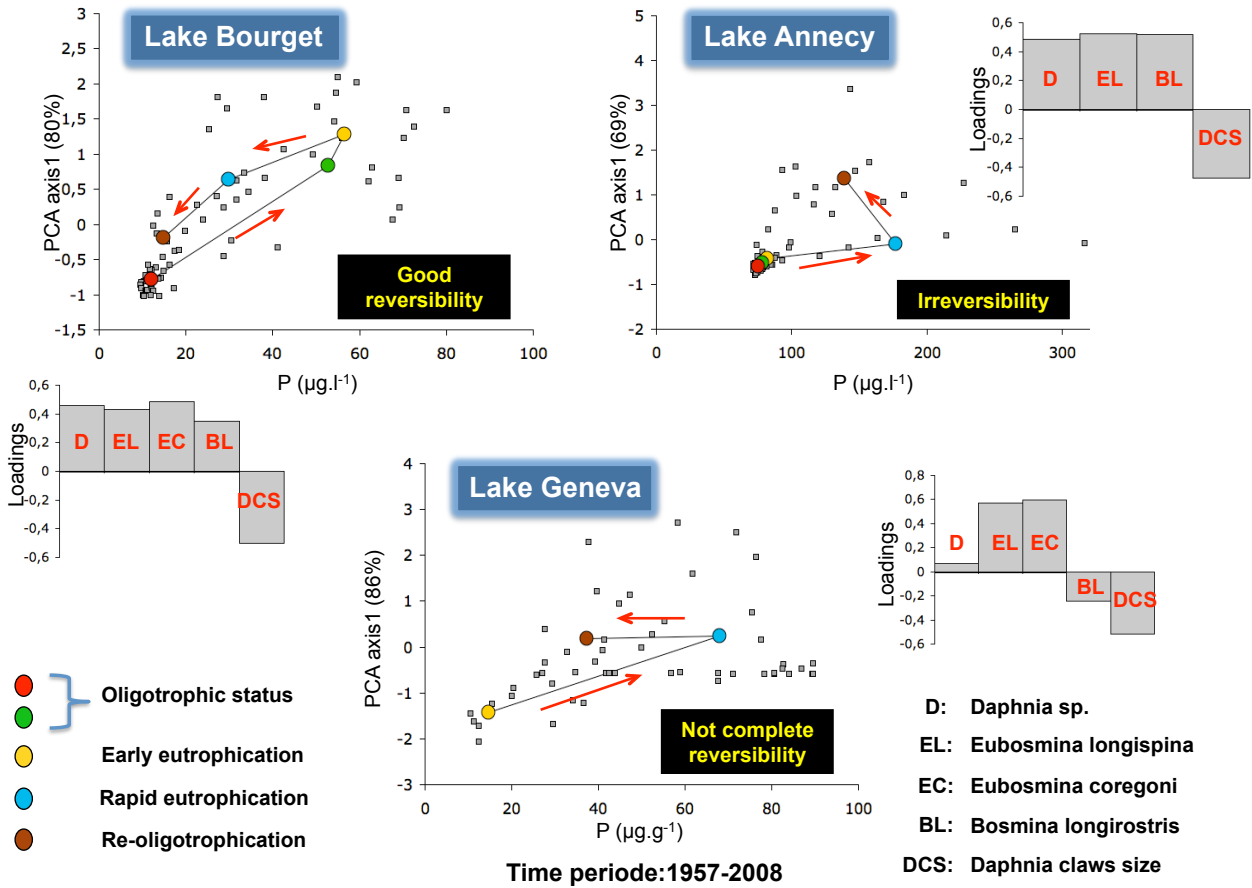


## 1. What is the trajectory of the pelagic cladoceran community

### Lake Bourget



# 1. What is the trajectory of the pelagic cladoceran community



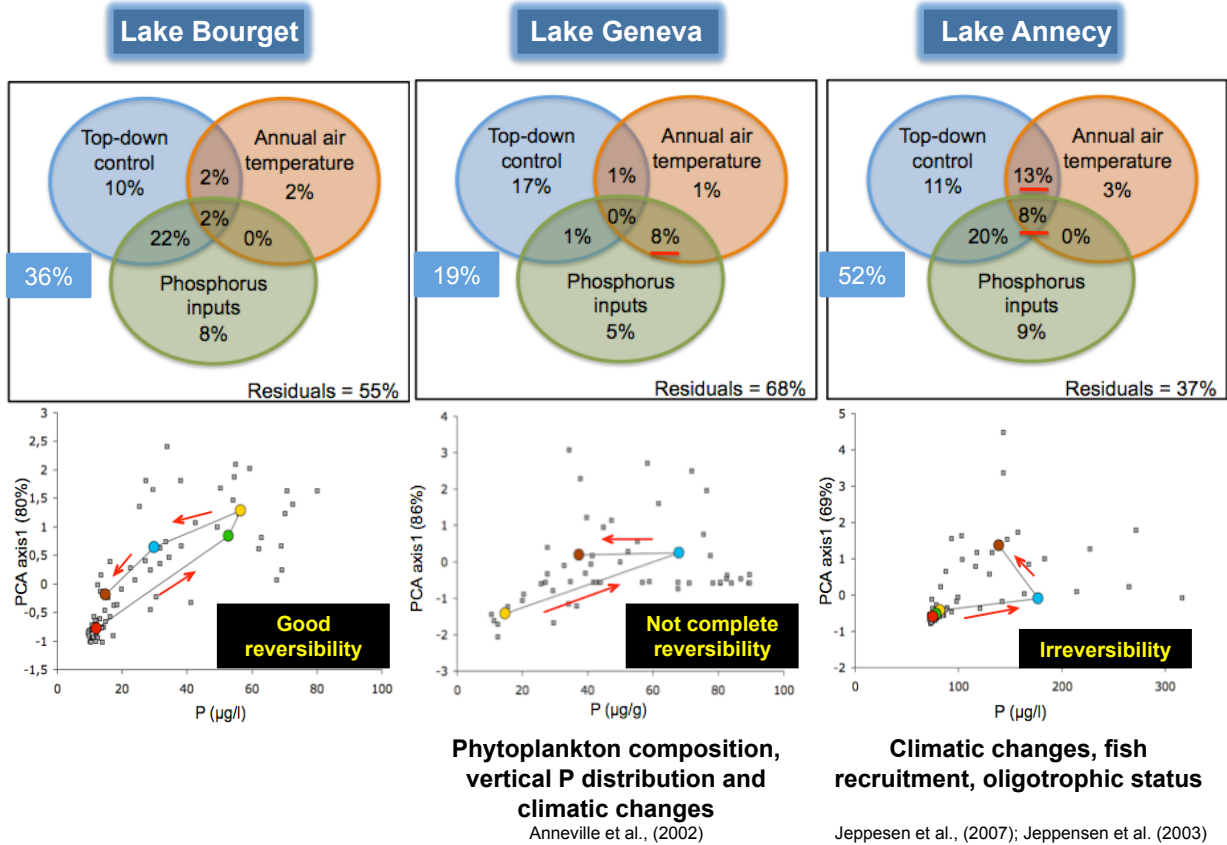
# 2. What is the contribution of 'bottom-up', 'top-down' and climatic changes in structuring the cladoceran community

Quantifying the relative effects of external forcing variables (VPA):

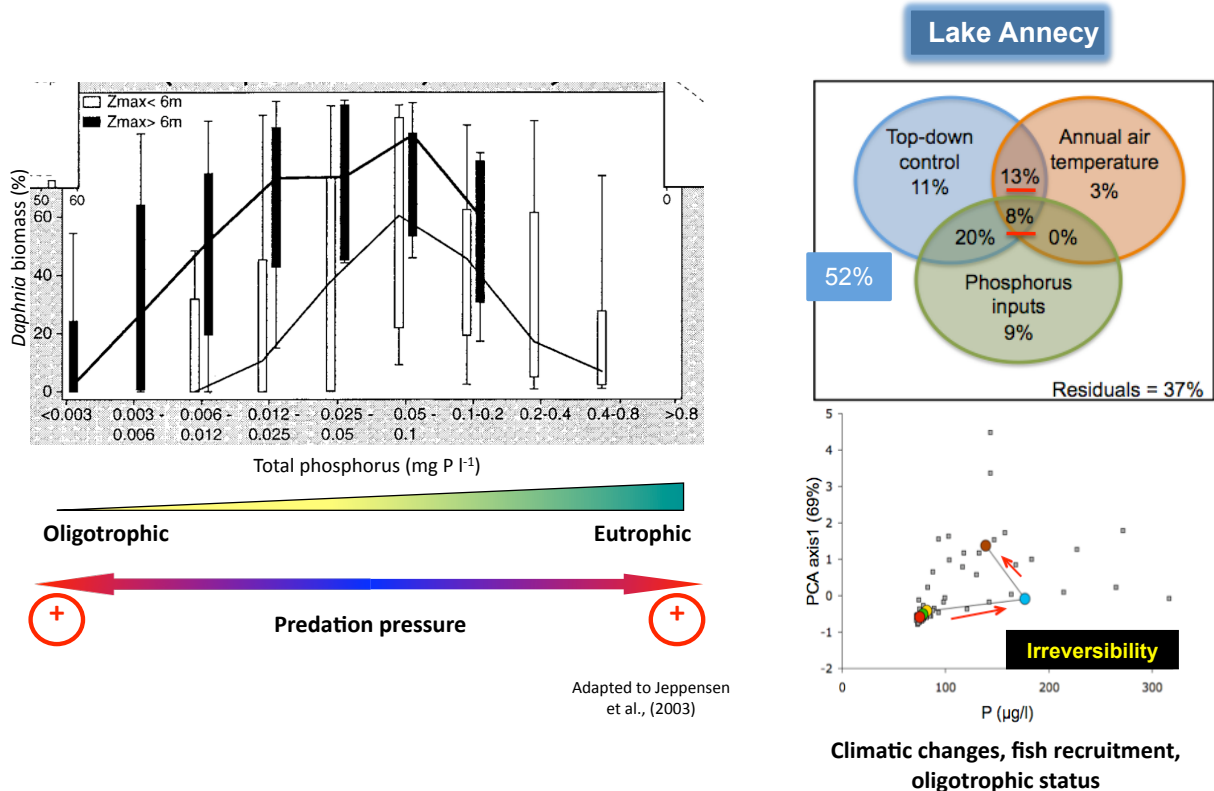
	Lake Annecy	Lake Bourget	Lake Geneva
<b>'Top-down'</b>	Daphnia claw size	Daphnia claw size	Daphnia claw size
<b>'Bottom-up'</b>	Phosphorous (Core)	Diatom-phosphorous transfer function (Wunsam & Schmidt, 1995)	Phosphorous (Water column) (1957-2008)
<b>Climate</b>	1. Annual air temperature (HISTALP)		
	2. River discharge	no major effects	no changes in precipitations (meteorological data)
	3. River inputs	no major effects	no changes in river OM inputs (pyrolyse rock-eval)

Size-selective predation hypothesis (Brook & Dodson, 1965)

## 2. What is the contribution of 'bottom-up', 'top-down' and climatic changes in structuring the cladoceran community



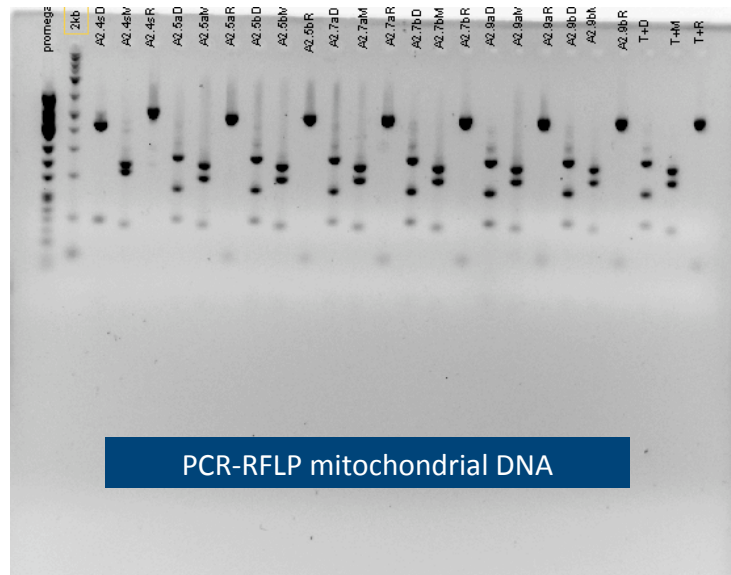
## 2. What is the contribution of 'bottom-up', 'top-down' and climatic changes in structuring the cladoceran community



## Conclusion & perspectives

The trajectory of cladoceran community was driven by a site-specific combination of local and global interacting perturbations.

Are changes in genetic architecture of cladoceran communities contribute to the irreversibility of their trajectories?



## Acknowledgements

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## Fundings



Thank you for your attention



### Nutrient inputs

