Conserving intraspecific diversification in a warmer world
A case study on endemic high-mountain plants of the Pyrenees

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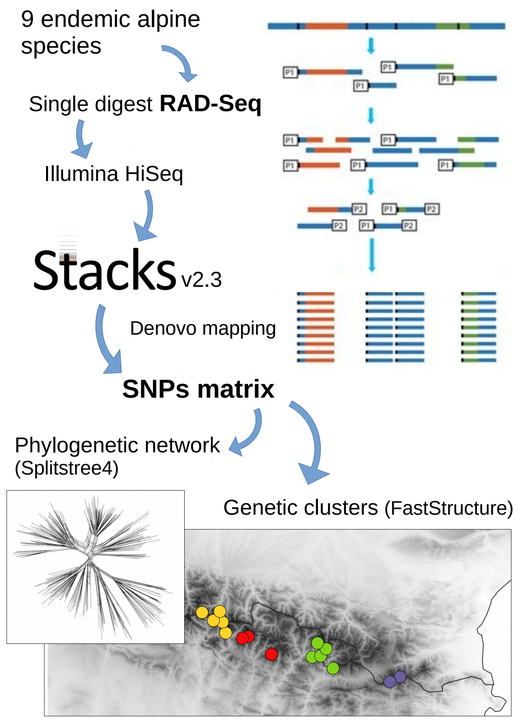
Introduction

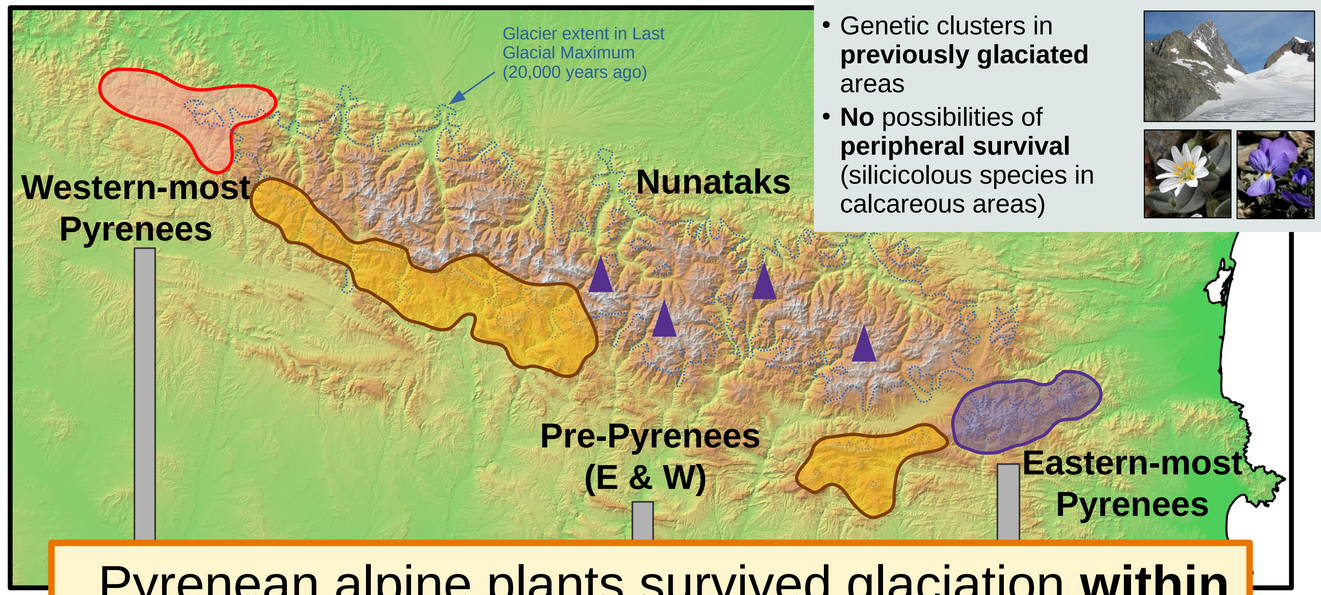
Intraspecific diversity of alpine plants is strongly defined by **ancient glaciation**.

The Pyrenees harbor a **high** and **well known species diversity**, but intraspecific diversity distribution and its origin have been poorly studied.

We conduct a comparative phylogeographic study to seek for **common patterns of distribution of intraspecific diversity**, to identify **glacial refugia** and to assess how **climate change** threatens intraspecific diversity of alpine plants.

Materials and methods





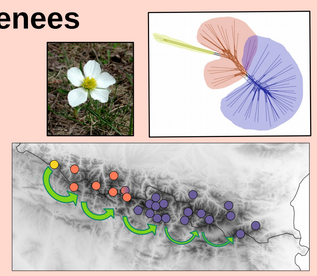
Within the ice sheet: Nunataks

- Genetic clusters in **previously glaciated** areas
- **No** possibilities of **peripheral survival** (silicicolous species in calcareous areas)

Pyrenean alpine plants survived glaciation within the ice sheet and in four peripheral refugia

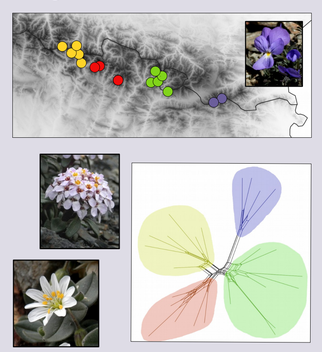
Western-most Pyrenees

- Oceanic: **mild climate**
- Decrease in population diferentiation towards the east: stepping-stone colonization



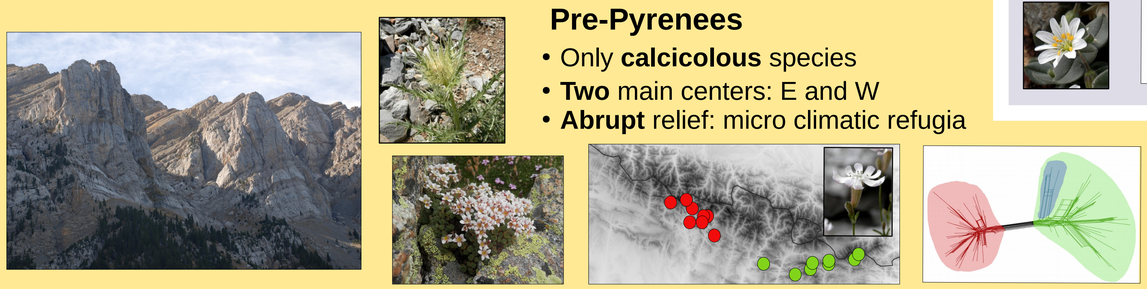
Eastern-most Pyrenees

- Oceanic: **mild climate**
- **Silicicolous + calcicolous** species
- Long branches: **strong phylogenetic isolation**
- Strong **geographic isolation**: deep valley



Pre-Pyrenees

- Only **calcicolous** species
- **Two** main centers: E and W
- **Abrupt** relief: micro climatic refugia



Conclusions

- Pyreneean alpine plants mostly show a **strong** intraspecific **genetic structure**.
- **Eastern-most Pyrenees** harbor strongly **differentiated** and **geographically restricted intraspecific lineages**. Potential local extinctions due to climate change would involve significant losses of intraspecific diversity.
- E and W **Pre-Pyrenees** are major refugia for calcicolous species and define major intraspecific lineages.

Next steps

- Model and project **species distribution** to Last Glacial Maximum, current and future (2050) conditions.
- Combine species distribution models with genetic data to estimate the distribution of **phylogenetic endemism** (Rosauer et al., 2015). Propose priority conservation areas accordingly.
- Test **simultaneous population expansions** from refugia after glaciation (Xue & Hickerson, 2017).

References

Rosauer, D.F. et al. 2015. *PLoS One* 10(5): e0126274.
Xue, A.T., Hickerson, M.J. 2017. *Molecular Ecology* 17:e212-e224.

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