



Coexistence of three alpine ungulates (*Cervus elaphus*, *Rupicapra rupicapra* and *Capreolus capreolus*) in an Alpine mammal community with anthropogenic disturbance

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Introduction

According to the **habitat heterogeneity hypothesis**, environmental heterogeneity increases the ecological niche dimensions, consequently allowing for more species to coexist (Macarthur & Macarthur, 1961; Stein et al., 2014).

The Italian Alps are characterised by high **spatial heterogeneity** and **seasonal fluctuations** of resources, along with spatial and temporal pulses of anthropogenic pressure.

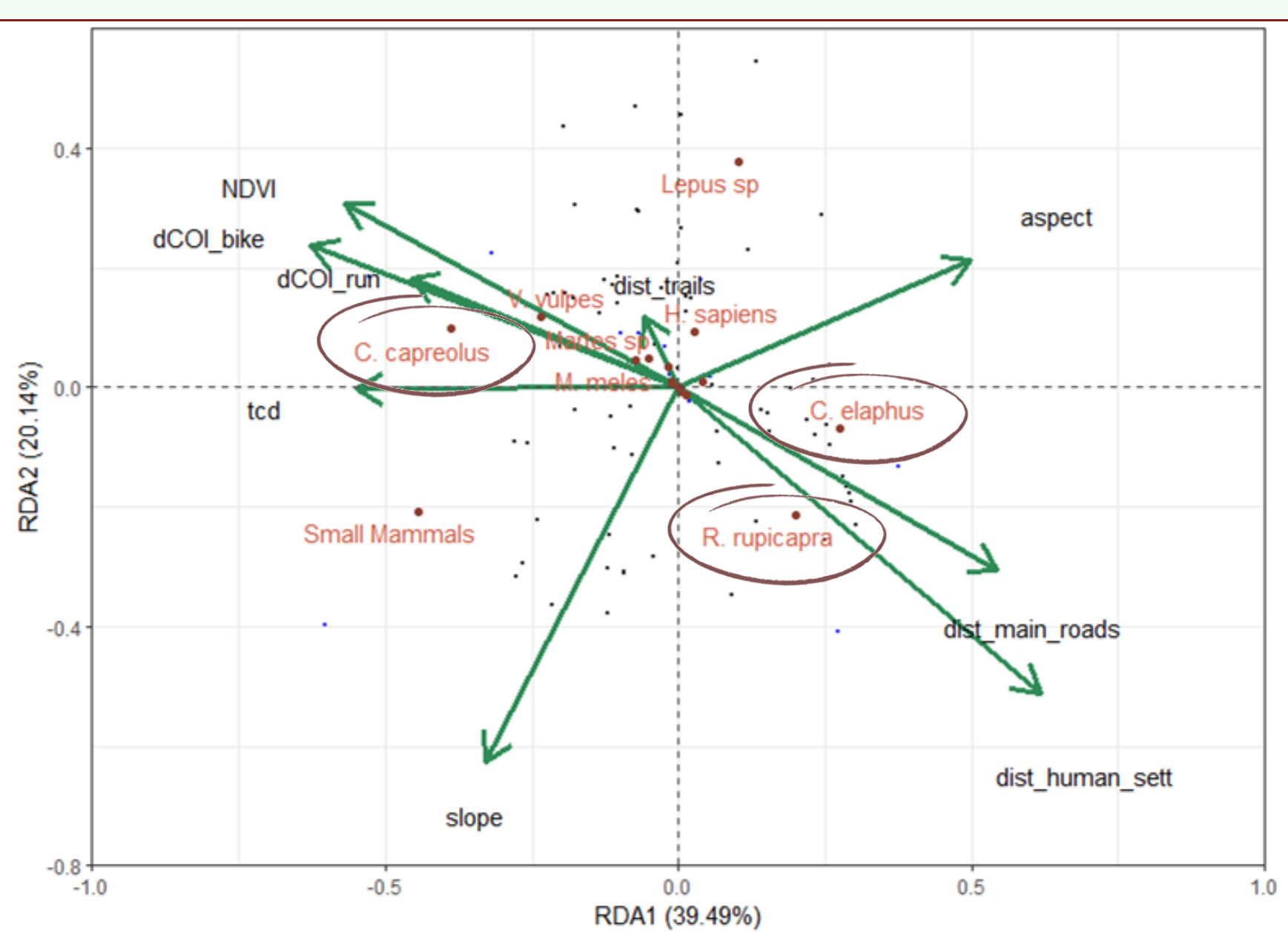
Eventually, the combination of these two dynamic forces likely affects the **distribution** of species, and the relationships among them, influencing the local **structure of animal communities**.

Aims

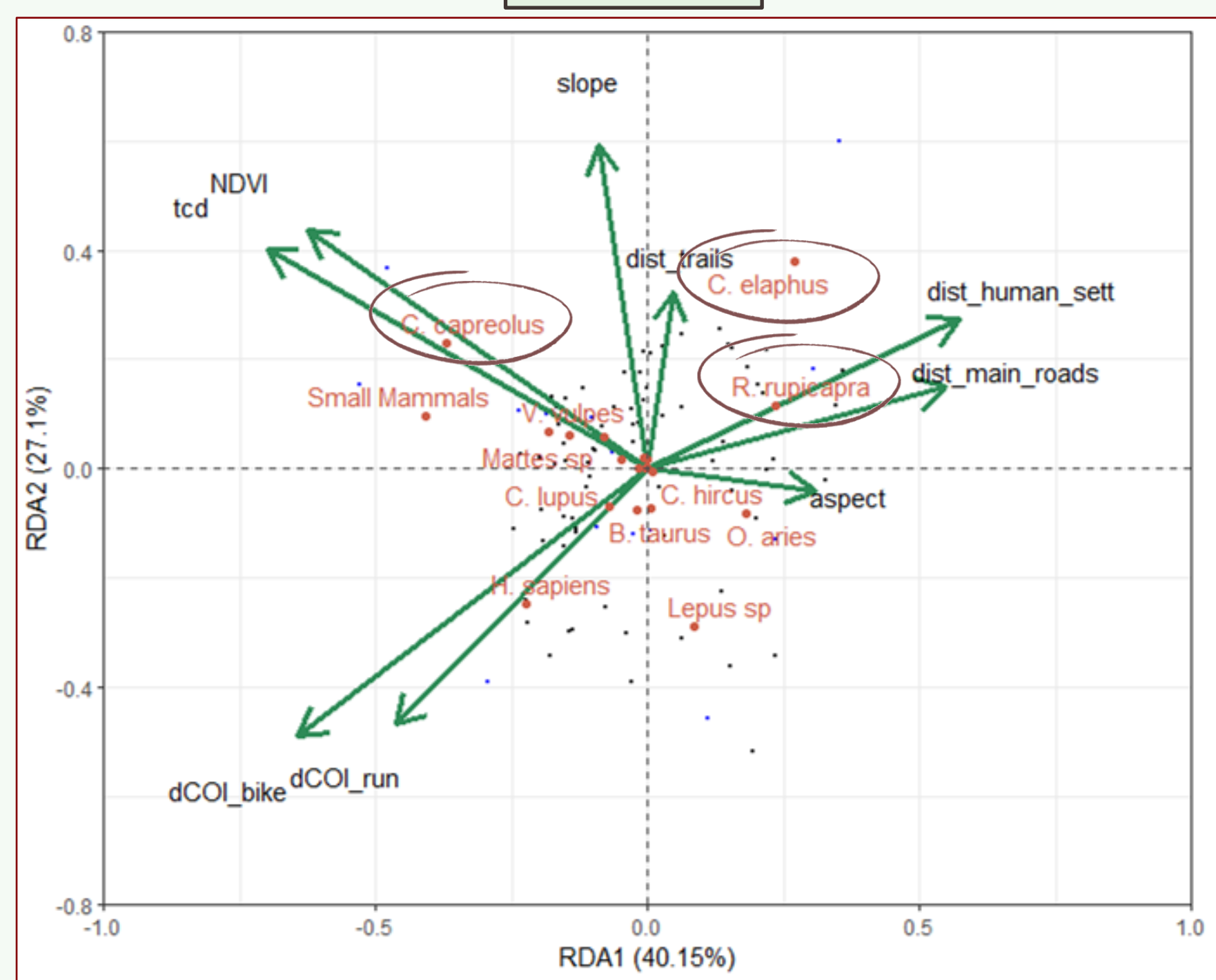
- To assess the **assemblage** of medium- to large-sized Alpine terrestrial mammals in relation to a set of **environmental** and **anthropic** drivers (OBJ1)
- To evaluate the spatiotemporal **associations** and potential niche overlaps within the guild of **ungulates** (OBJ2)

Results & Discussion

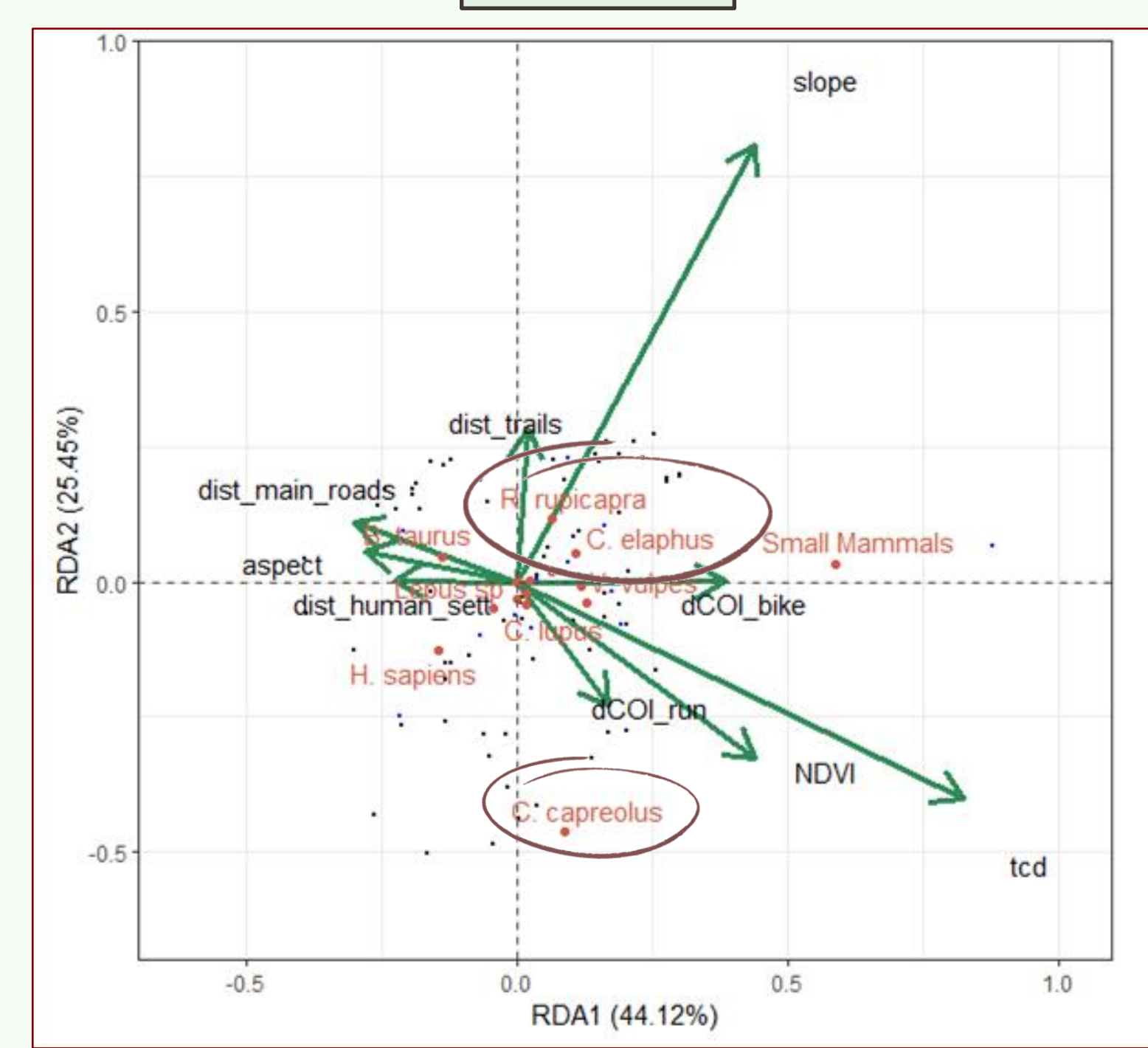
SPRING



SUMMER



AUTUMN



SPRING & SUMMER

- **Large-sized species** dissociated from human infrastructures and activities: larger space needs?
- **Specialists** more associated with the covariates than **generalist** species, and **carnivores** poorly dissociated from anthropogenic pressure: anthropogenic food sources and temporal avoidance?
- Only roe deer associated with primary productivity: other processes at act for **herbivores** or methodological limitation?

AUTUMN

- **Red deer & Chamois** less dissociated from human infrastructures: fall migration towards winter ranges and decreasing human pressures
- **Chamois** moved away from North-facing slopes for thermoregulation
- **No major modifications** detected in other species

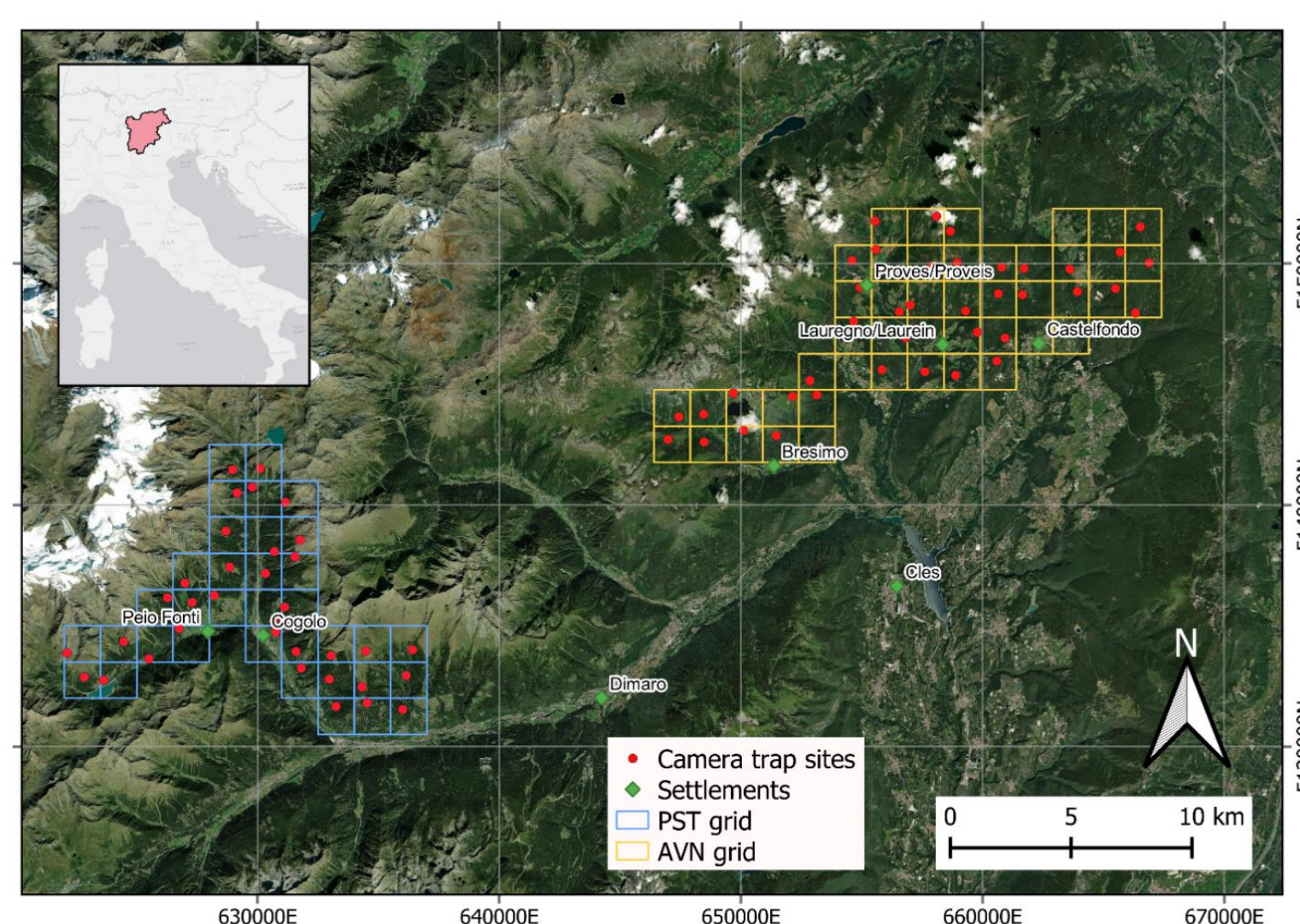
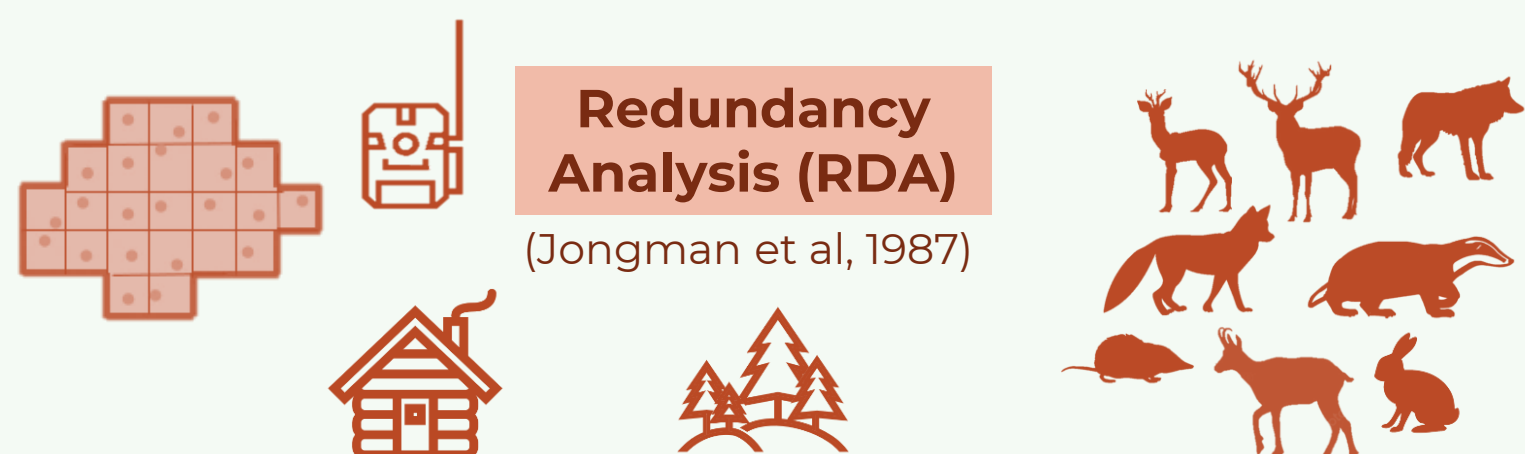
OBJ2

- **Red deer** and **chamois** were associated with each other in **all periods** (early uphill migration by red deer due to mild conditions?) but their common **association** to covariates **varied seasonally**
- **Red deer** and **roe deer** dissociated along the whole season (**P3.2**): **altitudinal segregation** between the two species?

Methods

- **77** random camera trapping sites in **Trentino** and **Alto-Adige** Autonomous Provinces
- Sampling from **May** through **October 2022**
- Association between species occurrence and habitat covariates was analysed by Redundancy Detrended Analysis (**RDA**)
- **3** different RDAs to account for **seasonality**

Redundancy Analysis (RDA)
(Jongman et al, 1987)



Conclusions

These **association** patterns might indicate potential **competition** between red deer and chamois. Further investigation on the ecological processes underlying these associations is ongoing, especially considering the **expansion of red deer** across the Alpine range and the **increasing human disturbance**

Bibliography

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