

Variability in activity restriction time and local persistence of mountain lizards coping with global warming

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In Pyrenees, records of operative temperatures on different exposure and altitude sites demonstrate the temperature variability and hence the activity restriction time variability. Thus, species should select some micro-habitats to survive face to climate change.

Introduction

The **process of local extinction** of populations may be estimated by calculating the **activity restriction time**. Extinction risk is elevated when warm temperatures restrict foraging hours during breeding season [1,3].

We investigate how **spatial and temporal variations** in restriction time may sustain **differential persistence between sites and years** and how such information may be used to **improve extinction risk modeling** [2,4].

Materials and methods

Biomimetic models deployment on **various exposure and altitude** during **two breeding seasons** of *I. bonnali* allowed to **measure operative temperature (Te) time series**.

Using the **eco-physiological model** of Sinervo, which compares each Te value to preferred temperature, **daily hours of restriction (Hr)** were computed for each site [1,3].

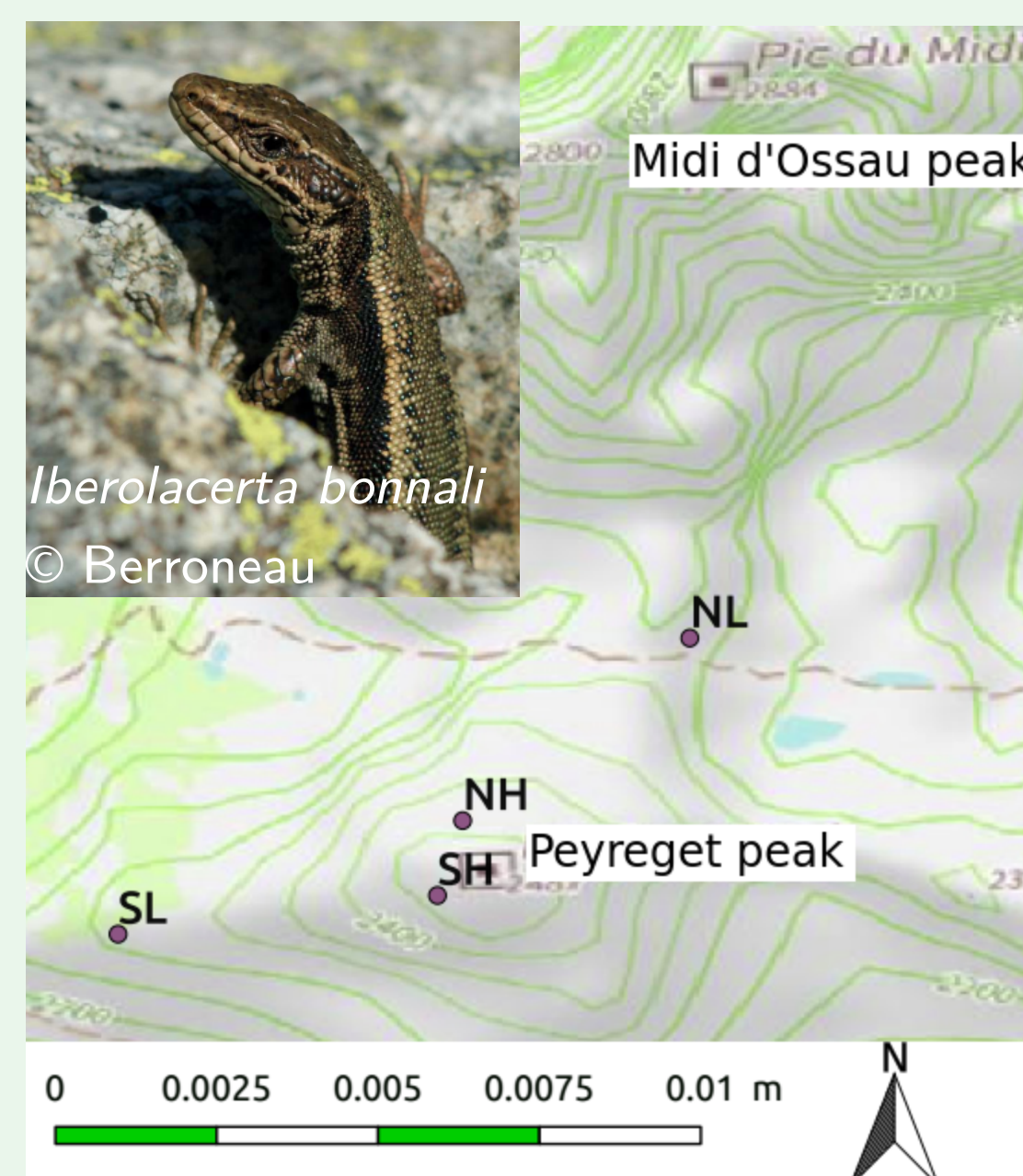


Fig. 1 : Sites studied on Peyreget peak South (S) and North (N) exposure, High (2440m) and Low (2200m) altitude

Results

Restriction time is **the lowest in north high site** and the **highest in north low**. Results are **similar between years**

A 5 hours gap exists between mean and maximum, 2 hours with minimum.

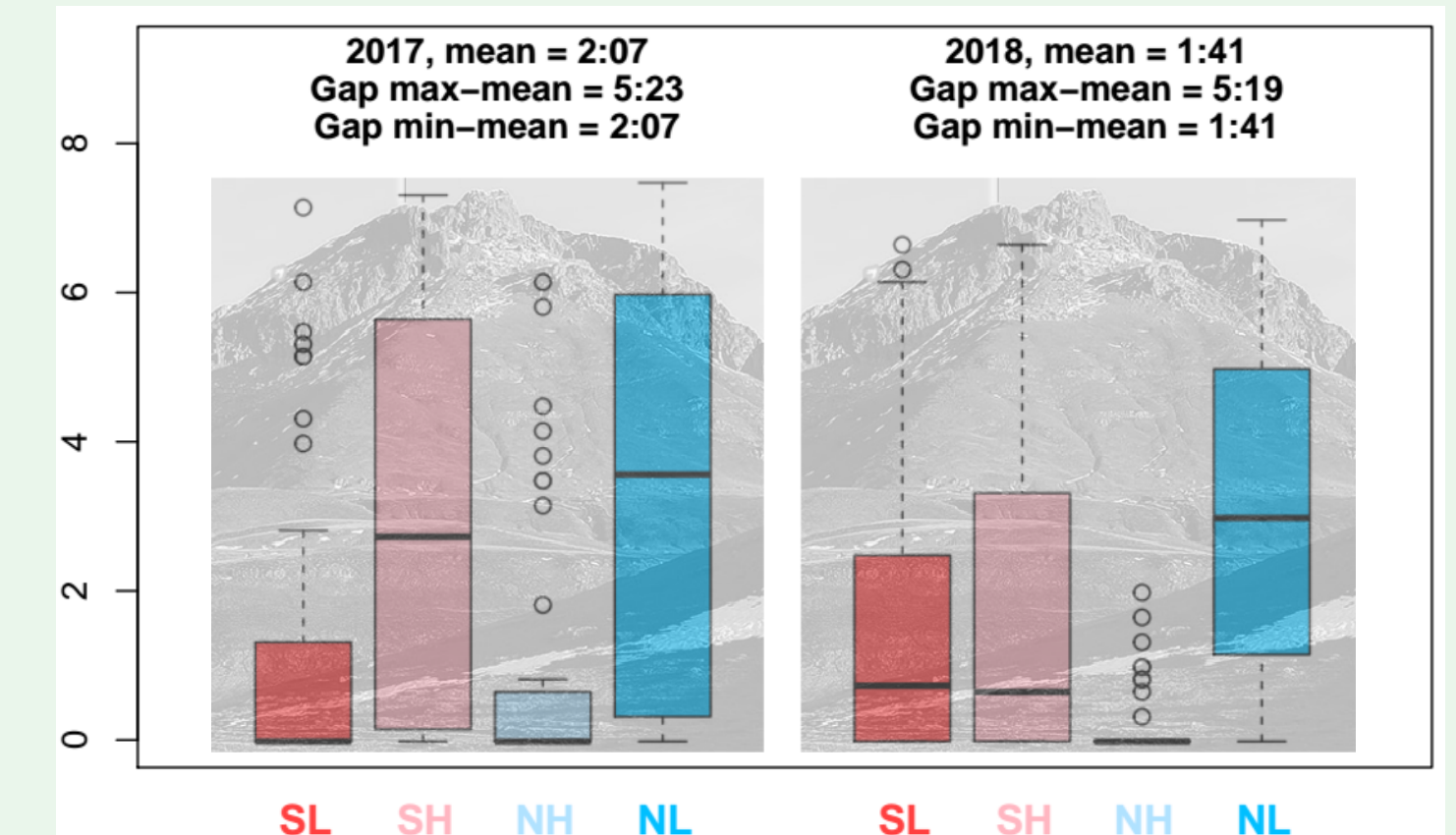


Fig. 2 : Hr according to sites and years

Discussion

Exposure and presence of adjacent peaks could affect **micro-climate** especially at the lowest altitude. Our approach could allow to **identify refuges taking account micro-topography**.

Restriction time is **mainly spatially variable**. To model persistence, the challenge is to **integrate this variability, using variance and mean** rather than mean values only, both in **eco-physiological equations** and in **species distribution models**.

1. Ceia-Hasse A and *al.* (2014) Integrating ecophysiological models into species distribution projections of European reptile range shifts in response to climate change.
2. Herrando-Pérez and *al.* (2019) Intraspecific variation in lizard heat tolerance alters estimates of climate impact.
3. Sinervo B and *al.* (2010) Erosion of Lizard Diversity by Climate Change and Altered Thermal Niches.
4. Vasseur DA and *al.* (2014) Increased temperature variation poses a greater risk to species than climate warming.

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