

Unveiling Vegetation Patterns, Modern Pollen Profiles, and Environmental Influences in Sougna Mountain, Northern Morocco

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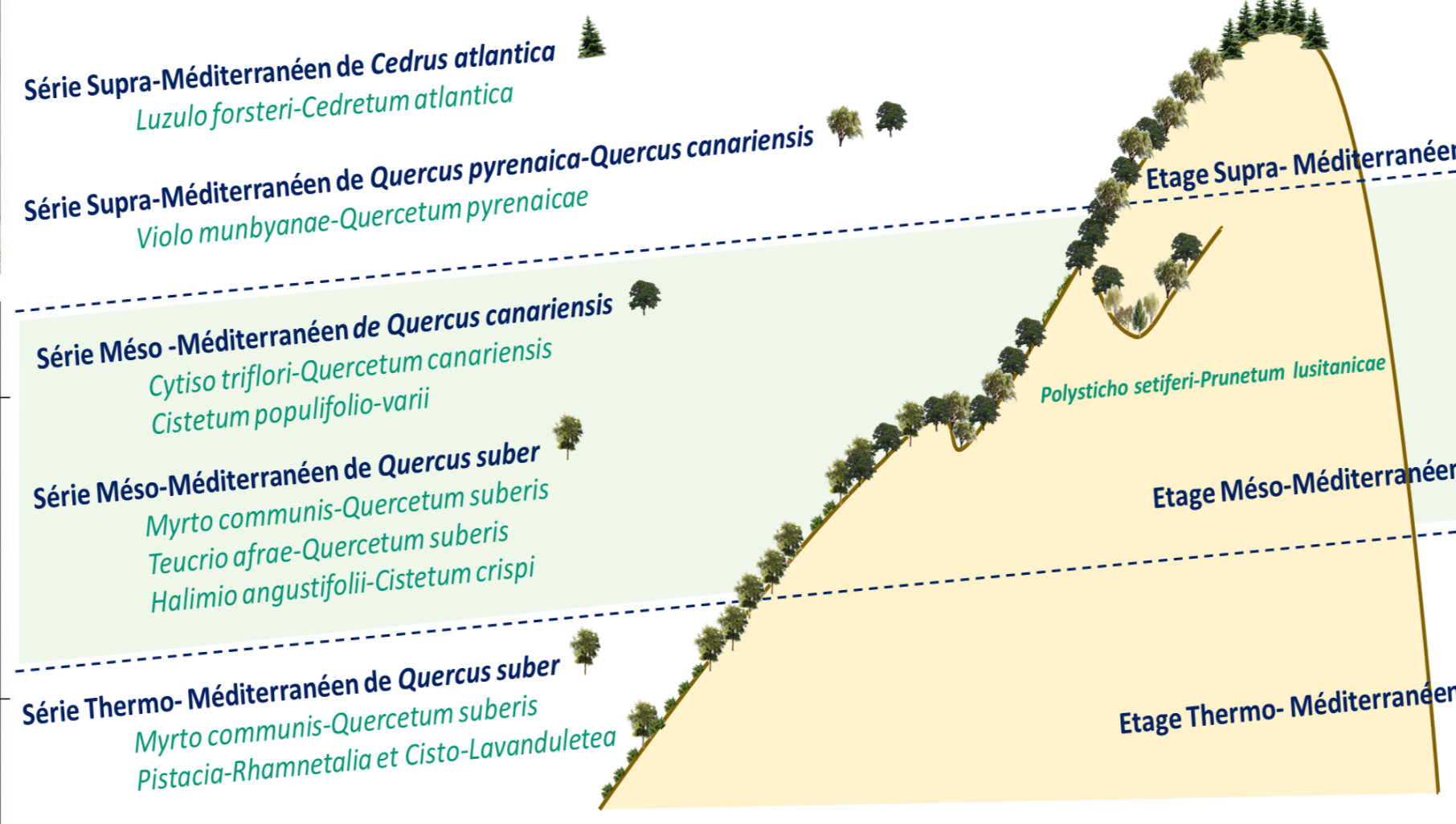
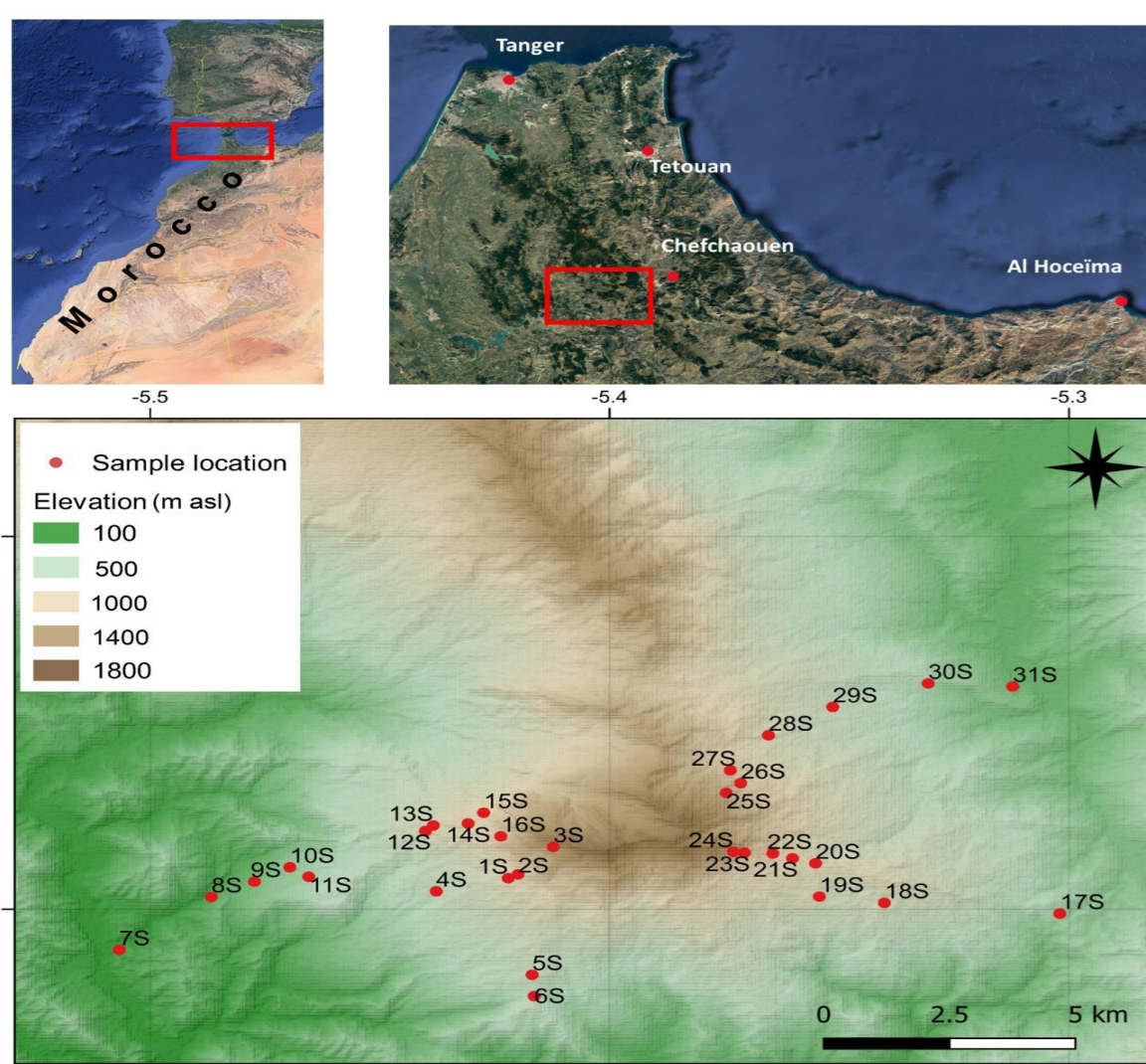
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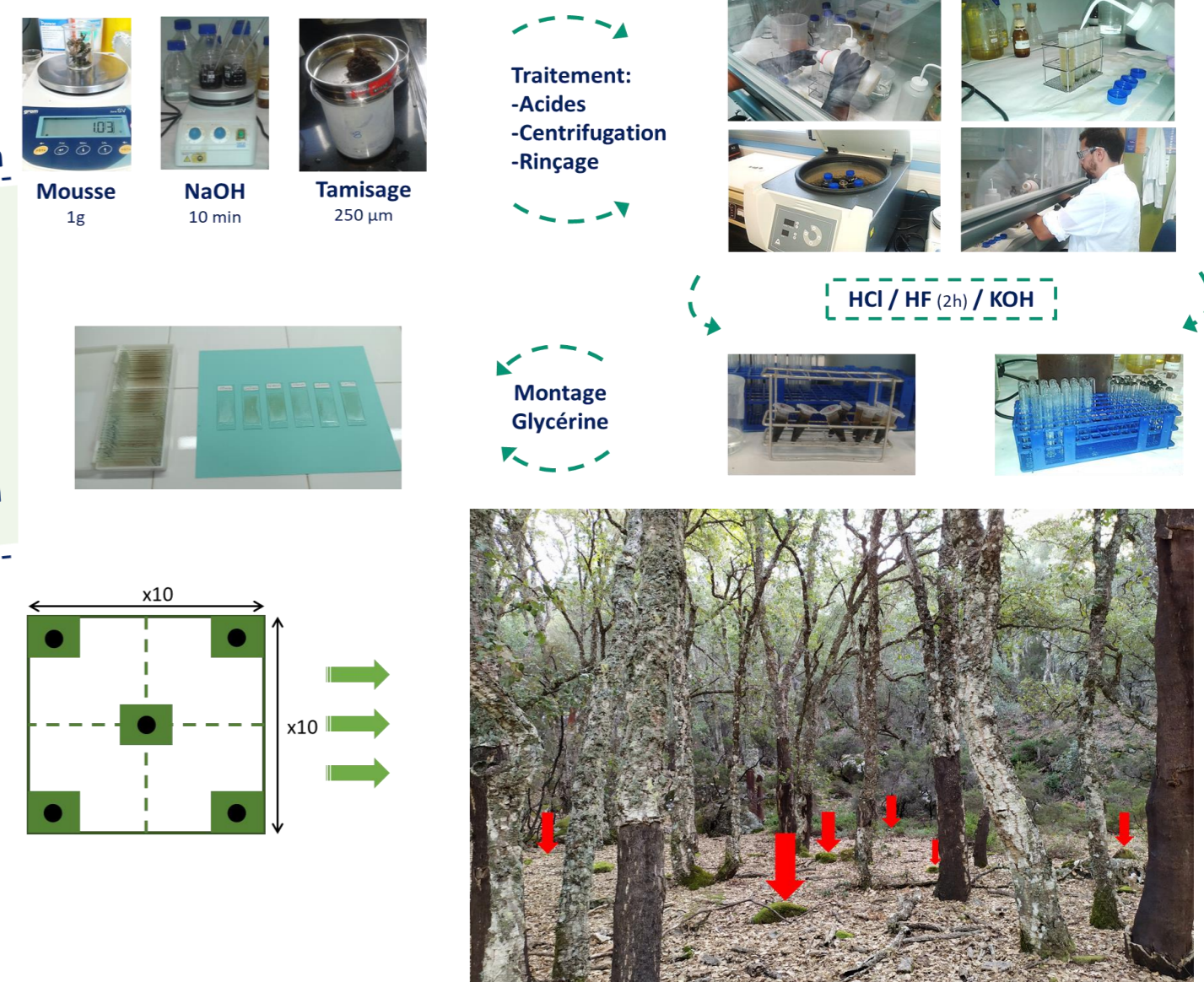
INTRODUCTION & AIM

Fossil pollen records represent one of the most used tools to reconstruct vegetation and climate changes over long timescales (e.g., Faegri and Iversen 1989; Bennett and Hicks 2005). However, due to the variability in pollen production, dispersion, and preservation, the relationship between pollen rain, vegetation, and the environment is not straightforward, which introduces challenges and uncertainties in the interpretation of fossil pollen records. (Hicks 2001; De Nascimento et al. 2015). The studies that relate modern pollen assemblages to modern vegetation have proven valuable to better distinguish pollen production and dispersion patterns, as well as understand pollen-vegetation relationships among environmental variables or human interaction (López-Sáez et al. 2018; Davis et al. 2020; Senn et al. 2022; Boutahar et al. 2023). This type of the studies of the modern pollen-vegetation relationship will be useful to better understand the past, current, and potential future trends in vegetation and climate dynamics in Morocco (Broothaerts et al. 2018). This study, we aim (i) to understand the modern pollen rain representation in the Sougna Mountain vegetation structure; (ii) to investigate the modern pollen-vegetation relationships in relation to environmental gradients and land-use variables; (iii) to propose the main pollen taxa which characterise the vegetation communities and the most important anthropogenic activities, in order to shed new light on the interpretation of fossil pollen records in the Rif region.

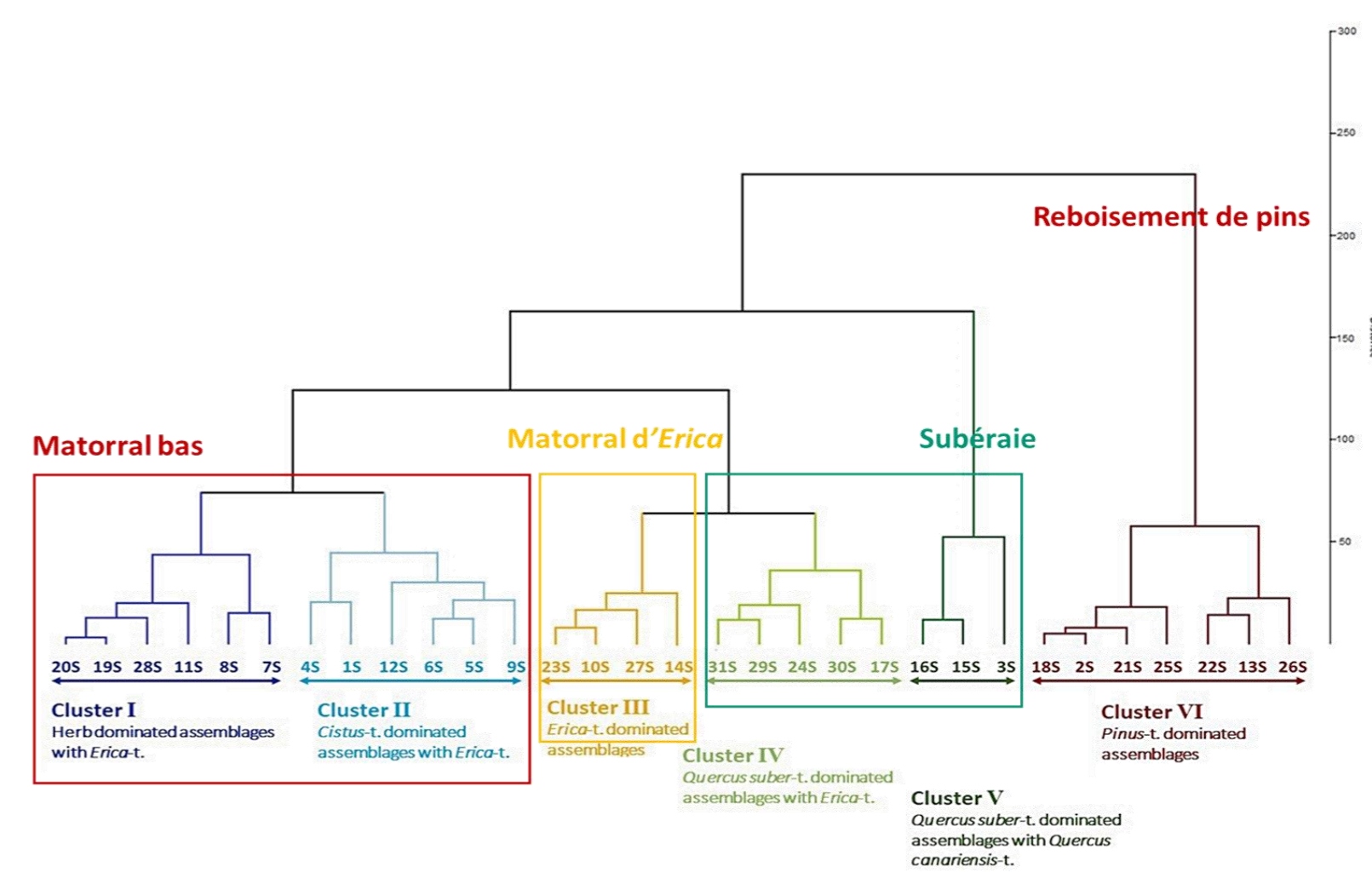
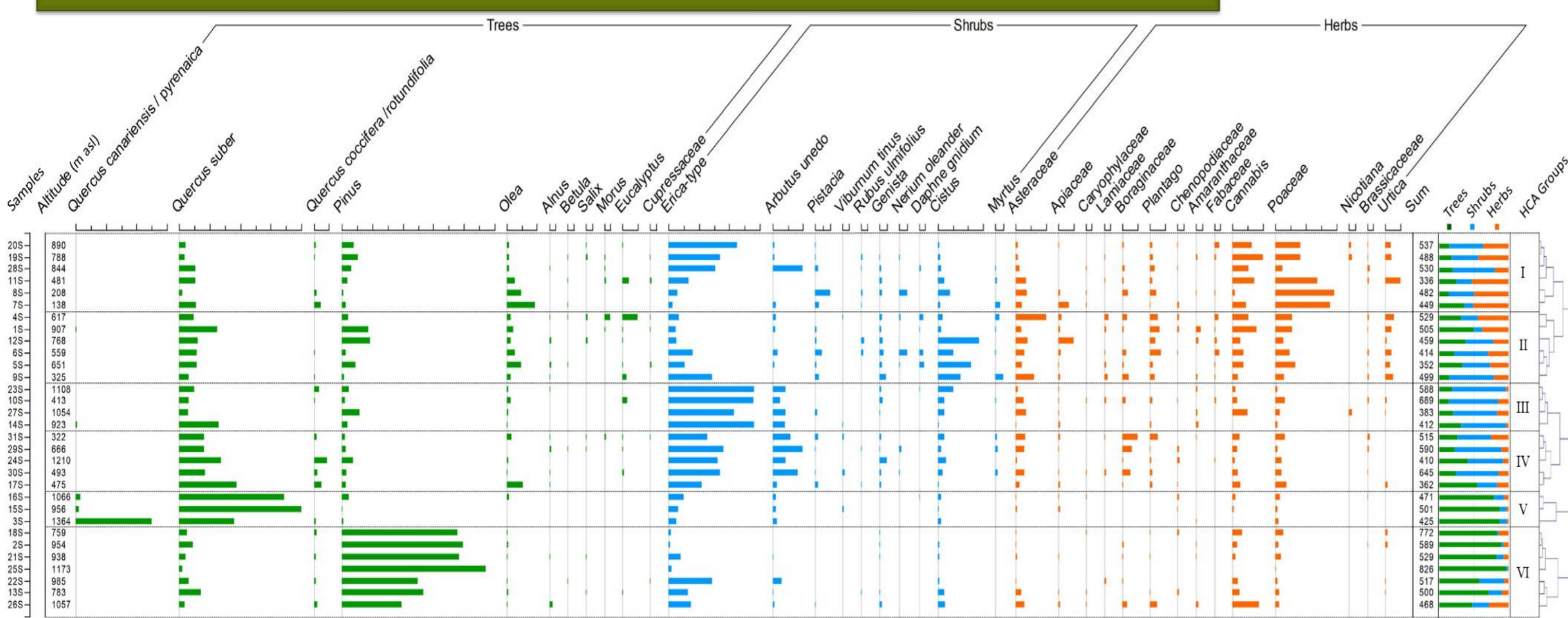
METHOD



Protocole standard : (Faegri et Iversen, 1989)



RESULTS & DISCUSSION



- The multivariate analysis, show clearly the distinction between the main vegetation types wooded communities, matorrals, degraded communities, and open areas
- The variation within the pollen data was displayed by CCA, which shows the variation within and between the six discriminated groups and identifies the variables responsible for this variation in pollen data. Altitude, annual precipitation and tree cover differentiate the high-mountain communities, whereas the land use and anthropogenic variables contribute to differentiate the degraded and grazed communities

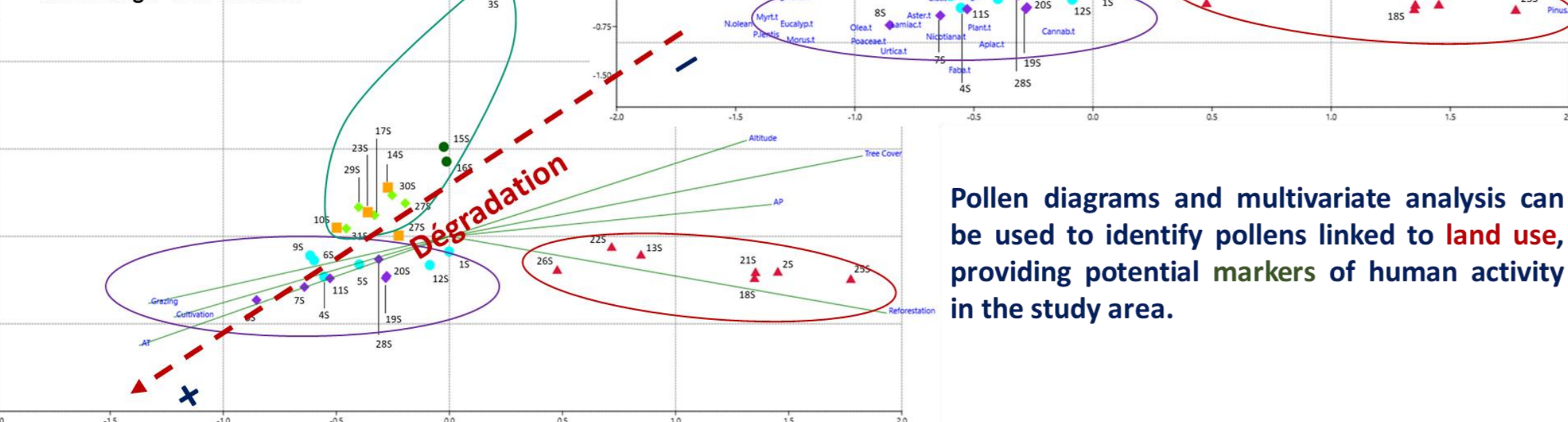
CONCLUSION

- Our investigation supports paleontological investigations of vegetation dynamics and climate in the Rif Mountains by helping to refine the pollen types that strongly differentiate the vegetation patterns in the Rifian landscape.
- Our results show that the pollen types of Poaceae, Cannabis, Plantago, Nicotiana, Asteraceae, and Urtica are related mostly to human practice and distinguish the disrupted communities.
- This work provides valuable data that have significant implications in the investigation for modern analogues in the Rif Mountains improving climate and the vegetation dynamics interpretations in the Rif landscape

Canonical correspondence analysis

Axe 1: 45,37 %
Axe 2: 33,67%

ACC ordination of pollen assemblage and variables



Pollen diagrams and multivariate analysis can be used to identify pollens linked to land use, providing potential markers of human activity in the study area.