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COM A CIÊNCIA
E TECNOLOGIA
EM PORTUGAL
28 a 30 JUNHO 2021
#ciencia2021PT

Using sedimentary leaf waxes and specific isotope signal to infer past climate in Western Iberia

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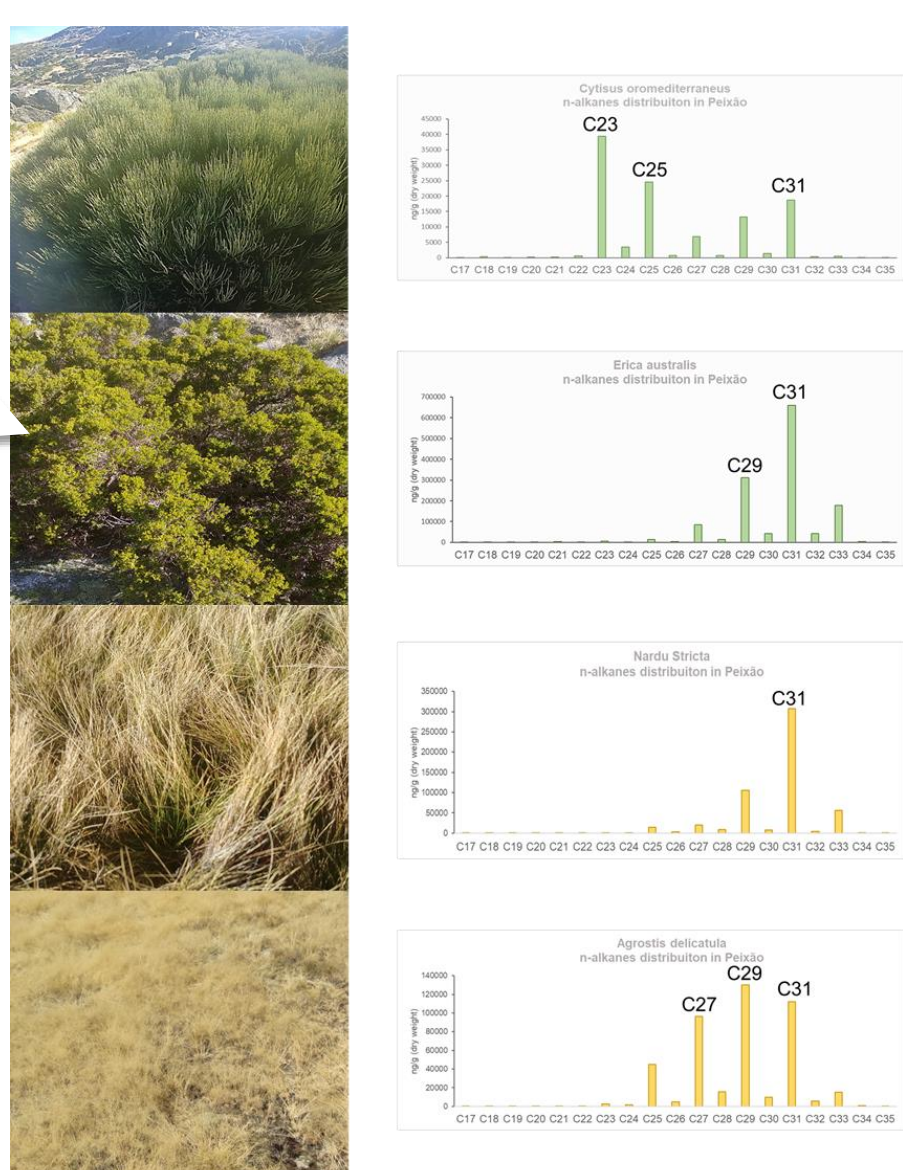
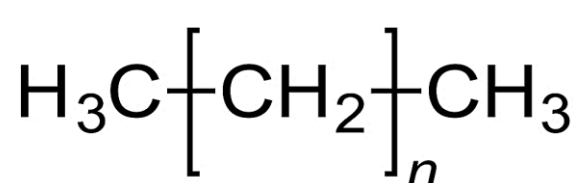
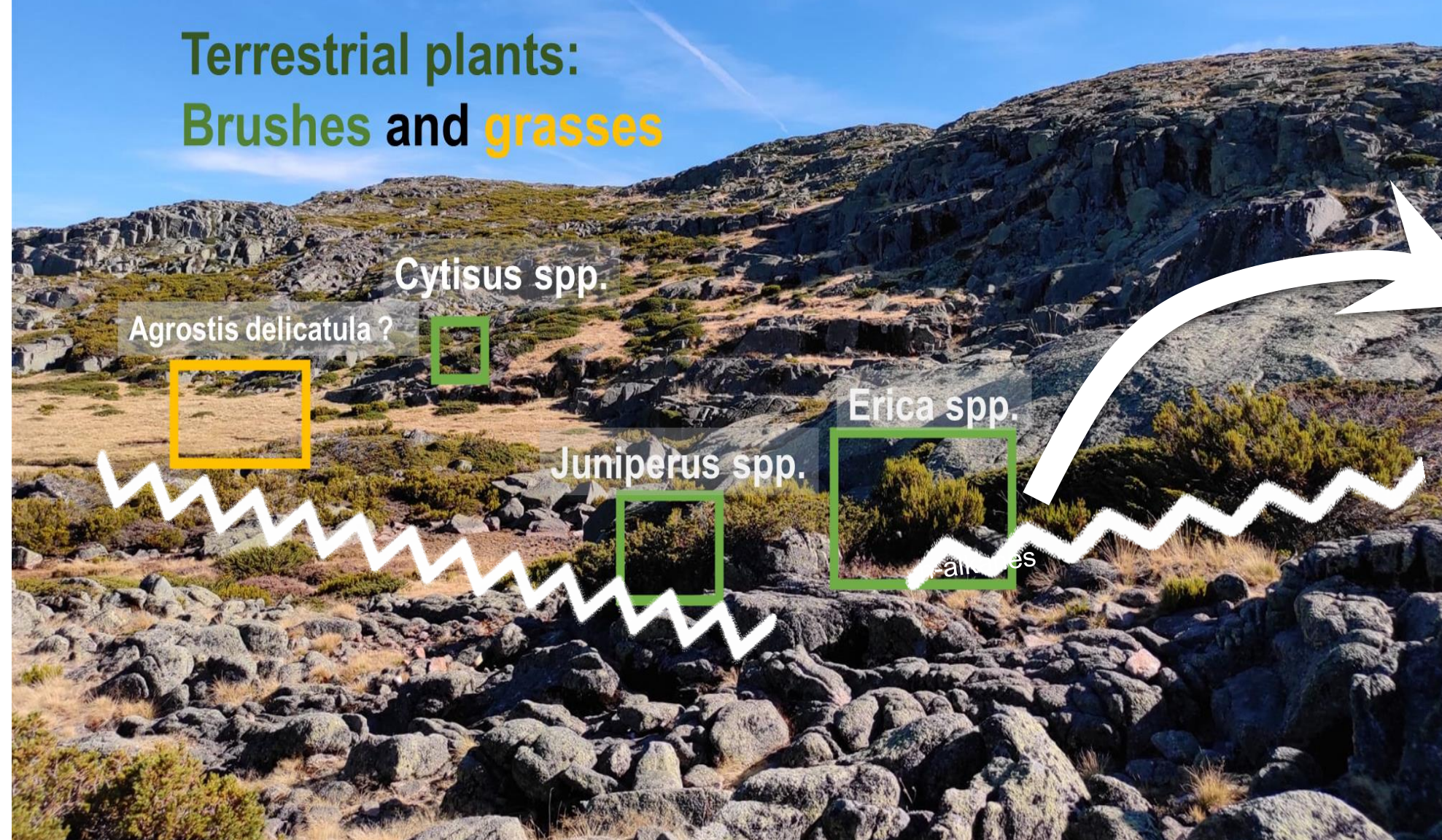
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Modern *n*-alkane characterization

Terrestrial plants:
Brushes and grasses



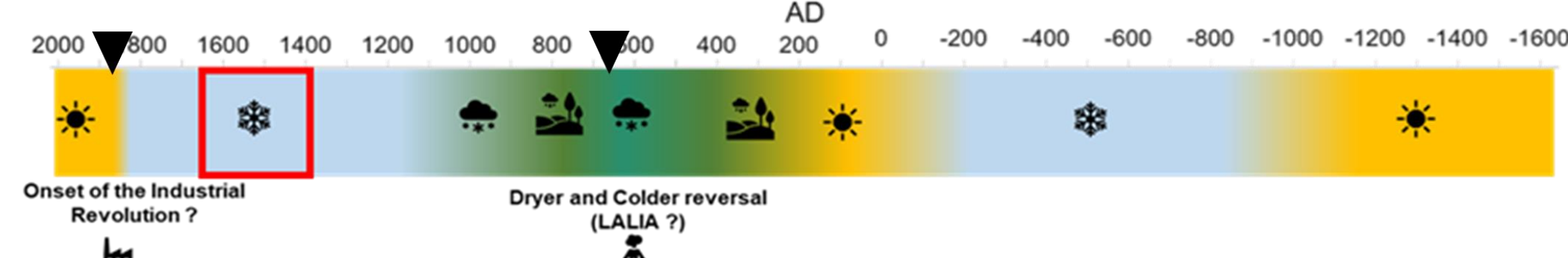
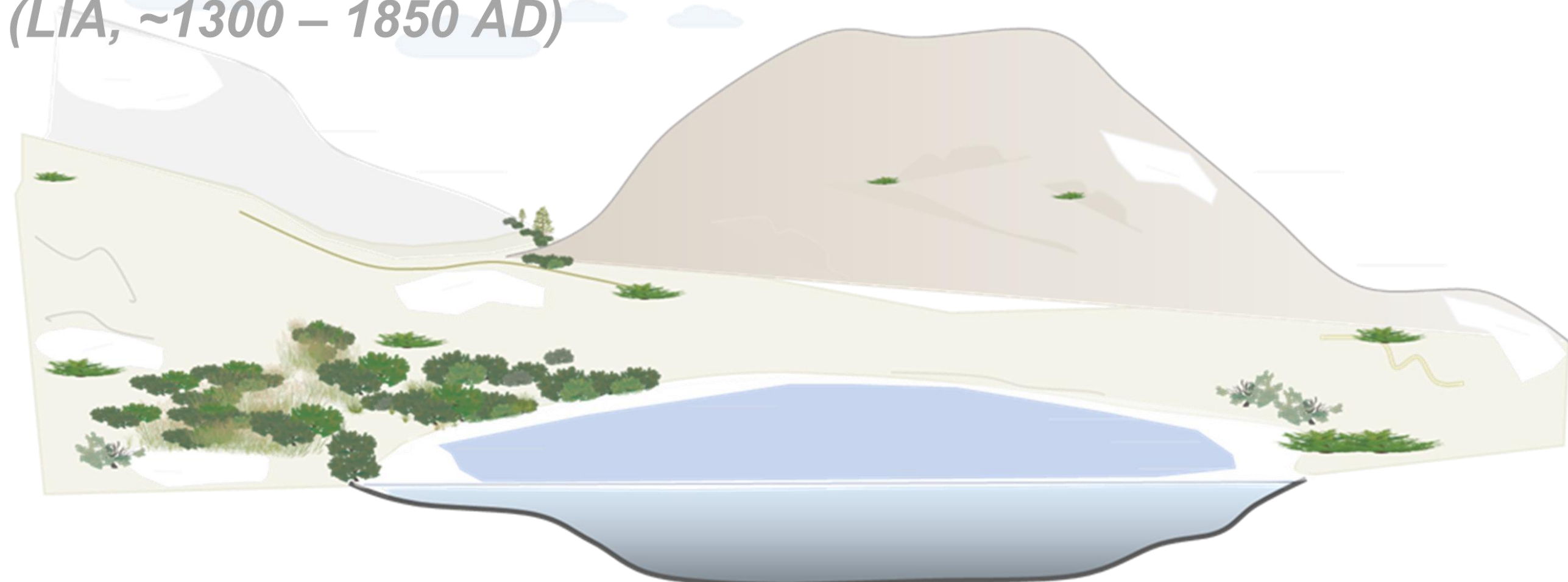
Here we present the preliminary results of our paleoclimate study which utilize a sediment core retrieved from a lake in **Serra da Estrela**, covering the last ~3600 years.

The *n*-alkanes signal (leaf waxes biomarkers), along with other climate and environmental proxies, were used to infer the following reconstruction and climate drivers.

Climate reconstruction in Serra da Estrela

Little Ice Age
(LIA, ~1300 – 1850 AD)

Lake Peixão Spring season



Dry and Warm

Dry and Cold

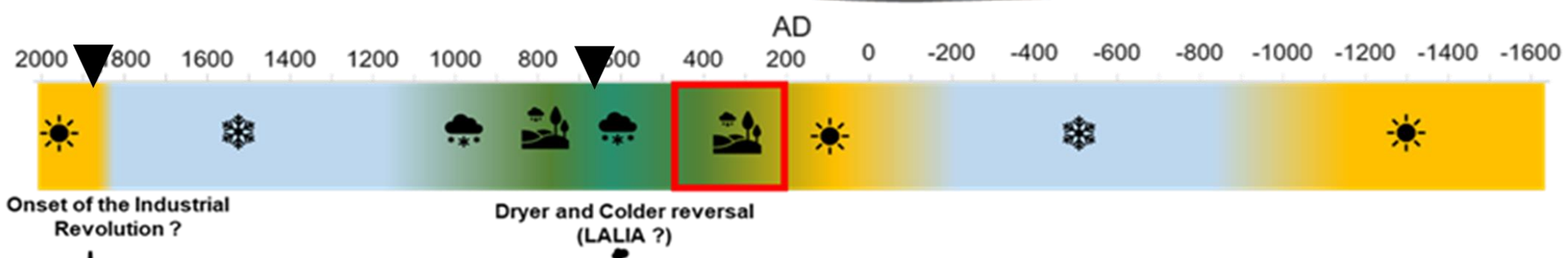
Cold and Wet

Warm and Wet

▼ Abrupt shifts

Lake Peixão Spring season

Roman Period
(RP, ~0 – 500 AD)

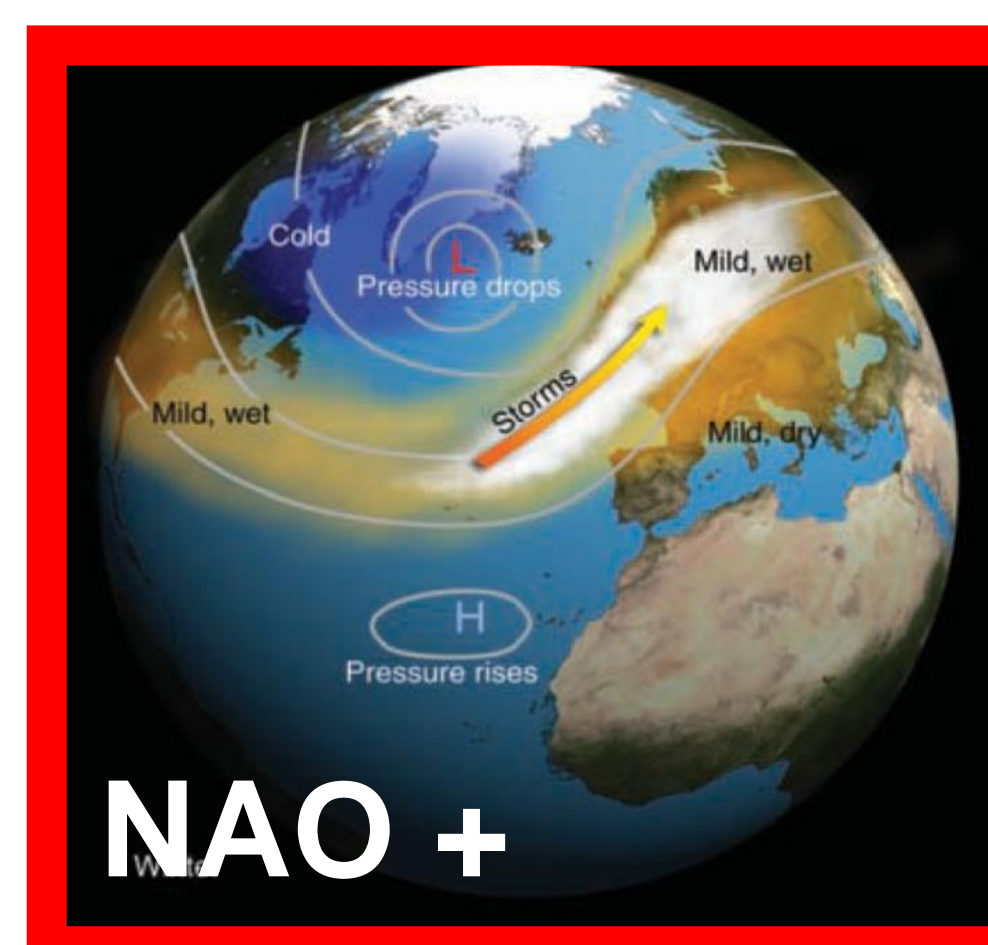


Climate
forcing

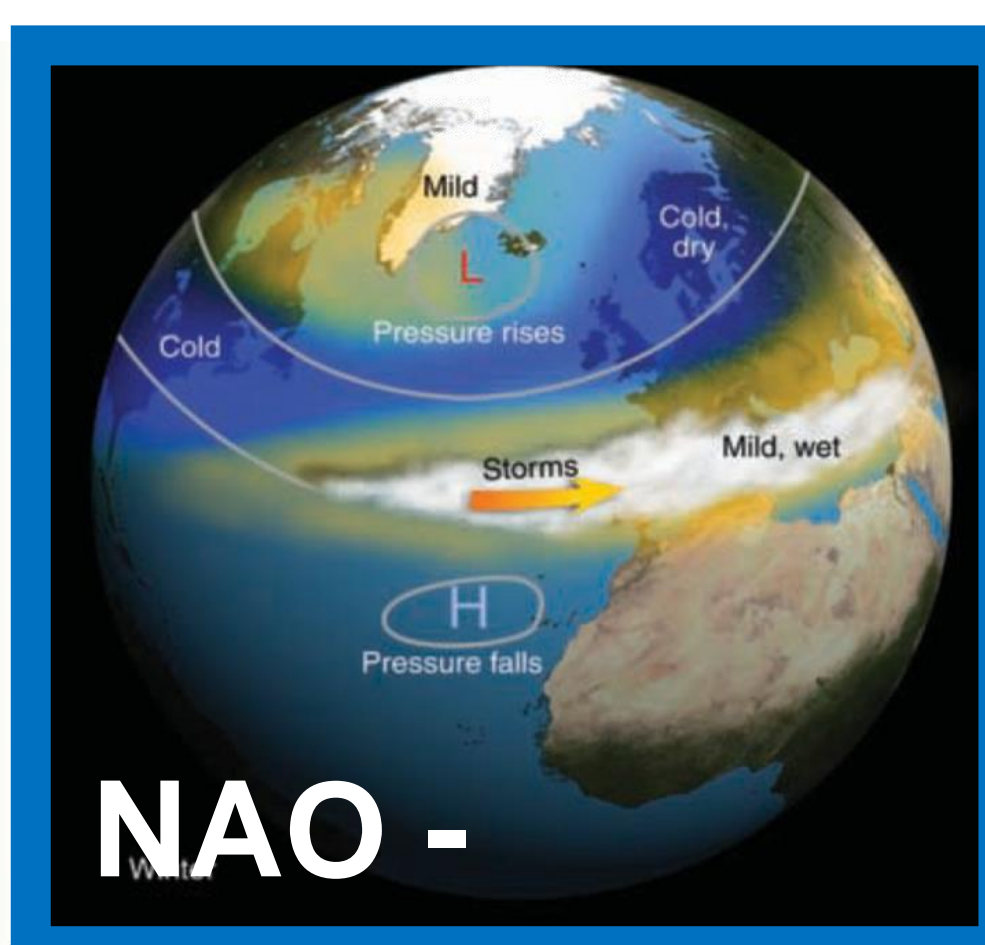
Biomarkers extraction process by Ricardo N. Santos



YouTube video about the lab work



NAO +



NAO -

Figure adapted from Petersen, J. F., Sack, D., and Gabler, R. E., 2008
(Physical geography, 9th edition).

Main conclusions:

- The lake ecosystem has shown a sensitive response to major climate forcers, highlighting Serra da Estrela mountain as a key area for paleoclimate studies.
- Periods of enhanced cold and dry conditions can be seen at ca. 2.8ka and during the LIA, under dominant NAO- and low solar activity.
- Milder climate with wetter conditions dominated during periods such as the RP, coeval with NAO+, and higher solar activity.
- There are two major changes in the regime of abruptness:
 - ~670 AD coeval with prior major volcanic activities, which lead to a short period of colder and dry climate.
 - ~1850 AD contemporary with the onset of the Industrial Revolution and changes in the grazing activity in Serra da Estrela, possibly linked with an increase in eutrophication conditions.

Acknowledgments:

The financial support for this work was possible through the following FCT project:
[HOLMODRIVE](#)—North Atlantic Atmospheric Patterns Influence on Western Iberia Climate: From the Late Glacial to the Present (PTDC/CTA-GEO/29029/2017).

