

Comparing C and N stable isotopes analysis between urban and peri-urban Mediterranean parks along a latitudinal transect

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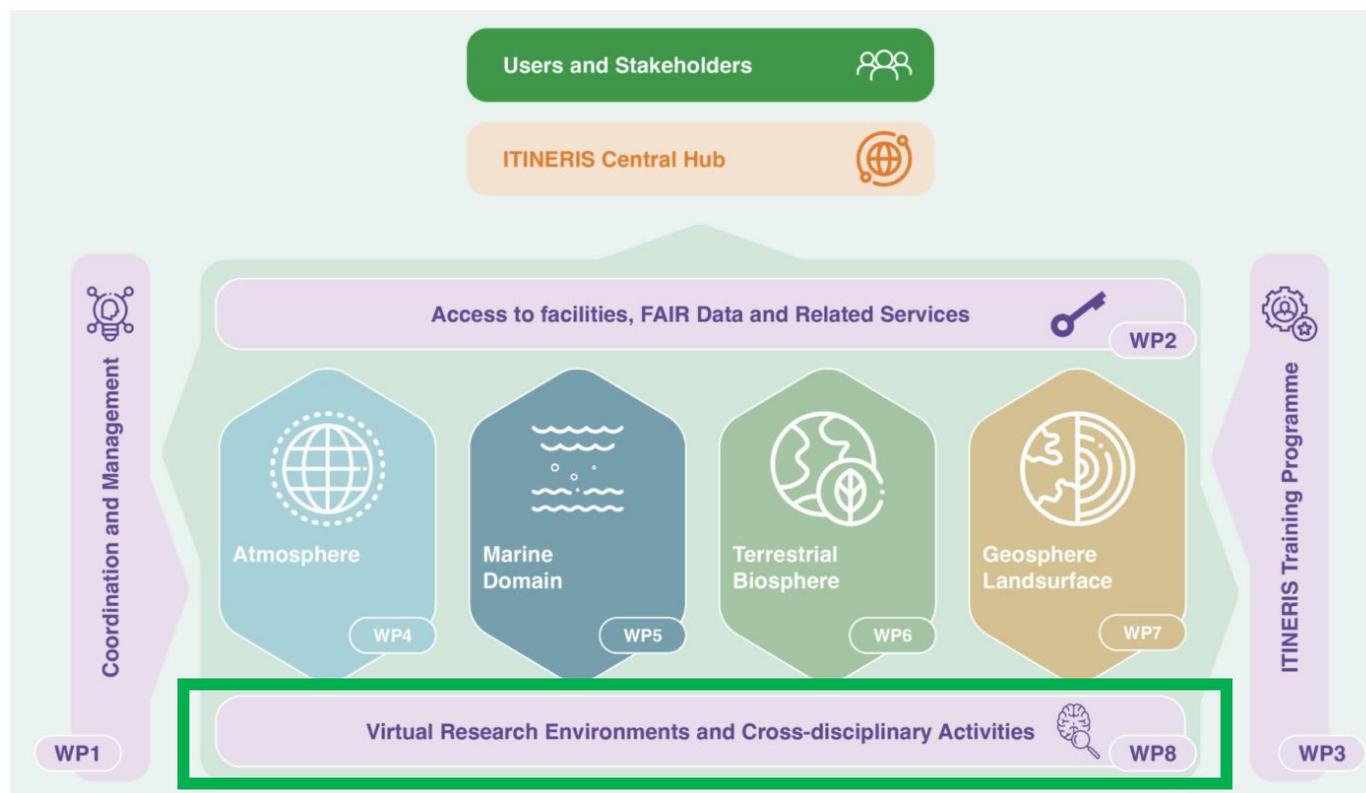
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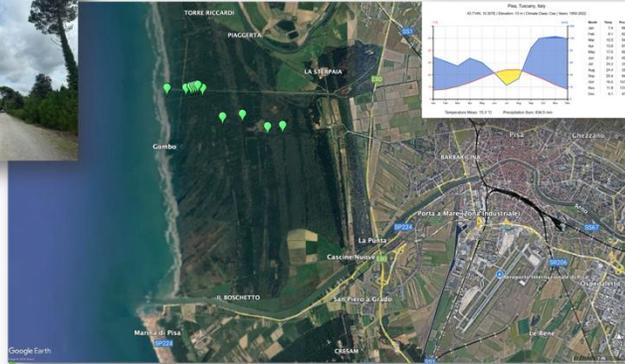
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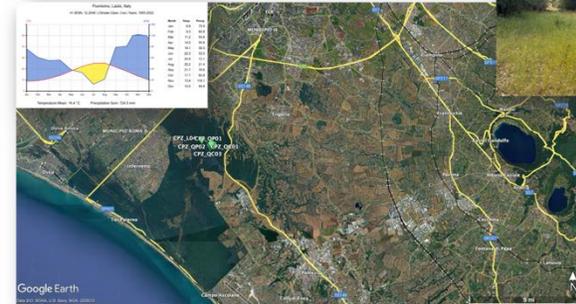
Rome, February 18th-19th, 2025



Study areas



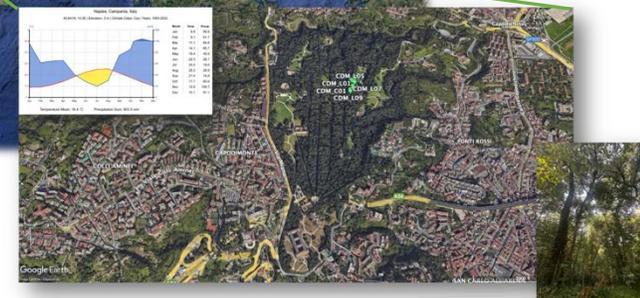
Castel Porziano (CPZ) – Rome
25m asl, ~25 km SW of Rome, presidential estate and hunting reserve since 1949. Due to its proximity to Rome, it has been impacted by human activities since Roman time.



Capodimonte (CDM) – Naples
149m asl, is an urban park established in 1700's as a hunting reserve and has been used for recreational activities since then. The vegetation is represented by mixed native and introduced species planted over the centuries.

Among the study areas this site is the most impacted by human activities.

San Rossore (SRS) – Pisa
4m asl, ~8 km from Pisa is a peri-urban park, natural reserve since 1979 and used for recreational purposes for centuries. The vegetation is represented by a mixed deciduous and evergreen species.



The three sites were selected among the ICOS (Integrated Carbon Observation System) network



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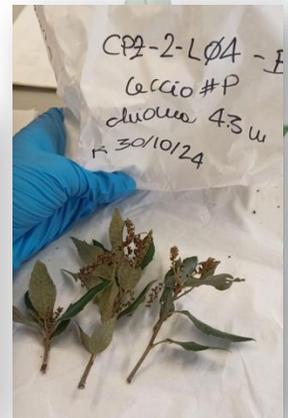
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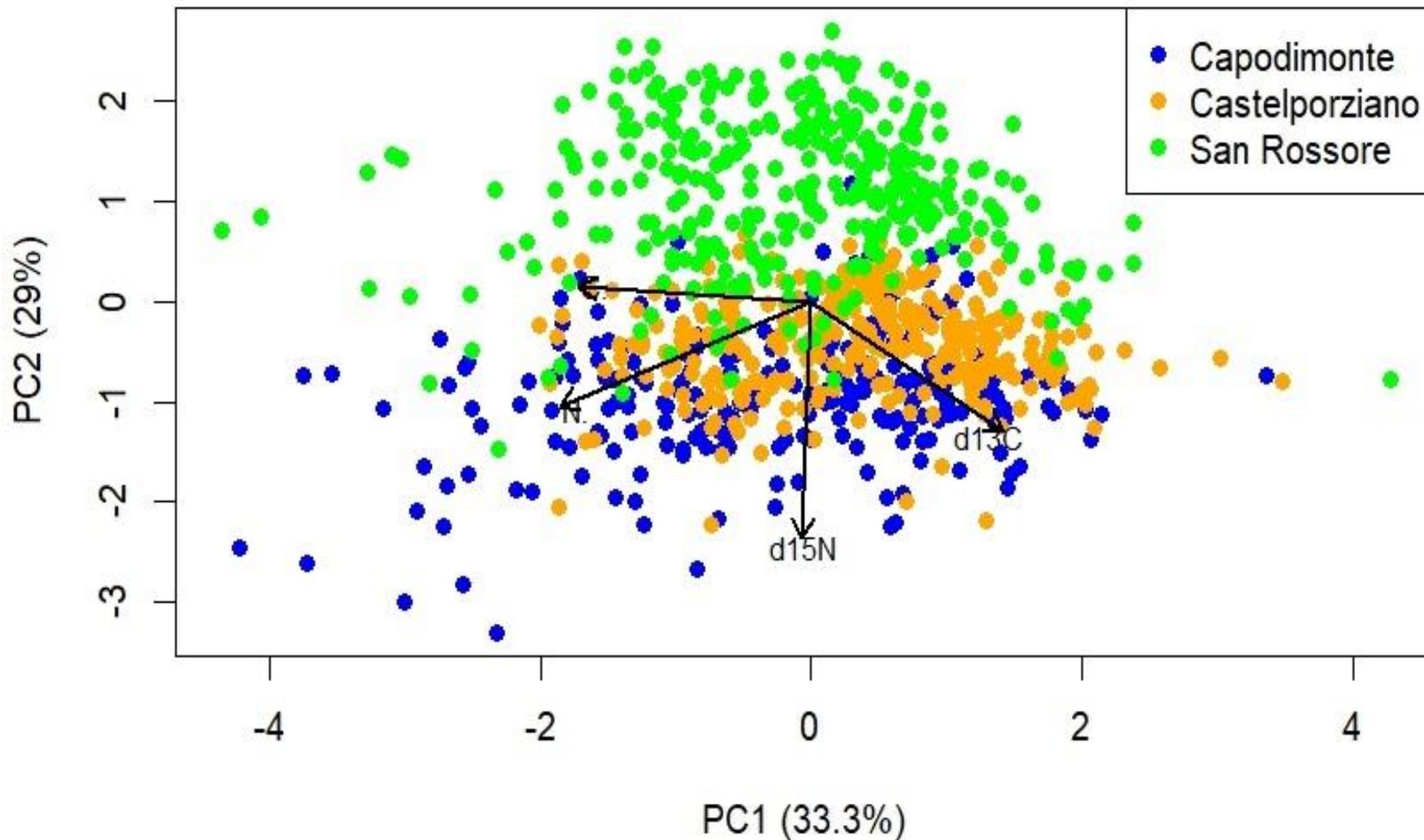


Sampling

- 2 sampling campaigns (May-Jun and Oct-Nov 2024)
- 3 sites (Capodimonte, Castel Porziano, San Rossore)
- 8 species
- 41 trees
- ~300 samples (vegetation + soil)
- ~1300 subsamples
- ~1000 C %, N%, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ analysis

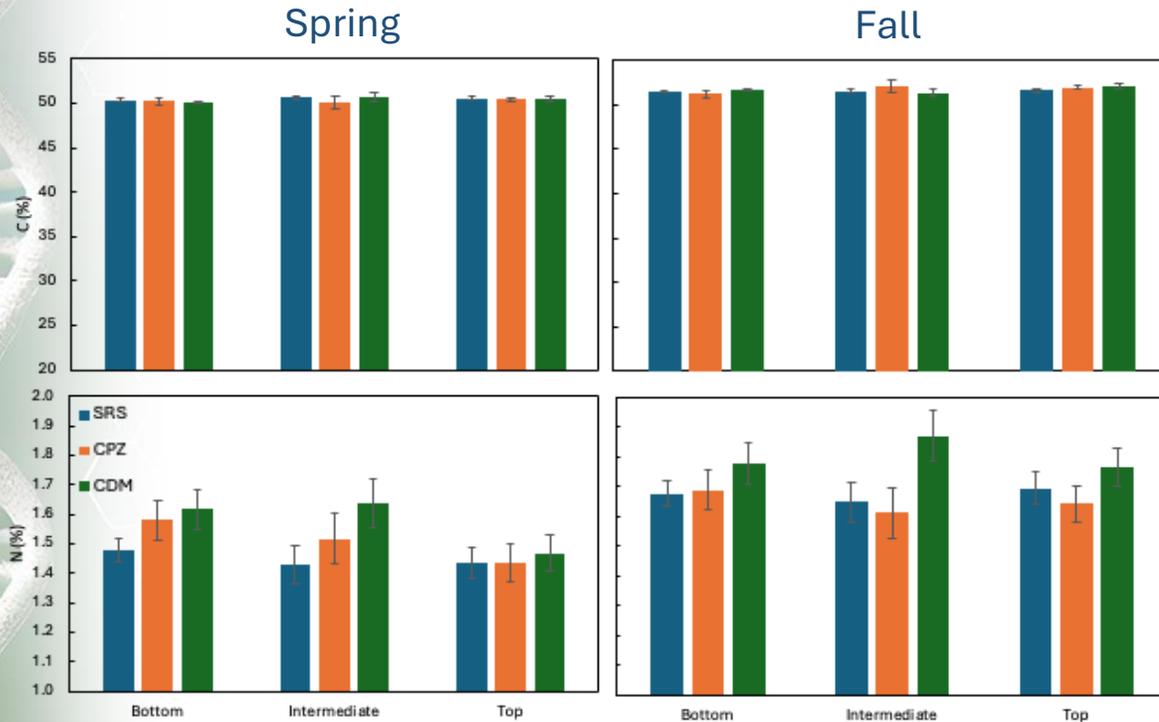


Sites separation along the latitudinal transect

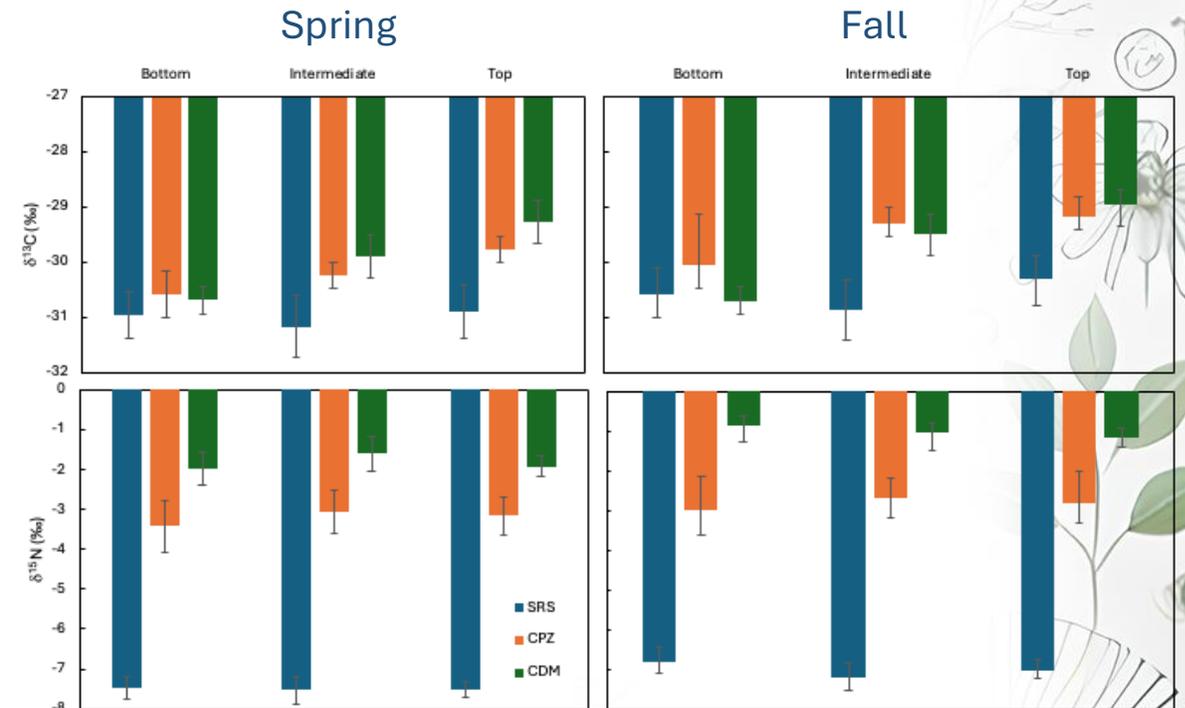




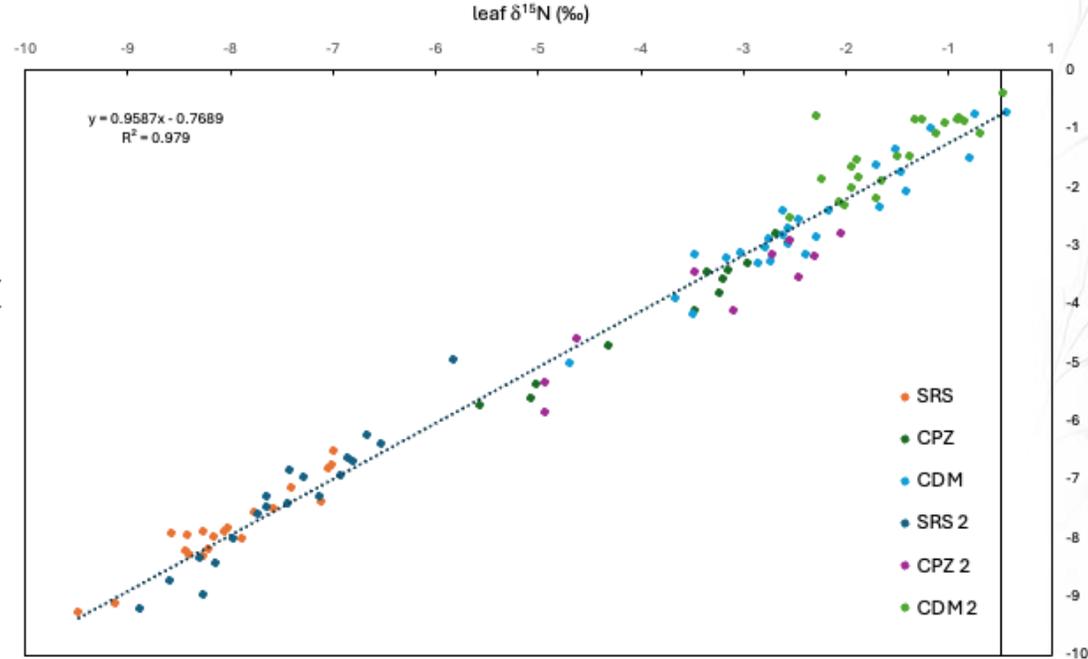
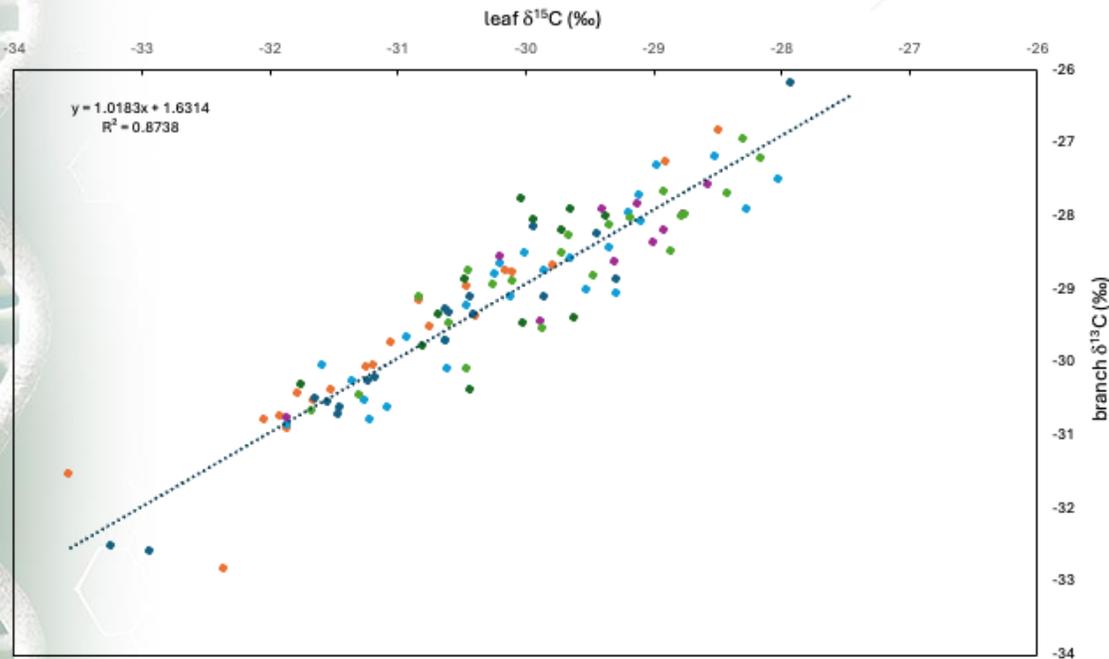
Holm oak (*Quercus ilex*) was chosen as potential bioindicator of environmental changes.



- Differences in C and N concentrations and isotope compositions were observed along the latitudinal gradient and seasons
- Capodimonte, the most southern site, reveals an enrichment in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ in leaves compatible with a response to hot and dry climate, and a much higher degree of anthropization
- Castel Porziano shows a similar trend but with lower $\delta^{15}\text{N}$ and N concentration



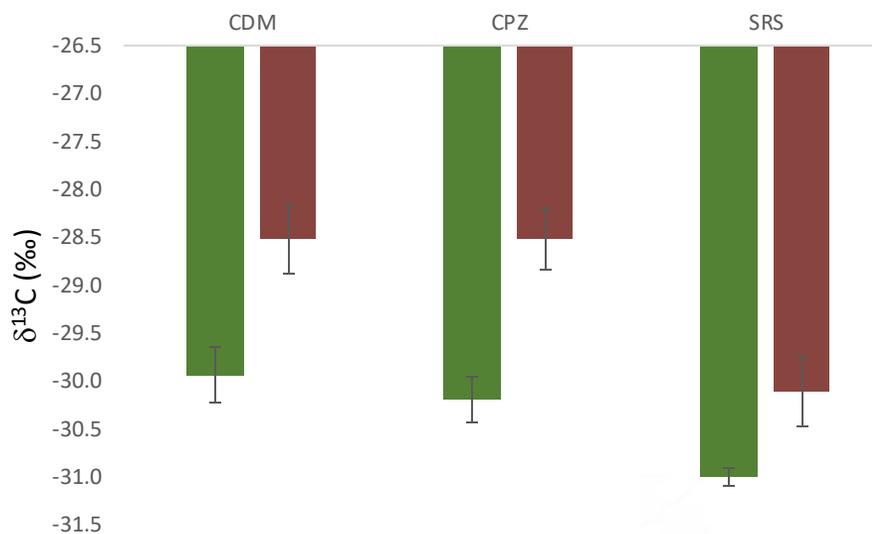
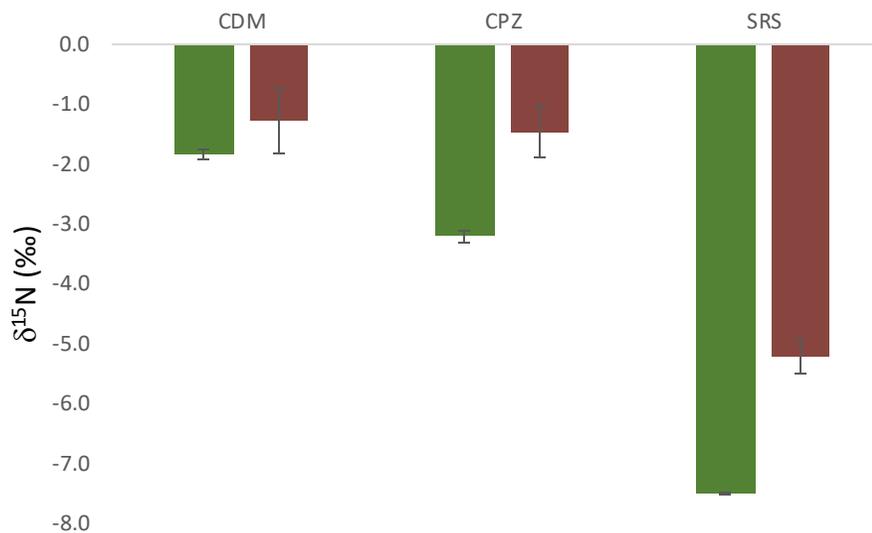
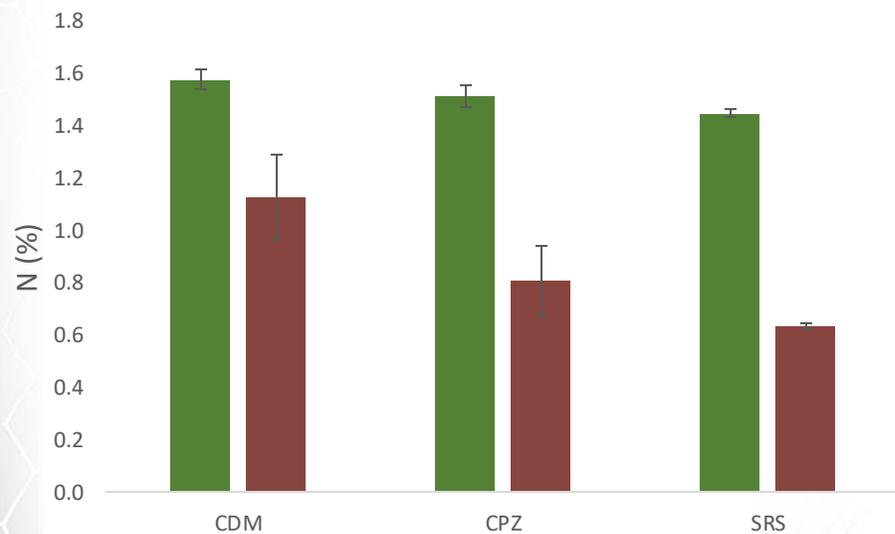
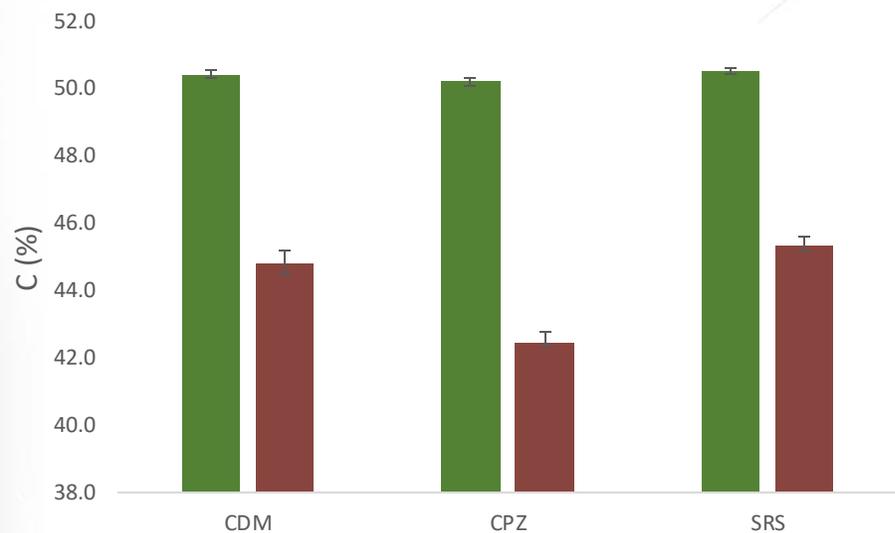
- San Rossore, the most northern site, appears to be less exposed to summer water stress and consequently shows more diluted $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values
- Leaves during the fall showed higher $\delta^{13}\text{C}$ and N concentration compared to spring



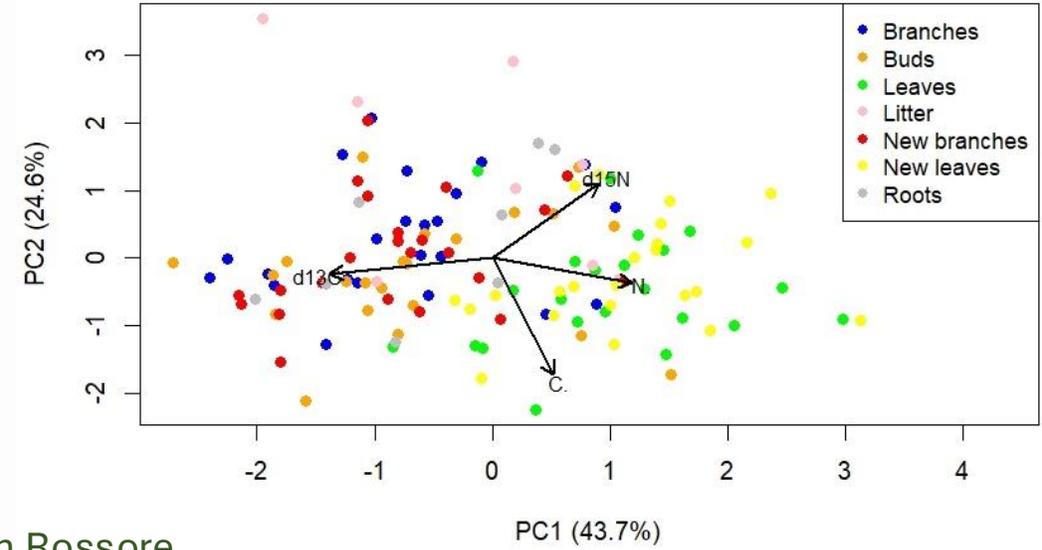
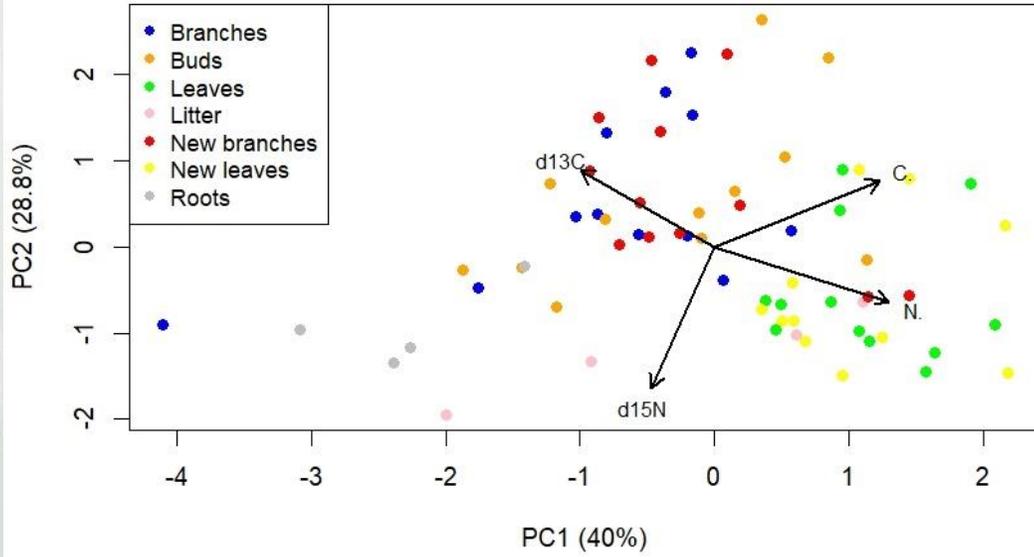
Linear relationships of C and N isotope compositions between leaves and branches show that branches were about 1 ‰ enriched in $\delta^{13}\text{C}$ compared to leaves



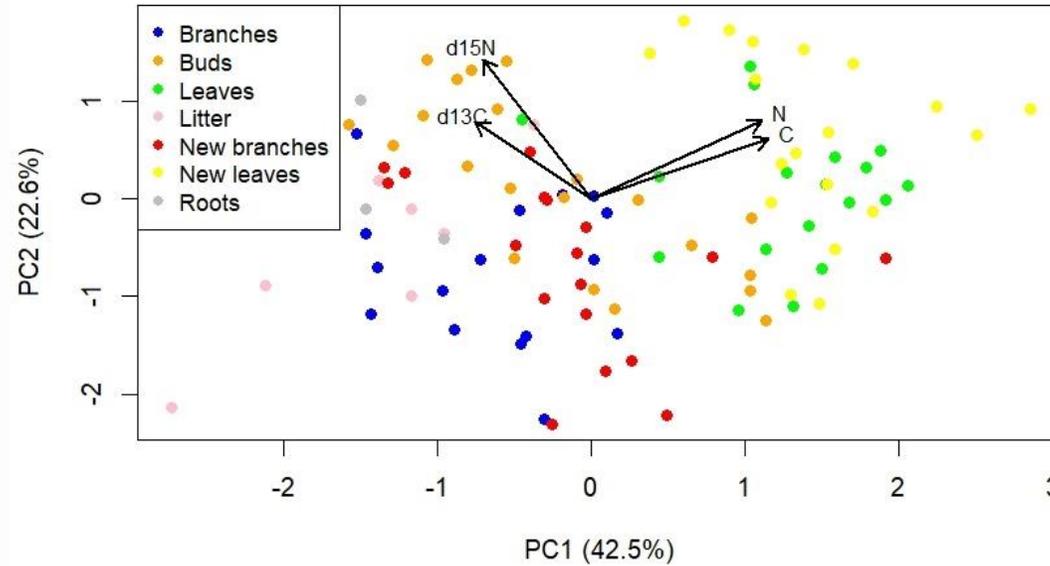
Source vs sink comparison



■ Leaves
■ Roots



San Rossore





Further analysis are in progress on other plant compounds, including pollen extracts, and soil samples using new methodologies like LA system to better understand the response of Mediterranean species to climate change and human impact



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Stable carbon isotope analysis on fossil *Cedrus* pollen shows summer aridification in Morocco during the last 5000 years

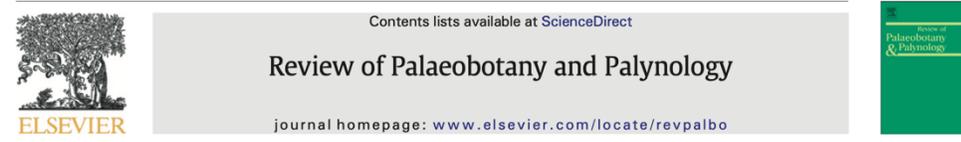
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Stable carbon isotope analysis of *Cedrus atlantica* pollen as an indicator of moisture availability

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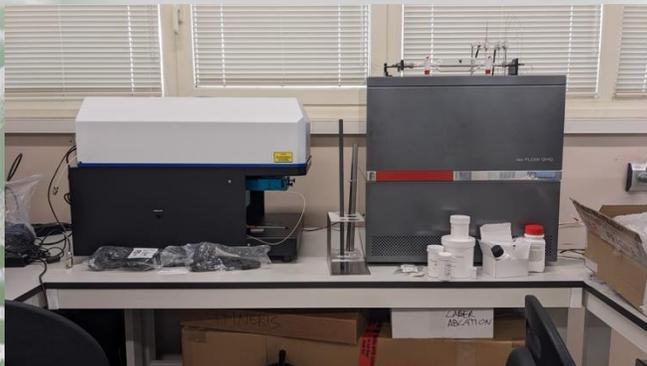
Montelibretti

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- IRMS
- GHG
- Laser Ablation System
- IsoToc





Thank you!

