SCIENZE A SISTEMA PER LA SOSTENIBILITÀ
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Palynology reveals anthropogenic environments in Central-Eastern Mediterranean during the mid-late Holocene

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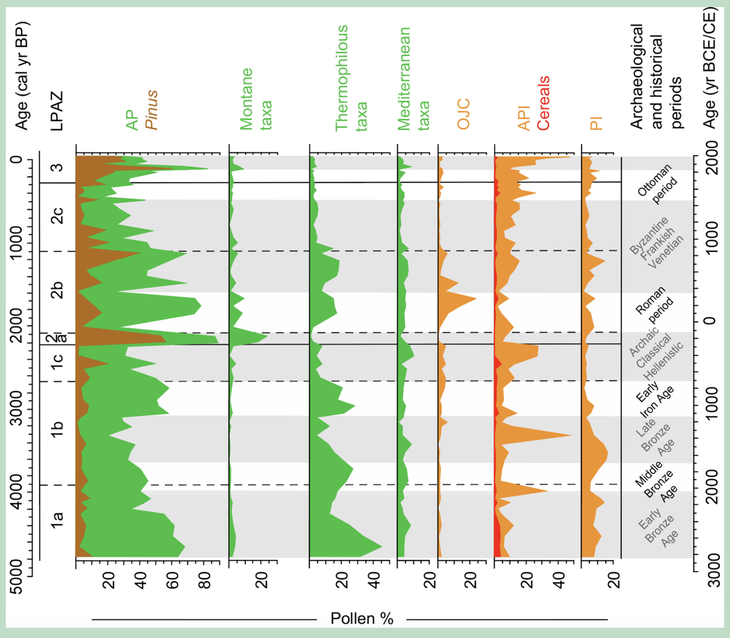
The Holocene represents a period of significant climatic and environmental changes in the Mediterranean. In particular, its central-eastern region was a cradle of important ancient civilizations, where agro-pastoral and trading activities flourished leaving indelible marks on the landscape. Through detailed analysis of pollen records we have been able to infer the interplay between vegetation dynamics and human exploitation. The **Laboratory of Archaeobotany and Palynology** has been involved in the study of Holocene vegetation from 6 records of Greece, Turkey, and Italy (central map), providing critical insights into the ecological history of the Mediterranean and reconstructing how ancient human societies adapted to and modelled the landscape.

Lerna Lake is an ancient coastal lake in the Argive Plain (Peloponnese, Greece), today represented by a seasonal wetland. The area was intensively occupied since the Early Bronze Age and some of the most notable archaeological sites in Greece were settled here.

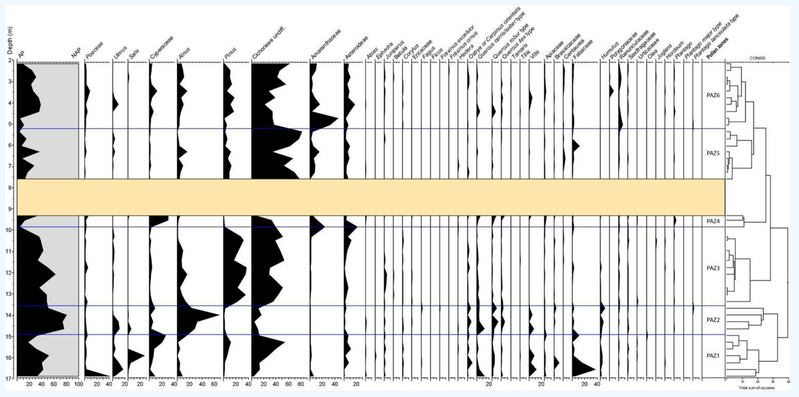
The expansion of *Olea* groves in the plain at the expense of woodland reveals how past economic activities impacted on the landscape during the Late Bronze Age and, above all, during Roman times marking the control on land use.



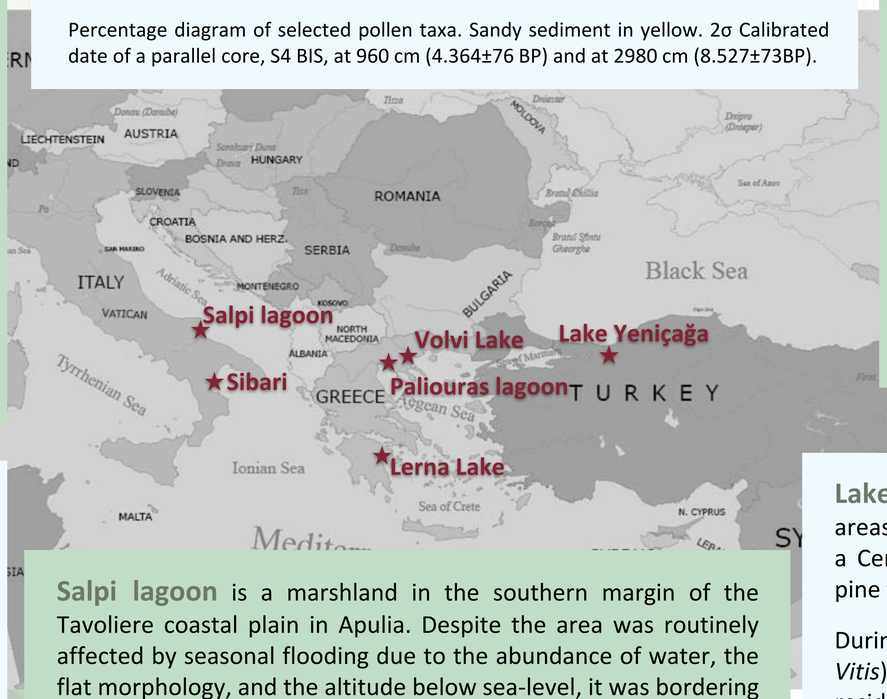
Percentage diagram of selected pollen taxa and ecological groups (OJC: *Olea, Juglans, Castanea*; API: Anthropogenic Pollen Indicators; PI: Pastoral Indicators) of ancient Lerna Lake.

Sibari Plain, in northeastern sector of Calabria, covers a surface of about 470 km^2 and it is affected by the subsidence mainly due to the compaction of alluvial sediments. The plain has a seaward long-term migration rate of ~1.0 m/yr.

The plain experienced continuous changes in vegetation composition during time, with a persistent prevalence of grasslands. The peak of *Alnus* in the Pollen Assemblages Zone 2 (PAZ2 of S4TER sequence), in substitution to Cyperaceae, show a wet environment covered by alder canopy, surrounded in the belt hills by patches of oak forests.

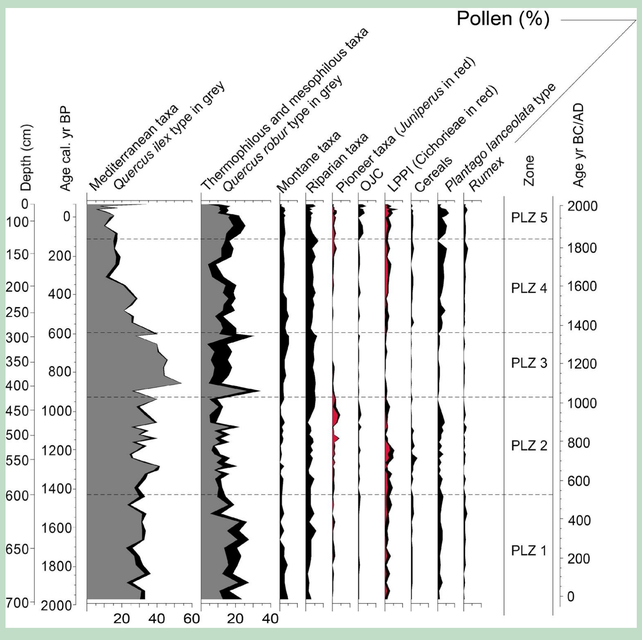


Percentage diagram of selected pollen taxa. Sandy sediment in yellow. 2σ Calibrated date of a parallel core, S4 BIS, at 960 cm (4.364±76 BP) and at 2980 cm (8.527±73BP).



Volvi Lake is the second largest natural lake in Greece (69 km^3), in the tectonic basin of Mygdonia. The area is protected as an important wetland habitat and is located on a strategic position for ancient trades: Via Egnatia.

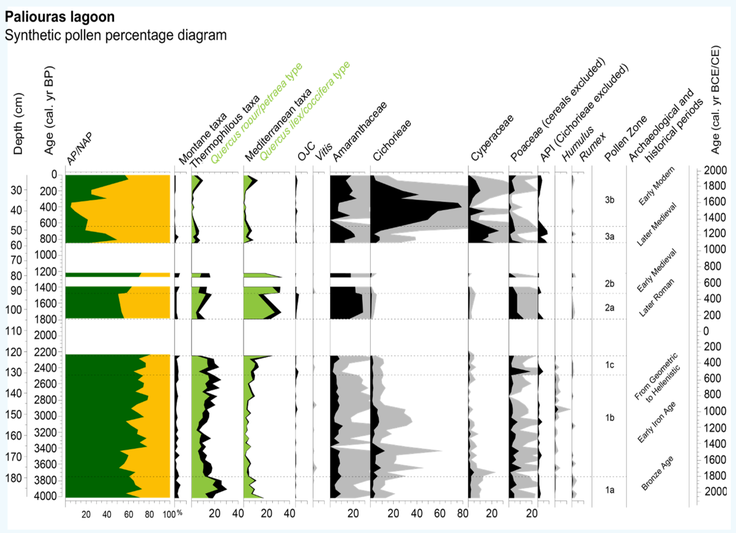
During the Ottoman occupation starting from the 15th AD it is visible the re-introduction of olive (*Olea)* and chestnut (*Castanea*) cultivation together with the spread of animal livestock (LPPI) linked to the demographic growth.



Percentage diagram of selected pollen taxa and ecological groups (OJC: *Olea, Juglans, Castanea*, LPPI: Local pastoral pollen indicator) of Volvi Lake.

Paliouras lagoon is a seasonal coastal site in Halkidiki peninsula (Greece), in a plain at 20 km south from the city of Thessaloniki, capital of the ancient Macedonia.

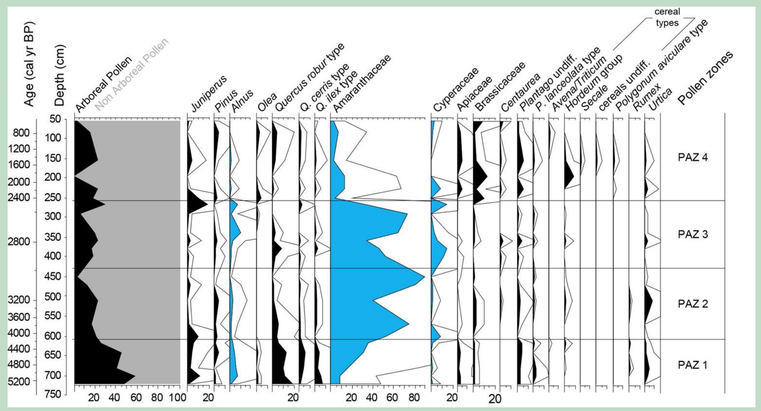
The continuous presence of *Humulus* from the Bronze Age to the Archaic period it is related to its use around the lagoon as an edible plant or for therapeutic purposes.



Percentage diagram of selected pollen taxa and ecological groups (OJC: *Olea*, *Juglans*, *Castanea*, API: Anthropogenic pollen indicator) of Paliouras lagoon compared with archaeological and historical periods.

Salpi lagoon is a marshland in the southern margin of the Tavoliere coastal plain in Apulia. Despite the area was routinely affected by seasonal flooding due to the abundance of water, the flat morphology, and the altitude below sea-level, it was bordering by important settlements during pre-Roman (*Salpia Vetus*) and Roman (*Salapia-Salpi*) periods.

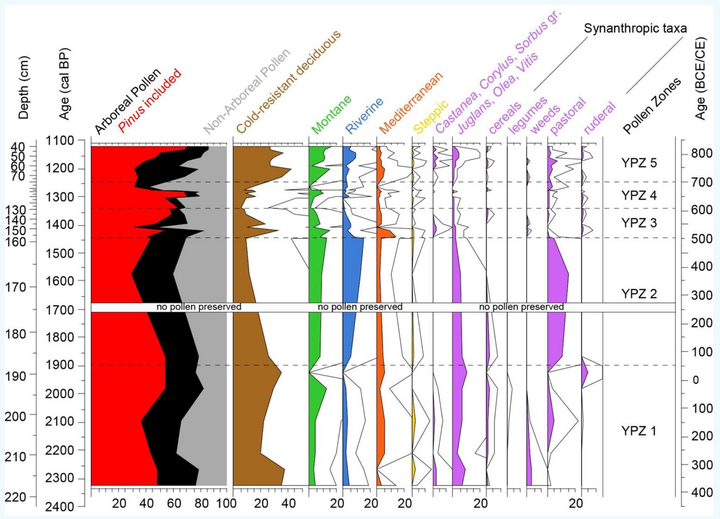
From the Hellenistic period onwards, the expansion of cultivated plants (cereals, olive, vegetables) in addition to synanthropic taxa like pastoral and ruderal herbs reveals the reduction of the brackish wet environment and the exploitation of land by the emerging urban centres.



Percentage pollen diagram of selected terrestrial (black) and wetland (blue) taxa from Salpi lagoon.

Lake Yeniçağa is a shallow water lake surrounded by marshy areas in the mountain region of Northern Turkey. The site displays a Central European beech forest zone to the north and a black pine forest zone to the south.

During the Late Antiquity tree cultivation (*Olea*, *Juglans*, *Castanea*, *Vitis*) and pastures characterised the landscape around the lake as residual activities of the intensive land exploitation under the Roman control.



Percentage diagram of selected pollen taxa from Lake Yeniçağa.

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