

## Study of Pleistocene ostracods from central and southern Greece- Digital imaging of a palaeoenvironmental tool (PLOSTRAC): Preliminary results

P. Papadopoulou<sup>1</sup>, M. Tsoni<sup>1</sup>, G. Iliopoulos<sup>1</sup>

(1) University of Patras, Department of Geology, Laboratory of Palaeontology and Stratigraphy, Panepistimioupoli, Rio, Greece, 26504, penelpapadop@upatras.gr

### Introduction

The Pleistocene has been a period of continuous universal climatic turmoil due to the establishment of glacial and interglacial periods and their periodic alteration (Millankovic cycles) which stigmatized Quaternary climates and ecosystems. Ostracods can be found in a wide variety of environments from alpine lakes to abyssal basins (Schellenberg, 2007) being excellent palaeoenvironmental indicators (Rodriguez-Lazaro and Ruiz-Munoz, 2012). Their highly calcified bivalve carapace can be easily fossilized. Actually, they are among the small number of organisms that can be found not only in great numbers especially in transitional environments, but also they are environmentally sensitive to several factors such as salinity, water chemistry, substrate characteristics, temperature, oxygen and nutrient availability (Frenzel and Boomer, 2005). All these factors cause severe changes in the composition of the ostracod assemblages, even in the intraspecific level, and high endemism.

The project's main objective is to study the Pleistocene ostracods deriving from sedimentary successions from central and southern Greece. The different species that dominate each ecological niche, their morphology, distribution, systematics, history and ecological preferences are examined. Moreover, high quality SEM images of the respective ostracod species have been produced and can serve as reference point for future studies. The results of this project will cover a significant gap in the Greek ostracod record which is rather incomplete compared to that of central Europe.

### Material and Methods

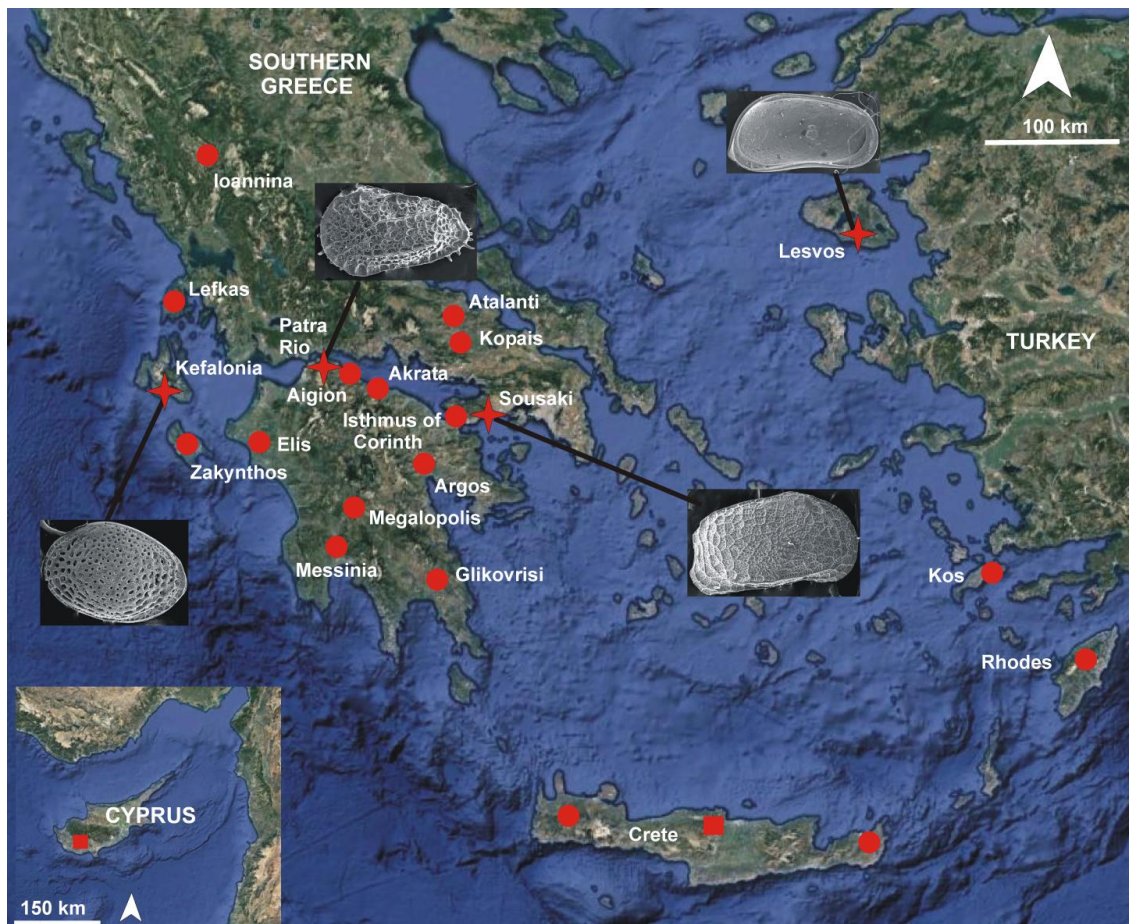
A bibliographic review of Pleistocene sediments that can be found in central and southern Greece took place in order to detect possible sampling sites. The location of the selected sedimentary sequences was mapped and at least 10 samples from each study site were collected. The samples were transported and stored at the Laboratory of Palaeontology and stratigraphy of the University of Patras. Sediment samples were appropriately processed (using tap water and/or suitable chemicals such as perydrol and dried), using standard methods. The fossils were handpicked and sorted under a stereoscope. After the determination of the tests, down to the species level, using appropriate atlases and keys (e.g. Stereo Atlas), representative valves of each ostracod species were cleaned and SEM photographed. Additionally, published literature that concerns the identified species and their distribution and palaeoecology is being studied as a comparative tool for the results of the project.

### Results & Discussion

Pleistocene sediments have been recorded in several places throughout central and southern Greece (Fig.1). Lower Pleistocene sedimentary sequences have been found in Atalanti (Central Greece), in Messinia and Lakonia (Southern Peloponnese) and also in Kefalonia (Ionian Sea) and Kos islands (Aegean Sea). Lower to Middle Pleistocene sequences have been recorded in Megalopolis (Southern Peloponnese) and in Zakynthos Island (Ionian Sea) while Middle Pleistocene sediments can be found in Lesbos Island (Aegean Sea). In Ioannina and Kopais (central Greece) sediments of Middle to Early Pleistocene age can be found. Finally Upper Pleistocene sediments have been recorded all over Crete Island and in Argos (NE Peloponnese). In Elis (West Peloponnese) and across the Southern margin of the Corinth Gulf (Northern Peloponnese) sediments that cover all Pleistocene can be found as it is also the case for Rhodes Island and for Cyprus. For this reason these areas are considered particularly important for the study of the Pleistocene evolution in central and Southern Greece.

Most of the recorded Pleistocene sedimentary sequences were deposited in marine environments. Lacustrine sequences have been recorded in Megalopolis Basin and on Lesbos and Kos islands. Across the Southern margin of Corinth Basin and also in Cyprus the sedimentary sequences show marine, transitional and lacustrine characteristics.

Currently, micropalaeontological analysis has been conducted in samples from the southern margin of the Corinth Gulf (Rion and Corinth Basin), and from Kefalonia and Lesbos islands. Ostracods belonging to 17 different families have been identified (Candonidae, Cushmanideidae, Cyprididae, Cytherellidae, Cytherideidae, Cytheruridae, Darwinulidae, Eucytheridae, Hemicytheridae, Leptocytheridae, Limnocytheridae, Loxoconchinidae, Neocytherideidae, Paradoxostomatidae, Pontocyprididae, Trachyleberididae, Xestoleberididae) and characteristic SEM photos are presented herein.



**Figure 1.** Satellite image (Google Earth) of central and southern Greece and Cyprus, depicting the geographic distribution of the Pleistocene sediments that have been recorded until now. Stars: studied sections, squares: under study sections, circles: other Pleistocene sections. Characteristic SEM images of Pleistocene ostracods from the studied sections are shown (Patra-Rio: Trachyleberididae, Kefalonia: Loxoconchinidae, Sousaki: Hemicytheridae, Lesvos: Candonidae).

### Future perspectives

Representative Pleistocene sedimentary successions from marine, transitional and lacustrine palaeoenvironments will be selected and sampled in order to acquire robust information about the Pleistocene ostracods of central and Southern Greece. Samples from Crete and Cyprus are already under study while two other Pleistocene sites (Elis and Megalopolis) have already been planned for sampling. This project will produce a digital collection with characteristic SEM photos of the identified ostracod species and respective information about their systematics, their ecology and distribution. A catalog with the bibliography on Greek Pleistocene ostracods will also be included. This collection intends to promote the communication between specialists and will greatly facilitate future research in the study of Pleistocene palaeoenvironments. At the same time, the gathering of published literature and the new data that will emerge will allow a future comparison of the Pleistocene ostracod species of central and southern Greece with the European Pleistocene ostracod record in order to ascertain possible relationships.

### Acknowledgements

The authors would like to sincerely thank Ac. Prof. Koskeridou E. and Dr. Agiadi K. for providing us the samples from Kefalonia. We would also like to thank Dr. Tsiolakis E. for providing us the samples from Cyprus. This project is implemented through the Operational Program "Human Resources Development, Education and Lifelong Learning" and is co-financed by the European Union (European Social Fund) and Greek national funds.



Επιχειρησιακό Πρόγραμμα  
Ανάπτυξη Ανθρώπινου Δυναμικού,  
Εκπαίδευση και Διά Βίου Μάθηση  
Ειδική Υπηρεσία Διαχείρισης  
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



### References

- Frenzel, P., Boomer, I., 2005. The use of ostracodes from marginal marine, brackish waters as bioindicators of modern and Quaternary environmental change. *Palaeogeography, Palaeoclimatology, Palaeoecology* 225, 68– 92. <https://doi.org/10.1016/j.palaeo.2004.02.051>
- Rodríguez-Lazaro, J. and Ruiz-Muñoz, F.: A General Introduction to ostracods: morphology, distribution, fossil record and applications, in: *Ostracoda as proxies for Quaternary climate change*, edited by: Horne, D. J., Holmes, J. A., Rodríguez-Lazaro, J., and Viehberg, F., *Developments in Quaternary Science*, 17, Elsevier, 1–14, 2012.
- Schellenberg, S., 2007. *Marine Ostracods S A*, *Palaeolimnology*, 2046-2062.