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# BOOK OF ABSTRACTS

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## **A 9.1 ka record of paleoenvironmental variability in the South Aegean region. A case study from a semi-enclosed basin in Astypalea island.**

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### **Research Highlights**

The Holocene paleoenvironmental evolution of a small semi-enclosed silled marine basin in the South Aegean Sea is controlled by both climatic and sea level variability.

Within the general South Aegean region, the Holocene presents a general aridification trend toward the present.

### **Background**

Coastal restricted basins are sensitive recorders of both global and regional scale changes and thus may provide important details regarding the environmental and climatic variability over a certain region (Finné et al., 2019). Furthermore, the evolution of a silled marine basin is strongly controlled by the sea level changes and thus their deposits are encountered as valuable archives for both sea level and climate changes assessment. The south Aegean Sea acts as an interplay between the high and low latitude climatic systems (Geraga et al., 2017, 2005; Marino et al., 2007; Rohling et al., 2019), and thus contains important details regarding this climatic variability. On the other hand, the sea level changes in this region have been affected by eustatic, isostatic and tectonic factors (Lykousis et al., 2005).

### **Objectives**

The main objective of this work is to assess the evolution of the environmental conditions developed during the Holocene in the Vathy bay located at the northeastern Astypalea island, South Aegean Sea. The bay is controlled by a 4.7 m water depth sill suggesting that the environmental evolution of the bay was depending on the sea level.

### **Methods**

A marine sediment core (ASTC1) was retrieved from a site located at the inner part of the Vathy bay, NE Astypalea, South Aegean Sea, at 10 m water depth. The core is 320 cm long and contains sedimentary deposits of about 9.100 yrs old. The sediments of the core were analysed for the grain size distribution, the variations of nitrogen and organic carbon content using a Fisons NA1500 CN elemental analyzer and microfauna (benthic foraminifera and mollusks) composition using the standards methodologies. Stable oxygen isotopes of *Ammonia* spp. were measured with a Gas Bench system.

### **Results and Conclusions**

All the acquired data sets exhibit large and almost simultaneous variations allowing the distinction of five sedimentary intervals (SI I-V, Table 1). The base of the ASTC1 core is characterized by the absence of marine specimen providing clear evidence for a terrestrial origin of the sediments of the SI-V and isolation of the bay due to the low sea levels. In the upper interval SI-IV, the sporadic presence of Charophyta together with brackish water indicative species suggest the development of an ephemeral pond or lake. The development of this freshwater body can be most probably related to increased precipitation within a period where the bay is still isolated. Moving upwards to the interval SI-III, the microfauna associations, present low abundances and are dominated by marine species which tolerate high salinity variations. This observation together with the laminated character of the sediments of this interval suggest the prevalence of a hypersaline marsh at the core site. This interval marks the first connection of the bay to the open sea, which seems to be extremely restricted at this point. In the following interval SI-II, the microfauna is dominated by species that are usually found in lagoonal environments, thus suggesting that the connection of the bay to the open sea has been established. Finally, the transition to the uppermost interval SI-I is marked by the gradual replacement of the lagoonal fauna by species thriving in shallow marine seafloors which finally dominate the faunal associations suggesting the establishment of the current conditions in the bay. The measured stable oxygen isotopic signal showed a general enrichment towards the present which is followed by the depleted Corg/N values, thus pointing out an aridification trend.

### **Conclusions**

Our 9.1 ka BP record showed that the study area experienced different environmental conditions through time. It was found that the basin was once isolated serving as a terrestrial environment between 320 and 390 cm and then progressively

transformed into a water-logged environment, first as a lake (290-250 cm) and later as a hypersaline marsh (250-160 cm), lagoon (160-80 cm), and to finally a shallow marine basin (80-0 cm). Conditions in the bay and thus in the general South Aegean region, present an aridification trend towards the present, which can be related to the termination of the African Humid Period.

**Table 1. Table which summarizes the main sedimentary intervals of the ASTC1 core, their corresponding depth, the sedimentary features, the occurring microfauna, the oxygen isotopic signal of *Ammonia* spp., the measured Corg/N ratio, and the environmental interpretation.**

Intervals	Depth (cm)	Sedimentological features	Faunal composition	$\delta^{18}\text{O}_{\text{Ammonia}}$ spp. (‰)	Corg/N	Environment
V	320-290	Fine grained homogenous brownish sediments	No fauna	-	>10	Land
IV	290-250	Fine grained homogenous greyish sediments	Brackish water indicative fauna (Charophyta, Ostracods)	-	5-10	Ephemeral Pond/Lake
III	250-160	Laminated sediments	Low in abundance marine fauna ( <i>Ammonia</i> spp., Miliolids, <i>Peneroplis</i> spp.)	(-0.12) - 1.31	1-10	Hypersaline marsh
II	160-80	Fine grained greenish gray homogenous sediments	Lagoonal fauna ( <i>Cerastoderma glaucum</i> s.l., <i>Abra</i> / <i>Ammonia</i> spp., <i>Quinqueloculina</i> spp.)	(-0.33) - 1.12	4-9	Lagoon
I	80-0	Coarser greyish homogenous sediments	Higher in abundance and in diversity Shallow marine fauna <i>Varicorbula gibba</i> , <i>Bittium reticulatum</i> / <i>Adelosina</i> spp., <i>Ammonia</i> spp., <i>Discorbis</i> spp., <i>Miliolinella</i> spp., <i>Melonis</i> spp., <i>Peneroplis</i> spp., <i>Rosalina globularis</i> , <i>Quinqueloculina</i> spp., <i>Triloculina</i> spp., <i>Spiroloculina</i> spp.)	0.19 - 1.17	2-5	Shallow marine

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