AGR

LANDSCAPE EVOLUTION & GEOARCHAEOLOGY

13TH BELGIUM-FRANCE-ITALY-ROMANIA GEOMORPHOLOGICAL MEETING

PRESENTATIONS PROGRAM

JUNE 18-21, 2008, PORTO HELI, GREECE
AKSHOTELS – PORTO HELI

LANDSCAPE EVOLUTION & GEOARCHAEOLOGY

13TH BELGIUM-FRANCE-ITALY-ROMANIA GEOMORPHOLOGICAL MEETING

PARTICIPANTS

HCGE, Hellenic **C**ommittee for **G**eomorphology and **E**nvironment

IWGG, International **W**orking **G**roup on **G**eoarchaeology

AIG/IAG, International **A**ssociation of **G**eomorphologists

EFA, École **F**rançaise d'**A**thènes

BAG, Belgian **A**ssociation of **G**eomorphologists

GFG, Groupe **F**rançais de **G**éomorphologie

AIGEO, Associazione **I**taliana di **Geo**grafia Fisica e Geomorfologia

AGR **AGR, A**ssociata **G**eomorfologilor Din **R**omania

GSG, Geological **S**ociety of **G**reece

GGS, Greek **G**eographic **S**ociety

LANDSCAPE EVOLUTION & GEOARCHAEOLOGY

13TH BELGIUM-FRANCE-ITALY-ROMANIA GEOMORPHOLOGICAL MEETING

POSTERS
Ballroom III
19-20/06/08

	El Assal M.
10.	ENVIRONMENTAL EVOLUTIONS OF THE MOSELLE AND ALZETTE VALLEYS (LUXEMBOURG) SINCE THE MIDDLE PLEISTOCENE : A FIRST COMPARISON *Naton H.-G., Cordier S., Baes R., Kausch B., Ruffaldi P., Meyrick R., Maquil R., Colbach R., Le Brun-Ricalens F., Brou L., Schoellen A. & Stead A.*
11.	ASSESSING THE LANDSCAPE DYNAMICS UNDER ANTHROPIC IMPACT BASED ON THE CARTOGRAPHIC DOCUMENTS PERTAINING TO THE XVIII-XX CENTURIES. CASE STUDY: THE LEFT SLOPE OF THE OLT RIVER, AT THE CONFLUENCE WITH SÂMNICUL AND WITH COISCA (ROMANIA) *Osaci G.*
12.	NEANDERTHALS OCCUPATIONS IN A ROCK-SHELTER AND CAVES DURING THE LATE PLEISTOCENE IN PINILLA DEL VALLE KARST (MADRID, SPAIN) *Pérez-González A., Arsuaga J.L., Baquedano E., Márquez B., Karambaglidis T., Bárez S., Panera J., Laplana C., Mosquera M. & Benito A.*
13.	GEOARCHEOLOGIE DE LA VALLEE DU LOIR: L'EXEMPLE DU SITE NEOLITHIQUE DU CLOS DES GUES A PEZOU (LOIR-ET-CHER, FRANCE) *Piana J., Carcaud N., Cyprien A.-L., Visset L. & Leroy D.*
14.	AN INVESTIGATION OF NATURAL PROCESSES AND HUMAN IMPACT IN THE SURROUNDING COASTAL AREA OF THE ANCIENT HARBOUR OF KEHREES (SARONIKOS GULF). *Alexouli-Leivaditi A., Poulos S.E. & Leivaditis G.*
15.	COASTLINE EVOLUTION OF THE OF PORTO-HELI AND ITS SURROUNDING AREA (SE ARGOLIDA) DURING HOLOCENE, ON THE BASIS OF GEOPHYSICAL, OCENOGRAPHIC AND ARCHEOLOGICAL EVIDENCES. *Poulos S.E., Giannia P., Alexopoulos I., Karditsa A., Leivaditis G. & Gournellos Th.*
16.	STUDYING EROSION – DEPOSITION PROCESSES IN THE ATHENIAN BASIN USING ARCHAEOLOGICAL DATA. *Gournelos Th.*

LANDSCAPE EVOLUTION & GEOARCHAEOLOGY,JUNE 18-21, 2008, PORTO HELI, GREECE

COASTLINE EVOLUTION OF THE OF PORTO-HELI AND ITS SURROUNDING AREA (SE ARGOLIDA) DURING HOLOCENE, ON THE BASIS OF GEOPHYSICAL, OCENOGRAPHIC AND ARCHEOLOGICAL EVIDENCES

S.E. Poulos, P. Giannia, J. Alexopoulos, A. Karditsa, G. Leivaditis & Th. Gournellos

Faculty of Geology and Geoenvironment, Department of Geography and Climatology, National and Kapodistrian University of Athens, Zografou, 15784 Athens, Greece

SCOPE

The present contribution is to present coastline changes in the region of Porto-Heli and its surrounding coastal area during the last transgression (~20,000 years BP), through the based upon archeological evidense, morphological, stratigraphic and eustatic information.

GEOLOGY

The southern Argolic peninsula belongs to the Pelagonian isotopic zone. The Dhidhima Range consists of Triassic-lower Jurassic limestones, dolomites and marbles (tj), whilst the Adheres Range is formed by flysch formations (fg) (mainly shales and sandstones). The southernmost of the peninsula, including the Porto-Heli region, covered by the so called Peloponnesian conglomerate of Plio-Pleistocene age (pq). To the east there are some upper Cretaceous crystalline limestones (c2) (Fig.2). The geotectonic structure of the South Argolid is shown on Fig. 3. The broader region is characterized by two strike slip faults, located at the area of Dhidhima Range, while the Porto Heli and Ververonda region seems to be controlled by two normal faults trending NW-SE and deeping to the NE. Although tectonic activity is present during Neogene (van Andel et al., 1993), the absence of any significant tilting of the Late Quaternary alluvial deposits (late Pleistocene and Holocene) indicates its minimal contribution in landscape changes. Furthermore, late Quaternary alluvial deposits (upper Pleistocene – Holocene) have been identified in Southern Argolid (Jameson et al., 1994) formed by the colluvium that has accumulated on lower slopes by slope wash, or the slow creep of the soil mantle.

Figure 2: *Lithology (IGME, 1981)*

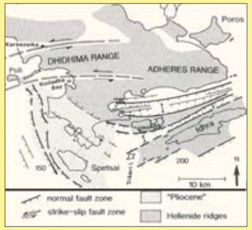

Figure 3: *Geotectonic strusture (Van Andel et al., 1993)*

GEOMORPHOLOGY

The Porto-Heli region belongs to the southern end of the Southern Argolid peninsula (Fig.1) which is bordered to the north By a large mountainous region which includes the mountains of Dhidima (1,113 m) and Adheres (588 m). The southern-most peninsula consists mainly of rounded hills (just above 100 m), intersected by many small and a few larger valleys. In particular, the country around the Porto Heli sloping gently and cut by many small, short and shallow valleys rises to 40-60 m. The generally cliff coast forms the Bays of Porto Heli and Ververonda; the former, almost entirely closed, hosts the homonymous harbour and the nowadays partly submerged ancient city of Halieis, while the latter at its east end has the Ververonda lagoon formed behind a spit consists of sand and gravel and communicating with the open Bay via an artificial dredged channel in 1970.

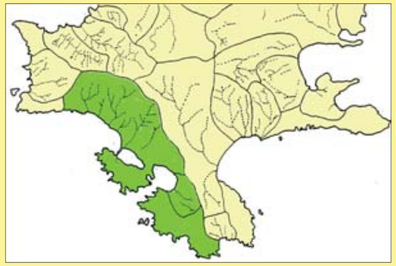

Figure 1: *Networks of ephemeral streams*

ARCHAEOLOGY (Jameson et al., 1994)

Palaeolithic - Mesolithic – Neolithic (prior to 3200 BC): A wide range of artifacts has been found primarily at Franchti Cave

Early (3200-2150) and Middle (2150-1600BC) Helladic period: An overall reduction in settlement density in the Southern Argolid

Late Helladic (Mycenaean, 1600-1100 BC): A significant expansion of settlement in the area

Geometric and Archaic Period (1050-510 BC): The most important sites at this period are Hermion, Mases and Halieis. The sanctuaries at Hermion and Halieis were certainly and the shrine at Mases probably, being the principal cult centers of that epoch.

Early-Middle Classical Period (510-420 BC): For Halieis for much of the 5th BC century most of the eastern part of the town of the 6th BC century was not inhabited, and foreign garrisons held the fortifications and the harbor. Hermion in the middle of the century had for a time a treaty with Athens.

Late Classical /Early Hellenistic Period (420 – 300 BC): A great rise of sites in all settlement areas of the Southern Argolid peninsula (38 sites).

Late Hellenistic to Middle Roman Period (150 BC – 140 AD): A dramatic reduction in settlement sites occurred during the first half 2nd century AD (only 17 small sites can be identified).

Late Roman - Early Byzantine Period (140 – 350 AD): The same Late Roman sites generally occur in the same location as their Classical predecessors, indicating not substantial residential change. Pausanias, who visited Greece in the third quarter of the 2nd century A.D. provides a good description of the ancient coastal topography of the Southern Argolid peninsula. He refers the presence of five islands of Aliousa (either the penimsula of Porto Heli or the small island at Xinitsa), Pytiousa (Spetses), Aristera (Spetsopoula), Trikrana (Trikeri), Aperopia (Dokos) and Hydrea (Hydra).

Medieval Period (400-1600): Settlements are found in Fournoi, Ermioni, and Pokrodhafni valleys, and on the Iliokastro plateau, with a few outlying sites.

LATE QUATERNARY COASTAL GEOGRAPHY IN RELATION TO SEA LEVEL CHANGE

The middle Palaeolithic coastline (around 35,000 B.P.) is related to water depths of -40 m (Chapell and Shankleton, 1986), while at last glacial maximum (upper Paleolithic 20,000 BP) considered to be at -120 m. At 10,000 B.P. (early Mesolithic) the coastline was at -29 m, during Neolithic (5,000 BP) at -10 m and in Early Helladic (2,500 BP) at -6m. Moreover, according to Lambeck (1995 and 1996) glacio-hydro-isostatic model for the Aegean Sea, the sea level around the Southern Argolid was about -120 m at 18,000 (the commencement of last transgression), -52m at 10,000 BP, -5m at 6,000 BP (when the rapid increase sea level was concluded) and -1,3 at 2000 BP (Fig 4). These sea level stands are in a relatively good agreement with those based on dated artifacts from the Southern Argolid peninsula (Late Roman 2-3 m b.p.s.l., after Flemming, 1978) and the Halieis region ~5m b.p.s.l. for the period 1700-3500 BP, and 2-3 m b.p.s.l. at 1600 BP (after van Andel and Lianos, 1983).

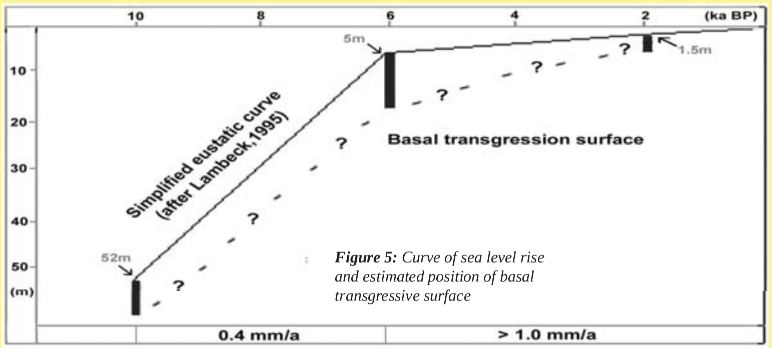

Figure 5: *Curve of sea level rise and estimated position of basal transgressive surface*

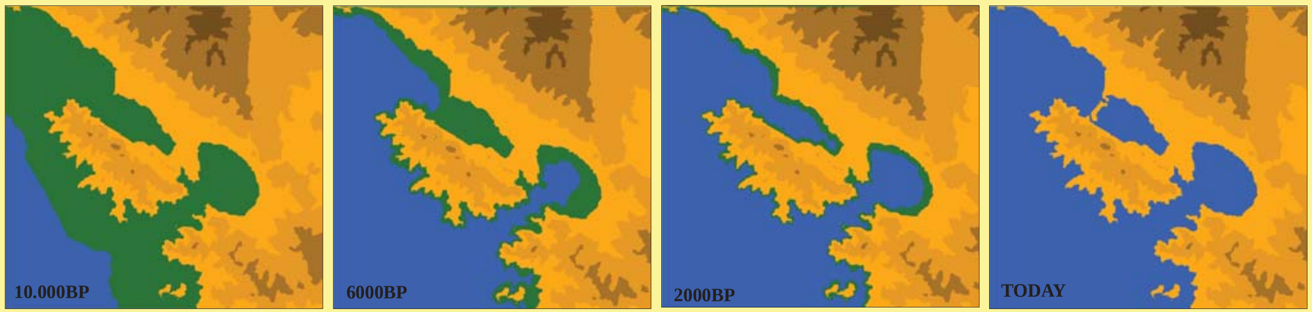

Figure 4: Coastline position according to Lambeck (1996) eustatic curve

Nearshore coastal bathymetry during transgression should be quite different to that shown today due to deposition of transgressive sedimentary sequences. On the basis of seismic (acoustic) profiling data obtained from water depths >10m the average sediment thickness above basal transgressive surface at PortoHeli embayment found to be in between 2m (for water depths >20 m) and 4 m (for water depths <20 m). Assuming that the seabed up to 50 m b.p.s.l. was covered by water during the past 10,000 years indicate a rate of deposition in the order of 0.2 – 0.4 mm/yr (van Andel and Lianos, 1983); this rates are regarded as rather small and attributed to the lack of any significant river system. On the other hand, these rates maybe much higher (>1 mm/yr) along the coastline (water depths <5 m), especially nearby the mouth of the various ephemeral streams . Therefore, the palaeobathymetry around the Porto Heli and Ververonda Bays during the last transgression (Fig. 5) is the outcome of sea level rise and the accumulation of terrestrial and marine, in origin, sediments, considering insignificant tectonic vertical displacements (e.g. <0.5 m). Thus, during the Halieis flourish period (cerca 500 BC) the sea level was about 2,5 m b.p.s.l, while the seabed was a few metres (2-3 m) deeper in relation to its present stage. The same applies to Ververonda lagoon whose barrier started to be built when water depths were ~4-5 m, around 2000-3000 years BP, if at –(1,5-2 m) b.p.s.l. at that period we subtract another 2-3 metres of coastal deposits.

REFERENCES

Chappell J. and Shankleton N.J., 1986. Oxygen isotope and sea level. Nature, 324, 137-140.
IGME, 1981. Geological map of Greece (scale 1:500,000). Institute for Geological and Mineralogical Exploration, Athens.
Jameson M.H., Runnels C.N. and van Andel T.H., 1994. A Greek Countryside: The Southern Argolid from Prehistory to the Present Day, with a Register of Sites by C.N. Runnels and M.H. Munn. Stanford University Press, 658 pp.
Lambeck, K., 1995. Late-Pleistocene and Holocene sea-level change in Greece and south-western Turkey: a separation of eustatic, isostatic and tectonic contributions. Geophysical Journal International, 122, 1022-1044.
Lambeck, K., 1996. Sea-level changes and shoreline evolution in Aegean Greece since Upper Paleolithic time. Antiquity, 70, 588-611.
Van Andel T.H. and Lianos N., 1983. Prehistoric and historic shorelines of the Southern Argolid Peninsula: A subbottom profiler study. The International Journal of Nautical Archeology and Underwater Exploration, 12(4), 303-324.
Van Andel T.H., Perissoratis C. And Rondoyanni T., 1993. Quaternary tectonics of the Argolikos Gulf and adjacent basins, Greece. Journal of the Geological Society, London, 150, 529-539.
Van Andel T.H., Runnels C.N. and Pope K.O., 1986. Five thousands years of land use and abuse in the Southern Argolid, Greece. Hesperia, 55(1), 103-128.