

# PALAEOCLIMATIC RECORDS OF A DEEP SEA CORE FROM THE ANAXIMANDER AREA

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## Abstract

The hemipelagic sediments from a gravity core retrieved from the Anaximander Mountains, Eastern Mediterranean were analysed for isotope, palynological and micropaleontological composition. The multiproxy data records provided the palaeoclimatic and palaeoceanographic evolution of the studied area during the late stage of Last Glacial period and Holocene.

**Keywords :** *Dinoflagellates, Eastern Mediterranean, Foraminifera.*

**Introduction.** The Mud Volcanoes (MV) in the Anaximander Mountains (Mts) Eastern Mediterranean were sampled during the cruises of the 'Anaximander' project with the *R/V Aegaeo* in May 2003 and October 2004. The target of the project, funded by EU, is the examination of the Gas Hydrates (GH) and the associated deep biosphere occurring at the area [1]. The aim of the present work is to present the results from the micropaleontological and the palynological studies of the hemipelagic sediments sampled from the gravity core AN11GC1 collected from Kula Mud Volcano in order to interpret the palaeoenvironmental conditions in Anaximander area.

**Materials.** The core AN11GC1 (lon.35° 43' 712, lat.30° 27' 589, water depth 1644m and 200cm length) retrieved in Kula MV. Twenty-six samples were used for palynological analysis (pollen, terrestrial spores and dinoflagellate cysts), for microfauna analysis, for the determination of the oxygen and carbon isotopes on the tests of the planktonic foraminifera *Globigerinoides ruber*. The dating of the events was based on two AMS <sup>14</sup>C dates and a tephra chronology.

**Results-Discussion.** The core AN11GC1 consists of eight lithological units. Sapropel S1 occurred between 23 and 29cm. Two lithological units (29-71cm and 157-200cm) consist of mud with abundance of clasts. Both these units indicate reworked sediments and enhanced activity of the related mud volcano. Almost during the former interval the microfauna associations were absent. A fine grey ash layer is present between 102 and 109cm and is correlated with the Y2 ash layer (Cape Riva eruption of Santorini).

The downcore variation of the  $\delta^{18}O$  in core AN11GC2 together with the downcore variation in abundance of the three main group of the planktonic foraminifera are shown in Fig.1. Group A consists of the warm planktonic species *Gs. ruber*, *Globigerinoides spp.*, *Globigerinella spp.* and *Or. universa*. Group B consists of the cold species *Gr. scitula*, *T. quinqueloba*, *N. pachyderma (d)*, *N. duertrei*, *G. glutinata* and *G. bulloides*. The Group C consists of *Gr. inflata*, *Gr. crassaformis* and *Gr. truncatulinoides* and is associated with cool and deep mixed waters in the Mediterranean [2].

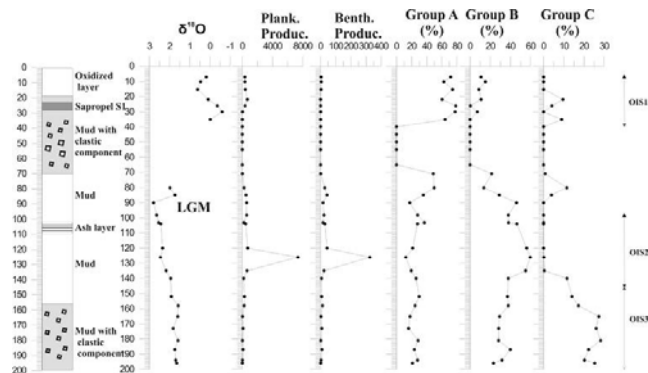


Fig. 1. Downcore variation of isotope and micropalaeontology data. The lithological sequence of AN11GC1 is presented.

Between 200 and 85 cm the heavy  $\delta^{18}O$  values together with the dominance in the planktonic associations of the Groups B and C suggest the prevalence of cold climatic conditions during the last glacial period. The most severe conditions prevailed around 90cm suggesting that this interval corresponds to Last Glacial Maximum. At the same time the increased abundance of the N on Alboeal Pollen (presented in Figure 2) dominated

by *Artemisia* suggests increase in aridity. The microfauna and microflora deduction for this period is in agreement with similar results from sediments of the eastern Mediterranean [2, 3]. Noticeable is the increased participation of Group C during the deposition of the reworked sediments between 200 and 140cm and the peak in the planktonic and benthonic productivity curves at 130cm which mark the end of the lithological unit. Between 85 and 35cm the deglaciation is characterized by the high presence of *Artemisia* and the low presence of *Quercus*. The climate in the pollen source area was arid, cold in winter, briefly warm in summer and subordinated the vegetation. Throughout the deglaciation from 18 to 11 kyrs, the aridity progressively increases but it is interrupted by a more humid event (presence of *Quercus*). Maximum aridity occurs around 70cm and probably corresponds to Younger Dryas chronozone (12-10.5 kyrs) [2, 3] interrupting the regional expansion of deciduous trees.

During the upper 35cm of the core the light  $\delta^{18}O$  values accompanied with increased abundance of Group A suggest the permanent climatic amelioration during the Holocene. The most depleted  $\delta^{18}O$  values occur during the deposition of S1 and are attributed to the establishment of warm and low salinity waters. In the pollen records the Holocene is characterized by warm mixed and temperate deciduous forest association [3]. During the deposition of sapropel S1 the records of palynomorphs are characterized by high increases of *Quercus*, accompanied by the increased abundance of *Spiniferites*, *Lingulodinium machaerophorum* and *Operculodinium centrocarpum*. The above indicate an increase in humidity and pollen productivity and a reduction in surface water salinity during the deposition of S1 [2,3]. In the planktonic data records the end of S1 is marked by the increase of Group C suggesting winter water mixing and recovering of the watercolumn circulation.

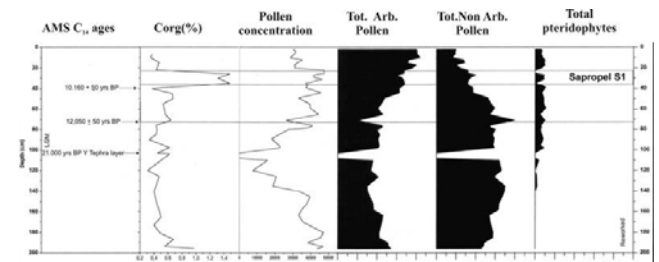


Fig. 2. Downcore variation of organic carbon percentage and palynological data.

## References

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