



## **High-resolution study of planktic foraminifera from the eastern Mediterranean over the last 13 cal ka BP. Example from the Nile prodelta**

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A unique high-resolution record from the Nile prodelta has been investigated in order to study past hydrological and climatic changes in the southeastern Levantine region over the last 13 cal ka BP. To this end, we used planktic foraminifera (accumulation rates, diversity, assemblages and size properties) as bioindicators of the ecological characteristics of the water column (temperature, salinity, primary production and hydrology). These characteristics were mainly connected to Nile discharges and thermohaline circulation which in turn were controlled by various global and regional climatic forcing factors (e.g., orbital forcing, African and Indian Monsoon, North Atlantic Oscillation (NAO)). Our data showed seven main climatic periods: 1) from 13.0 to 11.5 cal ka BP encompassing the Younger Dryas and characterized by rather cold productive and mixed waters; 2) from 11.5 to 10.1 cal ka BP matching the start of the Holocene and the onset of the African Humid Period (AHP). This period was defined by surface water warming and increasing stratification due to increased river outflow; 3) from 10.1 to 6.4 cal ka BP encompassing the Sapropel deposit (S1) and matching the maximum of the AHP with drastic ecological conditions and maximum water stratification. During this period, the dominant warm taxon *Globigerinoides ruber* increased significantly in size and accumulation rate marking an opportunistic behavior and a total adaptation to the less saline and stratified waters. After 8.8 cal ka BP, the increase in diversity marked a progressive return to normal conditions; 4) from 6.4 to 2.9 cal ka BP, a progressive aridification period was recorded and the planktic ecosystem returned progressively to equilibrium conditions due to the recovery of thermohaline circulation after S1 and the decrease in Nile runoff; 5) from 2.9 to 1.1 cal ka BP, particular dry conditions were recorded leading to a severe drop in planktic diversity. These conditions seemed to be connected to a negative state of the NAO marking the Roman Humid Period in the western Mediterranean and being anti-phased with the southeastern Mediterranean; 6) from 1.1 to 0.54 cal ka BP, a humid period was recorded matching the Medieval Warm Anomaly and this time connected to a positive NAO. The highest foraminiferal diversity was recorded and the increase in proportions of deep dwellers and eutrophic taxa marked highly productive and mixed waters; 7) from 0.54 cal ka BP to modern time encompassing the Little Ice Age and recorded in our data by a general aridity and surface water warming.