

Holocene palaeoenvironmental changes in the Romanian Black Sea shelf

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During Late Holocene times, the Black Sea experienced a shift from a brackish to a marine environment. The purpose of our investigations was to point out these changes, based on lithological and sedimentological modifications, as well as palaeobiological fluctuations, in a very shallow marine setting such as the Romanian Black Sea inner shelf. The study of several cores indicates that the youngest Holocene deposits formed a 'Shallow Unit', made by alternating sequences of mud, silt, clay and coquina layers, containing marine mollusc faunas. The Shallow Unit overlies a 'shell hash layer', mainly made by coquinas with mixing marine and brackish mollusc faunas. The oldest Holocene unit Lacustrine Lutite intercepted by the studied cores is characterized by the deposition of green-yellowish clay, containing freshwater molluscs.

The semiquantitative calcareous nannoplankton analysis of the Holocene deposits led to the identification of several ecozones (youngest first): (i) Ecozone 1, which is dominated by *Emiliana huxleyi* that yielded blooms of over 1400 specimens/mm², and covers the upper part of the Shallow Unit; *Braarudosphaera bigelowii* is present with a very low frequency or even absent; (ii) Ecozone 2, which is also dominated by *E. huxleyi*, that continuously decreases with the depth, from around 1,000 specimens/mm² down to less than 100 specimens/mm²; *B. bigelowii* continuously increased from younger to older intervals of this ecozone, always yielding a negative correlation with *E. huxleyi*; this ecozone extends within the lower part of the Shallow Unit; (iii) Ecozone 3, which is characterized by *B. bigelowii* monospecific assemblages; *E. huxleyi* is absent; this ecozone covers the base of the Shallow Unit and the upper part of the 'shell hash layer'; (iv) Ecozone 4 that does not contain any nannofloras *in situ* or reworked; it was observed in the lower part of the 'shell hash layer' and in the Lacustrine Lutite. These fluctuations could be indicative of a progressive increase in salinity during the deposition of the Shallow Unit, from a brackish setting to a marine one. The upper part of the Shallow Unit was deposited under more stable marine conditions, with salinity close to the modern times. The ostracod and foraminiferal communities follow the fluctuation pattern of the calcareous nannoplankton assemblages, indicating that a marine environment settled, in the Romanian Black Sea inner shelf, only in the latest Holocene. Notably, close to the coastline, in front of the Danube Mouth and Razelm-Sinoe lagoon system, no nannofloras *in situ* were observed in the cored sediments. This fact indicates that the salinity was, probably, extremely low in these areas during Holocene times, as consequence of the regional palaeogeographical setting.

High acidic sulphate salt production on the Cave Wall in the Yoshimi Hyaku-Ana Historic Site, Central Japan

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Acidic sulfates such as aluminum sulfates and ferric sulfates are often observed on the wall of tuff or volcanic rocks in Japan. We investigated wall surfaces of an artificial cave dug from 1941 to 1945 in the Miocene tuff. The cave locates in the historic site of Yoshimi

Hyaku-Ana which is ancient graves of 6-7 centuries. The cave was suffering from severe salt efflorescence and deterioration of its cause. Salts are much in dry winter but less in humid summer. We set up twelve investigation points for monthly monitoring of temperature and humidity. Fallen salts and debris at each point were also collected monthly from November 2008 to December 2009. Main salt minerals, detected by XRD, are hard and granularly effloresced alunogen ($\text{Al}_2(\text{SO}_4)_3 \cdot 17\text{H}_2\text{O}$) on the walls near the entrances, and gypsum was found on the inside walls in the humid summer. On the contrary, powdery effloresced halotrichite ($\text{FeAl}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O}$), sodialum ($\text{NaAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) and epsomite ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) were detected in the dry winter. Jarosite ($\text{KFe}_3(\text{SO}_4)_4 \cdot (\text{OH})_8$) minerals were observed on iron hydroxide stains on the walls in every season. Halotrichite, sodialum and epsomite damaged the walls most severely especially in the dry winter. The amount of salts and debris from the inner wall were greater than those from near entrances.

New data on the position of so called „klippes” in succession of the marginal units of the Outer Carpathians

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The large olistoliths of the Upper Jurassic rocks (the “klippes”) occur at the northern and the southern margin of the Outer Carpathians. Controversies concerned not only origin of “the klippes” but also the age and sedimentary character of the surrounding rocks. Earlier interpretations of position of the northern “klippes” located them within folded and tectonised Cretaceous-Paleogene sediments of migrating Carpathian accretionary wedge. Our investigations lead to amendment of the view. The research was carried on the following marginal units along the Outer Carpathians: the Ždanice unit (Czech Republic: Mikulov, Klentince, Štramberk), the Skole unit (Poland: Inwałd, Roczyny, Targaniczanka, Kruhel), the Boryslav-Pokuttya unit (Ukraine: Utoropy, Akroshory), the Marginal Folds unit (Romania, Slon, Draina). The results of research are as follows:

1. In the region of Mikulov (Czech Republic) the Upper Tithonian “klippes” are embedded in the Lower Miocene Ždanice-Houstopeče Formation. 2- The Upper Jurassic “klippes” that occur in the marginal part of the Skole unit in Poland, on the base of the foraminifera and the calcareous nannoplankton, are surrounded by the Lower Miocene sediments. Different is, however, the origin of “the klippes”. In the western part of the Skole unit “the klippes” represent the marginal part of the European Plate, while in the eastern part the Kruhel “klippes” derived from the Bilche-Volytsa zone of the Ukrainian part of the Foredeep. 3- Samples of matrix collected from the gravelstone containing a Štramberk-type (peri-reefal, Tithonian-Berriasian) limestones at Utoropy and Akreshory (Ukraine) revealed the presence of the Early Miocene foraminifera and calcareous nannoplankton. Sediments surrounding the Ukrainian “klippes” at Utoropy are the same as in case of the Kruhel “klippes” and represent the Lower Miocene Vorotyshcha Formation. 4 – Romanian samples collected from the Slon olistostrome (Slon and gypsum formations) confirmed the Early Miocene age of sediments. Peri-reefal limestone olistoliths from the Slon locality are of the Late Tithonian-Berriasian age.

The above presented results of studies suggests that, at least northern “klippes” (predominantly of the Tithonian-Berriasian age) are embedded in sediments that have character of chaotic complexes and are of the Early Miocene age.

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