Late Pleistocene – Holocene sea level and climate changes in the Black Sea

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The Danube Deep-Sea Fan, situated in NW Black Sea, is one of the most developed deep-sea sedimentary structures in Europe (Panin & Jipa, 2002). In 2018, in the framework of the uBiogas Project (24PCCDI/2018), several cores were acquired from the aforementioned area. In this study, high resolution microfaunal analyses coupled with sedimentological and geochemical ones, were performed on two gravity cores that revealed changes since the Last Glacial Maximum. The cores have been collected from two secondary canyons, situated in the E of the Danube Canyon, at 655,7 m (MN183_3_GC_1) and 1315 m water depths (MN183_8_GC_1). In both cores, three stratigraphic units as described by Ross & Degens (1974) were identified (oldest first): Unit 3 (Lacustrine lutite), Unit 2 (Sapropel Mud) and Unit 1 (Coccolith Mud).

The sediments of Unit 3 correspond to the Last Glacial Maximum and are marked by the presence of the cold-water ostracod species. The cores contain a reddish-brown clay and silty interval belonging to the post-glacial melt-water pulse of the Heinrich Event 1. In these deposits the ostracod assemblages display a high diversity and abundance. The CaCO$_3$ amount is very low, i.e. below 15%, except for the upper part where it reaches more than 50%. The samples of Unit 3 contain nannofossil assemblages that are entirely composed of reworked species from Cretaceous, Paleogene, Early and Middle Miocene intervals.

In Unit 2 (the sapropel), very few specimens of ostracods were identified, towards the top. During this depositional interval CaCO$_3$ values are dropping again below 15%. The high abundance of the calcareous nannoplankton species Braarudosphaera bigelowii in the upper part of Unit 2 suggests the first strong influx of marine waters into the Black Sea basin.

In the youngest Unit 1, a brackish-marine ostracod assemblage, with low diversity and abundance was identified. This interval is characterized by the presence of polyhaline ostracods with Mediterranean origin. The ostracods from this assemblage tolerate salinities comprised between 17-21 ‰ and characterize a sub-littoral environment. The CaCO$_3$ values are increasing to more than 50%. During the depositional interval of Unit 1 the environmental was definitely a marine one, probably with a constant salinity of surface waters over 17 ppm, allowing the calcareous nannoplankton species Emiliania huxleyi and Braarudosphaera bigelowii to proliferate. The great abundance of the two taxa and especially of Emiliania huxleyi indicates the existence in the basin of a high nutrient input.
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