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Isotopic signature of short term climate oscillations in the sediments of the Gulf of Gdansk (Southern Baltic Sea, Poland)

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The Gulf of Gdańsk is a part of the southern Baltic Sea - an intra-continental, shallow arm of the Atlantic Ocean entirely located on continental crust. The gulf occupies the area of ca. 5000 km^2. Its northern border is a conventional line between the Cape Rozewie (Poland) and the Cape Taran (Russia). The Gulf of Gdańsk is under impact of inflowing salty waters from the North Sea but also there is a great effect of the Vistula River marked. The river is one of two the most important sources of material in the gulf. Cliffs erosion is the second one. The interplay of marine and land waters is multiplied by impact of two different climates – continental and maritime. The subject of intended research is a core of muddy sediments collected within the framework of project carried by the Branch of Marine Geology of the Polish Geological Institute in Gdańsk. The core was 300 cm long and was taken using Kullenberg core sampler in 2006 from the depth of 32 m. Since 2009 the research has been led in cooperation with the Department of Radioisotopes, Institute of Physics, Silesian University of Technology. In our study we use δ^{18}O and δ^{13}C measured in organic mater of sediments with mass spectrometer. Radiocarbon concentration was measured using gas proportional counters using organic mater . ^{14}C dates were corrected according to isotopic fractioning with measured δ^{13}C. We found systematic inversions of dates that were probably caused by changing of ΔR (regional difference from the modeled global surface ocean reservoir age) during Baltic evolution. The attention was also paid on recognition of sedimentation process that is a very good indicator of dynamics in sedimentary environment. The grain size analysis was carried out for 300 samples using method of laser diffraction. Results showed great variability in bulk sediment composition that indicates susceptibility to changes in climatic and hydrodynamic conditions of studied area. Excluding the top ca. 30 cm of the core two clear cycles in sedimentation process may be distinguished. They are characterized by the greater contribution of thicker sediment fractions. Additionally shorter variations are also observed in both main cycles. All the results are bounded with ^{14}C age-depth model that represents last 7500 cal BP. It covers two stages of the Baltic Sea development. According to ^{14}C depth model two main cycles in granulation correspond to 1500 yr each. Shorter variations correspond to 550 yr each. We also noticed rapid shift in sedimentation rate that we correlate with sudden change in granulation composition occurring on ca. 30 cm of the core.