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Water and sediment inflow to the Black Sea during the last 30.000 years

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The hydrological balance of the Black Sea and the sediment supplied from the adjacent continents is characterised by large changes over the last 30,000 years. The major sources include a continuous inflow of water and sediment from the drainage area of European rivers (Danube, Dnjepr, Dnjestr and Don), temporary inflows from the rivers Volga, Ural, the Aral Sea and the Central Asian Mountains, via Caspian Sea over the Manych-depression during the last deglaciation, and high salinity waters from the Marmara Sea after reconnection to the Mediterranean Sea in the early Holocene. As a result the Black Sea level was subject to substantial changes (Major et. al., 2002; Preisinger & Aslanian, 2004).

In order to assess changes in the relative supply from these different sources, we have investigated gravity cores from two depth-transects on the continental slope of the northwestern Black Sea. High-resolution XRF-scanning and microprobe X-ray diffractometry provide major element concentrations and the mineralogical composition of the sediment. In addition, we performed a detailed analysis of the origin and abundance of framboidal greigite and pyrite by means of ore microscopy and transmission electron microscopy. The stratigraphy was established by ^{14}C-AMS dating of core GeoB 7608 and detailed correlation of XRF data to this master chronology (Bahr et al., in press).

Stable climatic conditions during the Last Glacial Maximum were followed by a series of meltwater pulses. This meltwater input rose the level of the Caspian Sea to a point that Caspian water could spill into the Black Sea via the Manych-depression north of the Caucasian mountains. The inflow for the Caspian Sea is indicated by iron - sulfide concrements. Later, during the Bølling/Allerød and the early Holocene, prevailing high temperatures led to authigenic calcite precipitation through increased phytoplankton activity, that was interrupted by more siliciclastic sedimentation during the Younger Dryas and possibly the “8200 yr BP cold event”. The appearance of biogenic, framboidal greigite/pyrite marks the beginning inflow of high-salinity water from the Marmara Sea. Significant fluctuations of the amount of authigenic framboidal greigites during the last 7,500 years appear to be climate-controlled.

References

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