Geophysical Research Abstracts
Vol. 20, EGU2018-591, 2018
EGU General Assembly 2018

Late Pleistocene sapropels in the Sea of Marmara: New evidence from a giant piston core

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Late Pleistocene to Holocene paleoceanography of the Sea of Marmara (SoM) and water exchanges between the Mediterranean and Black seas were previously explored by various core studies. A new 14.4 m-long piston core recovered from the northeastern slope of the İmralı Platform in the southern SoM extends the record to the marine isotope stage 6 (MIS-6) and possibly to the MIS-7. The detailed lithostratigraphy of the studied core, together with an age model based on correlation with NGRIP chronology and tephrochronology, allows us to differentiate between various marine and lacustrine phases of the SoM during the period from the MIS-6 to the MIS-4, based on sedimentological properties and faunal assemblages. While a presence of -85 m bedrock sill in the Çanakkale Strait controlled the overall water level of the SoM prior to the Holocene, the marine phases were only established when the global sea level increased above this sill depth. The connections of the SoM with the global ocean took place during marine isotope stages 7, 5 and 1 based on the core evidence. Marine isotope stage 6 in the SoM is represented by brackish-water lacustrine conditions, as inferred from the presence of fresh-brackish water molluscs in the core. The lacustrine conditions were established by the disconnection of the SoM from the Mediterranean Sea as the global sea level dropped below the Çanakkale Strait's sill. Marine and lacustrine conditions alternated in the SoM during marine isotope stage 5 and resulted in marine conditions and deposition of sapropels during MIS-5a, MIS-5c, and MIS-5e and brief lacustrine conditions during MIS-5b and MIS-5d. The sapropel deposition events are characterized by periods of high organic production and burial that were established by water-column stratification.

Keywords: Sea of Marmara, late Pleistocene –Holocene, sapropel, paleoceanography