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The sedimentary records of Holocene environmental changes from the Central High of the Sea of Marmara

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The Sea of Marmara (SoM) is located between the Aegean Sea and the Black Sea, to which it is connected via the Istanbul (Bosphorus) and Canakkale (Dardanelles) straits having sill depths of 65 and 35 m, respectively. It has a two-way water mass exchange with a permanent pycnocline located at 20-25 m water depth. With the objective of determining Holocene paleoenvironmental changes, we studied a 8.36 m-long piston core recovered from the Central High of the SoM at a water depth of 835 m, using multiproxy analyses such as total organic and inorganic carbon, high resolution μ-XRF core scanner analysis, grain size, magnetic susceptibility and density. A 2 cm-thick tephra layer with high K and Zr and relatively low magnetic susceptibility occurs at 2.1 meter below sea floor (mbsf), which is correlated with the Avellino (Somma-Vesuvius, Italy) eruption dated at 3.9 ka BP, according to the previous studies. Using this age and assuming a uniform sedimentation rate, the base of the core dates back to ca 8 ka BP. The core includes organic-rich (sapropelic) sediments with 1.5 % to 2.2%) in its top 3.5 m and bottom 1 m. Sapropelic layers are olive green and in part laminated, and contain occasional reddish brown spots and laminae formed by oxidation of iron monosulphides. The core also contains some few mm- to cm-thick sandy-silty mass-flow units below 2.4 mbsf, some of which could have been triggered by the earthquake activity on the Central High segment of the North Anatolian Fault, just a few km away from the core location. Variations in Ca-Ti ratio suggest millennial-scale climatic changes during the Holocene.

Keywords: Sea of Marmara, Holocene paleoenvironmental records, tephra, turbidites, TOC analysis, XRF analysis, physical properties.