



Evolution of the late Holocene sedimentary infill of Hersek Lagoon (Turkey, Izmit Bay): Use and limits for the reconstruction of past tsunamis in the Sea of Marmara

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The eastern part of the Sea of Marmara is frequently affected by the seismic activity of the North Anatolian Fault (NAF), which often triggers tsunamis and submarine landslides in the Izmit Gulf. During the last 2000 years, at least nine major tsunamis, mainly located in the vicinity of the Izmit Bay, have affected the Sea of Marmara. Likewise, the recent 1999 Izmit earthquake (17th August 1999, $M_w = 7.4$) has induced a tsunami with waves reaching 2.5 m in height along the northern and southern shores of the Izmit Gulf. In the framework of the EU-funded RELIEF project (RE-Liable Information on Earthquake Faulting - www.ingv.it/paleo/RELIEF), ten cores with a length varying from 1 to 4 meters have been collected in the Hersek coastal lagoon (Gulf of Izmit, Turkey), with the aim to reconstruct the history of tsunamis that affected the area. In order to discern probable tsunami deposits, these cores were analysed by a multi-proxy approach: physical properties of the sediment (GEOTEK multisensor core logger at the GFZ, Potsdam), TOC, TIC, grain-size, bulk- and clay-mineralogy, and determination of foraminifera, gastropods and bivalves. AMS radiocarbon measurements on terrestrial organic matter remains demonstrate very high sedimentation rates (2-4 mm/yr) varying with the position in the lagoon. Mineralogical data suggest that the sediment of the lagoon only originates from the Sea of Marmara and is not supplied by the Yalacdere paleoriver, at least during the last 2000 years. In

the studied cores, two types of event-deposits have been identified: (1) coarse layers, rich in broken or entire shells and characterized by very low MS values and (2) fining upward sand layers free of shells, and bearing high MS values. If these event-deposits are directly linked to the tsunami activity in the Sea of Marmara (i.e. they have not been deposited during storms), it means that the most intense tsunamis that affected the coasts of the Gulf of Izmit during the last 2000 years occurred in ~1000 AD and ~1700 AD. New radiocarbon measurements are in progress and should allow us to better constrain the age of the event deposits. Finally, these results are compared with historical data, and the potential of using lagoon sediments to reconstruct the history of tsunamis in the Sea of Marmara during the last millennia is discussed.