
Sediment Budgeting in the Marmara Basin in Glacial and Inter-Glacial Time

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Abstract

In between the Black Sea and the Aegean Sea, the Marmara Basin is an active tectonic basin that currently acts as a water strait between these two major hydrological basins. Over the last Glacial and Inter-Glacial cycles, the Marmara Basin has been both hydrologically connected and disconnected with these surrounding basins. This hydrological history correlates directly with the Relative Sea Level (RSL) at the two shallow water straits that linked the Marmara basin with its surrounding basins: the Cannakale and the Bosphorous straits. The present hydrological connection settled up 12,550 years (± 350 years) ago (e.g., Cagatay et al., 2019) when the RSL, which started to rise at the Last Glacial Maximum (18 500 years ago), reached an elevation between -65 and -40 m below the present mean sea level (bsl) reestablishing the connection that was cut off during the glacial lowstand. Further back in the past and since the MIS-5/4 transition (~ 71 000 Before Present), the Sea of Marmara was mostly a lacustrine system. Associated with these environmental changes, sedimentation patterns and budgets have also changed though this recent history, and we aim to quantify these changes. We have undertaken a large effort at integration and interpretation of published data, including seismic data, chirp data and core data. This enables us to map, with a very good precision, two critical stratigraphic boundaries: the Red-H1 (Grall et al., 2013, 2014, associated with the MIS 5 to 4 transition, Cagatay et al., 2019) and the Lake/Marine Transition. Depth maps of these two stratigraphic units allow quantifying sediment volumes and budgets at a regional scale between lacustrine and marine times. While sedimentation is mainly related to earthquake activity in this active tectonic basin (Mass Transport Processes and seismoturbiditic deposits), sediments delivered to basins are significantly higher during lacustrine time than during marine stages and are particularly high during transition times. This variability on sediment fluxes involves changes on sediment loading and in

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turn may change the rates of subsidence at depocenters, as well as uplift on the Marmara shelves. Also, the frequency of tectonically induced events (mud volcanoes, landslides) increased during transition times, showing how much environmental change (water elevation, temperature and salinity changes) can modulate these events and associated hazards. This may be important to note in the context of the present rapid environmental changes.