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Benthic foraminifera as indicators for recent sediments transport in the Eastern Mediterranean upper continental slope, offshore Israel

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Our study comprises a high-resolution multi-proxy investigation of a ~6 m long piston core DOR280, sampled from the headscarp of a mapped landslide on the upper continental slope (280 m water depth) at the Dor Disturbance area, northern central Israel. The core retrieved the sediment sequence overlaying the sliding plane of the last major landsliding event. Benthic foraminiferal assemblages and taphonomy, alongside particle size distribution, were used to determine the provenance, transport distance, and reoccurrence time of mass transport events in this area. Radiocarbon ages were measured along the core revealed an age of ~600 Cal Yrs. B.P. for the core base, suggesting unexpectedly high average sedimentation rate of ~10 m/kyr, which is highest at the core top meter. Computed Tomography (CT) of DOR280 shows two alternating sedimentary facies: 5 – 208 cm thick Non-Laminated (NL) and 5 – 37 cm thick Laminated (L). The L-facies sequences also include 0 – 4 cm thick High-Density Laminas (HDL). The NL-facies intervals consist of unimodal fine-sediments dominated by clay minerals. Their foraminiferal assemblage is dominated by autochthonous species (e.g. Uvigerina spp.) and low percentage of broken shells. This indicates that the NL-facies represents mostly in-situ hemipelagic deposition. The L-facies intervals also record unimodal size-distribution of fine-sediments dominated by clay minerals, but their foraminiferal assemblages are dominated by allochthonous species (e.g. Ammonia spp.) and high percentage of broken shells, indicating a contribution of transported sediments, originated from mid-shelf habitats. The HDL-facies consist of bimodal sediments comprised of fine silty-clay (~5 μm) and coarse silty components (~40 μm), dominated by quartz and calcite; as well as poorly preserved and broken shells of allochthonous foraminifera species. Thus, the HDL represent significant contribution of mid-shelf-origin sediments and are interpreted as turbidite-like mass transport events.

The temporal distribution of the 27 HDL events is nonrandom, revealing clusters at 59 ± 14 (n=9), 134 ± 12 (n=8), 453 ± 21 (n=4) and 641 ± 10 (n=4) years before present. These findings show prevailing cross-shelf and down slope sediments transport in the Dor Disturbance area. The HDL

events can be triggered by large remote earthquakes (> 6.5), tsunami, winter storms or by sediment load that coincided with high-stand Nilotic episodes. However, mechanisms controlling the observed recent mass transport in the Dor Disturbance area still need to be studied.

DOR280 is the first piston core studied in high resolution at the upper continental slope of of the Isreali offshore. The use of benthic foraminifera assemblages and their shells taphonomy reveals the transported sediments within the core and enables an assessment regarding their source. The findings reported here identified much higher sediments accumulation rate than previously known and thus have implications to the evaluation and mitigation of marine geo-hazard in the studied area.