Tsunami-derived sediments identified in the destruction sequence of an 8th century warehouse in Caesarea Maritima, Israel

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Preserved on land coastal tsunami deposits onshore have rarely been reported for the coastline of Israel. According to offshore sedimentological records, a tsunami struck the coast of early Islamic Caesarea Maritima, likely coinciding with a major earthquake in 749 AD. Anomalous sand layers from the same time period were reported by archaeologists in structures near the shore, but they were recorded with varied interpretations (construction fill, dune development, general abandonment). Unfortunately, no sediments were collected nor analyzed from those excavations. Recently, an area with this same deposit was freshly excavated. This allowed it to be studied to determine its taphonomic history. The deposit is comprised of a thick, well-sorted sand layer with semi-articulated sequences of building stones followed by independent matrix-supported building stones, the entire deposit sandwiched between an early-eighth century abandonment layer and a late-eighth century floor. Two sediment cores from the deposit, as well as reference samples representative of other depositional environments, have been analyzed for grain size distribution, foraminiferal abundance, diversity, taphonomic characterization, relative age by portable luminescence (POSL), and loss on ignition. In tandem, reference samples from modern beach, dunes, an eighth century archaeological construction fill, and shallow marine sands were analyzed as reference samples for comparison. The combination of results indicates that the sandy deposit formed during a high-energy event, and does not resemble other known types of sand deposits in the area, including those suggested as possible interpretations by the excavators. The results of this study will contribute to the understanding of tsunami deposits preserved on land in Caesarea Maritima, provide geographical constraints to enhance coastal inundation models and hazard/risk area maps, and more broadly contribute to the understanding of tsunami sedimentological studies in geoarchaeological contexts.