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Evidence of tsunami deposits in East Tunisia coastline contemporaneous of the AD 365 Crete earthquake: Field data and modelling

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New field investigations along the East Tunisian near Sfax coastline reveal sedimentary deposits that may account for a catastrophic event. The sedimentary unit is made of sand coarse gravels, limestone beach-rock, mixed with broken shells of marine gastropods and lamellibranch mollusks, bones and organic matter. Near Thyna, at El Amra site located north of Sfax city, 3.2 m to 3.6 m high late Quaternary coastal terraces are spread over the coastline; they contain a catastrophic deposit that often cover archeological sites of the Roman period. The stratigraphic units show a succession of sandy-silty paleosol truncated by 40 to 70-cm-thick catastrophic unit which is covered in some sites by fire remains overlain by a relatively thin (~10 cm) sandy-silty aeolian unit. The sedimentary succession ends with about 1-m-thick of alluvial deposits and paleosol units. Charcoal samples collected at 10 cm below and 4 cm above the catastrophic units provide radiocarbon dating 236 - 385 cal AD and 249 – 541 cal AD (2s), respectively. Radiocarbon ages bracket the catastrophic unit that may refer to the major tsunamigenic earthquake of 21 July 365 (Mw ~ 8) in west Crete (Greece) reported to have inundated coastlines of Sabratha in Libya and Alexandria in Egypt. The nonlinear shallow water Tsunami-HySEA code is used to perform numerical modelling using 2 different seismic sources comparable to that of the AD 365 Crete earthquake. They feature 2 principal mechanisms that accommodate the Nubia-Aegean convergence along the Hellenic Arc, namely a shallowly dipping thrust-faulting on the subduction interface, as well as a steeper splay faulting in the overriding material. The maximum tsunami wave heights distribution calculated along the Tunisia coast peak in both cases at about 3 meters. The run-up caused by these sources, also considering that we have used uniform slip on the causative fault, can be significantly higher. This proves that the tsunami waves may have reached Tunisia where several coastal cities where severely damaged and reported to have stopped their economic activity. With the identification of the 365 tsunami deposits in eastern coast of Tunisia, the tsunami hazard and risk associated with a major earthquake from the western Hellenic

subduction zone cannot be ruled out.