

## ***Interactive comment on “Extreme marine events revealed by lagoonal sedimentary records in Ghar el Melh during the last 2500 years in the northeast of Tunisia” by Balkis Samah Kohila et al.***

### **Anonymous Referee #1**

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The manuscript presents the sedimentological and geochemical investigation of lagoon deposits in Tunisa, aimed at the recognition of extreme sea surges of the last three millennia. Considering the NHESS focus, the topic is of potential interest for the journal community. However, I see serious flaws in the presentation and discussion of the results. I try to synthesize here what I consider to be the major weak points that do not allow the manuscript to be published in the present form.

Settings The setting lacks of basic information such as: the lithology of the bedrock surrounding the lagoon and forming the Medjerda river catchment; the Medjerda water and solid discharges (average and during floods); the amplitude of local tides and the

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existence of long-shore littoral currents; present wave heights and sea surge during severe storms.

**Methods** There is no indication of the method adopted for coring GEM3 and GEM4 (“piston core” is very general, e.g.: were they manually-operated? Which was the diameter of the core?) and for the collection of surface samples. Concerning these latter, no information is provided on how shallow they were (few centimetres? Few decimeters?), their geomorphological position in the landscape (river bed? Floodplain? Beach? Dunes? Etc.) and if they were collected from present-day soil horizons (meaning they may be slightly weathered sediment). No indication is provided on the grain-size classification applied.

**Calibration of  $^{14}\text{C}$  ages** Inaccuracy inherent to radiocarbon dating is not expressed in Table 1 and 2. Probability of the calibrated ages as 1 or 2 sigma is not reported. Altogether, these errors are not discussed when integrating the  $^{210}\text{Pb}$  and  $^{137}\text{Cs}$  chronologies and estimating sedimentation rates. This raises concerns on the effective existence of the hypothesized time-correlations between the datasets and the Bond events.

**Discussion and conclusions** A prominent conceptual inadequacy is the apparent non-consideration by the authors of the so-called Walther’s Law (Walther, 1894). This basic law of stratigraphy states that any vertical progression of facies is the result of a succession of depositional environments that are laterally juxtaposed to each other (Lopez, 2015, in Encyclopedia of Scientific Dating Methods). This implies that changes in the lithofacies characteristics and grain-size distribution in the two cored locations may be autocyclic, due to, e.g., the migration of the barrier islands, shifting of tidal inlets and channels, progradation of lagoonal deltas. Vertical changes in sediment characteristics can thus occur without the intervention of “extreme” climatic events. This depotentiates the conclusions of the authors, that appear not fully supported by the data. It further shows that alternative interpretations should be considered.

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English language Poor English language recurrently hinders the comprehension of the concepts presented in the text.

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