

# ***Interactive comment on “Reconstruction of past marine submersion events (storms and tsunamis) on the North Atlantic coast of Morocco” by Otmane Khalfaoui et al.***

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The authors would like to thank Professor Pedro JM Costa for his valuable comments and suggestions. they will certainly contribute to a significant improvement of the article. However, we present some clarification and answers (R) to his questions (Q) in the following text:

Q1. Dear authors, the work presented by Khalfaoui et al. focus on the reconstruction of storm and tsunami events in the Atlantic coast of Morocco. This is an interesting contribution on a very relevant topic for the definition of risk and return periods for the Atlantic coast of Morocco and broadly speaking for the Gulf of Cadiz. Despite a consid-

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erable effort made by the authors the manuscript has many shortcomings and in some case can be considered poorly supported by the data. For me, one crucial aspect is related with a sentence on page 7 - "Based on our sedimentological and geochemical results, 14 sediment layers attributed to marine submersion events have been distinguished in TAH17-1 core (Fig. 5). These layers present at least one of the following characteristics: - a well-defined sandy layer, interbedded in fine estuarine sediments; - an enrichment in Ca and Zr indicating a marine source of the sediment, and depletion in terrigenous elements (Rb); - the presence of sedimentation structures such as rip-up clasts and/or sediment discontinuity". The problem with this sentence is the "at least" that clearly demonstrated a lighthearted approach to tsunami sedimentology. I am strongly opposed to that approach- To assign a deposit as a tsunami-related unit one should present cumulative data - thinning and fining inland, erosive or abrupt basal contact, coarser than under and overlying layers, changes in geochemical, palaeontological and compositional features, etc. There are abundant review papers on tsunami sedimentology that focus on the multiple and vast approaches that need to be conducted before jumping to conclusions. In this manuscript by Khalfaoui et al. a potential good study case is not well-presented because of lack of comprehension on the care that must be taken when assigning a layer to an extreme marine inundations. Therefore, based on a single core it is highly speculative to identify 14 events and in many cases based on a single sedimentological criteria (which is contrary to what reference works state).

R1. This sentence needs to be corrected. in fact, all sandy layers identified in TAH17-1 core as marine submersion events have at least two distinctive criteria: (1) these deposits are coarser than under and overlaying layers; seconde, (2) they present high concentration of Ca and Zr, which indicate a marine source of the sediment. At this level, these two independent parameters (grain size + geochemistry) are sufficient to conclude that we have a marine submersion deposit (regardless of the type of event causing these deposits). These two criteria have been used to determine marine submersion deposits in previous studies (Raji et al., 2015; Avşar, 2019; Zhou et al., 2019).

Some sandy layers in the TAH17-1 exhibit more distinctive criteria, like the E1 event, with the presence of rip-up clasts and erosive basal contact with underlying unite. Perhaps it would be more interesting to present this part of the results through a table with all known sedimentological and geochemical criteria and to check for each identified level in this study whether these criteria are verified or not.

Q2: I am aware of the work conducted and the different analysis the authors did however, the data is poorly presented and clearly this manuscript is not mature enough for publication. You need to I totally subscribe the detailed comments made by Reviewer Raphael Paris and I am not going to repeat his brilliant review. Furthermore, I think the authors should take a step back, produce and present more data and them resubmit the manuscript. The work has potential but it is not ready for publication. Therefore, I regret to say but I recommend this manuscript to be rejected. Kind regards Pedro JM Costa

R2: Corrections and suggestions provided by Professeur Raphaël Paris are for sure important to improve the manuscript. We subscribe also for his detailed comments.

## References

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