

General Comments

The paper by Aguirre-Ayerbe et al. deals with tsunami risk assessment and strategies for risk reduction along the coast of Oman, presenting a comprehensive and integrated approach, that starts from the scientific aspect (hazard assessment), includes engineering methodologies (such as vulnerability indicators), and involves also the operative and human dimensions (involvement of stakeholders). Another important aspect is for sure the study and quantification of the human dimension of vulnerability, usually neglected or ignored in tsunami vulnerability and risk assessment. The approach adopted in this work, bridging different aspects and methodologies, is gaining importance in natural risk reduction perspective.

In general, the manuscript is clear, well organized and well written (some remarks are reported below, in the "Technical Corrections" section). The results provide very interesting indications to the local authorities in terms of tsunami hazard and effectiveness of preparedness and preventions measures. The references are extensive and appropriate, such as no particular remarks are found concerning the pictures.

The methodology section, on the contrary, needs some improvements (reported in "Specific Comments" section), probably leaving too much descriptions and details to other related works, where a similar approach or part of it was applied.

The main weakness of the work is that no observations on tsunami hazard and vulnerability are reported, in order to understand if the proposed vulnerability indicators fit the local conditions (for example, building vulnerability classes are the same in Oman as the case considered in SCHEMA project?), and if the proposed countermeasures are really effective. In few words: it is possible to validate in some way all the assumptions taken for all the aspects (hazard, vulnerability and exposure, risk, countermeasures) considered.

Apart from this aspect, the paper represents an important step forward the integration between scientific and operational aspects, and is recommended for publication with minor revisions.

Specific Comments

1. INTRODUCTION

Has this approach been applied to other cases? Which difficulties and could raise in other areas, and which changes should you perform on the vulnerability indicators?

2. METHODOLOGY

Line 130. Maybe it is better to specify that COMCOT account also for land flooding using the moving boundary technique.

Lines 135-137. When dealing with deterministic hazard assessment is this area, are there non-seismic tsunami events that are worth of consideration? Landslide-tsunamis, for example, usually affects short coastal stretches but their effect can be highly destructive.

At Line 140, an early warning system establishment for Oman is cited. Is it working, in phase of realization, or just an intention at the moment?

In the paper the expression "inundation depth" is used repeatedly (for example in the definition of the drag level, Line 145): if it refers to the height of the water inundating the land (meaning the difference between the elevation of the water top and the topography) it is better to use the expression "flow depth".

When dealing with building vulnerability assessment, the most diffused quantities in tsunami science are flow depth H , water velocity V , and momentum flux (defined as HV^2), the last accounting for the energy of

the incoming wave. However, specify better in Lines 145-150 that drag force is for human dimension and flow depth for building one, and justify why you did not use momentum flux.

What do you mean with “exposed people and infrastructures” (Table 1 and Line 172)? Are they counted considering their inclusion in the flooded area? Explain and specify better.

Concerning Risk Assessment: how are hazard components for human and building components estimated? Is the flow depth over each building computed as the maximum water height? And what about drag force? Is it computed at each time step and then the maximum selected, or is it simply the product of maximum flow depth and velocity for each element? Consider that these do not occur necessarily at the same time.

Lines 198-199: how are the two risk dimensions weighted?

Line 266: again about exposure, here concerning HS. How is it measured? Is there a threshold for the flow depth, or is it sufficient the inclusion in the flooded area in order to consider the element “exposed”? Specify and clear better this point.

3. RESULTS

Line 302. When you speak of “flooded area” do you consider a flow depth threshold? Or is it sufficient that the area is simply covered by water, though few centimeters?

Lines 376-383. Can you provide some explanation of the fact that a detached breakwater would increase wave elevation on the coast? Are there some hydrodynamics effects justifying it? In Figures 12c and 12d probably it would be better to evidence where such prevention measures (breakwater and artificial dunes) have been placed.

Technical Corrections

ABSTRACT

the first sentence [Lines 9 to 11] is repeated almost exactly in the Introduction [Lines 24-25], change one of the two.

1. INTRODUCTION

Line 32. “most exposed to MSZ *effects*”

Line 39. “for all the components *contributing to* the risk”

Line 48. “have to be taken” instead of “are to take”

Line 72. Remove comma after “or”

2. METHODOLOGY

Line 125. “to” instead of “and”

Line 127. Remove “quake”, repetition with Line 126.

Line 128. “...COMCOT (Wang, 2009), which *solves shallow water equations using Okada model...*”

Line 129. Provide citation for Okada model

Lines 162 and 164. Remove comma after “are”

Line 185. Describe in few words (or include a reference about) the min-max method.

Line 253. “It is summarized”

Line 279. "On the one hand"

Line 280. "where flooding occurs on a regular basis, at least annually" this seems to mean that these areas are affected by tsunami at least once per year. Is "flooding" meant in general, by storms, river flooding or other? Reformulate better.

3. RESULTS

Line 296. Separate with space "assessmentand"

Line 297. Separate with space "Omandeal"

Line 299. Separate with space "processdescribe"

Line 309. Remove "it", the subject Wilayat Al Jazir (is already present)

Line 310. Remove "the" before "8%".

Lines 361-362. Move "is located" at the end of the sentence.

Line 423. Add comma after "tsunami-prone flooded areas".

Line 438. Remove comma after "prioritizing".