Comment on essd-2021-316
Anonymous Referee #1

Referee comment on "Topo-bathymetric and oceanographic datasets for coastal flooding risk assessment: French Flooding Prevention Action Program of Saint-Malo" by Léo Seyfried et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-316-RC1, 2021

General comments:

The manuscript by Seyfried et al. presents two collections of datasets collected within the frame of the French Flooding Prevention Action Program (PAPI) of Saint-Malo, France. These comprise topo-bathymetric surveys performed recently and those gathered over time, with varying spatial extent and resolution, along with in situ ocean hydrodynamic data collected in intermediate and shallow water depths (tide, surges, currents and wind waves). The manuscript first presents the different sources of topo-bathymetric data and briefly explains how they are merged to form the final digital terrain model (TBDTM) made available to the community at two different spatial resolutions. The hydrodynamic campaign is then described along with the type of instrumentation and the data processing procedures.

First it must be recognized that the collection of such comprehensive datasets requires huge amount of work and resources. The effort to make it available to the community hence must be acknowledged. However, I feel that the overall objectives are not properly set in the manuscript which is, at least in part, due to the fact that no coastal flooding was actually monitored during the entire campaign. The Abstract reads: "The oceanographic dataset provides an overview of hydrodynamics in Saint-Malo bay and wave processes leading to coastal flooding". In the current form, this is not really the case. The dataset does present an opportunity for better understanding tidal and wave processes across this macrotidal environment, however, the claim that it will help understand further the physical drivers of coastal flooding in this area is clearly not supported in my opinion. At most, this dataset will help validating numerical models with the objective to predict more accurately the transformation of incident waves across Saint-Malo’s Bay and the associated circulation. The type of numerical models targeted is not mentioned, though it is an important point. From what I can see, mostly phase-averaged models would benefit
from the present field datasets. However, estimations of wave runup near the coastline or structures and quantifying overtopping processes are essential for accurately assessing coastal flooding risks; such datasets are likely needed and would complement this manuscript and the validation of wave phase or group-resolving numerical models.

In conclusion, I would advise the manuscript its current form against publication but I am pretty convinced that after revising it, it could be a nice contribution in the future. Mostly, I think that the manuscript has to be re-framed, with the ‘coastal flooding’ argument toned down, since it does not report any such event. A list or more or less detailed comments and suggestions for improving the manuscript and the datasets are provided below.

More specific comments:

#1 – I understand that this is a “data paper”, but the writing could be much improved at parts, the Abstract being one very good example. The quality of the figures also have to be improved, with an increased resolution and readability. For instance, the legends in charts cannot be read at present (e.g. Fig. 1 and 3).

#2 – Please provide the links to the pages in English. I managed to find them, but it took me a while, and one has to know that they exist in English too.

#3 – L37-38, please clarify.

#4 – L46-48: are those lines intended to provide the context/objectives of this study? The overall and specific objectives of the study have to be better scoped and reorganised taking into account the general comments above.

#5 – “few meters per second”?

#6 – L56: “limits understanding of hydrodynamics in the bay”. Besides the English, please expand.

#7 – L60 What do the authors mean by “significant wave fields”?

#8 – L62: the definition of a coastal flood in the area remains to be defined throughout the paper.

#9 – L75: Missing words at the beginning? It reads strangely.

#10 – L87: “final validation by a qualified hydrographer”. This formulation is used too often in my opinion, without much of an explanation. Instead, more details are often desired, especially on a “data paper”. For instance, no error estimates on the various bathymetric data is provided, while this is probably the most essential data for accurately assessing coastal flooding.

#11 – Section 2.2.5: these steps almost sound that the quality of the bathymetry is somehow arbitrarily granted, since the objectives appear to be a smooth-enough surface, without artefacts. Can more details be provided, with quantitative assessments?

#12 - “Finally, the processed data was subjected to final validation by a qualified hydrographer.”. Please explain what this means in the present context. Which criteria have been used to assess the quality of the retrieved water levels?
#13 – Are the tide pressure gauges deployed at the seabed? Otherwise, Eq. 1 is missing the distance from the sensor to the seabed.

#14 – L223: Why not using locally-sourced atmospheric pressure data? The error made on water levels would be reduced.

#15 – L227: This type of calibration is not acceptable for the accuracy desired. All pressure sensors have to be calibrated in the lab beforehand (or theirs curves known). The present procedure only ensures to verify the sensors drift through time.

#16 – L232-235: Much more details on the processing of water levels are needed, including the procedure for the “relocation” in height with respect to the tide gauge of Saint-Malo harbour.

#17 – L251-253: why these threshold values? These seem rather arbitrary.

#18 – L258-260: the problem is poorly described. In order, this should read something like: The dynamic (non-hydrostatic) pressure associated with short wave motions attenuates over depth. To retrieve the free surface elevation, a reconstruction method is thus required. Note that the hydrostatic assumption is one possibility, it just depends on the assumptions made on the wave field’s dispersive properties.

#19 – Why is this important in the present context?

#20 – I found the pressure data from the OSSI poorly organised. Timeseries files should contain the mean water depth per burst, along with the three reconstructed elevations (e.g. for wave-by-wave analysis). In a second file, the PSDs for all reconstructions could be provided per burst, however, water depths are also relevant. Also, it is really not clear why the three reconstructions share different datetime vectors if they are from the same source.

#21 – If I am not mistaken, this is the first mention of AST technology. Please provide more details.

#22 – L273: What do the authors mean by skew surge?

#23 – L277: there are no indications about how the wave setup was computed. Can you please provide further information? Considering the uncertainties on water levels as suggested above and in the manuscript (e.g. slope correction), how reliable are those estimates?

#24 – Figure 5: What is Hm02?

#25 – Appendix A1 and A2; please use proper mathematical Latex formatting (e.g. \cosh for the cosh function), \left( for large left parentheses etc.

#26 – L336-339: this statement is only true in the nearshore area with significant non-linearities in the wave field. For a linear wave field, there is no issue with this method. However, in intermediate water depth, noise in the pressure measurements can become an issue.

**Typos/Wording:**

Choose a notation: wave setup or set-up.
L50: “is subject”
L52: “during the flood”; “during the ebb”
L54: “significant wave heights up to”
L77: Seabed elevation then?
L87: “subject”
L100: space before “The”
L131: Missing point.
L150: “There” instead of “They”
L188: Nearshore bottom slopes are generally provided in %
L201: Figure 4