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Review and rebuttal of the paper

Optimising the wave attenuation of bamboo fences using the numerical wave model SWASH

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Editor handling the paper: Jeremy Bricker

The reviewers remain anonymous.

Second review round

Reviewer A:

Dear authors,

Thank you for your effort to revise your papers.

The manuscript "Optimising the wave attenuation of bamboo fences using numerical wave model SWASH" has improved significantly after the first reviewing round. The reviewer made several statements and questions for the authors about the methodology and the model and now received excellent responses. However, there is a minor change that the authors need to clarify in Figure 6b. The authors should draw dash lines for readers to know how sx is measured. The reviewer believes that the sx in Fig. 6b is between the centers of two cylinders. The author can also do the same in Fig. 6c.

Reviewer B:

I would like to thank the authors for having addressed all comments from the reviewers. The manuscript has greatly improved and I recommend it for publication.

Recommendation: Accept Submission

First review round

Reviewer A:

Overview:

The manuscript presented the application of SWASH model, developed by Delft University of Technology, to simulate the interaction between wave and bamboo fences. This manuscript also introduces several types of a fence for optimising wave attenuation in the numerical model, SWASH, which will be used in the field. Even though the bamboo fence design is not similar to the one built on the Mekong deltaic coast, the modelled fence shows a good reduction in wave heights from numerical results.

The manuscript is well-written and provides detailed steps to achieve author's goals. Overall, the reviewer thinks this manuscript is worth publishing. However, the reviewer has several major and minor comments listed below.

Major:

- First of all, the manuscript presents 1D mode of the SWASH model to simulate the interaction between wave and bamboo fences. In specific mode, the authors used

the vegetation implementation model, which applied the Morison equation for modelling only horizontal drag forces to vertical piles (poles). The vegetation model required three main parameters such as the number of cylinders in m^2, diameter, and drag coefficient (or bulk drag coefficient). While authors use another method to predict bulk drag coefficient, which shows reasonable values to use in validation and further models, the number of cylinders per m^2 is abandoned. The reviewer could not find this value in the Validation case section but only in the Design setup section. So, the authors need to present this value in the Validation section even though the authors already mentioned the reference.

- In the Validation case section, the structural configurations of cylinders in Figure 3 show the x and y setup, but the authors use 2DV (x and z) mode, which is 1D mode in the SWASH model. If the reviewer understands correctly, this is not so right because it is impossible to have the same configuration of cylinders in 1D mode, as shown in Figure 3. Note that one of the important parameters in the vegetation model is the number of cylinders per m^2, and cylinders can be in random arrangements as long as the number of cylinders stays at the same value as defined in the model. And we cannot know how cylinders can be fixed in the same configuration as in Figure 3 in 1D mode. So, the reviewer would like to ask if the authors can explain it.

- Also, in the Validation case section, why did the authors use two different scenarios for two layers, such as three and two layers? Were the results similar to those two scenarios? If there were differences between the results of three and two layers, the authors need to show them.

- Authors should not use “we” in the manuscript. The reviewer recommends removing all “we” and rewriting all sentences that used “we”. Note that the frequency of using “we” in this manuscript is super high.

Minor (the bold text is meant to add)

- Page 2, last paragraph: … where Ht, Hi are the transmitted and incoming wave heights, **respectively**

- Page 2, last paragraph: … in 10 months in 2016 in **Mekong deltaic coasts** in Vietnam…

- Page 3, 3rd paragraph: … SWASH by **Dao et al. (2018),** Dao et al. (2021), Mai et al. (2020)

(Tung Dao, Marcel J.F. Stive, Bas Hofland, Tri Mai; Wave Damping due to Wooden Fences along Mangrove Coasts. Journal of Coastal Research 1 November 2018; 34 (6): 1317–1327. doi: https://doi.org/10.2112/JCOASTRES-D-18-00015.1)

- Section 2.1, page 3, 1st paragraph: offshore waves (H_{m0} and T_s) are the average, maximum or statistical values? If it were statistical values, how many years of statistical calculation?

- Section 2.1, page 4, last paragraph: … found in **Alferink (2022)**

- Page 5, last paragraph: Rewrite the first sentence.

- Figure 6: re-arrange the arow positions.

- Section 4.1: the reviewer could not understand how relevant this section with the aim of the manuscript. But this section is quite interesting.

- Section 4.1, page 17, 1st paragraph: … see Figure **13a** … Figure **13b**

- Section 4.1, page 17, 1st paragraph: Reviewer does not agree with using “private correspondence”?

- Figure 13: Make clear x-axis label: R = … [yrs].

Recommendation: Revisions required.

Recommendation: Revisions Required

Reviewer B:

The paper focuses on the application of the Swash model in combination with a dissipative term, which approximates the drag induced by vegetation, to investigate a potential design of vertical bamboo poles for coastal protection purposes. The topic is of great interest for practitioners, engineers and coastal planners. Overall, the paper has scientific merit. There is certainly lots of content and the authors have done a substantial amount of work, but at this stage, the manuscript still resembles a lab report rather than a scientific paper. However, the final discussion part is good and objective. It would therefore help, if the authors had a closer look on how to streamline the model validation part, since the model setup is not clearly explained. It would be of great benefit, if the reader gained a better understanding of the model's performance in dependence of grid size. The grid size is a critical parameter, but it seems that it was chosen without taking too many things into account. A proper convergence test would allow for a better judgment of the validation results and the overall model performance for this particular case.

Below are some specific questions and comments:

Abstract: Shorten and highlight the findings. Half of the abstract belongs into the introduction.

End of page 2 after the 5-item list: The detailed information of the field campaign seems out of place here. It would help with the flow of the paper to mention the field campaign either in the end of the introduction after the literature review or possibly in the beginning of chapter 2 (design conditions).

The literature review should include the pioneer work by some of the IH Cantabria people on wave attenuation by vegetation. For example: Maria Maza, Javier L. Lara, Iñigo J. Losada, Experimental analysis of wave attenuation and drag forces in a realistic fringe Rhizophora mangrove forest, Advances in Water Resources, Volume 131, 2019

Eq. 4: Does the acceleration term in du/dt form a system of equations with the LHS of Eq. 2 or is it approximated with first order upwind based on the known solution of u from previous time steps?

Above Eq. 14: State how many layers you use (apparently 2-3 layers are used as denoted further down in the text)

Can tables 1 to 3 be shown in a graph. Probably difficult but so is extracting information from a table.

Figure 3: Y-axis unit is missing.

Grid size selection for SWASH: is 3cm fine enough to capture the poles of 4cm diameter. The poles will eventually show up as single quadratic cells and do not exhibit their naturally round nature. A convergence test is necessary to further understand the effect of the grid size on this problem. The choice of the mesh size should not only depend on the wavelength. Table 4 shows that some runs numerical tests were done with 2cm grid size. What is the reason for this choice?

It is not clear whether the model was run in 2D or 3D mode. The authors state that the model was set up along a horizontal transect with multiple layers, i.e. in x and z direction. However, Figure 3 shows a top view configuration with multiple cylinders in y-direction, which is the second horizontal dimension. The experimental layout of Gijon Mancheño et al. (2021) shows a 3D experiment but I cannot relate Fig 4 to such a setup. This might be trivial for people in the field but it is not clear for a reader from a different field.

In Jansen et al, 2019, a full 3D model with sub-centimeter grid size was used. In case the poles face the horizontal axis (vertical array of poles), how can a model set up with 2-3 layers handle this problem?

Above Eq 20: Can the processing script be provided for the reader?

Results: Here, the grid spacing is different, (5cm). What is the reason for validating the model for a particular grid size and then using a different one? How can a vertical array of poles be described in a 2-layer model?

The authors state that using the Cd,b coefficient returns “better” results than the drag coefficient for a cylinder. Could this be a classic case of offsetting multiple errors with each other? As mentioned above, the grid is not fine enough to resolve the full outline of the cylindrical features. A Cd,b coefficient might just work better though the cylinder drag should be more realisic. The same applies to the description of figure 8. It would be helpful to understand why the different methods perform differently.

Was only one n value (44.5%) tested for the volumetric approach?

Section 3.1 should probably come before section 2.4. The Design setup should probably be explained after the validation process is complete.

Figure 18: Limit y-axis at 0.1.

Recommendation: Revisions Required