Response to Editor comments:

"The role of morphodynamics in predicting coastal flooding from storms on a dissipative microtidal beach with SLR conditions: Cartagena de Indias (Colombia)" (nhess-2021-210) by Jairo E. Cueto Fonseca et al.

General Comments

a) The role of morphodynamics in terms of bed forms on the resulting frictions

RESPONSE: Because of the spatial resolution of the model (cell sizes of 1-3-5 m), bed forms below the order of one meter (e.g., ripples) are neglected. Seasonal changes in bed forms are also neglected since the time scale used for modelling is limited to few days at maximum. However, the cross-sections exposed in Figures 7 and 8 showed the formation of a longitudinal bar after every evaluated scenario. This morphological feature is generated by the offshore-directed sediment transport from the beachfront to the submerged beach. The presence of bars could play a fundamental role on dissipating energy from incoming waves and apparent friction. The formation (or migration) of bars modifies the hydrodynamics of Bocagrande, changing the location of the breaking point, and thus, establishing new boundary conditions for the local morphodynamics.

These comments were added in the discussion section (second paragraph: lines 350 to 363).

b) The suitability of the analysis for combining projections of sea level rise and wave conditions, particularly considering that future wave conditions compounded by a different mean sea level may act on beaches further from equilibrium and therefore the model suitability should be also considered.

RESPONSE: The suitability of the analysis and modelling strategy using XBeach when combining sea level rise and wave projections is now treated in the last paragraph (expanded) of the discussion section as it follows:

" Moreover, the beach morphology in the study area was assumed to remain the same under the future scenarios, whereas the submerged and subaerial beach will be adjusted to changes caused by environmental factors and anthropogenic interventions outside the scope of this research. Recent studies suggest that the gradual SLR and extreme storms allow beaches to migrate and mitigate adverse effects (e.g., Cooper et al., 2020), but this approach should be carefully analysed since behind Bocagrande there is an urban area that would prevent a proper beach migration. (i.e., coastal squeeze). It is important to point that the suitability of the present analysis may act on beaches further from equilibrium and hence the adverse effect may be underestimated. From the calibration process of XBeach, calculated bed level changes under storm and SLR conditions are a good estimation for the site. However, the numerical model does not consider the contribution of individual waves to morphodynamics when using the surfbeat mode. XBeach mainly uses the infragravity wave band to calculate morphodynamics, so the solving of diffraction processes (important in the presence of hard structures) can be limited."

c) Potential for extrapolating the approach to other beach types such as reflective or macro tidal."

RESPONSE: The presented methodology could be also applied on beaches with different configurations, but some adjustments must be executed. In the case of reflective beaches, it is necessary to consider the non-hydrostatic mode of XBeach. Since short waves will be more relevant for the surf and swash zones dynamics on reflective beaches, the surfbeat mode could be limited for solving the hydrodynamic processes involved. For meso and macrotidal beaches, it is suggested to include the modelling of different scenarios of astronomical tide. The modulation of the wave breaking point could contribute to an increase/decrease of the beach volume during storms.

These comments were added at the end of the discussion section.