

Comment on “The role of geological mouth islands on the morphodynamics of back-barrier tidal basins”

The work by Wei et al. is an intriguing numerical study that seeks to quantify how the number and distribution of inlet mouth islands impacts the morphologic evolution of semi-enclosed coastal basins. The results of this investigation easily spur multiple investigations for future study, and it is evident that work presented here could form the foundation of a fruitful line of research. As such, I support the publication of this paper, while acknowledging that some editing is needed to clean up grammar/syntax and add additional context to underscore the importance of the results. To this end, please see my comments below. Please note that, with regards to grammar, I have not flagged every instance of awkward wording and instead focus mostly on language that could impact comprehensibility.

#### General Notes:

The authors should consider being more upfront about the fact that the model uses ‘rocky’ fixed-dimension islands in their model experiments. This detail is not apparent until section 2.3, although it is hinted at in the abstract (“geological constraints”). Stating this clearly in the abstract will allow other researchers to connect with this topic more specifically. Additionally, the Introduction switches between citations of geologically constrained and unconstrained systems, which is somewhat confusing when presented with model investigations that focus only on rocky mouth islands. I think this confusion could be eliminated by concentrating more on embayed and drowned coasts in the Introduction, with references to sandy/alluvial-type systems as points of comparison and to make more general observations about how mouth islands have broadly been observed to function. To be clear, I am not proposing a total teardown and rebuild of the Introduction, but more of a rearrangement and rephrasing to present observations in a way that could better support the specific investigations undertaken in this study. This may also make it easier to project future work in the Discussion, simultaneously giving the reader an early understanding about the limitations of this study while suggesting the importance of this work for subsequent investigation.

#### Line Edits and Considerations:

Line 22-25. ‘Hindering role’ in this sentence can probably be removed to make the latter point in this sentence easier to understand. Recommend changing the dependent clause to “[...], while the presence of delta-side islands may increase relative sediment deposition in the basin.”—or something similar, assuming I have captured the concept correctly.

Line 35: The last part of this sentence should read either ‘these types of coastal zones’ or ‘this type of coastal zone’ to keep consistent with pluralization or lack thereof.

Line 42: Consider swapping ‘changed landforms’ for just ‘landforms’ to better convey that this is a two-way exchange of influence.

Lines 44-46: The sentence describing the finding of Otvos (1981) is ambiguous. Without looking to the reference, my first thought reading this line is that it is possibly referring to sediment being liberated from an antecedent high to begin early barrier formation during sea-level rise. Please clarify.

Line 48: The ‘and’ here is being used as a conjunction. Add a comma after ‘systems’.

Line 49: Consider splitting this sentence after ‘tool’. ‘Virtual’ is also implied by numeral modeling, so not needed.

Lines 83-85: The Massachusetts coast is heavily glacially-influenced, and bay islands are a mix of drowned uplands, glacial deposits, and alluvial features. To make the last part of the sentence more broadly accurate, could probably change to [...], which are probably formed from the drowning of topographic highs during sea level rise in the post-glacial period.”

Lines 91-94: When setting up the specific research questions, note that the number of islands is also being evaluated.

Lines 143-144: Merge with previous paragraph.

Lines 152-155: Suggest dropping ‘Besides’ from beginning of sentence. This line may also work better as the final sentence of the paragraph since it is a projection for future work, e.g. “In all cases, the same initial bathymetry is adopted so that the model results can be compared. Additionally, islands in this initial study are non-erodible (rocky) and square (1 km x 1km). In the future, different sizes and shapes of islands will be investigated to determine how these parameters impact morphological outcomes.”

Line 165: Need a conjunction to link thoughts about where currents occur, something like... “Morphological evolution first occurs in the mouth zone where tidal currents are strongest, as the well as the river input zone due to fluvial input.”

Line 173: Add comma after ‘therein’.

Line 182: Need an article before ‘larger spatial scale’. Suggest ‘a larger spatial scale’.

Line 183: Consider changing ‘And more erosion occurs’ to ‘Also, more erosion occurs’ or something similar.

Lines 184-185: Slight phrasing corrections needed here. Suggesting the following: “Meanwhile, in the upstream zone, small differences are observed between the four cases, indicating that hydrodynamic effects on this area are relatively limited.”

Figure 4: In the future, consider using a color palette that is more accessible to readers with color deficiencies. Again, not an issue here, but something to think about for the next study.

Line 194: I think “leading to more sediment suspended and transported, and forming a deeper inlet channel” could be rephrased more simply as just “leading to more suspended sediment transport and forming deeper inlet channels”.

Lines 191-199: Reading this paragraph reminds of how much this setup mimics the processes that occur around bridge pilings, which seems to be what the modeled rocky islands act like. Could be a thought worth mentioning in the discussion.

Lines 213-214: Slight phrasing corrections needed here. Suggesting the following: “As the morphological evolution continues, the channel gradually develops into the upper intertidal area and forms a complex channel network.”

Line 214: Considering flipping the word order of ‘scenarios of inlet island (“IL”)’ to ‘inlet island scenarios’. This reordering would apply to similar phrasing throughout the paragraph.

Line 219: It is generally inadvisable to use contractions in a professional paper. Please change ‘that’s’ to, in this case, ‘This is’.

Lines 224-225: Not sure what this is trying to say. Based on the previous sentence, this should say something about how morphology differs at CS3 with longitudinal placement of the island, but as currently written there’s just a broad statement about where channels and deposition generally develop. Please elaborate further.

Line 234: “evolution a basin” should be “basin evolution”.

Lines 248 to 249: In the final sentence of this paragraph, I think the last line should read “[...] indicating that hydrodynamics gradually adapt to basin morphology and a relative equilibrium state.” Please confirm if this is the correct meaning.

Figure 8: This is my favorite figure in the paper!

Line 291: “the ones gradually move the left side and become convex after 500 years” could be reworded to be more technically accurate. Perhaps something like “modeled hypsometric curves at 500 years become noticeably convex”.

Lines 294-299: Check the wording on this paragraph—the topic sentence, especially, does not really explain the result. If I understand correctly, there are really only two points here: [1] During basin morphological evolution, the area of tidal flats grows slightly slower under the delta-side scenario and slightly faster under the basin-side scenario. [2] After 500 years, the magnitude of shoals and flats developed under all cases are similar. These two thoughts can probably be appended to the previous paragraph.

Figure 9: Both the 100-yr and 500-yr curves being dashed is slightly confusing to look at. Consider either making one set solid lines, or alternatively, changing the color shading between the sets. I am thinking something along the lines of dark blue and light blue for BS, dark green and light green for DS, etc.

Lines 335-336: Suggest changing “the tidal basin tends to be stable showed a gradually stable tidal prism” to “the tidal basin tends to be stable, as shown by an increasingly stable tidal prism.”—or something similar.

Lines 405-407: The second part of the last sentence in this paragraph does not really add anything to the discussion here. In light of the previous sentences in said paragraph, it reads almost contradictory, although I can see that is not the intent. Consider removing and/or elaborating.

Section 4.2: This section could be better served in section 3, as it is effectively another result and could be easily discussed in the context of section 4.1. Consider rearranging—I think this would be fairly easy to implement and would improve the flow of the Discussion.

Line 451: In this first line of this section, remind the reader again that this is referring specifically to the basins in Massachusetts.

Lines 451 to 469: I think it is possible these two paragraphs can be combined. The theme here is that the study does not fully capture the differences in the observed basins, which is probably a result of other geological constraints (particularly, initial bathymetry) that were not fully explored in this investigation. This could be used to set up a future sensitivity study to compare the relative magnitudes of morphological forcing from initial bathymetry and mouth island presence/placement.

Lines 474-475: “while natural islands are often slowly eroded with time”—for the case of rocky islands specifically? Sandy mouth islands can be completely destroyed and reformed over decadal timescales. Might be worth adding some additional specificity.

Section 4.3: Overall, in this section, I was expecting more focus on future work, since the authors mention in section 2.3 that they have designs for more study. In general, I feel this like section could be more optimistic about the model results—this is a topic that is largely unexplored, and the fact that the basins which inspired the study have some differences that are not easily explained speaks to the richness of possible investigations in this research area.

Conclusions: Depending on if suggestions for more future work discussion/speculation are considered in section 4.3, consider adding a corresponding line or two here.