

Please note that in this rebuttal, *italics* refer to the text of the reviewer's comments, the detailed response is in **bold red**.

AUTHOR RESPONSE TO REVIEWER #1:

Summary:

The manuscript describes a numerical study of the Mo.S.E. flood protection scheme in Venice. Specifically, the author assesses the effects of a Partial Closure of the lagoon exclusively involving the Lido inlet (PCL) and successfully showcases the potential of this novel operation concept. Although recent studies about this topic exist, the presented results further elucidate the influence of tidal range, wind setup and intra-gate infiltration, which complements the understanding of the city's capacity to adapt to increasing flood frequencies as a consequence of Climate Change.

General comments:

Although the hydrodynamic situation of the Venice lagoon is doubtlessly unique, the presentation of results and underlying methodology can readily be transferred to other cases of numerical modelling. The text is very well structured and the provided figures concisely summarize and illustrate all relevant findings. It was a pleasure reading this positive piece of work and, therefore, only minor revisions could be proposed that mainly address the style of presentation or mere Formalia.

We thank Reviewer #1 for the comments and suggestions that will help to improve the manuscript. Please, find below the author's answers.

Minor comments:

L72: "According to recent studies..." – *it is arguable whether these studies are recent, but all of them seem to be anticipatory with regard to Mo.S.E.*

L103: Figure 1 – *a rectangular box around the Lido inlet may be added to define the extents of the blowup region more clearly*

L104: "... physical, biogeochemical, and biological conditions..." – *biological concerns seem to appear twice here*

L109: "Nutrient and pollutants ... from the drainage basin." – *the location of this drainage basin and its discharge system may be of interest to the reader and could be included in Figure 1.*

L144: Chapter 2.1.1 – *this is the only third-order section in this chapter and its content could well be included in both the previous section 2.1 or in an individual section of second-order*

L179: Appendix A – *the figures generally attest a good resemblance between observed and simulated tidal curves, but could still benefit from additional quantitative justification, such as root mean square errors or correlation coefficients etc.*

L228: "Results are not affected ..." – *they are affected, but not significantly*

L228: Figure 3d – *in a greyscale print, the regression lines can hardly be distinguished, which may be enhanced by different colour depths or name tags*

L259-264: *For the first time, the text loses some of its conciseness. Hydrodynamically, the lagoon simply becomes a one-ended basin.*

L264: Figure 4d – *again, lines in the fourth plot are hard to read in greyscale (and for people with colour vision deficiencies)*

L282: “... the singularity of such event.” – a short indication of the general nature of this event would be very helpful at this point

L322: “... same difference could be achieved by increasing of 0.1 m the tidal range ...” – the origin of this quantity is not self-evident

L348: cf. comment on L322

L386: “... combining structural and non-structural measures ...” – it is arguable whether the operation of the Mo.S.E. concept can be called an (individual) non-structural measure

The reviewer is right in all the minor comments she/he provided. All these suggestions will be carefully considered in the new version of the manuscript.

Formalia:

L65: „... independently flap gates ...” – a word (reference of the adverb) seems to be missing

L68: “Works ... begun in 2003.” – participle tense should be checked

L70: “see Appendix A” – legend entries below figure (r) all contain “L” for Lido inlet

L161: “... a coupled wind wave-tide model ...” – presumably a wind-wave tide model is meant

L195: “... all the events (n° 42) ...” – presumably the total number of events was 48, which may better be expressed as “(N = 42)”

L202: “... the tidal dynamics has been reproduced ...” grammatical number should be checked

L273: “... data from 42 storm events occurred in the years 2019 and 2020.” – presumably “events that/ which occurred”; further examples of this use of participles follow

L315: Figure 7b – both axes refer to volumes and accordingly would usually be measured in cubic meters (m^3)

L362: “... a World Heritage site enhancing threatened by flooding ...” – presumably “increasingly threatened”

L378: “... higher SLs respect to an unregulated lagoon.” – a word seems to be missing here

L380: “... reducing the effectiveness of the PLC” – presumably Partial Closure of the Lagoon involving the Lido inlet only (PCL).

The author is very grateful with the reviewer for noting all the Formalia that will help to improve the manuscript.