



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-198-RC1>, 2022
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Comment on egusphere-2022-198

Goneri Le Cozannet (Referee)

Referee comment on "DSCIM-Coastal v1.1: An Open-Source Modeling Platform for Global Impacts of Sea Level Rise" by Nicholas Depsky et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-198-RC1>, 2022

This paper provides a framework, codes, data and results on future coastal impacts of sea-level rise under different adaptation scenarios. The paper represents a huge work, it is well presented and clearly written. It is excellent that the data, codes and framework are provided in a transparent manner. To me, the paper is definitively worth publishing, but some aspects require clarification from my perspective. I hope this review is useful.

Moderate comments:

- Following the FAIR principles (Line 144) is excellent, but it is not demonstrated that the DSCIM platform is FAIR. One possibility could be to explain how the criteria of Force11 have been implemented.
- It is not clear how flooding is modelled. Is this a bathtub approach? And in this case, given that the Bathtub approach generally highly overestimates the flooded area during events characterized by overflow, can this lead to overestimates of damage and adaptation costs? Similarly, how would the consideration of erosion and salinization of estuaries and coastal aquifers increase costs? I would not expect a detailed quantified value here but may be a note in the discussion.
- The resolution of the coastal segments is obviously a key issue: there is a trade-off between the computation time and the ability to remain realistic in terms of coastal extreme sea levels modelling. The study demonstrates well that reducing the number of points was possible because some regions representing a very small fraction of the total aggregated costs are simplified (e.g. French Polynesia). However I wonder to what extent the aggregated numbers given for 50km segments can be realistic. Typically, for example, the wave setup contribution to extreme sea levels is lower in harbors than in adjacent beaches (e.g., Lambert et al., 2020). What can be the impact of this simplification on the final results?
- When discussing future socio-economic development, it is unclear why the work of Merkens et al. (2016) who downscaled SSPs in coastal areas is not acknowledged or discussed.
- Figure 2 displays non-zero costs in states or regions which are not connected to the

sea: e.g., Arizona in the US, Auvergne-Rhône-Alpes in France. In addition, it displays apparently zero costs in regions known highly exposed to sea-level rise (e.g. Occitanie in Mediterranean France, characterized by low lying urbanized sandy lidos). Can this be explained?

- A diagram displaying the different components of the model and main principles would help the reader.

Minor comments:

- Line 114: please note that the IPCC glossary gives slightly different definitions for these terms (e.g., costs are a measure of some impacts)
- Line 205: may be add "are characterized as follows..."
- Line 239-250: this is a reminder of the Method of Diaz, 2016, but another method is used here. Is this section is necessary here?
- Line 256-257: I don't understand which population redistribution is meant here: is this that due to SSPs or due to additional coastal migrations, e.g., in response to SLR?
- Line 267-269: I understand that you have accounted for mortality as described in the Diaz paper, and not in its implementation. Is this correct? Eventually, the sentence could be made a bit clearer. Further, is this the population exposed to flooding (not ESL) which is considered to compute mortality?
- Line 294: It is excellent to model this issue, but should this issue be framed only in terms of benefits and costs, or could there be also a general aversion to relocation motivated e.g. by optimism biases and attachment to specific location?
- Line 326: I don't understand what is meant by data fidelity here. Can you rephrase or explain?
- Line 340: Table 2 shows these times apply for an Apple MacBook Pro laptop with a 2.8 GHz Quad-Core Intel Core i7 processor and 16GB of RAM, but Table 2 is referred much later. May be add it here to help the reader
- Line 258-259: the note on resolution between parenthesis is based on the resolution of the initial dataset, but it can be clearer by just giving the grid cell or segment size.
- Section 2.5.3 can be misunderstood: as I understand it, the CoastalDEM is not independent of SRTM, but it improves SRTM by learning coastal features in the US where there is Lidar and improving in other regions. Can this be clarified?
- Section 2.7.4 : what protection standard is assumed beyond the US and the Netherlands? Is this 1:100?
- In section 3.3 – Model limitations: I suggest to include here some aspects raised above, such as the 50km coastal segmentation and the flood modelling approach (bathtub?). In addition, the analysis is purely economic, but there are other aspects that can be included, such as the feasibility of adaptation measures in 2070/2100, when resources and energy availability and costs may be completely different than today (See SPM of the WGII). Another limitation could be the consideration of salinization and erosion, as rightly noted in the introduction.
- In Figure 5 and in the similar figures in annex, it is difficult to see the difference between the IAM and CIAM models because triangles, circles and squares are superimposed. Can this be improved? One possibility could be to display them on different column?

Data and codes:

- I have visited the codes without trying to extract all data run them on my computers (I am limited in terms of computer performance, data storage and time to run models!). It seems to me that the dataset lacks a bit of explanations (why two files, the smallest one seems to contain a lot of files of 0kB). Furthermore, it is not completely clear from the abstract why the framework and the codes are in two different deposits.

I hope the review is useful

Gonéri Le Cozannet, BRGM, 5th June 2022

References cited in the review (not necessarily for inclusion in the manuscript)

IPCC AR6 WGII Glossary: available

https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf

IPCC WGII SPM <https://www.ipcc.ch/report/ar6/wg2/>

Force11 criteria: The FAIR Data Principles - FORCE11

Lambert, E., Rohmer, J., Le Cozannet, G. and Van De Wal, R.S., 2020. Adaptation time to magnified flood hazards underestimated when derived from tide gauge records. *Environmental Research Letters*, 15(7), p.074015.

Merkens, J. L., Reimann, L., Hinkel, J., & Vafeidis, A. T. (2016). Gridded population projections for the coastal zone under the Shared Socioeconomic Pathways. *Global and Planetary Change*, 145, 57-66.

