

# ***Interactive comment on “BRICK v0.1, a simple, accessible, and transparent model framework for climate and regional sea-level projections” by Tony E. Wong et al.***

## **Anonymous Referee #1**

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The submitted manuscript, “BRICK, a simple, accessible, and transparent model framework for climate and regional sea-level projections,” presents a good example for other geophysical modelers to follow. The authors describe a modular and transparent framework for projecting changes in regional sea level under different uncertain future scenarios, and they also give an example of how the framework can be used to plug in other modules enabling decision support based on the climate model outputs. While the flood risk management example is simplistic, it is illustrative of the potential for the BRICK model to be leveraged in a variety of useful applications. Further, the authors make a nice case for the value and importance of open-source, transparent, and simple modeling.

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I believe the paper is of high quality and nearly ready for publication, but I have included a number of suggested revisions or comments on certain elements as outlined below:

P2, line 25 – difficulty can be due to a variety of things: closed platforms, reliance on databases or other inputs that are less portable than source code, etc.

P3, line 26 – Is that intended to be conservative, rather than “underconfident”? Worth explaining underconfident about what, exactly.

I am unqualified to comment on the fundamental dynamics described in section 3. However, this section provides what appears to be an appropriate level of detail, and the components are based in reputable sources and representations from other well-vetted models.

P14, 1-5 – Ability to easily recalibrate model in future with new data and/or methods is a very nice feature that should provide more longevity to the model

P18, 21-22 – “With respect to dike heightening, the expected investments are a linearly increasing function”: this is not strictly accurate, as written, and should be explained more clearly. Jonkman (2009) makes a reasonable assumption that construction costs are proportional to the length of levee being constructed or upgraded, but the resulting calculations appear to show that investment costs are linear with respect to the log of the return period of level of protection provided. This is also a bit different than what readers might reasonably interpret the highlighted phrase to mean. Raw material costs when upgrading levees scale with the square of the levee height, because when raising the height, the base must also be widened.

P18, 27 – what does the “exponential flood frequency constant” represent? Is this related to the amount the probability of flooding is reduced per meter of increased dike height?

P18, 27-28 – What factors are rolled up into the net discount rate? Jonkman (2009) assumes a real interest rate, net of inflation, and then makes further reductions for

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economic growth and changes in the yearly probability of flooding due to sea level rise. This is perhaps a small point because the discount rate is treated as uncertain, but if the intent is to follow Jonkman, it should be noted that the flood probability due to SLR is now endogenized in the BRICK analysis, rather than being an exogenous factor for Jonkman.

P18, 30-31 – How were the plausible ranges for each of these parameters chosen? Some of the choices seem a bit odd, such as assuming that the top end of the range for the investment cost uncertainty is 1. Why was the particular mean probability of flooding chosen? I acknowledge that this is not particularly important, given the illustrative nature of this simplified example, but some additional explanation of the experimental setup would be helpful to put it on par with the level of thoroughness given to previous sections.

4.4.2. – Given the local example, it would be nice to say something about the sea level rise encountered by Louisiana here. Otherwise, this section seems a bit out of place. In the previous section, it is stated that results (for the decision-analysis module) are presented for RCP 8.5, but then this section dives into sea level rise elsewhere in the world and also in RCPs 2.6 and 4.5. The authors may wish to consider i) removing this section, ii) making more clear that the sea level rise serves as an input into the flood risk module and integrating it better into the rest of the section 4.4 discussion, or iii) moving this section back to 4.3 or elsewhere, then mentioning the local sea level rise in Louisiana as part of 4.4.1, in relation to being an input to the flood risk module.

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