

## Response to reviewers

**We thank the reviewers for their insightful comments, which have strengthened this manuscript.**

**Reviewer:** After reading the authors' responses, I feel that the authors are not particularly interested in disaster impact analysis. Rather, it seems that they just want to show what they can do with their data and model.

I raised the question about the limitations of input-output analysis on disaster impact analysis and referred Oosterhaven (2017) in my previous review comments. They added this reference in the revised version, but appear not reading it carefully. Their method (or Steenge and Bockarjova, 2007) is the standard Leontief model, which is a demand-driven model. They transformed supply shortages (or changes) to demand changes based on equation (2) on page 6, but it was plugged into the standard Leontief model (or somewhat modified with  $q$ ), which is still a demand driven model. Demand driven model can derive only backward linkage effects, not forward linkage effects, which is one of the claims of Oosterhaven (2017).

If they read Oosterhaven (2017) carefully, they should find Oosterhaven's six classifications of disaster impact: (1) supply shortage due to damages on production facilities including infrastructure, which 'will have forward or downstream effects (page 453)'; 2) supply shock of non-replaceable intermediate inputs; 3) substitution effects on replaceable intermediate inputs; 4) impacts from demand decline due to damages on production facilities including infrastructure; 5) impacts from redistribution of consumption demand; and 6) impacts of reconstruction demand injection. As described in the methodology part of their paper (pages 6-7), it is obvious that this paper's analysis captures only 4) and a part of 5), none of the supply side impacts of 1), 2), and 3), which cannot be derived with the standard Leontief model as made clear in, again, Oosterhaven (2017).

The authors' response argues that because Steenge and Bockarjova (2007), by which the paper's analysis is based on, indicated that a preferred method for disaster impact analysis does not exist, their method in this paper can be useful. Steenge and Bockarjova (2007) paper was published in 2007. Since then, we have come a long way to evaluate and improve disaster impact models to this date, as some of the referenced papers in this paper discuss. The authors review some of the improved models, but they still use the standard Leontief model without carefully warning readers about their severe limitations. I have to insist that not indicating what the model in this paper can derive AND cannot cover could be seen as dishonesty of their attitude toward readers. At least, they need clearly write that this paper's results capture only a small subset of disaster impacts as above, because of the use of input-output model.

**Response:** Thank you for your comments. In light of these comments, we have made the following modifications to the text:

**Addition: Lines 160-161:** As this method uses Leontief's demand-driven model, it captures backward, upstream supply-chain impacts resulting from a disaster.

**Addition: Lines 278-287:** First, since this study uses Leontief's demand-driven IOA version, we are only able to quantify backward, or upstream supply-chain effects, such as impacts from decline of demands due to damages to production facilities and changed consumption possibilities. We are unable to quantify the forward or downstream effects of supply-side shocks due to the unavailability of non-replaceable production inputs, or substitution effects due to the unavailability of replaceable production inputs. As such, this study covers only a subset of Oosterhaven (2017) classifications of potential disaster impacts. A more comprehensive, but also significantly more data-hungry approach would be to use dynamic CGE modelling, however in this context Steenge and Bočkarjova (2007) warn against overly optimistic assumptions regarding market flexibility and substitution. A promising way forward is the linear programming approach by Oosterhaven and Bouwmeester (2016) in which the authors minimise the information gain between pre- and post-disaster inter-regional IO tables.

**Deletion: Lines 301 – 306:** Steenge and Bočkarjova (2007) remark that a preferred method for disaster impact analysis does currently not exist, due to (a) many possible research questions, and (b) many relevant items of information surrounding disasters being unknown. Steenge and Bočkarjova (2007) also clarify the strengths and weaknesses of static input-output analysis against dynamic CGE modelling. In this context, they warn against overly optimistic assumptions regarding market flexibility and substitution. Oosterhaven (2017) summarises the shortcomings of input-output based disaster analysis approaches in their attempt to estimate real world consequences of disasters.