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Drinking Water Engineering and Science Discussions

Interactive comment on "The large-scale impact of climate change to Mississippi flood hazard in New Orleans" *by* T. L. A. Driessen and M. van Ledden

Anonymous Referee #1

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General Nice climate change sensitivity analysis, but several critical comments are to be made.

- No relation to drinking water engineering

- The authors suggest a strong link between the existing flood risk in New Orleans and the Mississipi River (MssR). Such a link exists of course – and is underestimated by the New Orleans public – but flood risk coming from Lake Pontchartrain is considerably higher; hurricanes have limited effects on the MssR discharges. Damage sensitivity of the urban and industrial areas of New Orleans is very high – self-evident - and Katrina unfortunately proved that.

- Land subsidence in New Orleans is particularly concentrated in the Northern part of

the town and has limited influence on flood damage sensitivity (vulnerability) functions in case of fluvial flooding. The article gives the impression that relative sea level rise (SLR) has a strong impact on the damage sensitivity of the town.

- Although mentioned at the very end, sediment transport regime will be influenced by changes in the MssR flow regime and SLR. River morphological changes are neglected in the scenarios.

Specific: P 334 Abstract L 12: Improved model: what is improved? What is the old one? L 13: Remove "Subsequently" L 15: remover "very"; replace "necessity" with "influence" L 19: "of these scenarios" on what? L 20: high flows will not be affected: But how about the frequency of extremes? L 21: "presence of the spillways ensures a constant discharge" (1) Is there any risk that these spillways won't function? (2) is the MssR discharge really constant under these conditions? No information is provided on the operating regime and functioning of these spillways. Pls add more info. L 24: "more frequent use of the spillways". (1) This is not evidenced in the article. (2) Does failure risk increase due to more frequent use and (3) how about the damage due to opening the spillways; isn't this damage relevant for the opening strategy? L 24: opening strategies based on stages: Isn't that the case now?

P 335 L 1-13 can be shortened. L 2: remove "in all its greatness";41 % including Alaska and Hawai? L 9-13: Not related to MssR flood hazard. See general remarks L 21-25: See general remarks; rather mention river bed level changes due to morphological changes here.

P 336 L1-4: Role of the spillways in the sediment management of the MssR and Mss delta? And role of the spillways in the salinization of the coastal wetlands? L 5-7: Sediment starvation due to the levees are indeed a reason for coastal mashland deterioration and erosion. But what is the role of the spillways in sediment starvation? L 10: Process enhanced by strong subsidence. How? I can see no relation. L 22-23: This question seems to be the key question of the article. Pls highlight this. L 25: climate

change and SLR. L 28: Some Potential solutions for Gr NO are indeed mentioned at the end of this paper, but without any logic or evidence. Pls. focus the paper on the impact assessment and skip that brief list of first thoughts.

P 337 L 14: replace “will hardly receive” with “receives” L 14-15: how about losses or inflow via groundwater? These could be substantial and a reason for the problems with modeling the time shift of the peak discharge. L 17 and P 340 L 11-12: How about the impact of climate change on the upstream boundary condition. The way it is dealt with in the scenarios looks like we don’t know what to expect. I would assume that studies of the impact of climate change on the MssR flow regime will be available somewhere. L 24: How about the influence of storm surges? As negligible as tidal influences?

P 338 L 1-3: remove first sentence L 7-9: grammar of this sentence? Remover “earlier mentioned”. L7-9: How are the spillways calibrated? Is their stage discharge relation very well known? Isn’t there any backwater effect from the floodplain behind the spillway of the discharge curve? L 3-20: What is the data set used for calibration? L 18: Is six segments out of 164 sufficient for calibrating the whole stretch?

P339 L 15: Use of the spillways goes not without substantial damage. Is it acceptable to use them more frequently? L 21-22: Velocities are underestimated: friction coefficient too high or overcompensation for losses to groundwater?

P340 L 9: How realistic is it to assume SLR of 0.7 or 1.0 m without substantial morphological changes in the MssR mouth and delta? L 6-19: Need to stress that this is all under the assumption of an unchanged river bed.

P431 L 4: why “minimum”? L 6-8 delete sentence, as we should focus on high flow conditions L 9: “stages along the entire modelled reach are affected by SLR” would mean that the upper boundary condition of the model is influences too. Is that true? L22-23: “”due to the confined levees” this refers to the stretch downstream of Baton Rouge only? L 23 – P 342 L 6: Pls remove these open-ended suggestions for solutions or, even better, elaborate and underpin the solution mentioned in line 24-25 (“a number

of spillways or small-scale river diversions”) with model calculations.

P 432 L 8-21 Pls quantify your conclusions L 22-endPls remove these open-ended, unfounded suggestions; no conclusions from your study.

P 345 Fig 1 Pls show the alternative flowpath of the water downstream of the two spillways. Could be in an indicative way

P 349 Fig 5: Colors in legend do not match the colors in the graph.

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