

Manuscript gc-2026-4130 - "Sea level rise in Los Santos and Los Angeles: a comparative flood analysis using Grand Theft Auto V"

Response to Reviewer 2 (Rolf Hut)

Reviewer comments are reproduced in black; our replies follow in green.

We thank the reviewer for a review that set us a concrete challenge rather than a general objection. Meeting it required reconstructing the original ArcGIS workflow from the surviving project files, which turned out to be possible and which also surfaced two errors in the submitted figures that we report below.

1. AR5 vs AR6

The authors use AR5 and not the more recent AR6 as input for their flood modelling. They justify this by arguing that no studies exist that translate global sea level rise from AR6 specifically for the Los Angeles area and which areas would be flooded. The data on sea level rise per location from AR6 is available here: https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool?psmsl_id=245&data_layer=scenario (for Los Angeles). I would challenge the authors to see if the work of Grifman 2013 and/or Moffatt and Nichol 2018 can easily be reproduced using AR6 sea level rise data? [...] The authors already mention this limitation to their work. I would like to challenge them to instead of accepting it, to overcome it.

Challenge accepted, and the Los Santos simulations have been re-run on AR6. We used the tool the reviewer links, for PSMSL station 245, taking total sea level change including the vertical land motion term, relative to a 1995-2014 baseline.

One point is worth stating explicitly, because it would be easy to get wrong. The AR6 figures usually quoted for 2100, 0.44 m for SSP1-2.6 and 0.77 m for SSP5-8.5, are global mean values. The local projections for the Los Angeles gauge are about 20 % lower, 0.33 m and 0.63 m, because Los Angeles is subsiding and its stereodynamic signal is weaker than the global average. Since the reviewer's link is to the station page, we have used the local values throughout.

A second point constrains what is possible. The tool provides station-level projections only as far as 2150; AR6 assesses 2300 only as global, low-confidence ranges and does not reach 2500 at all. The AR6 simulations therefore cover 2100 and 2150, and the AR5 values are retained for 2300 and 2500. Rather than replace the AR5 results, Figs. 4 to 6 now show AR5 and AR6 side by side as companion panels, with the caption stating why the AR6 panel stops where it does, and two further supplement figures give the AR6 full-island extents.

The result is more interesting than a re-tabulation. Moving from AR5 to AR6 lowers the modelled 2100 inundation by 24 to 40 % without storm surge, but by only 7 to 8 % once the 1.591 m surge is included, because the surge dominates the total still-water level. The paper's central comparison with Los Angeles is therefore insensitive to the change of assessment report, which is a stronger statement than we could make before. A related detail: AR6 SSP1-2.6 reaches 0.53 m, the AR5 RCP 2.6 value for 2100, only at 2150, so the revision delays that flood level by roughly fifty years.

On reproducing Grifman (2013) and Moffatt and Nichol (2018) with AR6 inputs, we have to be straightforward about what we did not do. The Los Angeles panels in Fig. 7 use the published

CoSMoS v3.0 flood hazard layers, which are pre-computed dynamic model outputs at fixed sea level increments. We can select the increment nearest an AR6 value, but we cannot re-run CoSMoS ourselves, so the Los Angeles side of the comparison is not an AR6 re-run in the sense the reviewer has in mind. The comparison band used in Fig. 7, approximately 2.5 to 3.0 m of extreme sea level, is unchanged and remains the appropriate one. The Los Santos side, which is the part we control, has been re-run in full.

2. Static flooding, and publication of the terrain model

The authors do mention that a limitation to their work is that they look at height in the digital elevation model and compare that to sea level rise, without taking the hydro-dynamics of flooding into account. [...] However, the flood hazard and climate change community have moved on to study the impact of flooding under climate change using dynamic models [...]. It is unfair to ask the authors to run a study like this for LS. But: for the modelling community it would be a great asset if the digital elevation model of LS was available openly as a testbed for their studies and to build on the work of the authors. I therefore would ask the authors to, next to this paper, publish the output of their workflow directly as supplementary material (of file size permits) or as a separate data publication (on Zenodo?) with a separate DOI that is linked to this work.

On the static-flooding limitation itself we agree, and Reviewer 1 asked for the same strengthening. Sect. 3.4 now cites Ramirez et al. (2016) and Sanders et al. (2024) on the tendency of static approaches to overestimate flood extent, and states that the maps show land lying below a still-water level rather than where water would reach in a given event.

On publication we have to make a distinction the original manuscript did not make clearly enough. The terrain mesh is a community reproduction of a proprietary Rockstar Games asset. It is not our work and not ours to redistribute, and depositing it under our own DOI would assert a right we do not hold. We have therefore not put the mesh on Zenodo, and the manuscript now says so explicitly, directing readers to the Sketchfab source where we obtained it and where it remains available (Somnit, 2020).

What is ours is the processing chain and its products, and those we are glad to publish: the calibrated digital elevation model in metres above mean sea level, the modelled flood extent for every scenario in Tables 1 and 2 as both raster and vector layers, and the scenario table. These will be deposited in a public repository with a DOI on acceptance. We think this gives the modelling community the testbed the reviewer is asking for, since a hydrodynamic modeller needs the calibrated elevation surface rather than the original mesh.

While preparing this we found and corrected an error in the data availability statement. It offered an 'ArcGIS model builder file' on request; no such file exists. The workflow was run interactively rather than built as a ModelBuilder toolbox. The statement now says this, and gives the calibration constants in Sect. 3, which are sufficient to reproduce the chain.

3. Conclusions on science communication and educational potential

Here I refer to reviewer #1, who beat me to it in providing his review. I share the same concerns and it would be inefficient to repeat them here, for the authors to have to respond to both separately. I do want to stress that I think this is an important point that the authors do need to address.

Addressed, and in the direction both reviewers indicated. Research question 3 has been removed from the paper, along with Table 4 and the entire six-lesson classroom sequence. Sect. 5.3 is now two paragraphs, retitled 'Applications in communication and outreach', which state why a formal classroom application is not appropriate for an 18+ title and set out the non-formal routes instead. Our full reply is in the response to Reviewer 1, point 1.

Concluding remark

Using a popular game such as GTA V is not only an interesting way to do education or science communication, the study done here and up for publication in GC itself is most likely worthy of media-attention, and rightly so [...]. This stresses however the need to be methodologically very sharp.

We took this seriously, and it is the reason we re-examined the figures rather than only the text. Two errors emerged that no reviewer had flagged. The scale bars in the submitted figures were wrong: the bar labelled 1000 m in Figs. S1-S4 spans about 1555 m, and the 200 m bar in Fig. 4 spans about 220 m. The manuscript's own stated total map area of 74.3 km² matches the raster extent at 1.0524 m per cell to within 0.1 %, which fixes the scale independently and confirms the bars were at fault. Separately, Sect. 3.1 claimed a 1 m x 1 m cell size that is inconsistent with the same calibration; it now states 1.05 m. All figures have been redrawn with correct bars and a colour-blind-safe palette. We would rather report these ourselves than have them found in a widely read paper.