Broader points

1) **Introduction:** The motivation for this study is very clear and very timely. The authors stress very well the current gaps in research and how their study will fill these gaps. However, I feel the introduction could be restructured slightly to remove some redundancies. I specifically suggest moving lines 111 – 124 farther up to become the second paragraph of the introduction. That way, the motivation of global urbanization is all at the beginning of this section. Then, I would continue with describing GMPE and their drawbacks and limitations. I would finish this with the very good list of immediate challenges and problems with the current approach (lines 125 – 138 and lines 150 - 157). I would then continue with outlining how you propose to tackle this problem (lines 102 – 110 and lines 139 - 149). The closing paragraph in the Introduction is then lines 158 – 176. After reorganizing the paragraphs, you may find you can shorten some of it to avoid repeating similar arguments.
2) **Section 3:** Please give a brief introduction into the used solver SPEED so the reader can get an idea of the basic concept and its limitations. Is it a finite difference, finite element or finite volume solver? Please list the basic parameters you used such as grid spacing, time increment, and boundary conditions. Please also elaborate why you used this solver. Does it have specific benefits for this study, or could the inclined reader use any wave propagation solver? What features would the solver need to have?
3) **Section 3 (lines 282 – 289):** You state that you do not explore all possible scenarios but will focus on investigating parameter A. That is fine. But then please change your Introduction to reflect this and to not raise false expectations. Specifically, in lines 167 – 168 you state 'we demonstrate the convergence of the simulated ground motions providing measurable fields (Delta and A)' and in lines 170 – 171 you state 'we highlight that the assessment of these parameters is not notably influenced by source characteristics' when in lines 282 – 289 you know tell us that you did not consider 'Delta' in your simulations but will just analyse A. You then proceed in the following sections to discuss both parameters. In essence, be a bit more consistent in wording what you are actually investigating.
4) **Section 4 (lines 312 - 316):** How did you select the random 100 receiver locations? In Figure 3a it looks like only three of the receivers are above the channel and no receiver is actually in Tomorrowville. How will the amount of stations in the basin compared to those outside influence the trends in Figure 3b?
5) **Section 4 (lines 342 - 354)** Receivers shown in Figure 4a are not the same as in Figure 3a. Please elaborate on which receiver geometry you used for which analysis.
6) **Figure 4c:** You show densely interpolated PGA maps. Please give the inter-station distance (and/or receiver layout, see my previous comment) and interpolation method you used to create these images so the reader can understand the degree of smoothing compared to the actual background data that went into these plots.
7) **Section 4 (lines 335 - 337**): You state that numerical uncertainties due to the chosen velocity structure are negligible. Could you elaborate why you draw this conclusion from Figure 3b?

8) **Section 4 (lines 355 - 360):** You mention that high frequencies are often a challenge in numerical simulations. Therefore, you limit your analysis to frequencies below 1 Hz. With your minimal shear wave velocity of 250 m/s, your smallest wavelengths would, thus, be 250m. Most wavelengths will be a lot larger. Could you elaborate on the influence on your interpretations considering the relation between your wavelength and the depth and extent of the basin structure? You hinted at the limitations and benefits from using this frequency range. Could you elaborate a bit more on the significance for hazard assessments for this frequency range considering the spatial dimensions of the channel compared to the wavelength?
9) **Section 6 (Lines 581 - 588):** To convince others to use your new workflow you need to demonstrate that it is either more accurate, requires less input data or is faster. The first two points you tackled quite well in the manuscript. Here, you hint at the speed of the results. To drive the point home, I would be a bit more specific. How long does it take to do all the simulations necessary to calibrate your model? How fast is it afterwards to create the PGA maps? Compare that to the time it takes for the old workflow. The more specific you can be, the more convincing this argument becomes.
10) **Section 6 (Lines 612 – 613):** You did not mention ambient noise tomography at all in your manuscript. Why is this the last sentence? What benefit does this have to your study? If you explain the connection to ambient noise tomography, then move it to its own paragraph in the discussion part. Otherwise, I would suggest removing this last sentence.
11) **Section 6, last paragraph:** I, personally, would prefer to have the last paragraph its own section titled 'Conclusions' and would appreciate if you added 1-2 sentences summarizing your main findings. However, I would be totally ok to leave it like it is.

Minor Comments

1) Lines 183 – 184: The Green's function is time invariant when using boundary conditions that are independent in time (i.e., elastic). That is also true for the displacement time series (see for example Aki, K. and Richards, P. (1980). Quantitative Seismology: Theory and Methods). I would rephrase the sentence to say that in the elastic case the Green's function is time invariant.
2) Equation 9: The 'x' is sometimes used to refer to the cross-product of two vectors. Consider changing it to a dot or explaining the symbol in text.
3) Figure 2b: Consider moving you colorbar label from being centered over the plot to being centered over the colorbar.
4) Figure 2b: This is not really necessary to change but it seems that you plot the model domain as individual dots. This creates the effect that the top of the model looks patchy (i.e., one can see the yellow between the orange dots) and there seems to be some streaking that I am not sure if it is a visual glitch or a model feature (i.e., light blue streaks in dark blue at the sides of the model). It might be more representative of the actual model you used if you interpolate the dots to a surface.
5) Supplemental material: While I found the docx document with the supplemental Figures just fine, I was not able to find the referenced movies.

6) Line 315, 337, 338, and all other instances: figure -> Figure
7) Line 426: '… for both sites, S2 and , which …' There seems to be a missing word
8) Line 453: 'Finally, For each' -> 'Finally, for each …'
9) Line 469: a 'the' too much