Response to Reviewers for Hartin et al., Advancing the estimation of future climate impacts within the United States

We thank the reviewers for providing additional comments and feedback on the manuscript. These have helped us further refine sections where additional clarification and discussion in the main text were required, such as further details on the treatment of adaptation within the FrEDI framework and clarification regarding the types of uncertainty accounted for in the main and supplemental analyses and the requested changes did not result in new or additional analyses. We have responded to each specific comment below in italics and have updated the text accordingly. The line numbers associated with our responses correspond to the line numbers in the clean version of the resubmitted text document.

Reviewer #1

The manuscript is moving in a positive direction. I have a few remaining concerns, almost entirely related to clearly communicating the caveats and limitations and outline them below.

Caveats – I feel that there remains a need for stronger caveats to make clear the assumptions and approximations that must be made to carry out this kind of analysis. I first want to recognize that what constitutes the "best available science" depends on the spatial and temporal scales we're talking about and requires balancing representing more processes against more uncertainties. Stylized relationships are a requirement when doing this kind of impacts work on the national or global scale, but of course we don't want to oversimplify or neglect key processes. Even experts will disagree about what constitutes "key processes" (deep uncertainty). I'll note below a few places where I feel stronger justification/caveats are needed in light of the inherent uncertainties, but in my view this further emphasizes the need for tools (like FrEDI) to explore uncertainties.

We thank the reviewer for the additional comments and have addressed each specific concern below. We also agree that the phase, "best available science", is dependent upon the applicable temporal and spatial scales, as well as uncertainty characterization and thresholds. This phrase does not appear in the manuscript or its supplement. Please see below for our specific responses and changes.

Line 114 - multi-century projections – certainly socioeconomic, but climate as well – have a lot of asterisks' involved. It's important to be up front about the limitations too. For example, the lack of tipping points could be quite relevant in high-emissions scenarios wherein Greenland melt could slow the AMOC and greatly cool the northern hemisphere. Same goes for potential runaway Antarctic melt. I would characterize these limitations as structural uncertainties that FrEDI is ideally suited to characterize by its modular nature. I see the note about tipping points at Line 415 - can you expand this discussion to justify that even without such mechanisms, the results are still reliable and useful?

We agree with the reviewer that there are large and important uncertainties in multi-century projections and analyses, and that under some of the very high emission scenarios, tipping points may be reached within the Earth system. To further clarify these uncertainties in the input scenarios and resulting analysis, we have added the following text to the methods and discussion sections.

Line 125. While uncertainties multi-century projections are considerable, as discussed in Rennert et al., 2021, these projections represent the largest set of probabilistic socioeconomic and emissions scenarios based on high-quality data, robust statistical techniques, and expert elicitation.

Line 136. While FaIR only captures uncertainties in those feedbacks and climate tipping points that are apparent in more sophisticated Earth system models or the historic record to which FaIR is calibrated, FaIR does include uncertainties in parameters such as the equilibrium climate sensitivity, transient climate response, present-day aerosol radiative forcing, present-day CO_2 concentrations, and recent-past ocean heat content change.

Line 449. We recognize that multi-century projections are inherently challenging. This is particularly true for socioeconomic projections of GDP, population, and technologies: even projections to the end of the century have been challenged (Barron, 2018). The climate system is better understood, but FaIR only captures the effects of those feedbacks and tipping points which are apparent in the GCMs and historic record to which FaIR was calibrated.

Line 488. Future work may entail coupling BRICK to the framework to better explore the uncertainty within sea level rise (Wong et al., 2022, 2017) or coupling to an alternative reduced-form climate model, Hector, to explore permafrost thaw (Woodard et al., 2021). Without explicit representation of some of these feedbacks, we can view these results as potentially lower bound damage estimates.

Paragraph at Line 149 – What assumptions about migration are baked into the regional population projections? Somewhat related to what I recall the other reviewer noted, there are a number of likely interrelated/overlapping structural uncertainties in here - for example, assumptions about migration and retreat from inundated coastal areas.

The national-level population projections are from the RFF-SPs. At the national level, the RFF-SP population scenarios are built by forward projecting changes in fertility, mortality, and international migration, by age and sex and country, as described in Rennert et al., 2021. In the RFF-SPs, these probabilistic projections of net international migration did not consider future climate changes, such as climate induced migration. At the regional scale, as described in the main text, relative populations in each of the 7 FrEDI regions were taken from years 2010-2090 in EPA's ICLUS model. Like the RFF-SPs, these projections do not account for climate driven migration within the U.S. We have adjusted the text in the Methods section to clarify this detail.

Line 193 – Is this using census data from 2014-2018, held constant, to estimate future demographic breakdowns in population out to 2090, or 2300? Stronger justification/caveats are needed here too. Can you refer in the main text to specific text/sections in appendix for details about social vulnerability calculations/assumptions? It's still a bit unclear in the main text how this is done, and a clearer picture will help put the assumptions/limitations into context.

To clarify how we use U.S. census data for estimating differential climate-driven impacts across different populations, we have moved the following text from the Appendix up into the Methods section. As described in this section, total U.S. and regional populations change over time (driven by ICLUS data), but the relative percentages of each population group within each Census tract are held constant over time. These relative population counts are help constant because long-term projected changes in regional demographic patterns are not available.

Line 215: These differential impacts are calculated in FrEDI at the Census tract level as a function of current population demographic patterns (i.e., percent of each group living in each census tract) (U.S. Census), projections of CONUS population (U.S. EPA, 2017), and projections of where climate-driven *damages are projected to occur (from Census tract-level temperature-impact relationships in FrEDI). The relative percent of each group in each Census tract is from the 2014-2018 U.S. Census American Community Survey dataset (U.S. Census) and is held constant over time because robust and long-term projections for local changes in demographics out to 2090 and beyond are not readily available. We consider four categories for which there is evidence of differential vulnerability (Table A2), including low income, ethnicity, and race[1], educational attainment, and age.*

I appreciate the extended discussion in Sec. A3 about adaptation assumptions. Can this be called out specifically in the main text? For example, just a sentence or two that acknowledges that this sort of climate impacts modeling is important, but necessitates assumptions and approximations. You could mention one or two prominent ones in main text (e.g., no proactive relocation in light of coastal risks), then refer the reader to A3 for further discussion. Relatedly, I note that many contemporary large-scale studies of coastal adaptation and impacts are similarly limited in a lack of proactive retreat in the face of sea-level rise and increasing storm surge hazards. There are some that include it, though they're in the minority.

At the reviewer's request, we have moved the following text to the methods and results sections to further clarify our treatment of adaptation and the associated sensitivity of our results. We also added further detail on the treatment of adaptation in the temperature-related mortality sector, in response to additional comments from Reviewer 2.

Line 196. As discussed further in Section A3, Reactive or Reasonably Anticipated Adaptation is where decision makers respond to climate change impacts by repairing damaged infrastructure (e.g., road or rail repair) or reactively responding to current conditions (e.g., building sea walls or beach nourishment), but do not take actions to prevent or mitigate future climate change impacts. No Additional Adaptation largely incorporates historical or current levels of adaptive mitigation that were in place during the time period of each underlying sectoral study. Example sensitivities to projected climate-driven damages are explored within section 3.1 and A3.

Line 337. These sectoral damages are sensitive to assumptions in the adaptation scenarios (see section A3 for more detail). For example, the coastal property sector considers three different adaptation options, no adaptation, reactive, and proactive adaptation. The underlying model within this sector, the National Coastal Property Model, has options for optimal ("proactive") response to future sea level rise, "reactive" or reasonably anticipated response to current conditions (including sea walls, beach nourishment, house elevation, or managed retreat), or rebuilding in place as often as necessary. Historical data suggests that most of our response to sea level rise thus far is in between reactive adaptation and no adaptation (Lorie et al., 2020). Considering the range of possible adaptation options in this coastal property sector, mean damages range from $17 billion USD under no adaptation to $7.5 billion USD under proactive adaptation. Damages under the default 'reactive' adaptation assumption are $9.4 billion USD. While the inclusion of adaptation options for any sector within FrEDI depends on the consideration and treatment of adaptation in the underlying impact studies, Table A3 further illustrates that projected climate-driven damages are sensitive to adaptation options in each sector where they are considered. Notably, the largest impact sector in this study, temperature-related mortality does not *include assumptions about future adaptation. While the primary underlying study (Cromar et al., 2022) is a well-regarded meta-analysis of existing global temperature-related mortality studies, it does not explicitly consider future adaptative measures. Exploring projected 2090 damages from one alternative damage function that assesses impacts of extreme temperature on mortality in 49 U.S. cities (Mills et al., 2014), suggests that damages will be significantly reduced (Table A4) in the event that U.S. cities can gradually adapt to hotter temperatures, for example through physical acclimatation, increased air conditioning penetration, and behavioral changes. Several other studies have also observed reductions in temperature-related vulnerability over time (Lay et al., 2021), however there is little consensus regarding the most appropriate way to consider future adaptation in this sector, even though several methods have been applied (Sarofim, M.C. et al., 2016; Carleton et al., 2022; Heutel et al., 2021). Therefore, we use the most recently published meta-analysis for the central estimate in this analysis, but also present results from alternative assumptions and studies (Tables A3 and A4), further illustrating the unique advantage of the FrEDI framework of enabling direct comparisons across studies.*

Line 99 – Can you give more details about what specifically from AR6 or other data the FAIR simulations were calibrated with, and in what ways this addresses the potential issues of incompatible SSP-RCP or other socioecomic-emissions/temperature pathways? I get the sense that they're internally consistent because temperatures and populations (eg) are both generated within the MimiGIVE model, or something along these lines. Some specificity or further details here would clear that up.

We have added the following text in the Methods section to provide more specifics about the parameters with uncertainty distributions that are included within FaIR. We also note that the FaIR uncertainty parameter set was not only calibrated to the IPCC AR6 assessment of present day warming, but the IPCC then used FaIR with this calibrated parameter set for their projections of future warming probabilities in the AR6 report.

Line 102 - *The FaIR calibration is consistent with the IPCC AR6 Working Group 1 assessment of present-day warming, equilibrium climate sensitivity, transient climate response, present-day aerosol radiative forcing, present-day* CO_2 *concentrations, and recent-past ocean heat content change, including the uncertainties in these distributions (Forster et al. 2021; Smith et al. 2021).*

Line 136. While FaIR only captures uncertainties in those feedbacks and climate tipping points that are apparent in more sophisticated Earth system models or the historic record to which FaIR is calibrated, FaIR does include uncertainties in parameters such as the equilibrium climate sensitivity, transient climate response, present-day aerosol radiative forcing, present-day CO_2 *concentrations, and recent-past ocean heat content change.*

We also note that the RFF-SP emission and socioeconomic projections were developed to be internally consistent. Following the approach described in Rennert et al., 2022, we then randomly sample emission timeseries from the RFF-SPs and FaIR parameter sets from the calibrated population (2237 calibrated sets out of a possible 1 million). As reviewer 2 also had similar clarifying questions regarding these details and potential limitations, we now also clarify in the Methods section that this approach of separately treating emission and climate uncertainties does not allow us to account for potential feedbacks of certain climate parameters on, for example, changes in climate-driven damages and the resulting impacts on U.S. GDP/population.

Line 109. *However, there remain some limitations in that separately considering climate parameter and socioeconomic uncertainty ignores potential feedbacks from observed climate change onto socioeconomics (e.g., a higher climate sensitivity could result in larger climate-driven damages, which could lead to lower emissions or GDP than would occur in a lower climate sensitivity world).*

Reviewer #2

Thank you for responding to my comments and questions regarding your manuscript. After reading the updated manuscript and response to reviewers, I am convinced that the article does not need any meaningful additional analyses. The calculations conducted by the authors represent an important and comprehensive assessment of sector-specific climate damages in the United States and will undoubtedly have profound policy impact. However, I am not fully satisfied with the authors' replies to my concerns. I will note that I found the response very difficult to digest because no precise textual changes were listed and no text from the manuscript was reproduced, so I cannot directly trace what has been changed in response to each of my concerns. I aim to provide an accurate reflection of manuscript updates below, but it is possible I have missed something because no direct links to the updated text were provided. Second, the authors largely responded directly to me regarding each of the limitations of the analysis that I had raised. But in most cases, the text of the manuscript did not change in a meaningful way. I am convinced that the authors have an important contribution without needing to address each of these limitations head on. However, I do think it is necessary for key assumptions and limitations to be transparently communicated to the readers. I list the specific cases where I think this is critical below.

We thank the reviewer for their careful re-review of this manuscript. It has been greatly improved as a result. We have responded to each comment below and provided explicit excerpts of additions or changes we made to the text in response.

1. Adaptation. The authors insufficiently communicate that most sectors in their analysis assume no adaptation takes place (see Table A2-1). Text on lines 198-204 mentions that different adaptation scenarios are modeled to the extent possible given available scientific evidence, but this text should also explicitly note that only two of 20 sectors include proactive adaptation, making it likely that estimated impacts are overly severe. Given that temperature-related mortality dominates their overall damage estimates, the fact that these results ignore adaptation, despite strong evidence of historical adaptation (Heutel et al., 2021; Barreca et al., 2016), should be openly discussed and justified.

Thank you for this comment. Reviewer 1 also requested that we add more explicit discussion of adaptation to the main text. In response, we moved some of our discussion of adaptation from the Appendix to the main text. We have also added a new section discussing the treatment of adaptation in response to the reviewers point about adaptation in the temperature-related mortality sector.

Line 338. These sectoral damages are sensitive to assumptions in the adaptation scenarios (see section A3 for more detail). For example, the coastal property sector considers three different adaptation options, no adaptation, reactive, and proactive adaptation. The underlying model within this sector, the National Coastal Property Model, has options for optimal ("proactive") response to future sea level rise, "reactive" or reasonably anticipated response to current conditions (including sea walls, beach nourishment, house elevation, or managed retreat), or rebuilding in place as often as necessary.

Historical data suggests that most of our response to sea level rise thus far is in between reactive adaptation and no adaptation (Lorie et al., 2020). Considering the range of possible adaptation options in this coastal property sector, mean damages range from $17 billion USD under no adaptation to $7.5 billion USD under proactive adaptation. Damages under the default 'reactive' adaptation assumption are $9.4 billion USD. While the inclusion of adaptation options for any sector within FrEDI depends on the consideration and treatment of adaptation in the underlying impact studies, Table A3 further illustrates that projected climate-driven damages are sensitive to adaptation options in each sector where they are considered. Notably, the largest impact sector in this study, temperature-related mortality does not include assumptions about future adaptation. While the primary underlying study (Cromar et al., 2022) is a well-regarded meta-analysis of existing global temperature-related mortality studies, it does not explicitly consider future adaptative measures. Exploring projected 2090 damages from one alternative damage function that assesses impacts of extreme temperature on mortality in 49 U.S. cities (Mills et al., 2014), suggests that damages will be significantly reduced (Table A4) in the event that U.S. cities can gradually adapt to hotter temperatures, for example through physical acclimatation, increased air conditioning penetration, and behavioral changes. Several other studies have also observed reductions in temperature-related vulnerability over time (Lay et al., 2021), however there is little consensus regarding the most appropriate way to consider future adaptation in this sector, even though several methods have been applied (Sarofim, M.C. et al., 2016; Carleton et al., 2022; Heutel et al., 2021). Therefore, we use the most recently published meta-analysis for the central estimate in this analysis, but also present results from alternative assumptions and studies (Tables A3 and A4), further illustrating the unique advantage of the FrEDI framework of enabling direct comparisons across studies.

2. Income effects on the damage function. The authors state that "most of the sectoral damages are proportional to GDP per capita" (line ~275). In our exchange, we agree that in some cases damages may be higher in wealthier populations, but in other cases the reverse may be true. Instead of omitting this important point, the authors should mention that they make this structural assumption despite evidence that income could push damages in either direction.

As shown in Table A5 and discussed further in A4, FrEDI uses at least one type of socioeconomic scaling factor to monetize climate-driven damages across 14 of the sectors (or variants within sectors) currently included within the framework. These scale factors are derived from the same underlying studies from which the damage functions have been derived, which generally show damages increasing with GDP per capita. For example, the number of mortality cases in the health-related sectors are proportional to population, and the valuation of these cases scales with GDP per capita, such that the willingness to pay to reduce fatality risk (i.e., VSL) is adjusted based on the projection of GDP per capita and an income elasticity of 1. In other sectors where wealthier populations may increase the potential for various forms of adaptation to reduce damages (e.g., increased air conditioning to reduce heat mortality), these actions also come at a cost, and where available in the underlying studies, FrEDI provides the ability to explore these adaptation scenarios. We have added the following text to the original sentence to clarify that this structural assumption reflects the data in the underlying sector studies currently within the framework and have added additional details about the treatment of adaptation (see response to reviewer comment #1)

Line 263. Because most of the sectoral damages as determined from the underlying sectoral models are proportional to GDP per capita (given that the default elasticity of VSL to GDP per capita is 1, all sectors *with a mortality endpoint also qualify), a correction can be made to account for this relationship (Nordhaus, 2017).*

3. Spatial heterogeneity of warming. The authors should clearly state that they ignore uncertainty in the spatial distribution of warming across the United States. It makes sense to cite Sarofim et al. (2021) to justify this choice, but it shouldn't be left to the reader to figure out what forms of climate uncertainty are or are not included.

We have included the following text within the Methods section to clarify our treatment of regional warming and relevant uncertainties. While FrEDI does provide the option to explore differences in regional warming that are associated with spatial warming heterogeneity in the 6 GCMs also used in the underlying studies (e.g., CanESM2, CCSM4, GFDL-CM3, GISS-E2-R, HadGEM2-ES, MIROC5), results presented in this analysis reflect the average across the GCM ensemble.

Line 182. Sub-national differences in warming are also explored within FrEDI using results derived from a consistent set of GCMs that were also used within the underlying studies (e.g., Sarofim et al., 2021). For example, unique damage functions for each sector (and variant within each sector) are developed for each region and GCM, based on its relationship to CONUS temperature. While FrEDI outputs damages by region and GCM, the main results in this analysis present national and regional damages calculated from the average across the GCM ensemble.

4. Damage function uncertainty. The authors show some uncertainty in damage functions for mortality by comparing across impact models. However, many impact models, in particular econometric ones, also have damage function uncertainty within each model. The authors should clearly state that such damage function uncertainty is omitted. Showing that the range across these three modeling approaches lies within the distribution of climate uncertainty results does not address my concern – if you combined damage function uncertainty with climate model uncertainty, as is recommended (Burke et al., 2015), results would undoubtedly convey far larger uncertainty ranges.

Very few studies explore uncertainty within the damage function space. Two of the temperature-related mortality sectors within FrEDI do provide information that we can use to develop two additional damage functions that reflect the 90% confidence interval associated with the parametric damage function uncertainty in each underlying study. We present impacts are predicted across these uncertainty intervals for each study, as calculated from the mean warming and socioeconomic scenarios from the RFF-SPs. We use the mean RFF-SP scenario in order to be able to more directly compare the different levels of uncertainty associated with climate and socioeconomics compared to the uncertainties associated with the damage functions. We have added the following text in the Results and Discussion section to clarify the sources of uncertainty that are included in our main text results. We also added information in the Appendix on this supplemental temperature-related mortality damage function analysis, as well as information about the combined damage function and climate uncertainties.

Line 283 - Confidence intervals presented throughout this section include uncertainty in GDP, population, and climate parameters, but do not account for additional sectoral parametric or structural uncertainty.

Line 412. In addition to these uncertainties and sensitivities to adaptation options, damage estimates within FrEDI are also sensitive to uncertainties in the underlying damage functions themselves. Similar to adaptation, FrEDI can incorporate parametric uncertainty in each damage function when the relevant *information is available in the underlying study, as well as this source of structural uncertainty when uncertainty estimates are available in the underlying study or when multiple damages functions are available for a single sector. For example, as further described in section A4, FrEDI incorporates three studies of climate-driven temperature-related mortality, two of which include underlying uncertainty estimates.*

Line 598. The Cromar et al., 2022 study also provides a standard error on the impact function relative risk coefficient, which was used to develop a 90% confidence interval around this parameter. The 90% confidence interval supports the calculation of impacts for the low and high end of the confidence interval (5th and 95th percentile values) within FrEDI, as well as a central estimate which corresponds to the mean result. The Hsiang et al., 2017 study authors also shared results from uncertainty modeling in the underlying work, which was also used to develop a 90% confidence interval of results. These uncertainty results support the calculation of the low and high end of the confidence interval (5th and 95th percentile values) within FrEDI, as well as a central estimate which corresponds to the median result (50th percentile).

There are currently three underlying temperature-related mortality studies within FrEDI. Table A4 provides a snapshot of the parametric uncertainty within each temperature-related mortality estimate, as well as structural damage function uncertainty by comparing impacts across multiple studies. To separately evaluate the level of damage-function-related uncertainty compared to other sources of uncertainty presented in the main text (e.g., socioeconomics & climate), we show the mean damages from each damage function in Table A4, as calculated as the average across the RFF-SPs, as well as the 90th confidence intervals, as calculated by taking the average across the RFF-SPs for the damages predicted by the high and low confidence interval damage functions. Compared to Table A1, Table A4 shows smaller predicted ranges in temperature-related mortality damages than the ranges in damages derived from combined uncertainties in socioeconomic and climate parameters. We do not present these uncertainty levels in the main text as only a one sector currently included with the FrEDI framework include information that allow us to evaluate parametric and structural damage function uncertainty.

5. Electricity. The authors reply to me, oddly, by stating that although they include only electricity, the study they draw on also has natural gas. Why not include natural gas, then? At a minimum, the authors should clearly convey that natural gas expenditures are not included in their analysis (noting that their inclusion would likely lower damages).

Thank you for clarifying this point. As noted this is not a comprehensive accounting of all impacts to the U.S. and we continue to update the tool. We will explore whether we can include expenditures from natural gas within our framework.

6. Overlapping sectors and sector interlinkages. We can agree to disagree on the importance of these issues in the current FrEDI results, but the authors should at least mention the limitations of FrEDI in these areas. Its omission from the manuscript, given the many-sector bottom-up approach, is troubling.

We have added an additional paragraph to the Results and Discussion section in the main text to better describe these details of overlapping sectoral damages within FrEDI.

Line 363. The sectors assessed in this study are independent and therefore damages are additive across these sectors. One potential exception could be temperature-related mortality and the climate-air quality *linkage, as most approaches to estimating temperature-related mortality are statistical rather than mechanistic, which could lead to double counting of some health effects between these two sectors. Specifically, (Cromar et al., 2022) note that it will be important to continue exploring potential synergies between the effects of temperature and air pollution to adequately capture the potential risk in compound climate events such as these. Conversely, there can also be compounding effects that the FrEDI analytical approach does not account for: e.g., power outages due to increased summer electricity demand could exacerbate temperature-related mortality. However, few studies produce quantitative, monetized estimates of compounding or interacting effects at the national scale as would be required to build into comprehensive impact tools (Clarke et al. 2018).*

7. I remain confused by lines 85-90, which imply that a user could pair any climate scenario with any socioeconomic scenario, which is not what the authors do in this paper (and which is concerning, given logical inconsistencies that could arise).

*As the reviewer notes, we use a Monte Carlo approach to couple FaIR climate model parameter sets (that account for uncertainties in climate model parameters) with paired emission/socioeconomic projections that were previously developed by RFF. This is the same sampling approach that was recently employed by Rennert et al., 2022. We have adjusted the text in multiple locations in the introduction and methods sections to clarify that the emissions (and resulting temperature) and socioeconomic projections used in this analysis are internally consistent. This approach of pairing a specific socioeconomic scenario with any climate *parameter* scenario is equivalent to pairing a single SSP scenario (e.g., SSP2-4.5) with different GCMs (which embody different climate parameter sets). However, this approach does have limitations and (also in response to a comment from reviewer 1), we have added additional text in the Methods section noting that this sampling approach cannot account for feedbacks between climate change and socioeconomics.*

Line 76. In this study, we use 10,000 recently developed, paired probabilistic emissions and socioeconomic projections, in combination with resulting temperature projections from a simple climate model as inputs to FrEDI, which is then run to quantify the annual physical and economic impacts associated with each resulting paired climate and socioeconomic scenario through the end of the 21st century across the contiguous United States (CONUS).

Line 91. First, projections of global greenhouse gas emissions (Figure 1, Input 1) are used as input to a simple climate model to derive trajectories of changes in global mean surface temperature (Figure 1, Output 1). These emission projections were developed as paired scenarios with projections of national-level population and GDP, and therefore the resulting temperature trajectories from the simple climate model are then passed to FrEDI (Figure 1, Input 2) alongside the paired projections of U.S. Population and GDP (Figure 1, Input 1) to model annual long-term climate damages across 20 impact sectors, seven CONUS regions, multiple adaptation scenarios, and socially vulnerable populations (Figure 1, Output 2).

Line 109. However, there remain some limitations in that separately considering climate parameter and socioeconomic uncertainty ignores potential feedbacks from observed climate change onto socioeconomics (e.g., a higher climate sensitivity could result in larger climate-driven damages, which could lead to lower emissions or GDP than would occur in a lower climate sensitivity world).

8. The authors stated that they included a footnote clarifying that their calculations are equivalent to a domestic SCC, but I cannot find that footnote anywhere.

Thank you for catching this mistake. We added the footnote back in on page 18.

Footnote 10 Net present damages resulting from an additional ton of CO_2 emissions is sometimes characterized as a "domestic social cost of carbon".