

Interactive comment on “Assessing the impacts of 1.5 °C global warming – simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b)” by Katja Frieler et al.

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In the course of the ISIMIP2b simulation phase there have been some improvements of the protocol that do not directly refer to the reviewers' comments but have let to associated adjustments of the manuscript:

1. Instead of the originally suggested linear interpolation from historical land use patterns from HYDE3.2 to future projections generated by the LU model MAGPIE we have decided to apply a harmonization method that has recently been developed in the context of the CMIP6 process (Hurtt et al., in preparation). While the underlying MAGPIE simulations have not changed the main text and the SI have been adjusted to describe

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the new harmonization approach. Figure 3 of the main text now shows the areas of crop land from the historical reconstruction and the original MAgPIE simulations without interpolations. The SI contains a comparison of the harmonized crop land areas and the original data for the IPSL-CM5A-LR climate model. The patterns for the other models are currently generated. George Hurtt, Louise Chini, Ritvik Sahapal, Benjamin Bodirsky, Jan Volkholz, and Steve Frolking have been added to the list of authors as they were involved in the generation of the new harmonized LUH2-ISIMIP2b land use data set.

2. We were able to integrate a section on the simulation of climate-change effects on lakes using coupled lake-hydrodynamic and water-quality models into the ISIMIP2b protocol. Rafael Marcé, Don Pierson and Jonas Jägermeyr have lead the development of the section and have been added to the list of co-authors.

3. Similarly, a “terrestrial biodiversity sector” has been added to the ISIMIP2b protocol. Christian Hof and Matthias Biber have worked on the development of the associated section of the protocol document (<https://www.isimip.org/protocol/#isimip2b>) together with Thomas Hickler and they have thus been added to the list of co-authors.

4. We now also provide spatially explicit GDP distributions as input for the ISIMIP2b simulations or to e.g. estimate damages in post-processing of bio-physical impact simulations. The new data set covers the period from 1860 to 2100 and is consistent with reported national GDP data for the historical period and future projections on national level following SSP2 (see section 6 of the main text). The development has been done by Daisuke Murakami, Yoshiki Yamagata, and Tobias Geiger who have been added to the list of co-authors.

5. We now propose a method to account for the effect of changes in Terrestrial Water Storage (TWS) e.g. due to projected changes in ground water abstraction according to SSP2 on sea level rise. The approach is designed to be consistent with projected changes in land use and irrigation patterns as provide within ISIMIP2b and will be

applied to generate spatially explicit patterns of sea level change for the Group 3 simulations within the coastal infrastructure sector. A description of the associated addition to the Group 2 sea level projections has been added to the paper. Riccardo Riva has been involved in the development of the approach and will contribute the sea level fingerprints associated with the projected changes in TWS. He has been added to the list of co-authors.

6. The hurricane simulations are no longer considered as an additional impact sector within ISIMIP2b but as a complement to the climate input data sets provided to force the impact models. Therefore the associated description has become part of Section 3 on climate input data.

Below we provide detailed answers to the review by A. J. Dolman:

This is a difficult paper to review. There is no doubt that it should be published, as it contains the deliberations that go in to developing scenarios to quantify the impacts of warming, socio economic trends and land use in an attempt to remain below the Paris goal of 1.5 C. The paper as such provides a very useful and needed reference for the impact community. The paper is also clear, contains no mistakes or errors.

Answer: We thank the reviewer for this generally positive judgement of our paper!

That being said, the paper is very hard to read. My suggestion would be to keep the paper as it is up to section 8. In section 8, the level of detail, repeating of similar tables is such that anyone would loose direction. I appreciate that the sector specific implementation is important, but I would give only one example, and put the other tables in the supplementary material.

Answer: We fully agree with the reviewer that the details listed in section 8 are more relevant for modelers who want to join ISIMIP2b than for general readers of the paper. We therefore generated a separate protocol document published on the ISIMIP website (<https://www.isimip.org/protocol/#isimip2b>) including all technical details required

to generate the impact models runs within the divers sectors, e.g. data formats and naming conventions. The document serves as the most-up to date reference for the modelers and now also includes the tables of scenarios and output data previously listed in section 8 and the SI. In this way 1) the paper becomes more readable and 2) we avoid confusion regarding the latest reference for technical details of the implementation that might have to be adjusted in the process of the project if they turned out to be impractical or confusing. We decided to only keep one table of scenarios in the main paper for illustration.

On page 5, line 15-20 the item number 3 is missing.

Answer: Thank you very much for the hint. We have adjusted the numbering.

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