

Interactive comment on “Differential climate impacts for policy-relevant limits to global warming: the case of 1.5 C and 2 C” by C.-F. Schleussner et al.

Anonymous Referee #2

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General comments:

This study provided an in-depth exploration of the relationship between global mean surface temperature (GMT) and many different climate, environmental, and agricultural variables. The methods were straightforward, and the conclusions were largely supported by the results in a clear concise manner. The overall findings of this analysis support the IPCC RFC assessment of differences in key impacts of climate change, which is good.

It was interesting to note that there are significant differences in climate impacts between the 2 GMTs. This would suggest that risk is not globally homogeneous to incre-

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mental increases in global temperature, and would require further analysis into reducing and/or adapting to regional impacts. The abstract provides a complete summary of the relevant findings of the analysis, but the scope of the study may be a little too broad for a concise storyline.

Additionally, The methods described in Section 2 are very similar to those used by the impacts community in pattern scaling, particularly in regards to the relationship between GMT and climate variables. This type of scaling was mentioned in section 6, but not explicitly. There is a wealth of information (and studies) that use pattern scaling to look at regional impacts through impact assessment models (IAMs). Tebaldi and Arblaster, 2014, give a thorough critique of such methods.

Specific comments:

Introduction, page 2450, lines 15-20

The argument that global temperature scales with local impacts should be made clearer in the introduction. Reference should be made to Held and Soden, 2006. Briefly describing the thermodynamic relationship between temperature and the hydrological cycle would add value to the method section(s). This is briefly discussed on page 2452, lines 13-20, but the physical mechanism is not mentioned.

Section 2, page 2452, lines3-7

How do the models used compare against observations? I understand that a pre-industrial baseline from observations is not possible, but I didn't think there was a clear surface temperature trend in the observations. Also, was the preindustrial scenario used or was this a period in the historical scenario? Is the pre-industrial period mentioned here the same as in section 6 (1850-1875)?

Section 2, page 2452, line 8

I am unclear as to what the “X” means in Table S1. The dates listed in Table S1 are the centered dates around which a 20-year running average GMT reaches a specific

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threshold? I am not sure this information is needed.

Section 2, page 2453, line 20-27

Because there is the assumption of stationarity, you could do a Priestly-Subba-Rao test of stationarity to support the null hypothesis.

Section 3, page 2454, line 16

The assumption is that climate variables and extremes have a relationship with GMT has been examined in many papers. The relationship of GMT and precipitation should be referenced with the Held and Soden, 2006, and/or Liu and Allen, 2013. Also, you could reference the Sillmann et al, 2013, paper to show that the models show good agreement with reanalysis for the ETCCDI variables.

Section 3, page 2455

Why was a land mask applied for the ETCCDIs? I would have liked to see the results (ie maps) over the oceans as well.

Section 3, page 2458, lines 10-14

As with the King et al, 2015, paper, regions of complex topography show little significance in changes in extreme precipitation. Aggregating to large regions is likely to mask significant changes in precipitation extremes.

Section 7, page 2471, line 9

The reference period (1980-2000) is different from reference period used in prior sections. Why?

Section 8, page 2475, lines 10-14

Will this sentence be revised due to the outcomes of the Paris 2015 meeting?

Figure 2

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Is this for TXx? It doesn't say this in the figure caption.

Minor comments, typos

Page 2465 line 2

risks = risk

Page 2466 line 1

substantially, if = unclear of sentence structure.

Page 2471, line 18

Should units be included?

Page 2471, line 23

Constant = constant

Page 2472 line 12

Saturation = saturation

Interactive comment on Earth Syst. Dynam. Discuss., 6, 2447, 2015.

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