

Interactive comment on “Changes in extremely hot days under stabilized 1.5 °C and 2.0 °C global warming scenarios as simulated by the HAPPI multi-model ensemble” by Michael Wehner et al.

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Anonymous Referee 2

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Responses in **red**.

The paper "Changes in extremely hot days under stabilized 1.5oC and 2.0oC global warming scenarios as simulated by the HAPPI multi-model ensemble" uses the HAPPI large ensemble simulations to examine changes in temperature extremes. Annual maxima of averaged three consecutive days temperature (TX3x) are modelled with

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a GEV distribution. TX3x 20-year return levels are compared between different warming targets (1.5oC and 2oC) and present climate. This study is very interesting and merits publication after the minor point below has been addressed.

Specific comment: I would suggest to make some hypothesis testing in order to check if TX3x 20-year return values are significantly different between different warming levels and present climate. Please, in case these differences are not significant across some region, I would suggest of highlighting the grid points with no-significant differences in each relative figure.

Rather than pick a significance level, we have elected to plot the standard error estimates directly. As the ensemble sizes are quite large, uncertainty from the statistical fitting procedure is minimal. However, uncertainty from internal variability remains and can be quantified. This subject will be dealt with a forthcoming paper that is underway. We have added the following text to the main body as well as a third figure to the appendix (reproduced below). "Standard errors obtained from the method of Hoskins and Wallis (1997) are shown to be small in figure A3 of the appendix. Generally, these error estimates are less than 0.15°C with the largest values towards the higher Northern latitudes. Variability in CanAM4 is higher than the other HAPPI models but is generally less than 0.25°C. Standard error estimates in the CESM are of a similar magnitude but are not directly equivalent. Most of the changes in figures 1-4 are interpreted as at least at the likely level in the IPCC calibrated language (Mastrandrea et al. 2010)."

The new figure caption is:

Figure A3: Standard error estimates of 20 year return values of TX3x (°C) in the 1.5°C or 2.0°C HAPPI simulations. Upper left: CAM4. Upper right: CanAM4. Middle left: ECHAM6. Middle right: MIROC5. Lower left: NorESM1. Lower Right. CESM.

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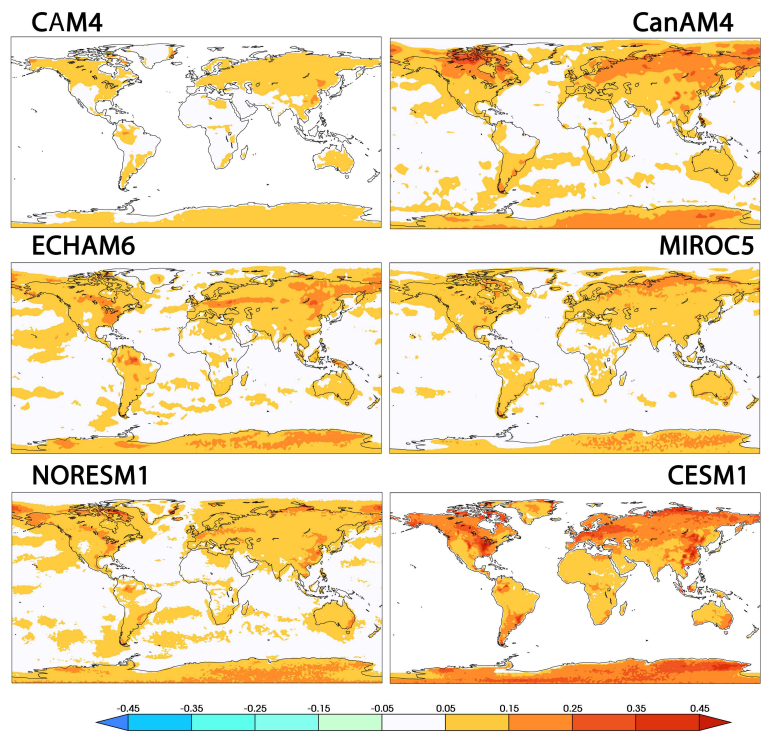


Fig. 1.