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## ***Interactive comment on “Changing trends and abrupt features of extreme temperature in mainland China during 1960 to 2010” by S. Fang et al.***

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Question(1): The authors argue that there has been very little research reported on the occurrences of high extremes warm days and cold nights according to 5th or 1st (95th or 99th) percentiles. This is true, but the reason is simple. We do not have enough samples to accurately estimate the 95% or 99% percentile.

Response: Thank you for your comments.

What is a temperature extreme? Defined as fig.1 by IPCC SREX and ETCCDI of WMO (IPCC SREX,2012; Klein Tank et al., 2009, Zhang, et al., 2011).

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In case of the calculation of TX90p, the 90th percentile of the daily maximum temperature data at a certain station in the period 1971–2000 was taken as the upper threshold. If a daily maximum temperature was greater than the upper threshold, then it was considered a warm day event. If fig.1 was used to describe the 90th percentile of the daily maximum, 10% of red shaded areas were extremes warm days in the period 1971–2000. Annual average was 36.5 days of TX90p, 18.25 of TX95p, and 3.65 days of TX99p in the 30 years. So we think that have enough samples to estimate the 95% or 99% percentile. In our study, the total days of TX90p, TX95p and TX99p during 1960-2010 was  $36.5 \times 51 = 1862$  days,  $18.25 \times 51 = 931$  days, and  $3.65 \times 51 = 186$  days which was enough to calculate the linear trends TX90p, TX95p and TX99p in the 51 years.

What more, 99% percentile were used to defined Hot days during 1961-2003 in Asia-Pacific region– frequency of days with maximum temperature above the 1961–2003 mean 99th percentile (Griffiths, et al., 2005) , 97.5% (or top 2.5%) and 95% (or top 5%) – were used for annual extreme daily precipitation analysis(Bell, et al.,2004; Wang and Zhou, 2005).

Question(2): As in the present paper, there are only 51 years' data. Moreover, in line 21-23 the authors wrote "Most of the researches based on the 10th (90th) percentiles as thresholds set to assess moderate extremes that averagely occur 36.5 times every year (10 percentage of 365 days)". It seems that the authors do not understand what are the climate extremes defined in the literature The 10% percentile is estimated according to the samples of the same day (or several days centered on the day of interest to increase samples) over the 51 years. This is totally different from what the authors have thought.

Response: Thank you for your comments.

Maybe the word “36.5 times” made referee confused, 36.5 days will be correct and easy to understand. The definition in the study was source from IPCC SREX,2012 and ETCCDI of WMO, which has been describe as fig.1 in response to Question(1). The

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10% percentile in our study was not estimated according to the samples of the same day over the 51 years, in the calculation of our indices, the 95th or 99th (5th or 1st ) percentile of the daily maximum (minimum) temperature data at a certain station in the period 1971–2000 was taken as the upper (lower) threshold. If a daily maximum temperature was greater than the upper threshold, then it was considered a warm day event. Similarly, if a daily minimum temperature was less than the lower threshold, then it was considered a cool night event.

This definition was widely used , which was also could be find in many cited reference in our discussion paper. The fig.2 is an example : percent of days exceeding the 90th (blue), 95th (black) and 97.5th (red dashed line) percentiles North American (Zhang et al., 2011).

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**ESDD**

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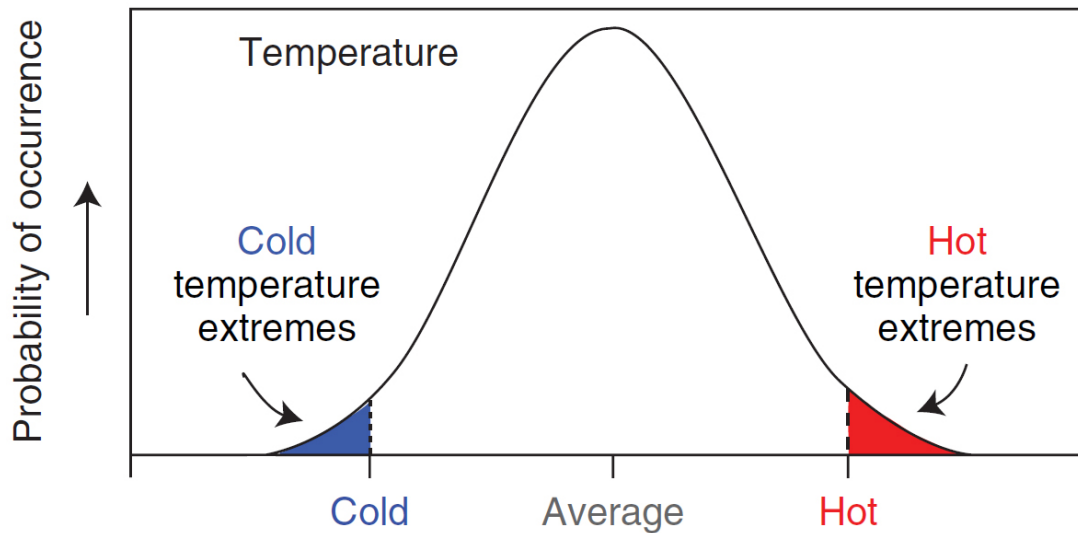
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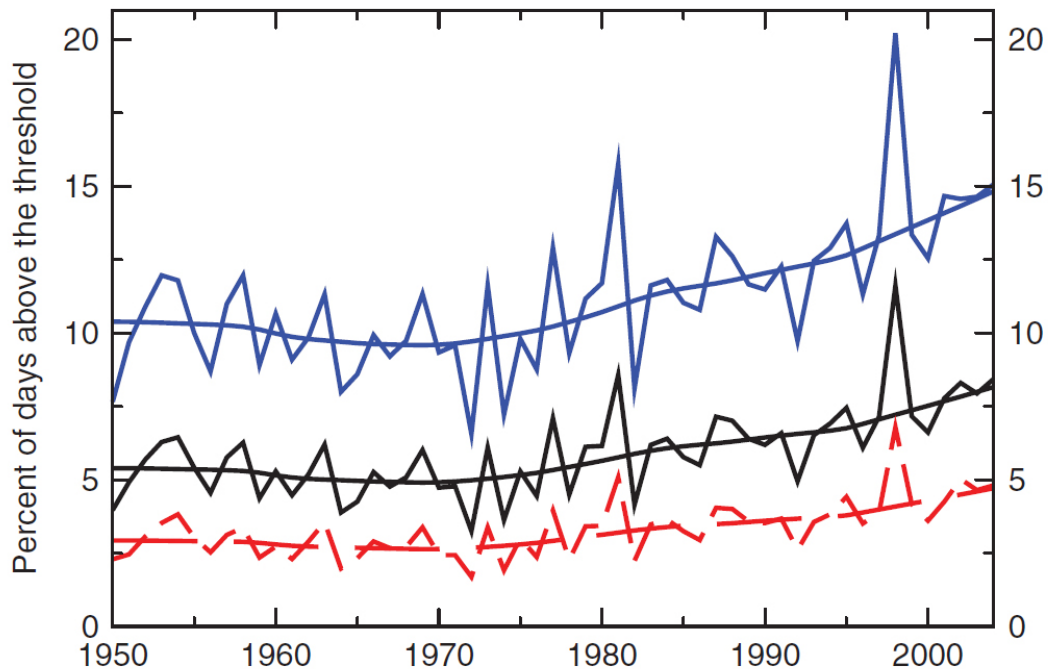
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**Fig. 1.** Fig. 1. The probability distributions of daily temperature. Extremes are denoted by the shaded areas (IPCC SREX, 2012; Zhang et al., 2011).

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**Fig. 2.** Fig.2 Percent of days exceeding the 90th (blue), 95th (black) and 97.5th (red dashed line) percentiles North American minimum temperature(Zhang et al., 2011).

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