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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.***

### **Anonymous Referee #2**

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General comments: This paper analyzed trends and abrupt change points in trends in annual temperature extreme series derived from observed daily maximum and minimum temperatures at 591 Chinese stations for 1960–2010. The authors first defined four temperature indices by counting percentage of days when daily maximum (minimum) temperature exceed (below) its 99th and 95th (1st and 5th) percentiles respectively. They then analyzed trends and abrupt change points in trends for the annual series of the four indices. While I found the topic of this analysis is potentially interesting to Earth System Dynamics readership, the paper is poorly written, lacks critical detail and pre-mutual. As a result, the paper does not appeal to have sufficient quality for publication.

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I have multiple concerns:

1) Methods: The authors defined four percentile-based temperature indices in a way similar to the widely used ETCCDI indices. However, the authors did not give any detail and it is thus impossible to know exactly how these indices were calculated. Indices computed in a different manner may mean very different things (see Zhang et al. 2011). Additionally, the percentile-based temperature indices need to be carefully calculated to avoid artificial inhomogeneity (Zhang et al. 2005). For example, the ETCCDI indices software RClimDex uses data samples from a 5-day moving window centered on a calendar day to estimate the temperature percentiles and a bootstrap procedure to remove data inhomogeneity in the indices series. On the other hand, some people compute the percentiles based on all daily data within the base period. The indices computed with these two different methods mean quite different things. Unfortunately, there is no information whatsoever how the authors computed their indices, it is thus impossible to interpret the results shown in the paper. The authors also mentioned trend estimation and the estimation of change points in trends. However, the corresponding methods are equally unclear. The authors must spell out in detail how they computed the indices, and how they detected the change points, and how they tested the relevant statistical significance.

2) Data: Data homogeneity issues in Chinese climate data have been carefully examined by many people. For example, Xu et al. (2013) developed a homogenized daily maximum and minimum temperature dataset at 825 stations for China. They showed that among all stations, about 43.5% and 56% of stations contain at least one shift for daily maximum and daily minimum series respectively. Other studies also find significant data homogeneity issues with Chinese temperature data. It is a surprise that the authors stated “In this study, no direct relationship between the year of data inhomogeneity and metadata was found and no adjustment was attempted for any stations.” This leads me to question if the authors actually examined data homogeneity issue using RHtest or if the authors used it properly.

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3) Another data related question is how the authors dealt with missing values. Missing values are unavoidable from observed time series, especially for hourly or daily data. This paper only indicated that “591 stations which had good quality data were chosen to use to analyze”. So how do the authors define the “good quality”? How did the percentile threshold be estimated if there are missing values in the daily temperature series?

4) Language: The paper is near impossible to understand and requires very careful editing perhaps by a native speaker. The authors also did not pay enough attention to what they write in the paper. For example, in para. 3.1, the authors used “+1.8 day/10 a” or “+0.62 day/10” on linear trend without defining “10 a” or “10”. In the caption of figure 2, the text is “Time series of annual occurrences of warm days . . . . . during 1956-2010” which dataset they used is “1960-2010”.

## References:

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