Reviewer 2

This analysis reassess the 1887 high temperature record of Kilkenny, Ireland, using different datasets including the early-year records, current observations and reanalysis product, and concludes that this record and other early observations of extreme high temperature are not sufficiently reliable. The authors instead suggest the 1976 heat record at Boora as the highest national temperature measurement. The analysis is interesting, and the conclusion is also more or less convincing. This is not an easy work anyway. One of my concerns is the locality of the study, and thereby the narrowness nature of its significance if it is published in the CP. In addition, I find a few of other issues which demand further clarification.

We thank reviewer 2 for the time taken to review our manuscript and the positive response provided. We believe that our manuscript is of interest to the readers of CP given the methods and multiple approaches adopted to evaluate a questionable historical extreme, therefore going beyond local interest. We will of course endeavour to provide further clarification as necessary.

1. The Kilkenny observational site is located in the centre of Kilkenny Town. Was it also located in the town centre in 1887? What was the extent and population of the town in the early time? If the town has not changed much in urban area and population, would the central location of the observation in 1887 be more productive to the higher temperature records compared to other observational stations in the nearby cities and towns of similar size?

   The Kilkenny observational site is currently located in a private residence, which is believed to be a different location to the recording of 1887. However, the specific location of the 1887 record is not known within the Kilkenny Caste grounds.

   In 1841, the population of Kilkenny City was approximately 19,071, decreasing to 15,257 in 1851 (McDill, 2021). In 1891, the population total of the county of Kilkenny was 87,261 (CSO, 2004). According to the 2016 census, Kilkenny City has a population of 25,512 (City Population, 2021). Therefore, it can be stated that the population has grown in Kilkenny City by over 10,000 since the mid-1800s. Since the 1800s, new buildings and developments have occurred in Kilkenny City. Although many historic buildings remain, ultimately the city is not the same as it was in 1887.

   The closest weather station to Kilkenny Castle is Kilkenny Greenhills, which became a climatological station with daily observations from manual instruments being submitted to Met Eireann in 2010 (Kilkenny Weather, 2019). The maximum temperature recorded at this station since 2010, was 29.6 °C in 2013 and 2021. Other weather stations in Kilkenny do not record daily maximum temperatures. A figure has been added to illustrate the relative locations of the castle and the newer site.

   We will add this additional insight to the revised paper.

2. The application of 20CR to show the synoptic situation seems not so persuasive, I feel. It indicates a favorable weather condition for the extreme hot and dry event, but when the authors said that the condition is not uncommon in the summer season over

Ireland, they did not exhibit an example of the synoptic situation at present. Is there any similar or even more extreme high pressure system over the study region during the same length of periods in modern time?

Thank you, in line with the response to Reviewer 1 we will update this analysis to replace with MSLP and 850hPa temperature reanalysis.

3. The exercise to compare the JJA season differences of maximum temperature between Kilkenny Greenshill and the four stations is convincing procedure. However, the representativeness/proximity of Kilkenny Greenshill to Kilkenny Castle would be important. The authors did not well document this. It would be good to at least give a large-scale map showing the specific locations of the two sites. Besides, all the data used should be evaluated for their quality and homogeneousness.

   Thanks for spotting this. We will add a map showing the proximity between these two stations as a new figure.

4. Given Kilkenny Greenshill could well represent Kilkenny Castle, there are other issues that should be clarified. 1) Birr seems mostly close to Kilkenny Greenshill, with both being inland stations, but its modern data was not shown, why?

   Thank you, we have now provided information in the paper as to why Birr was excluded from the modern-day frequency distribution. The modern data was only available for the 2010 summer which would have been insufficient to analyse the frequency distributions. As a result, Birr station was excluded from the modern-day frequency distribution analysis. This detail will now be made clear in the revised manuscript.

   2) For the two sites (Roches Point and Armagh) which is located inland or more closely to Kilkenny, the differences of Tmax between 1887 Kilkenny Castle record and those of the two stations are within 99% of the modern data, which means that the differences are not impossible. If the reference sites are closer to Kilkenny, would the possibility for the 1887 Tmax differences to occur be higher? –

   The modern-day frequency distribution shown in Figure 5, does provide a possibility for the 1887 heat record of Kilkenny to have occurred however the frequency distribution also suggests that the 1887 heat record would be an extremely unlikely occurrence. Furthermore, the June 1887 Tmax representation of the six selected weather stations shown in Figure 3, clearly has the Kilkenny heat record displayed as an outlier in comparison to its reference sites, If one or two sites being compared were at 99% of distribution that would be one thing, but for all comparator sites in all directions to be either at the limit of or entirely outside the expected distribution is quite another. It is both the extreme nature of individual pairwise comparisons, but more that in all directions these fall either outside or right in the extreme tail that raises serious questions around this possible record event.

5. Finally, I would suggest that all the figures be improved for their quality and clarity.
   Noted. All figures will be improved in line with suggestions from both reviewers.