



## The Global Warming Policy Foundation

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USA

4 February 2019

Dear Dr Berenbaum

**Complaint re “Climate-driven declines in arthropod abundance restructure a rainforest food web” PNAS October 30, 2018 115 (44) E10397-E10406**

You published a paper by Bradford C Lister and Andres Garcia on 30 October 2018, entitled “Climate-driven declines in arthropod abundance restructure a rainforest food web”.<sup>1</sup> It has come to our attention that the paper contains serious flaws, which we believe completely undermine the paper’s findings. As such, we ask that you retract the paper. In brief, the paper examines two separate samplings of arthropod abundance in Puerto Rico’s Luquillo Forest - the first in 1976 and the second in 2012, and finds that there has been a substantial decline in the intervening period. Both samplings used the same study area and methods, and the paper provides no evidence of any similar samplings in the interim.

The paper notes that between 1976 and 2012 mean maximum temperatures rose by 2.0°C, and goes on to claim that:

“...climate warming is the major driver of reductions in arthropod abundance, indirectly precipitating a bottom-up trophic cascade and consequent collapse of the forest food web.”

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<sup>1</sup> PNAS October 30, 2018 115 (44) E10397-E10406.

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The temperature data underlying this claim comes from a single record, from a site called El Verde. Temperature data for a second station, Bisley, is also shown in the paper, but only starts in 1994, and does not affect the paper's results.

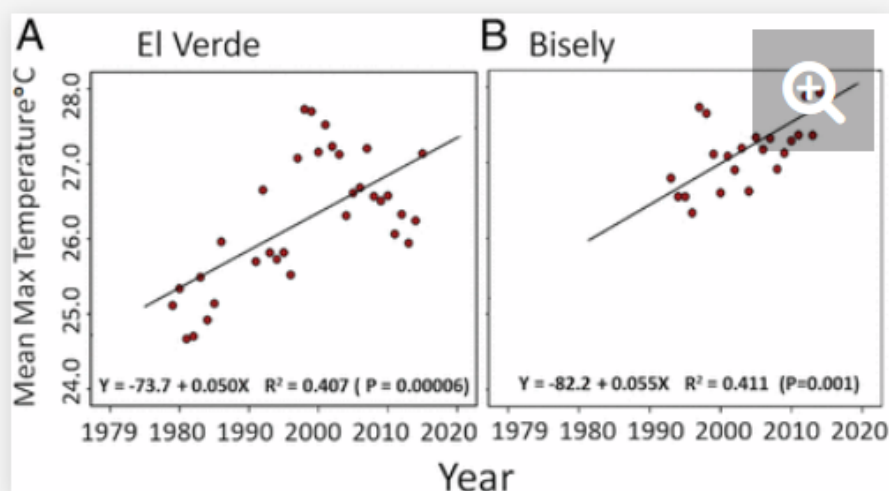


Fig. 1.

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Air temperature trends within the Luquillo forest. MnMaxT vs. year for the (A) El Verde (1978–2015) and (B) Bisley Tower (1994–2012) meteorological stations. The stations are ~8.2 km apart at elevations of 350 and 352 m, respectively. The least-squares regression lines have been drawn through the data points. The difference between the slopes of the two regression lines is not significant ( $t = 0.281$ ,  $P = 0.78$ ).

The two records are shown in the paper's Figure 1, reproduced here.

Our complaint relates to the quality of the El Verde temperature record. This data comes from the US Forest Service El Verde Field Station, which is maintained by Luquillo Long Term Ecological Research (Luquillo LTER). The station metadata has also been published.<sup>2</sup>

According to the station's page on its QC procedures:<sup>3</sup>

Temperature data has been collected continuously at EVFS since 1975. The early part of that record (from 1975-1992) have been filled by extrapolating from other stations or from previous data from the EVFS station.

Subsequent manipulations make the EVFS record less valuable for interpreting long term trends. In particular, instrument problems toward the end of this early period led to changes in the thermometer and its housing (and perhaps in its location) in September 1992. We mark this as the end of the first measurement phase and the beginning of the second.

After September 1992, recorded maximum temperatures increased substantially at this station, certainly as a result of the instrumentation changes that took place in that month. Noticing this, a correction was applied to the data collected after September 1992 to make it comparable to the data collected previously. The exact nature of this correction is not described in the metadata or temperature logs. This correction

<sup>2</sup> <http://evfs.ites.upr.edu/research/meteorological-data>

<sup>3</sup> <http://luq.lternet.edu/data/luqmetadata16>

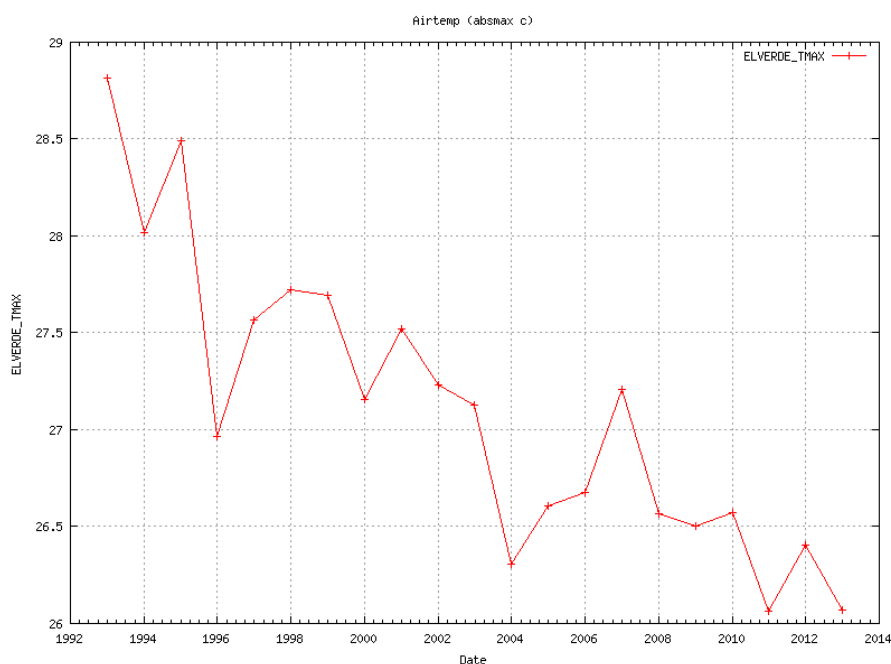
ceased to be applied to these maximum temperature data in 1997, and as a result, the EVFS maximum temperature record (LUQ data set 16) showed an abrupt increase in maximum temperature in 1997.

This partially corrected data set is the one we made accessible to people on our web site and through ClimDB until Feb 2014. At least one paper has reached erroneous conclusions about long term trends based on these data (Huey et al. 2009).

We are now (since March 26, 2014) treating the January 1975-August 1992 data and the October 1992-present uncorrected data as two different data sets. The differences in instrumentation have introduced differences in the data between these two periods, and treating them as a single data set misrepresents the data. Moreover, the extensive extrapolation of data in the earlier data set makes them suspect, and combining the two data sets pollutes the later record.

There are several statements that are relevant to our complaint:

1. Changes in the thermometer, housing and possibly its location in Sep 1992 led to a substantial increase in maximum temperatures.
2. As a result, in 2014, the dataset was split into two, with one series from 1975 to Aug



1992, and the other from Sep 1992.

3. Luquillo LTER are clear that treating these two series as a single dataset “misrepresents the data”.
4. At least one other study has reached erroneous conclusions about long-term trends from use of the single dataset.
5. Originally, adjustments were made to the post 1992 data in order to correct for the equipment changes. However, the exact nature of this adjustment is not now known, and the adjustment was not applied after 1997. This left a substantial and abrupt increase in maximum temperatures in 1997 in the original, single dataset.

In short, the single dataset beginning in 1975 introduces a false warming trend into the data, and use of this dataset misrepresents the data.

Luquillo LTER also provide a graphing tool for their temperature data,<sup>4</sup> although the annual data only runs to 2013. As can be seen in the figure below, the temperature data shows a sharp fall in annual maximum temperatures from 1993 to 2013, in stark contrast to the rising trend plotted by Lister & Garcia, which was derived from the faulty dataset. The reason for the difference is that the faulty dataset includes an artificial step up in temperatures from September 1992 due to the equipment changes.

Although the above chart only runs to 2013, Lister & Garcia's own chart, which extends to 2015, clearly shows that both average maximum temperatures in 2014 and 2015 were lower than 1993.

The paper also makes reference to the “fact” that the number of days of 29°C and over increased significantly between 1978 and 2015. However, this is the inevitable result of the instrumentation changes, which registered a higher temperature than the previous one. As such there is no evidence that the trend of hot days identified in the paper has any climatic significance at all.

The paper claims that arthropods in Luquillo have been declining at an alarming rate since the 1970s, based on samples taken in 1976 and 2012. (There is no analysis provided of population samples taken in between these dates.) The paper then claims that this decline has been due to rising temperatures, based on the temperature record at El Verde from 1978 to 2015. It is clear from the abstract that linking the decline to a warmer climate was the main purpose of the paper. However, as we have shown, the long-term temperature record at El Verde since 1975 is fundamentally flawed, and the LTER, who are responsible for it, are absolutely clear that the dataset from 1975 to 1992 should not be used for estimating long-term trends.

The only reliable data, which is data since Sep 1992, shows a significant cooling trend, casting further doubt on Lister & Garcia's assessments. Indeed, we might ask whether it is this cooling that has been responsible for the decline in arthropods.

In short, the whole basis of the paper is undermined by the significantly flawed temperature data used. As such we request that you withdraw the paper.

Yours sincerely

Dr Benny Peiser



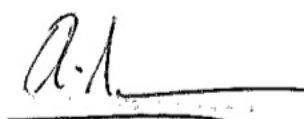
Dr Matt Ridley



Paul Homewood



Andrew Montford



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<sup>4</sup> <https://climhy.lternet.edu/>