# ESCAPING THE ISLAND

*Abnormal surface temperature post threat to survival, biodiversity and health in NJ*

by

YaoYuan(Andy) Zhang, Longge(Andrea) Wang

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GLOBE Teacher: Ms. Desai

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## 1. Abstract

The research addresses the effects of a global issue, surface temperature anomaly, on both micro and macro scales. The departures of temperature from long-term average value can lead to alarming consequences to organisms survival, local biodiversity and epidemic diseases. To truly apprehend the scale and the results of temperature anomaly, multiple data sets are tracked and analyzed from November 2016 to March 2017. By comparing the graphs, the correlation between theses factors is revealed, which serves as a warning sign to the global community. The emergences of urban heat island, the rising temperature at the South Pole, and the extreme weather in winter are only glimpses of this vast issue; other numerous factors need to take account when analyzing the influences of surface temperature anomaly.

Although finding the solution to this problem may be difficult, it is the global community's duty to consistently understanding and researching. In this research, there are three plausible options: biological, chemical, and physical. The next step of this research is to create an index that is capable of accurately predicting the pattern of surface temperature anomaly on a global level. The calculation will provide more time to scientists, politicians, and citizens before the situation beyond redemption.

**Key words:** Surface temperature anomaly, Global Warming, GLOBE, NJ

## 2. Research Questions

Renown for its beautiful beaches and hospitable climate, NJ represents an ideological world of a mutual relationship between human and the nature. However, over the past few years, the global warming influences abnormality in surface temperature which results in "high temperature, low cloud cover, and low average wind speed" which tend to accelerate the heat island effect. Moreover, the soil becomes less tolerable to changing temperature that post threat to underground organisms.

Since last centuries, scientists start to warn the danger of global warming, the gradual heating process on multiple levels: atmosphere, water surface, and land surface. This global phenomena will lead to both food and land deprivation. According to the IPCC the concentration of carbon dioxide will increase geometrically and the global temperature will rise between 1.5 to 4.5 degree Celsius. In a local scale, the power and the scale of Global Warming reflects on the existence of urban and suburban heat island. Heat island is the result of excessive heat emitting

from urban surface over a long period of time. The constant heat generate by the urban area lead to local modifications thus lead to two distinct patterns between urban and rural.

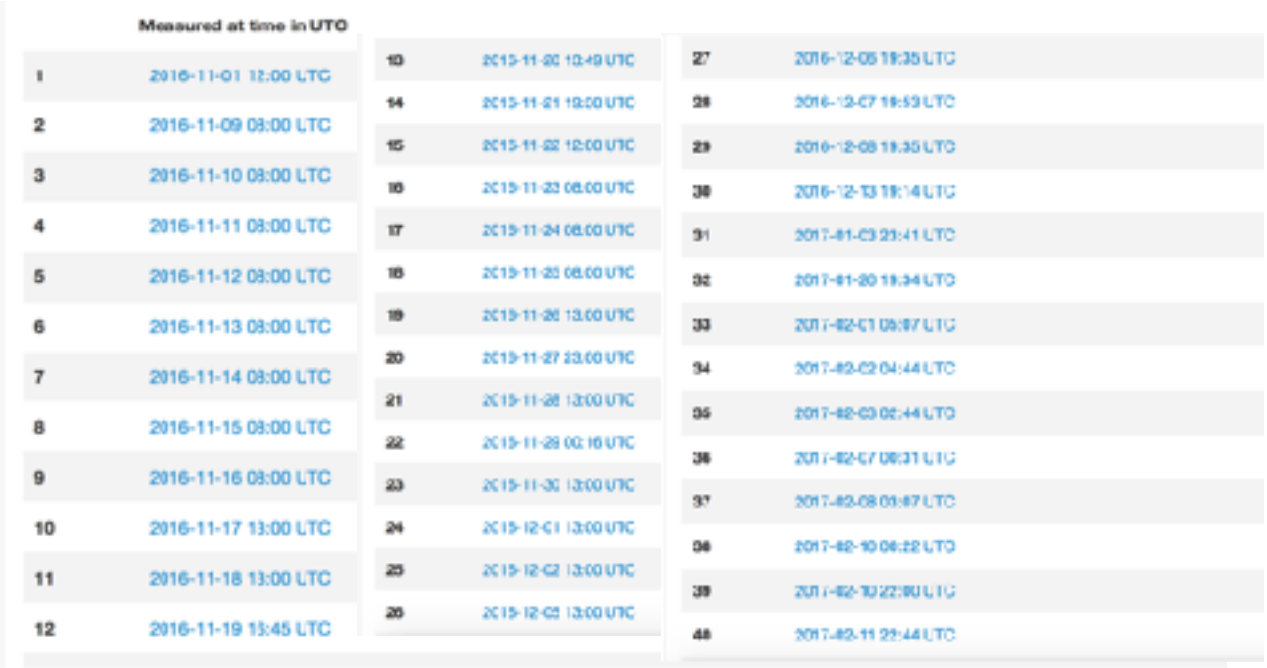
It is also important to realize that the effect of Global warming does no have to involve with a "heating" process. The decreases of soil temperature toleration is another sign of destructive ecosystem. Temperature toleration may used to describe the most suitable temperature environment for a certain species but in this case decreasing temperature toleration depicts the appearances of extreme values from collected data. This is not a promising news for conformer species or ectotherm species which relies on external temperature to regulate inner metabolic pathways. The unstable temperature situation can lead to decrease in biodiversity in certain areas by affection the survival of keystone species.

The solution of this problem may be relatively simple or difficult depending on perspectives. In this research, we received assistance from 12th District of Representatives of NJ and have the opportunity to reach out to local community through presentations and conferences.

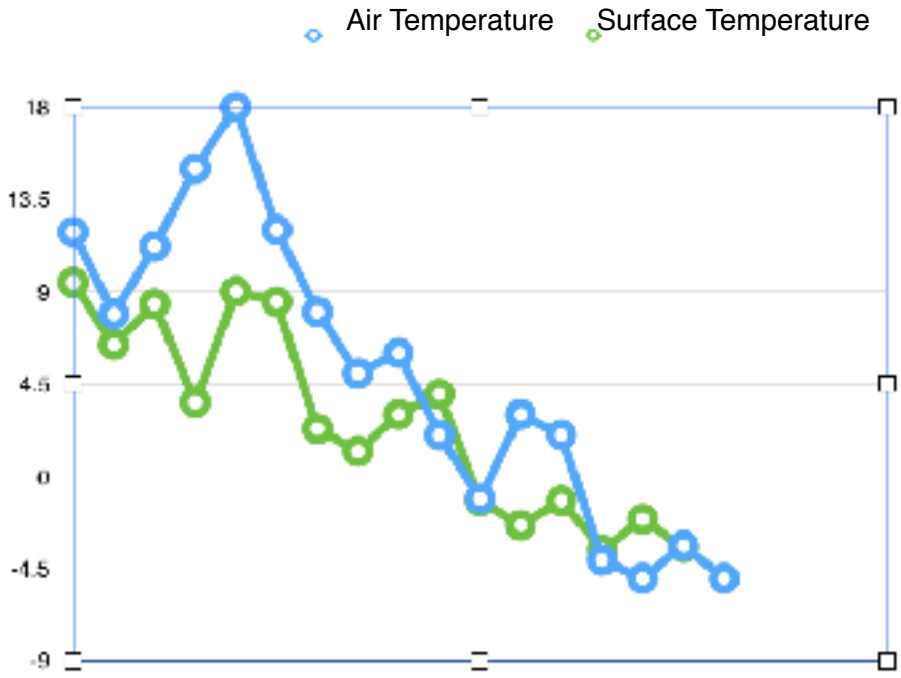
***Hypothesis:*** *the abnormal surface temperature directly causes changing air temperature, and biodiversity*

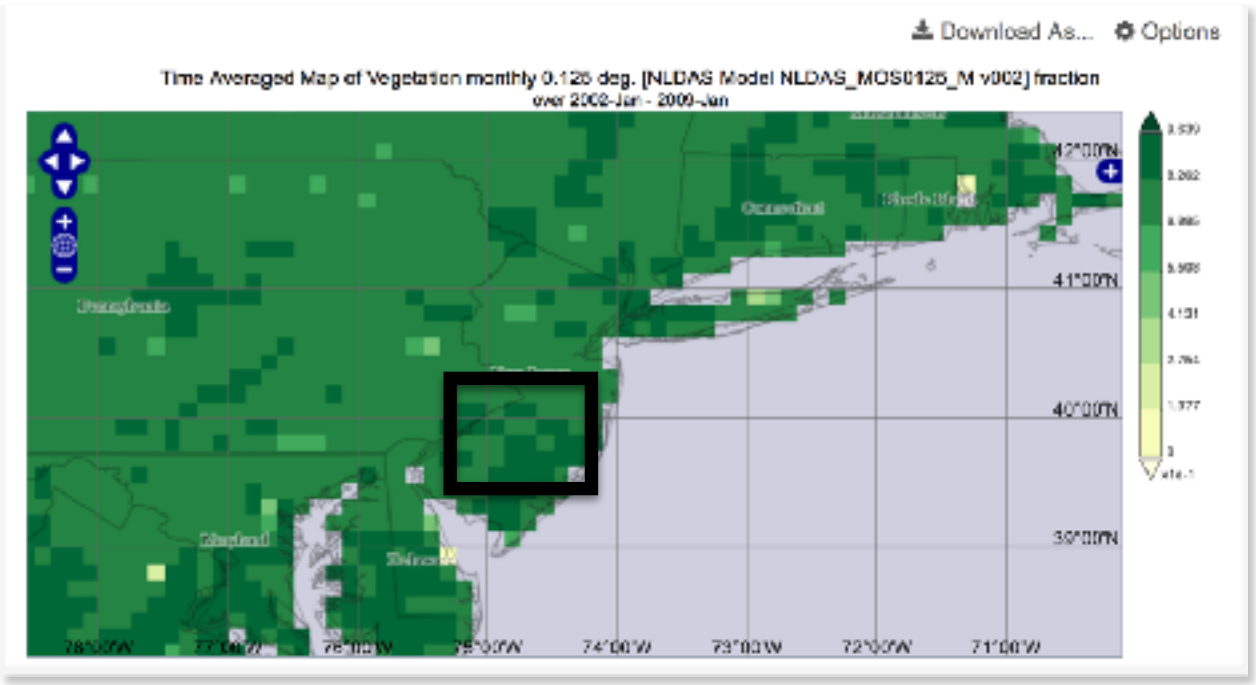
## 3. Research Methods and Data

The primary site of data collection locates at central NJ (Rutgers Preparatory School), next to Riverton River, from the November of 2016 to the March of 2017. Within this short period of time, patterns are generated by comparisons.

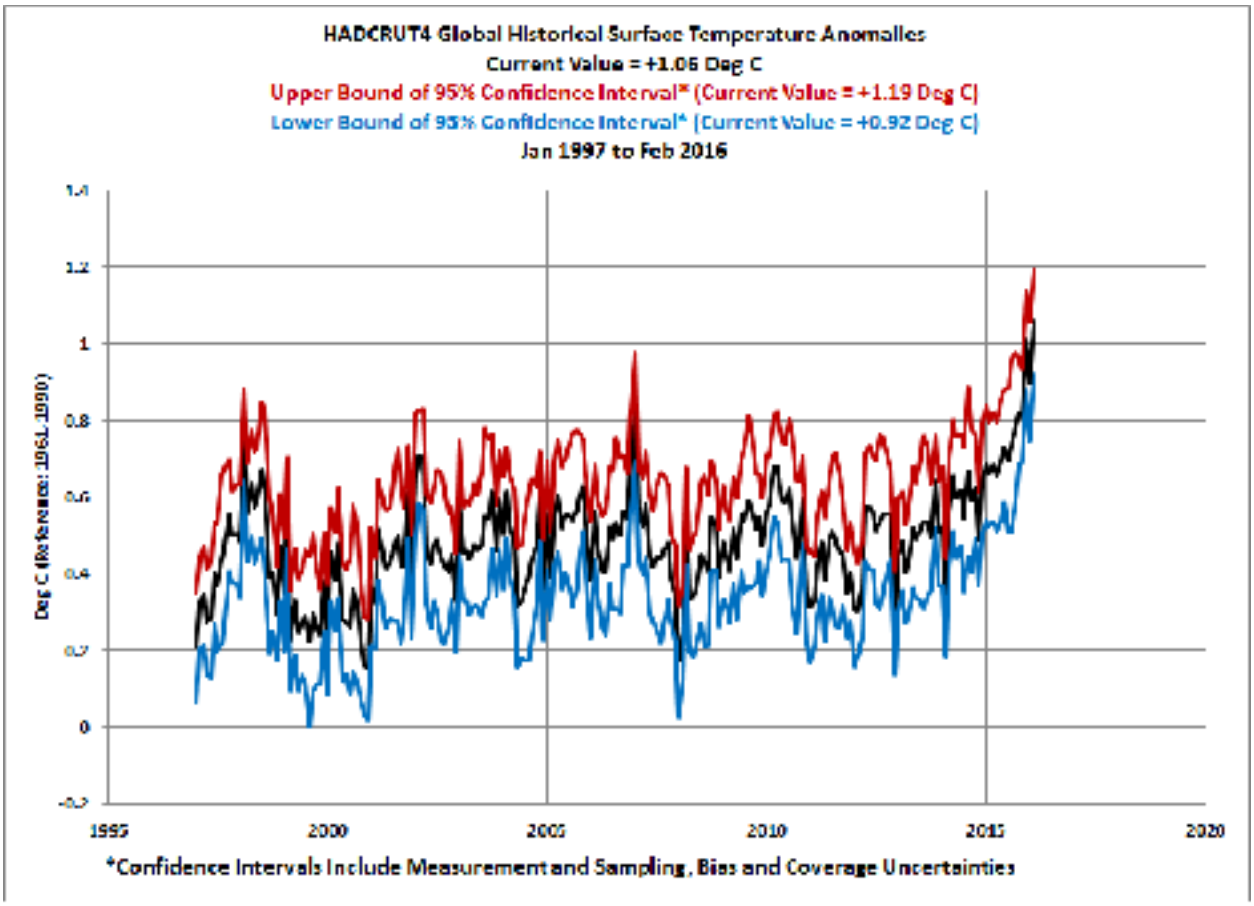


| | Measured at time in UTC |
|---|---|
| 1 | 2016-11-01 12:00 UTC |
| 2 | 2016-11-09 08:00 UTC |
| 3 | 2016-11-10 08:00 UTC |
| 4 | 2016-11-11 08:00 UTC |
| 5 | 2016-11-12 08:00 UTC |
| 6 | 2016-11-13 08:00 UTC |
| 7 | 2016-11-14 08:00 UTC |
| 8 | 2016-11-15 08:00 UTC |
| 9 | 2016-11-16 08:00 UTC |
| 10 | 2016-11-17 13:00 UTC |
| 11 | 2016-11-18 13:00 UTC |
| 12 | 2016-11-19 13:45 UTC |
| 13 | 2016-11-20 10:49 UTC |
| 14 | 2016-11-21 19:00 UTC |
| 15 | 2016-11-22 12:00 UTC |
| 16 | 2016-11-23 08:00 UTC |
| 17 | 2016-11-24 08:00 UTC |
| 18 | 2016-11-25 08:00 UTC |
| 19 | 2016-11-26 13:00 UTC |
| 20 | 2016-11-27 23:00 UTC |
| 21 | 2016-11-28 13:00 UTC |
| 22 | 2016-11-29 00:16 UTC |
| 23 | 2016-11-30 13:00 UTC |
| 24 | 2016-12-01 13:00 UTC |
| 25 | 2016-12-02 13:00 UTC |
| 26 | 2016-12-03 13:00 UTC |
| 27 | 2016-12-05 19:35 UTC |
| 28 | 2016-12-07 19:53 UTC |
| 29 | 2016-12-08 19:35 UTC |
| 30 | 2016-12-13 19:14 UTC |
| 31 | 2017-01-03 23:41 UTC |
| 32 | 2017-01-20 19:34 UTC |
| 33 | 2017-02-01 09:07 UTC |
| 34 | 2017-02-02 04:44 UTC |
| 35 | 2017-02-03 02:44 UTC |
| 36 | 2017-02-07 09:31 UTC |
| 37 | 2017-02-08 01:07 UTC |
| 38 | 2017-02-10 06:22 UTC |
| 39 | 2017-02-10 22:50 UTC |
| 40 | 2017-02-11 23:44 UTC |


Air Temperature
Surface Temperature
18
13.5
9
4.5
0
-4.5
-9




This is the Time Average Map of Vegetation monthly of New Jersey from 2002 to 2009



## 4. Discussion and Conclusion

From the first graph, we can see a relatively strong connection between air temperature and surface temperature. There is no significant differences between these two pairs of data beside one group of outliers. With this in mind, we can predict that when the air temperature increases during the summer, the surface temperature will increase as well. However, this graph cannot conclude the leading factor in this cycle. The possible explanation that can be drawn from the comparison of data is that the increasing surface temperature and rising air temperature involve into a positive feedback cycle.

Unexpectedly, the rising surface temperature increases biodiversity shortly. The selected region's cover vegetation  biodiversity increases from 2009 to 2016 primary due to the increases of precipitation. Yet, the long term effect of surface temperature abnormality to vegetation's rooting system and secession orders (first, second and third) requires more data analysis. Beyond, we should expand our research on animals and other plants species

The last graph demonstrates the limitations of soil temperature's buffer effect. From 1995 to the early year of 2015, the global historical surface temperate anomalies deviates from 0 to 0.8 degrees. In contrast, after 2015, the  anomalies increases drastically.

In conclusion, with limited amounts of data, we analyze the strong correlation between temperatures and biodiversities. Although biodiversity increases along the rising of global temperature, the penultimate effect is not promising.

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