

International Center for Enterprise Preparedness (INTERCEP)

Our Warming World: Consequences of Global and Regional Climate Change

Web Forum

On Tuesday, August 21, 2018 INTERCEP held a web forum titled ***Our Warming World: Consequences of Global and Regional Climate Change***. **Dr. David Robinson**, New Jersey State Climatologist and Professor of Geography at Rutgers University, provided insights on climate change impacts, with a focus on temperature increases and heat, and responded to participant questions.

Introduction

There are many aspects of climate change to discuss and the focus of this web forum was on rising temperatures and heat.

The Office of the New Jersey State Climatologist provides decision-makers with data and information to make decisions in the area of weather and climate. New Jersey has a network of 65 weather stations that report weather conditions every five minutes.

The summer of 2018 has been warm, with many places around the world recording record temperatures. This is summarized in an article by Jason Samenow that appeared in The Washington Post [See the Additional Resources section below]. In particular, it's been a very warm summer across the northern hemisphere.

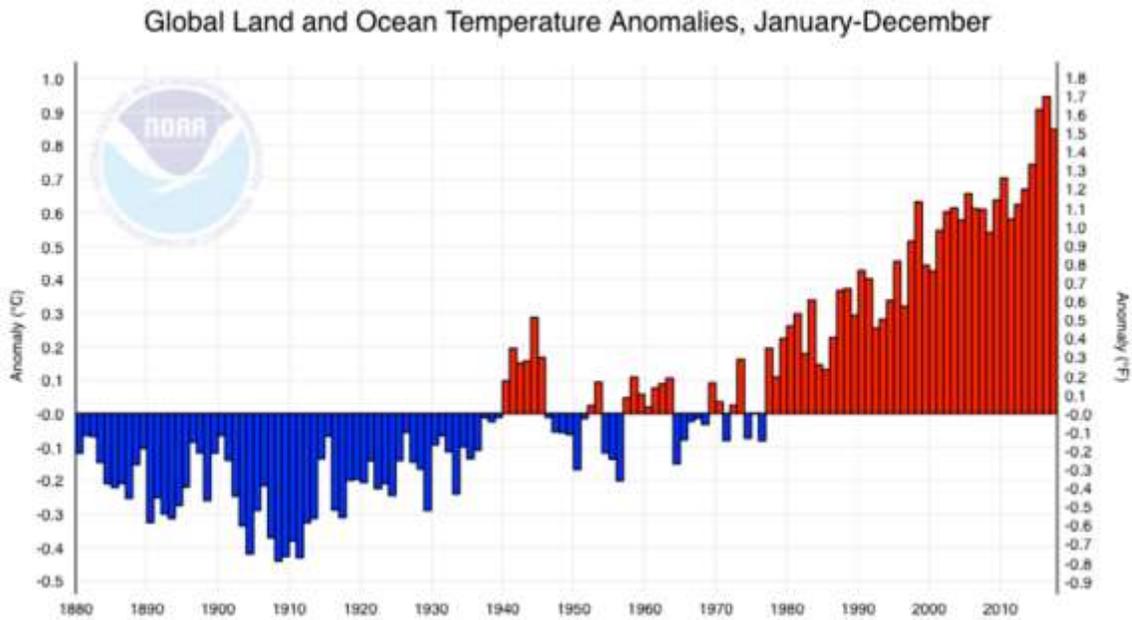
There were record May-July temperatures across the contiguous US. Europe had wildfires above the Arctic Circle. The period May-July was the warmest on record across Europe. There have always been areas that experience high temperatures but now the geographical areas that experience very high temperatures are much broader areas. This year will likely be the third or fourth warmest year on record.

Temperature Trends and Persistent Patterns

Figure 1 summarizes global temperature data for the period 1880-2017. The data show an average global temperature increase of 0.13 °C per decade. This increase is not uniform around the globe. For example, temperatures in the Arctic are increasing at twice the global rate.

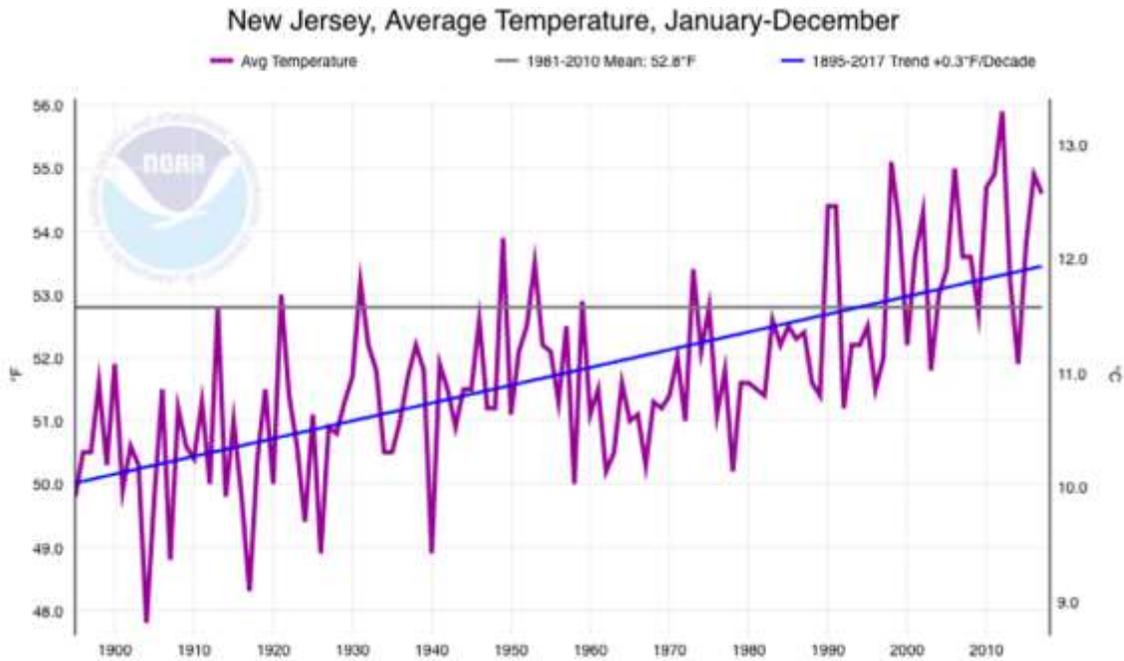
In New Jersey there is a **trend of overall warming** although here you have to go back to 2012 to see some of the highest temperatures. Figure 2 shows this trend. The warming has been more rapid since 1980. The three warmest years recorded in the state have occurred since 1998, with 2012 being the hottest year.

Figure 1. Global Land and Ocean Temperature Anomalies, 1880-2017



Source: National Oceanic and Atmospheric Administration (NOAA).

Figure 2. New Jersey, Average Temperature, January-December 2017



Source: National Oceanic and Atmospheric Administration (NOAA).

When looking at temperature data it is important to look at the global trend and not just the local conditions to understand what is happening.

There has also been a slight increase in **precipitation** in the last decades. The variability from one year to the next is also larger since the 1960s when a large drought was recorded. As temperature warms other variables may become more variable, which makes it more difficult to deal with related impacts.

Sea level is also rising in the New York metropolitan area and globally as a result of increasing temperatures.

Why is the temperature increasing?

The climate system is extremely complex and the various spheres interact with each other – the cryosphere, biosphere, hydrosphere, lithosphere, etc - and the climate system interacts with the sun.

Human activities are responsible for most of the changes we are observing. This conclusion is based on theory, models and observations. The concentration of **greenhouse gases**, including carbon dioxide, is higher now than at any point in the last several million years.

Urban Warming

Urban environments result in changes in precipitation, humidity, wind and temperature. The heat they absorb and reradiate and the geography of urban canyons exacerbate heating. Cities are warmer than the surrounding terrain.

The lack of vegetation in Trenton, New Jersey, for example, results in much different evening temperatures due to evaporation, etc., compared to other areas with more vegetation cover, such as swamps and wetlands.

The nighttime low temperatures have also changed significantly. In urban areas the combination of rising temperatures and the heat island effect means nighttime temperatures are higher and people in urban areas just can't get a break in summer to cool down. That is a major health crisis for people that do not have air conditioning or fans.

There is a lot of focus on temperature records but it's also important to look at the duration of heat events. It's not just the high temperature that matters but also the duration and geographical extent of the heat, all these variables are increasing, not just the magnitude of the temperature, and all have to be considered.

Where are we going?

A lot of really good climate change impact studies are being done for this area. These studies include various scenarios with estimates that consider business-as-usual to mitigation measures, with different emissions scenarios.

These studies indicate that in New York City the average temperature increase in the decades ahead could be about 6-8 degrees Fahrenheit. This is an estimate for the central range of the temperature increase by the end of the century. But the temperature increase could go higher than that.

High, medium and low emission scenarios provide different results, with high emissions scenarios resulting in much more significant temperature impacts later in the century. These results show that the emissions decisions made today may not make a huge difference in the next couple of decades but will make a very significant difference later in the century.

The number of expected days with temperatures over 95 degrees Fahrenheit will represent a very serious issue later this century, including things that have never been experienced before. Already, most of the hottest summers in this region have been in the last couple of decades.

Impacts and thoughts on how to respond

The impacts of climate change are expected to affect energy, national security, health, crime, agriculture, water and many others areas. A wide range of impacts is expected since almost everything is related to weather or climate.

What can we do about this?

Knowledge – we need a better understanding about how the climate is changing.

One approach is **mitigation** – reducing greenhouse gas emissions. Currently the greenhouse gas emissions trend is not going in the right direction. In the policy arena in the United States the federal government is not providing the right incentives. An example is what the current administration is doing with regard to deregulating coal plants.

But climate is already changing – mitigation will have to be integrated with **adaptation**. It is important to participate and vote on environment and climate change, and to be leaders at the local level.

To sum up

- Warming continues globally and locally.
- This trend will continue for the foreseeable future.
- Impacts will continue to be felt.

- While the train has left the station, time remains for mitigative and adaptive actions to slow the locomotive.

Q&A

Can there be an integrated approach with the multinational corporate world to collaborate or merge corporate social responsibility and taking care of its employees and taking care of its supply chain and interests?

A lot of corporations consume a lot of energy and can reduce energy consumption and can work with consumers to create products that use less energy.

You can also look at this webinar, we didn't fly or drive to a meeting, we did it remotely.

How do we educate people on this issue?

You have to be creative, one size does not fit all. Make it relevant to their world. If you are in the middle of the country you can talk about how the climate will affect agriculture, if you provide relevant examples of how it is already affecting people it will be make a much stronger statement. You need to tell stories and something they can relate to. For example, climate refugees as arctic villages are sinking and eroding.

What is the impact of PV solar energy on warming?

If the panels are on roofs, or on top of parking lots, they will not add much heat considering there is already a lot of built environment. If they replace a grassy field maybe but there hasn't been much study of this. Energy is not significantly being diverted, so overall this is a very small factor.

Additional Resources:

- Office of the New Jersey State Climatologist. <https://climate.rutgers.edu/stateclim/>
- Jason Samenow. August 17, 2018. "Red hot planet: This summer's punishing and historic heat in 7 maps and charts," *The Washington Post*. Available at: https://www.washingtonpost.com/news/capital-weather-gang/wp/2018/08/17/red-hot-planet-this-summers-punishing-and-historic-heat-in-7-maps-and-charts/?utm_term=.b94932cc5ba7
- New York Panel on Climate Change. <https://www1.nyc.gov/site/orr/challenges/nyc-panel-on-climate-change.page>
- Intergovernmental Panel on Climate Change (IPCC). <https://www.ipcc.ch/>
- National Oceanic and Atmospheric Administration (NOAA). Climate Change Impacts. <https://www.noaa.gov/resource-collections/climate-change-impacts>