



Catastrophic Prospects: The Link Between Global Warming and Extreme Weather



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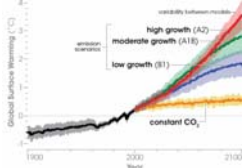
Abstract

The warming of the planet not only warms average global high temperatures, but also raises the average sea surface temperatures, causes a rise in global sea level, and changes wind and ocean circulation patterns. These complex changes caused by planetary warming have and will likely continue to have an effect on world agriculture, glacial retreat, desertification, human health, ecosystems, and the spread of diseases. This research focuses specifically on the link between climate change and extreme weather events. In addition to patterns of increased precipitation and increased evaporation, global warming is a chief cause of the increase in hurricane, flood, and drought frequency.

Introduction

The Intergovernmental Panel on Climate Change is the foremost source for data and models concerning global climate change. Therefore, I rely on the IPCC for much of my data. The current level of understanding of the IPCC on the link between global warming and weather impacts is based on the Fourth Assessment Report:

"Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century...There will very likely be an increase in frequency of hot extremes, heat waves, and heavy precipitation...and a likely increase in tropical cyclone intensity...There is now higher confidence than in the TAR in projected patterns of warming and other regional-scale features, including changes in wind patterns, precipitation, and some aspects of extremes and sea ice."



Summary of Weather Impacts

Precipitation

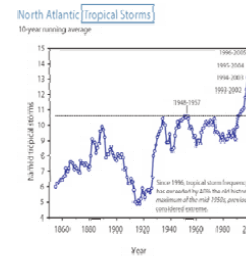
Global warming will cause increased precipitation patterns in many areas around the world. The EPA estimates that increased rainfall would cause more flooding, landslides, avalanches, soil erosion, and mudslides in many areas. One positive effect of increased precipitation would be the increased moisture to floodplains, creating more fertile agricultural regions.

Additionally, scientists have discovered that global warming has changed monsoon patterns on the Indian subcontinent. Monsoons in the region have become more intense but less frequent--meaning that flooding and other natural disasters will become more frequent under these conditions.

Evaporation

As global climate warms, one result is the production of warmer temperature ocean water. This warmer water will cause evaporation rates to increase. The increased rates of evaporation will come with higher rates of rainfall as well, causing a disastrous situation with a high potential for soil erosion and desertification.

Hurricanes



Studies have discovered a link between higher ocean temperatures and increased tropical storm frequency in the North Atlantic. Since 1996, the frequency of tropical storms has exceeded by 40% the highest frequency ever reported in the 1950's. Additionally, tropical storms have become increasingly intense each year. Studies report that in the past 35 years, the number of hurricanes classified as Category 4 and 5 have doubled.

To make the situation worse, sea level rise (caused by sea water expansion with greater temperatures and the input of melting glaciers due to warming) plays a role in the intensity and destruction caused by hurricane storm surges. Higher sea levels brought on by global warming will mean that storm surges will increase in strength and will have the capacity to reach further inland, causing even more coastal destruction and loss of life.

Georgia Tech scientists conducted a study that reported that among all of the environmental factors that effect hurricane formation (sea surface temperature, wind shear, humidity, and the cyclonic tendency of the wind), the only factor proven to explain the long term intensification of hurricanes is sea surface temperature.

Inland Storms

A recent NASA study reports that a warmer and moister planet would allow for more intense inland storms producing thunder, lightening, hail, and tornadoes. In the United States, a combination of geography and weather factors makes the country susceptible to a strong storm season in the spring and summer. The U.S.'s large land mass heats up on warm days, is affected by the behavior of the jet stream, experiences wind blowing off the Rocky Mountains, and has the warm moist Gulf of Mexico air all in one place. The NASA scientists found that global warming would tinker with one important factors in this combination: wind updrafts. These faster updrafts cause more powerful inland storms, creating even more dangerous lightning, hail, and tornadoes.

Drought

The increased rate of evaporation caused by global warming creates increased probability of drought in already sensitive and dry areas. Worsening drought conditions cause a decrease in the water supply and an increase in the intensity and rate of wildfires. For example, in the 2006 U.S. wildfire season, new records were set in the number of acres burned by fires and the number of fires reported. In the 2006 season, nearly 10 million acres burned as a result of the almost 100,00 fires reported. These rates are 125 percent higher than the 10-year average for wildfires, posing problems for ecosystem survival, human life, property, and health standards.



Floods and Rising Sea Levels

Higher global temperatures are expected to raise sea level by expanding ocean water, melting mountain glaciers and causing portions of Greenland and the Antarctic ice sheets to melt. The IPCC report estimates that the global average sea level will rise between 0.3 and 2.9 feet in the next century alone. To put this into perspective, a 3-foot rise in sea level would devastate cities all along the U.S. eastern seaboard. A 20-foot sea level rise would submerge a significant portion of Florida. The rate of sea level rise depends largely on the rate of glacial melt and sea temperature rise, which are determined by the rate of global warming.

Conclusion

The most recent scientific studies conclude that the reality of climate change not only affects agriculture, ecosystems, and human lifestyles, but also the weather patterns that are intricately connected to temperature, precipitation, and evaporation. It is clear, based on the most current information, that precipitation will increase, evaporation will decrease, and that hurricane, flood, drought, and storm conditions are expected to escalate if nothing is done to curb the rate of warming. Reducing anthropogenic contributions to warming may be key to lessening the extreme weather impacts of climate change.

Sources

This poster was developed as an assignment for Honors 295, Fall 2007: **Population, Environment, and Sustainability: Ethics for Living into the Future.** References can be obtained by contacting the author.

Helpful Websites: <http://www.epa.gov/climatechange/>, <http://www.pewclimate.org/>, <http://www.ipcc.ch/>.