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Perception and Effects of Climate Change

Abstract

The evidence and consequences of global climate change are negatively impacting physical and mental health across the world due to disease spread and changing temperature, as well as degrading ecosystems through loss of vegetation and species extinction. Public perception of climate change is heavily dependent on politics and demographics, and has an effect on the government's willingness and ability to provide further funding for research and investment in areas most negatively impacted by climate change.

Evidence of Climate Change

The evidence supporting the presence of global climate change and global warming have been found and supported by a number of studies, focusing on surface air temperature and rising sea levels.

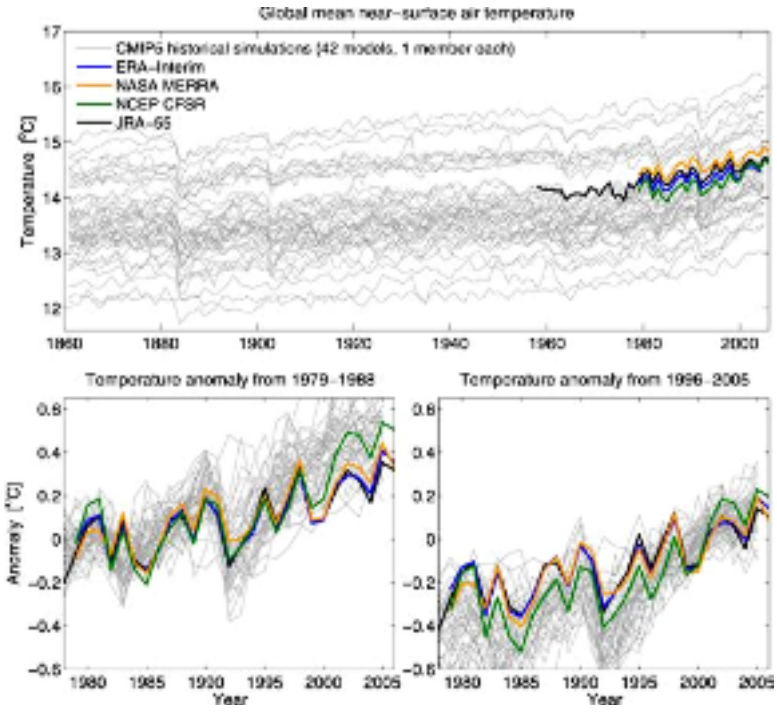

Figure 1. Change in global mean surface temperature from 1980-2005 (top graph). Using the same data, intensity of temperature anomalies from 1979-1988 (bottom left) and 1996-2005 (bottom right) measured in degrees celsius [1].

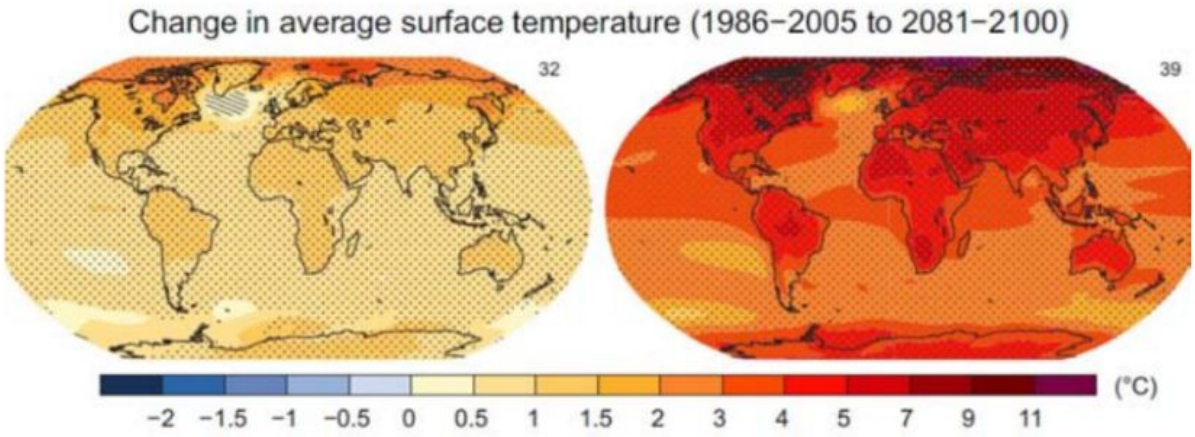

Figure 2. Trends in temperature increase (left) and projections for future warming (right) [2].

As seen in fig. 1, global mean surface air temperature has increased substantially since 1980, as well as the intensity of temperature anomalies [1]. While the exact number of temperature anomalies across the globe is unknown, these anomalies range from -0.2 to 0.5 degrees Celsius from 1979-1988 (relatively consistent spikes in temperature); more recently, the data shows lower temperature anomalies ranging from -0.5 to 0.2 degrees Celsius [1]. Overall, Earth has warmed more than 0.8 degrees since the late nineteenth century and is projected to increase up to 11 degrees in colder, northern climates by 2100 [2]. While the ocean is less susceptible to changes in temperature than the ground due to its high specific heat capacity, even a mild increase in temperature causes the water to expand and sea level to rise. The increased number of greenhouse gases in the atmosphere are disproportionately affecting the northern hemisphere, melting glaciers and adding even more water into the ocean [2]. There has also been an increase in natural disasters due to the circulation of hotter and more humid air in the atmosphere [5][3].

Consequences to the Environment v.s. Human Health

Due to the changing temperature and climate across the globe caused by human interference, ecosystems are being degraded; eutrophication of freshwater bodies and species extinction create a domino effect within communities, leading to an “extinction cascade” [6]. With this, pollinator levels are on a steady decline, threatening most plant populations and human food sources; it is noted that “there is now an increasing recognition of its potential risks to human health that are not only related to disasters but also to significant changes in climate systems such as increasing temperatures and altered rainfall patterns” [3]. Melting glaciers are also a heavier consequence than most would like to think, as the positive feedback loop from increased ocean temperatures will continue to build, which will displace both wildlife and human communities along the coast due to the rising sea levels [2].

While the effects of climate change on the environment are impossible to ignore, many focus primarily on the effect it has on the physical and mental health of people. There is already

evidence of increased mortality rates due to extreme changes in temperature; a study done in 2015 found that 7.71% of deaths in 384 locations were caused by suboptimal temperatures, mostly due to the cold [3]. Climate change not only refers to temperature, but humidity as well; hotter and more humid weather is the perfect breeding ground for viruses like malaria, dengue, and the zika virus [3][4], all transmitted by mosquitoes. It is noted that “The direct effect of climate change on future malaria transmission results in an increase of the simulated length of the malaria transmission season,” which endangers thousands of lives in the tropical highlands [3]. It has been established that “meteorological variables such as temperature and precipitation affect the biophysical functioning of the mosquito and the breeding habitat” [4], and there is concern that “[dengue] virus transmission may increase in regions where it has until now been uncommon” [4]. The fact that natural disasters and extreme weather events are increasing puts a burden on the human population, as it is noted that “All natural disasters can cause physical trauma and death” [5]. The effect on mental health is also worth mentioning, given that these events can cause severe psychological trauma from injury, death of a loved one, or loss of livelihood and property. This creates yet another effect similar to those of dominos falling down, as “Natural disasters can lead to structural or technological crises… These follow-on breakdowns exacerbate the trauma and distress the disaster has already caused.” [5] Women, children, and older individuals are more susceptible to this trauma, which can lead to substance abuse and increased anxiety and depression [5].

Perception of climate change

Despite the overwhelming evidence of climate change, public perception is heavily dependent on social issues; multiple studies have shown that the primary factor in people’s perception of climate change is politics, though people may be more perceptive of climate change because of personal experience [7]. Factors such as age, race, and location are also important, as it is noted that people in the Southeastern US are more concerned about climate change than those in the North, and citizens of the UK are more likely to attribute extreme cold to climate change [7][8]. Overall, it was found that younger people, liberals/democrats, and those who have had a higher education are more likely to believe in climate change than older, conservative republicans, and those who did not complete their education [7]. Roughly 48% of American voters say that protecting the environment is “very important”, with 38% voting the same for global warming [8]. Actual facts about climate change are not likely to impact perception when politics are involved [7], so politicians have no reason to alter already-established viewpoints on climate. This prevents necessary steps such as funding and research for climate change-related issues and investment in areas most negatively impacted by climate change [3][7].

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