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CAUSES, EFFECTS, TRENDS OF GLOBAL WARMING AND SOLUTIONS TO GLOBAL WARMING

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Abstarct
Historically, Earth's climate has regularly shifted back and forth between temperatures like those we see today and temperatures cold enough that large sheets of ice covered much of North America and Europe. The difference between average global temperatures today and during those ice ages is only about 5 degrees Celsius (9 degrees Fahrenheit), and these swings happen slowly, over hundreds of thousands of years. Measurements show that the Earth's global-average near-surface temperature has increased by about 0.8°C since the 19th century. It is critically important to determine whether this global warming is due to natural causes, as contended by climate contrarians, or by human activities, as argued by the Intergovernmental Panel on Climate Change. This study updates our earlier calculations which showed that the observed global warming was predominantly human-caused. Humanity is also responsible for the most recent period of warming. Internal climate variability is primarily responsible for the early 20th century warming and the subsequent cooling. It is also found that the equilibrium climate sensitivity is on the low side of the range given in the IPCC Fourth Assessment Report.

Keywords: Global Warming, Climate Change, Causes of Global Warming, Effects Of Global Warming.

INTRODUCTION
Global warmth begins with sunlight. When light from the Sun reaches the Earth, roughly 30 percent of it is reflected back into space by clouds, atmospheric particles, reflective ground surfaces, and even ocean surf. The remaining 70 percent of the light is absorbed by the land, air, and oceans, heating our planet's surface and atmosphere and making life on Earth possible. Solar energy does not stay bound up in Earth's environment forever. Instead, as the rocks, the air, and the sea warm, they emit thermal radiation, or infrared heat. Much of this thermal radiation travels directly out to space, allowing Earth to cool. Some of this outgoing radiation, however, is reabsorbed by water vapor, carbon dioxide, and other gases in the atmosphere (called greenhouse gases because of their heat-trapping capacity) and is then re-radiated back toward the Earth's surface. On the whole, this re-absorption process is good. If there were no greenhouse gases or clouds in the atmosphere, the Earth's average surface temperature would be a very chilly -18°C (0°F) instead of the comfortable 15°C (59°F) that it is today.

What has scientists concerned now is that over the past 250 years humans have been artificially raising the concentration of greenhouse gases in the atmosphere at an ever-increasing rate. By 2004, humans were pumping out over 8 billion tons of carbon dioxide per year. Some of it was absorbed by "sinks" like forests or the ocean, and the rest accumulated in the atmosphere. We produce millions of pounds of methane by allowing our trash to decompose in landfills and by breeding large herds of methane-belching cattle. Nitrogen-based fertilizers and other soil management practices lead to the release of nitrous oxide into the atmosphere. Once these greenhouse gases get into the atmosphere, they stay there for decades or longer. According to the Intergovernmental Panel on Climate Change (IPCC), since the industrial revolution began in about 1750, carbon dioxide levels have increased 35 percent and methane levels have increased 148 percent. Paleoclimate readings taken from ice cores and fossil records show that these gases, two of the most abundant greenhouse gases, are at their highest levels in at least the past 650,000 years. Scientists have very high confidence (a phrase the IPCC translates to "greater than 90 percent certainty") that the increased concentrations of greenhouse gases have made it more difficult for thermal radiation to leave the Earth, and as a result, Earth has warmed.

GLOBAL WARMING
The phrase *global warming* refers to the documented historical warming of the Earth's surface based upon worldwide temperature records that have been maintained by humans since the 1880s. The term *global warming* is often used synonymously with the term climate change, but the two terms have distinct meanings. *Global warming* is the combined result of anthropogenic emissions of greenhouse gases and changes in solar irradiance, while climate change refers to changes caused by *global warming* in weather (temperatures, precipitation, frequency of heat waves, etc.) and other climate system components, such as Arctic sea ice extent.

GLOBAL WARMING AND CLIMATE CHANGE
Global warming and *climate change* are terms for the observed century scale rise in the average temperature of the Earth's climate system and its related effects. Multiple lines of scientific evidence show that the climate system is warming. Although the increase of near surface atmospheric temperature is the measure of global warming often reported in the popular press, most of the additional energy stored in the climate system since 1970 has gone into ocean warming. The

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remainder has melted ice, and warmed the continents and atmosphere. Many of the observed changes since the 1950s are unprecedented over decades to millennia.

Scientific understanding of global warming is increasing. The Intergovernmental Panel on Climate Change (IPCC) reported in 2014 that scientists were more than 95% certain that most of global warming is caused by increasing concentrations of greenhouse gases and other human (anthropogenic) activities. Climate model projections summarized in the report indicated that during the 21st century the global surface temperature is likely to rise a further 0.3 to 1.7 °C (0.5 to 3.1 °F) for their lowest emissions scenario using stringent mitigation and 2.6 to 4.8 °C (4.7 to 8.6 °F) for their highest. These findings have been recognized by the national science academies of the major industrialized nation.

CAUSES OF GLOBAL WARMING

Almost 100% of the observed temperature increase over the last 50 years has been due to the increase in the atmosphere of greenhouse gas concentrations like water vapour, carbon dioxide (CO2), methane and ozone. Greenhouse gases are those gases that contribute to the greenhouse effect (see below). The largest contributing source of greenhouse gas is the burning of fossil fuels leading to the emission of carbon dioxide.

Global warming causes by greenhouse effect

Greenhouse gases in the atmosphere (see above) act like a mirror and reflect back to the Earth a part of the heat radiation, which would otherwise be lost to space. The higher the concentration of green house gases like carbon dioxide in the atmosphere, the more heat energy is being reflected back to the Earth. The emission of carbon dioxide into the environment mainly from burning of fossil fuels (oil, gas, petrol, kerosene, etc.) has been increased dramatically over the past 50 years.

The greenhouse effect

When sunlight reaches Earth's surface some is absorbed and warms the earth and most of the rest is radiated back to the atmosphere at a longer wavelength than the sun light. Some of these longer wavelengths are absorbed by greenhouse gases in the atmosphere before they are lost to space. The absorption of this long wave radiant energy warms the atmosphere. These greenhouse gases act like a mirror and reflect back to the Earth some of the heat energy which would otherwise be lost to space. The reflecting back of heat energy by the atmosphere is called the "greenhouse effect". The major natural greenhouse gases are water vapor, which causes about 3670 of the greenhouse effect on Earth (not including clouds); carbon dioxide CO2, which causes 926% ; methane, which causes 49%, and ozone, which causes 37%. It is not possible to state that a certain gas causes a certain percentage of the greenhouse effect, because the influences of the various gases are not additive. Other greenhouse gases include, but are not limited to, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons and chlorofluorocarbons. Cause for global warming: Carbon dioxide emissions in million tons per year over the last 200 years.

EFFECTS OF GLOBAL WARMING

The effects of global warming are the environmental and social changes caused (directly or indirectly) by human emissions of greenhouse gases. There is a scientific consensus that climate change is occurring, and that human activities are the primary driver. Many impacts of climate change have already been observed, including glacier retreat,changes in the timing of seasonal events (e.g., earlier flowering of plants),and changes in agricultural productivity.

Future effects of climate change will vary depending on climate change policies and social development. The two main policies to address climate change are reducing human greenhouse gas emissions (climate change mitigation) and adapting to the impacts of climate change. Geoengineering is another policy option. Near-term climate change policies could significantly affect long-term climate change impacts. Stringent mitigation policies might be able to limit global warming (in 2100) to around 2 °C or below, relative to pre-industrial levels. Without mitigation, increased energy demand and extensive use of fossil fuels might lead to global warming of around 4 °C. Higher magnitudes of global warming would be more difficult to adapt to, and would increase the risk of negative impacts.

There are two major effects of global warming: Increase of temperature on the earth by about 3° to 5° C (5.4° to 9° Fahrenheit) by the year 2100. Rise of sea levels by at least 25 meters (82 feet) by the year 2100.

MORE DETAILS ABOUT THE EFFECTS OF GLOBAL WARMING

Increasing global temperatures are causing a broad range of changes. Sea levels are rising due to thermal expansion of the ocean, in addition to melting of land ice. Amounts and patterns of precipitation are changing. The total annual power of hurricanes has already increased markedly since 1975 because their average intensity and average duration have increased (in addition, there has been a high correlation of hurricane power with tropical sea surface temperature). Changes in temperature and precipitation patterns increase the frequency, duration, and intensity of other extreme weather events, such as floods, droughts, heat waves, and tornadoes. Other effects of global warming include higher or lower agricultural yields, further glacial retreat, reduced summer stream flows, species extinctions. As a further effect of global warming, diseases like malaria are returning into areas where they have been extinguished earlier. Although global warming is affecting the number and magnitude of these events, it is difficult to connect specific events to global warming. Although most studies focus on the period up to 2100, warming is expected to continue past then because carbon dioxide (chemical symbol CO2) has an estimated atmospheric lifetime of 50 to 200 years. For a summary of the predictions for the future increase in temperature up to 2100.

TRENDS OF GLOBAL WARMING

According to the World Meteorological Organization (WMO), the decade of 1998-2007 is the warmest on record. The global mean surface temperature for 2007 is currently estimated at 0.41°C/0.74°F above the 19611990 annual average of 14.00°C/57.20°F. WMO states that among other remarkable global climatic events recorded in 2007, a record low Arctic sea ice extent was observed which led to first recorded opening of the Canadian Northwest Passage.The United States National Climatic Data Center (NCDC), found that in 2006 “Globally averaged land temperatures were +0.78°C (+1.40°F) and ocean temperatures +0.45°C (+0.81°F) above average, ranking 4th and 5th warmest, respectively. The land and ocean surface temperatures for the Northern and Southern Hemisphere ranked 2nd and 6th warmest, respectively,” since global temperature record monitoring began in 1880. The report states that “during the past century, global surface temperatures have increased at a rate near 0.06°C/decade (0.11°F/decade) but this trend has increased to a rate approximately 0.18°C/decade (0.32°F/decade) during the past 25 to 30 years. There have been two sustained periods of warming, one beginning around 1910 and ending around 1945, and the most recent beginning about 1976.”

The United States National Climatic Data Center (NCDC), The NCDC 2006 report also described temperature trends aloft in the atmosphere measured over the past 50 to 60 years using balloonborne instruments (radiosondes) and for the past 28 years using satellites. The report states that temperature data collected from approximately 5,000 to 30,000 feet above the surface indicate that 1958-2006 global temperature trends in the middle troposphere are similar to trends in surface temperature 0.12°C/decade for surface and 0.15°C/decade for midtroposphere. On 2 February 2007, the Intergovernmental Panel on Climate Change (IPCC) released the Summary for Policymakers (SPM), an executive summary of the first volume of its 4th Assessment Report entitled, “The Physical Science Basis of Climate Change.” The IPCC Report documents that not indicate global warming trends are not an artifact of urbanization or the so called “heat island” effect. Only do the records show a warming trend during the past half century in land based temperature data but also in global ocean temperature measurements. The increases in ocean temperatures

Temperature changes vary over the globe. Since 1979, land temperatures have increased about twice as fast as ocean temperatures (0.25 °C per decade against 0.13 °C per decade). Ocean temperatures increase more slowly than land temperatures because of the larger effective heat capacity of the oceans and because the ocean loses more heat by evaporation. Since the beginning of industrialisation the temperature difference between the hemispheres has increased due to melting of sea ice and snow in the North. Average arctic temperatures have been increasing at almost twice the rate of the rest of the world in the past 100 years; However arctic temperatures are also highly variable. Although more greenhouse gases are emitted in the Northern than Southern Hemisphere this does not contribute to the difference in warming because the major greenhouse gases persist long enough to mix between hemispheres.

The thermal inertia of the oceans and slow responses of other indirect effects mean that climate can take centuries or longer to adjust to changes in forcing. Climate commitment studies indicate that even if greenhouse gases were stabilized at year 2000 levels, a further warming of about 0.5 °C (0.9 °F) would still occur. Global temperature is subject to short-term fluctuations that overlay Long-term trends and can temporarily mask them. The relative stability in surface temperature from 2002 to 2009, which has been dubbed the global warming hiatus by the media and some, is consistent with such an episode. Recent updates to account for differing methods of measuring ocean surface temperature measurements show a significant positive trend over the recent decade. Trends for greenhouse gases: Carbon dioxide (CO2) and nitrous oxide (NOx) concentrations in the atmosphere are still increasing.

Recent trends in global mean surface air temperature fall outside the 90% range predicted by models using the Coupled Model Intercomparison Project phase5 (CMIP5) forcings and scenarios (Fyfe and Gillett 2014); this recent period of muted warming is dubbed the “hiatus”. The hiatus has attracted broad attention in both the popular press and the scientific literature (Boykoff 2014; Hawkins et al. 2014), primarily because of its perceived implications for understanding long-term trends

(Lewis and Curry 2014; Otto et al. 2013). Many hypotheses have been offered to explain the warming slowdown during the hiatus, and comprehensive studies of this period across multiple variables and spatial scales will likely improve our understanding of the physical mechanisms driving global temperature change and variability.

However, that decadal temperature trends *by themselves* are unlikely to constrain future trajectories of global mean temperature and that the hiatus does not significantly revise our understanding of overall climate sensitivity. Instead, we demonstrate that, because of the poorly constrained nature of the hiatus, model-observation disagreements over this period may be resolvable via uncertainties in the observations, modeled internal variability, forcing estimates, or (more likely) some combination of all three factors. The hiatus defined interval as 1998–2012, endpoints judiciously chosen to minimize bserved warming by including the large 1998 El Niño event and excluding 2014, an exceptionally warm year. Such choices are fundamentally subjective and cannot be considered "random", so any probabilistic statements regarding the likelihood of this occurring need to be made carefully. Using this definition, the observed global temperature trend estimates from four datasets fall outside the 5–95% interval predicted by the CMIP5 models.

SOLUTIONS TO GLOBAL WARMING

There is no single solution to global warming, which is primarily a problem of too much heat-trapping carbon dioxide (CO2), methane and nitrous oxide in the atmosphere. The technologies and approaches outlined below are all needed to bring down the emissions of these gases by at least 80 percent by mid-century. To see how they are best deployed in each region of the world, use the menu at left.

Boosting energy efficiency: The energy used to power, heat, and cool our homes, businesses, and industries is the single largest contributor to global warming. Energy efficiency technologies allow us to use less energy to get the same—or higher—level of production, service, and comfort. This approach has vast potential to save both energy and money, and can be deployed quickly.

Greening transportation: The transportation sector's emissions have increased at a faster rate than any other energy-using sector over the past decade. A variety of solutions are at hand, including improving efficiency (miles per gallon) in all modes of transport, switching to low-carbon fuels, and reducing vehicle miles traveled through smart growth and more efficient mass transportation systems.

Revving up renewables: Renewable energy sources such as solar, wind, geothermal and bioenergy are available around the world. Multiple studies have shown that renewable energy has the technical potential to meet the vast majority of our energy needs. Renewable technologies can be deployed quickly, are increasingly cost-effective, and create jobs while reducing pollution.

Phasing out fossil fuel electricity: Dramatically reducing our use of fossil fuels—especially carbon-intensive coal—is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants starting with the oldest and dirtiest, and capturing and storing carbon emissions from power plants. While it may sound like science fiction, the technology exists to store carbon emissions underground. The technology has not been deployed on a large scale or proven to be safe and permanent, but it has been demonstrated in other contexts such as oil and natural gas recovery. Demonstration projects to test the viability and costs of this technology for power plant emissions are worth pursuing.

Managing forests and agriculture: Taken together, tropical deforestation and emissions from agriculture represent nearly 30 percent of the world's heat-trapping emissions. We can fight global warming by reducing emissions from deforestation and forest degradation and by making our food production practices more sustainable.

Exploring nuclear: Because nuclear power results in few global warming emissions, an increased share of nuclear power in the energy mix could help reduce global warming—but nuclear technology poses serious threats to our security and, as the accident at the Fukushima Diaichi plant in Japan illustrates to our health and the environment as well. The question remains: can the safety, proliferation, waste disposal, and cost barriers of nuclear power be overcome?

Developing and deploying new low-carbon and zero-carbon technologies: Research into and development of the next generation of low-carbon technologies will be critical to deep mid-century reductions in global emissions. Current research on battery technology, new materials for solar cells, harnessing energy from novel sources like bacteria and algae, and other innovative areas could provide important breakthroughs.

Ensuring sustainable development: The countries of the world—from the most to the least developed—vary ramatically in their contributions to the problem of climate change and in their responsibilities and capacities to confront it. A successful global compact on climate change must include financial assistance from richer countries to poorer countries to help make the transition to low-carbon development pathways and to help adapt to the impacts of climate change.

Adapting to changes already underway: As the Climate Hot Map demonstrates, the impacts of a warming world are already being felt by people around the globe. If climate change continues unchecked, these impacts are almost certain to get worse. From sea level rise to heat waves, from extreme weather to disease outbreaks, each unique challenge requires locally-suitable solutions to prepare for and respond to the impacts of global warming. Unfortunately, those who will be hit hardest and first by the impacts of a changing climate are likely to be the poor and vulnerable, especially those in the least developed countries. Developed countries must take a leadership role in providing financial and technical help for adaptation.

CONCLUSION AND SUGGESTIONS

Global warming is a big problem all over the world. All countries should come forward to protect earth. Give to rise recycle system against miss use of sources. A commonly cited goal is to stabilize GHG concentrations around 450550 parts per million (ppm), or about twice preindustrial levels. This is the point at which many believe the most damaging impacts of climate change can be avoided. Current concentrations are about 380 ppm, which means there isn’t much time to lose. According to the IPCC, we’d have to reduce GHG emissions by 50% to 80% of what they’re on track to be in the next century to reach this level. While talking about GHG, they totally ignore moisture and particulate contents of the atmosphere, but why? Humans have often rebuilt after natural disasters. Humans have created new forests and habitats for other living things. a volcano can throw up a lot of gases, lava, ashes which can affect climate for decades and even millenniums. Kill many species and wipe out many life forms (Toba in Sumatra 70 k years ago)

Plants and trees absorb CO_2 as they grow, “sequestering” carbon naturally. Increasing forestlands and making changes to the way we farm could increase the amount of carbon we’re storing. Consensus global agreement on the GHG emission reduction targets required to cap the planetary temperature rise at 1.5 degrees Celsius. This Link is essential. To be successful, National Adaptation Strategies, Programmes and Projects must be informed, in a meaningful way, by the concept of Sustainable Human and Social Development ... and, prior to implementation, filtered through the lens of a comprehensive Sustainability Impact Assessment (SIA). There are a variety of options to put us on a path toward a stable climate.

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