



WWF Brief on the IPCC Working Group 1

The Science is Clear, Humans are Causing Climate Change

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its impacts, and options for adaptation and mitigation. On Friday, February 2nd, the IPCC will be issuing their Fourth Assessment Report (AR4) on the underlying science of climate change in Paris. It has been six years since the last assessment report and according to the IPCC AR4, humans are the primary cause of the buildup of greenhouse gases in the atmosphere. These greenhouse gases are from the burning of fossil fuels, agriculture, and land-use change and are causing global climate change.

The IPCC has identified that the rate of increase of greenhouse gases since the beginning of the industrial era is “very likely”[†] higher than any time during the last 10,000 years. In fact, the atmospheric concentration of carbon dioxide (CO₂), the most important greenhouse gas, is now higher than at any point during the last 650,000 years and 35% higher than before the Industrial Revolution. Because of the Greenhouse Effect – the warming of the Earth caused by trapping of heat, due to the sun’s radiation, by the greenhouse gases of the atmosphere – scientists have attributed the recent warming of the earth with the unprecedented rate of increase of greenhouse gases. Consequently, the IPCC states that it is “very likely” that humans have caused most of the observed increase in global temperatures over the last 50 years.

The Earth has Warmed and Will Likely Continue to Warm

The IPCC states that since the last report (the Third Assessment Report (TAR) in 2001), there is now very high confidence that the Earth has warmed overall since 1750 because of human activities and that this effect is likely at least five times greater than that due to solar output changes. The IPCC identifies that there is now better understanding of how the climate is changing, through better and more data, broader geographical coverage of observations, better understanding of uncertainties, and a wider variety of measurements.

Scientists now claim that the warming of the climate system is ‘unequivocal’. In fact, over the last 100 years, the earth has warmed 0.74°C, up from the previous estimate (TAR) of 0.6°C. The AR4 cites evidence from surface temperature records, lower and mid tropospheric temperature records, ocean temperature records, decline of glaciers, snow cover and sea ice, and an increase in sea levels.

The AR4 also identifies evidence from continental-scale climate changes including changes in wind patterns, precipitation, ocean salinity, sea ice, ice sheets, and extreme weather. Specifically, the AR4 identifies the following changes:

- Arctic temperatures increased at almost twice the global average
- Arctic sea ice has shrunk by about 3% per decade
- Greenland and Antarctica ice sheets have contributed 0.41mm per year to sea level rise from 1993-2003
- The top layer of permafrost has warmed by 3°C since the 1980s and the frozen ground area has decreased by 7% since 1900
- Significant drying trends have been observed in the Sahel, Mediterranean, southern Africa and parts of southern Asia and increased precipitation has been observed in eastern parts of North and South America, northern Europe and northern and central Asia
- The tropics and subtropics have experienced more intense and longer droughts since the 1970s
- Extreme weather, including heavy precipitation events and heatwaves, has increased in frequency and tropical cyclones have increased in intensity

Better Projections

The AR4 presents much improved climate change projections due to the major advancement of climate modeling and observations. The IPCC projects that over the next century we should expect to see temperatures increase between 1.0 and 6.3°C, depending on what rate we release greenhouse gases. IPCC Working Group 1, which focuses on the scientific basis of climate change, used a wide range of possible futures, each with different scenarios of greenhouse gas emissions. However, it should be noted that there has also been an improvement in near-term projections – the ability to predict what is likely to happen in the near future - and all scenarios project a warming of 0.2°C over the next two decades. This inertia in the climate system shows the actions we choose to make today really do have an affect on future generations.

[†]The following terms are used by the IPCC to indicate the assessed likelihood of an outcome or a result: Virtually certain > 99% probability of occurrence, Extremely likely > 95%, Very likely > 90%, Likely > 66%, More likely than not >50%, Very unlikely < 10%, Extremely unlikely < 5%.



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What the IPCC Report Leaves Out

While the recent IPCC report does provide a more detailed and clearer picture of how humans are changing the earth's climate by burning fossil fuels, it fails to adequately identify the real risks of sea level rise and does not fully identify the fingerprint that humans are having on the natural world (attribution).

• Sea Level Rise

The figures that the IPCC cites in the AR4 neglect the effect of Antarctica and Greenland on sea level revealed by recent studies and give the false impression that predicting sea level rise over the next century has become an easier problem to solve. IPCC models used to predict the fate of Greenland and Antarctica ignore the role of glacier mechanics and are unable to explain recent, significant glacier acceleration in Greenland, Antarctic Peninsula and West Antarctica. While the IPCC views these events as temporary phenomena, field scientists view them as cause for concern and greater uncertainty in our present ability to predict the future. Sea level rise calculated by a simpler approach¹ could in fact be twice as large than that predicted by IPCC over the next century and exceed 1 m. Underestimating the potential sea level rise is putting millions, who live along the coast, at risk.

• Attribution

The IPCC AR4 identifies that human influences are detectable at the continental scale but suggests that it is too difficult to detect and attribute observed temperature change at smaller scales, which according to recent scientific literature is not entirely accurate. For example, recent studies have been able to attribute observed temperature change to increasing greenhouse gases at relatively small scales in England, Europe, Australia, Western North America and many other regions of the world².

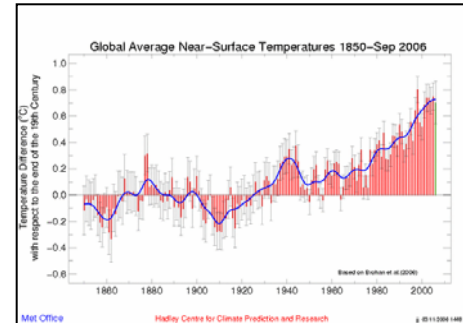
Urgent Action, Now!

According to recent research by NASA³, even if we were to stop all greenhouse gas emissions right now, we would still experience another 0.6°C of warming because of the amount of greenhouse gases we've already pumped into the atmosphere and the slow response of the oceans. Changes of these magnitudes will undoubtedly cause widespread ecological and societal impacts, beyond those that we already see. Some examples include increased extreme weather events (including more flooding and drought, more frequent heatwaves, and frequent and intense storms), increased agricultural losses, sea ice melt, retreating glaciers, sea level rise, coastal flooding, coral bleaching, and species extirpations. Communities in both developed and developing countries are already suffering from these impacts, and small island nations, such as the Maldives and Tuvalu are planning evacuations because of the serious threat of rising sea levels.

How much is too much?

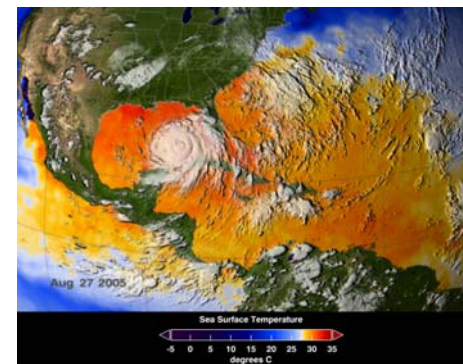
The ultimate objective of the United Nations Framework Convention on Climate Change is to stabilize greenhouse gas concentrations to avoid *dangerous* human interference with the climate system. Numerous independent analyses indicate that we must limit climate change to less than 2°C to avoid dangerous impacts to nature, humans, and the global economy, but unfortunately, we've already committed ourselves to 1.3°C so we need to act fast and now.

¹Rahmstorf. 2006. A Semi-Empirical Approach to Projecting Future Sea-Level Rise. *Science* 315:368 – 370. ²Giorgi. 2002. Variability and trends of sub-continental scale surface climate in the twentieth century. Part I: Observations. *Climate Dyn.*18:675–691; Karoly and Wu. 2005. Detection of regional surface temperature trends. *J. Climate* 18:4337–4343; Karoly and Stott. 2006. Anthropogenic warming of central England temperature. *Atmos. Sci. Lett.* 7:81-85; Knutson et al. 2006. Assessment of Twentieth-Century Regional surface temperature trends using the GFDL CM2 coupled models. *J Climate* 19:1624-1651; Zhang et al. 2006. Multimodel multisignal climate change detection at regional scale. *Climate* 19:4294-4307. ³Hansen et al. 2005. Earth's energy imbalance: confirmation and implications. *Science* 308:1431-1435.



The increasing temperature trend from 1850 – 2006, primarily a result of humans and increased greenhouse gas emissions.

Credit: Hadley Centre



Hurricane Katrina. Warm ocean waters fuel hurricanes, and there was plenty of warm water for Katrina to build up strength once she crossed over Florida and moved into the Gulf of Mexico. August 25-27, 2005.

Credit: NASA/SVS



Natural Savannah burnt during severe drought and forest fires, Roraima State, Brazilian Amazon.

For More information

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