

Global Warming and Climate Change

St Mary's Chapel Course

Bruce Parker

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(Global Warming Intro.docx)

Global Warming - the increase in the Earth's average temperature due to the increase in atmospheric greenhouse gases, particularly CO₂.

Climate Change - the ways in which the climate will change due to a warmer atmosphere; also includes sea-level rise and ocean acidification

Global Climate Disruption – The current and future changes to our climate system that cause significant damages above and beyond the historical levels

Because the burning of fossil fuels is responsible for most (if not all) of the increase in atmospheric CO₂, humans are responsible for most (if not all) of the temperature increase. Therefore the most important climate science question is "How much will the Earth's average oceanic and atmospheric temperatures increase this century as the atmospheric CO₂ increases?" Using computer models, climate scientists expect that "If emissions continue on their present trajectory, without either technological or regulatory abatement, then the best estimate is that global average temperature will warm a further 2.6 to 4.8 °C (4.7 to 8.6 °F) by the end of the century" (<http://dels.nas.edu/resources/static-assets/exec-office-other/climate-change-full.pdf>, page 18). Not only is this estimated temperature range corroborated based on paleoclimate data but also there is no credible scientific model that shows a likelihood that the temperature increase will be less. The next most important question is "what are the likely impacts on the Earth of an additional 2.6 °C increase in average temperature?" In addition to at least 40 feet of sea level rise and the dying of a very large percentage of oceanic life (due to ocean acidification), there will be greatly increased incidences of drought, floods, and wildfires, a large reduction of agricultural yields, large negative health impacts, etc. In other words, if we continue to burn fossil fuels at the current rate the changes to the Earth's climate will very likely be catastrophic for our civilization even if the temperature increase is the lowest expected. And again there is no credible scientific theory that shows that this is not the case. It is way past time to debate whether or not global warming is occurring and how severe (or not) the resulting changes to the climate will be. Instead we need to be debating both how we can best reduce CO₂ emissions and how we can best prepare ourselves for a warming world. Even though we may have already passed the point where meaningful steps to reduce CO₂ emissions would prevent catastrophic climate change, there is a chance that if we take immediate steps to reduce our greenhouse gas emissions that we can buy enough time for future generations to stabilize our climate before it becomes inhospitable to civilization as we know it.

Many of us believe that we are likely approaching a planetary emergency regarding the Earth's climate. If we continue burning fossil fuels at the current rate the likely impacts will include:

- Significantly higher temperatures
 - Most climate scientists think that it is very unlikely that we will be able to limit emissions sufficient to keep temperatures from rising only 2 degrees C (3.6 degrees F)
- A disrupted climate

"Here's just a bit of what we already know: man-made global warming is bad, and it's getting worse. It is linked to [worsening drought](#), [extreme precipitation](#), [more intense wildfires](#), and maybe even to lowering the yield of our [most important agricultural product, corn](#). It's going to make sea levels [rise higher](#), heat waves [last longer](#), and diseases [spread farther](#). Hotter cities means more smog and asthma attacks, too." (Center for American Progress)

- Catastrophic sea level rise (see "Sea Level Rise" handout).
 - Miami WILL be abandoned this century and we should plan on at least 50 feet of sea level rise over the long run.
 - The vast majority of our coastal cities may eventually have to be abandoned
 - By 2100 we could well pass the tipping point that would make 200+ feet of sea level rise all but unstoppable
- Catastrophic increases in ocean acidity (caused by increased CO₂ in the atmosphere)
 - The shells of a key species of tiny sea creature at the base of the food chain are already dissolving
 - The corals in the Great Barrier Reef of Australia will "turn to mush"

Without a significant reduction in greenhouse gas emission starting in the next few years the temperature change caused by the ever increasing human-caused greenhouse gas emissions will very likely result in a changed climate and sea levels rises that are not consistent with civilization as we know it.