

Rate Of Climate Change To Soar By 2020s, With Arctic Warming 1°F Per Decade

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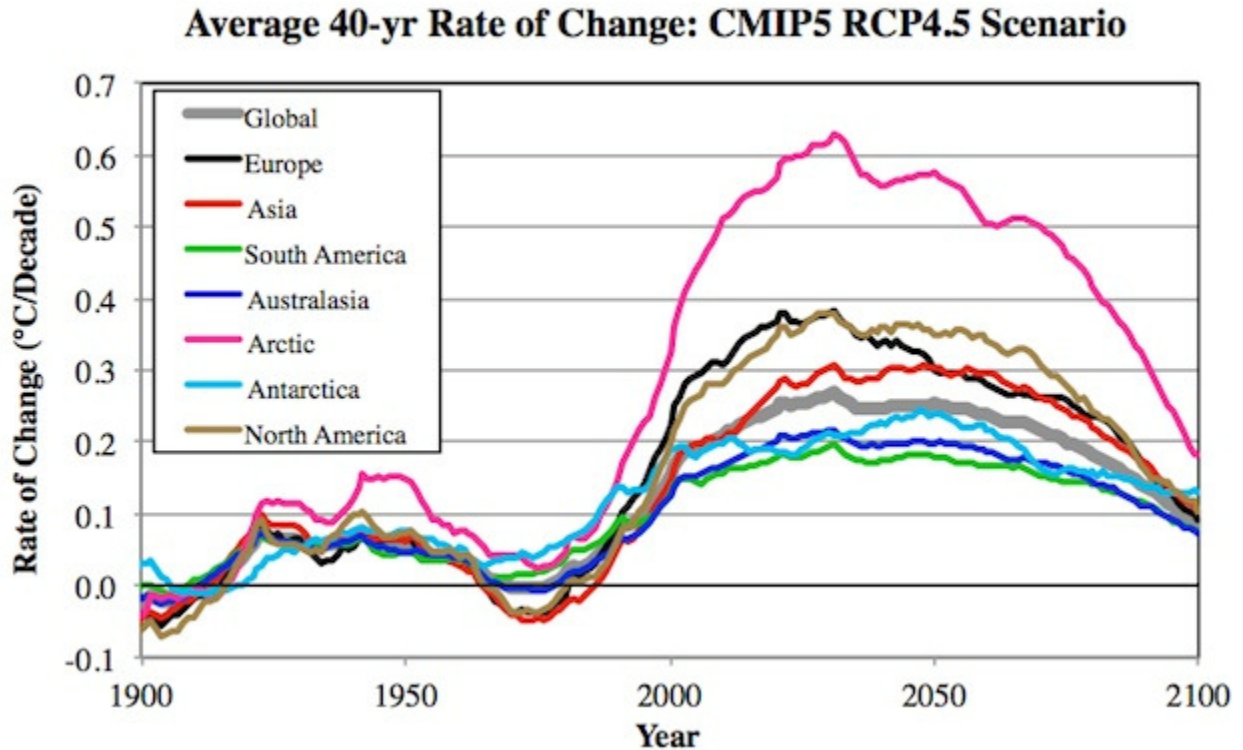
New research from a major national lab projects that the rate of climate change, which has risen sharply in recent decades, will soar by the 2020s. This worrisome projection — which has implications for extreme weather, sea level rise, and permafrost melt — is consistent with several recent studies.

The Pacific Northwest National Laboratory (PNNL) study, “Near-term acceleration in the rate of temperature change,” finds that by 2020, human-caused warming will move the Earth’s climate system “into a regime in terms of multi-decadal rates of change that are unprecedented for at least the past 1,000 years.”

In the best-case scenario PNNL modeled, with atmospheric carbon dioxide concentrations stabilizing at about 525 parts per million (the RCP4.5 scenario), the four-decade warming trend hits 0.45°F (0.25°C) per decade. That means

over a 4-decade period, the Earth would warm 1.8°F (4 x 0.45) or 1°C (4 x 0.25). This is a faster multi-decadal rate than the Earth has seen in at least a millennium.

Because of Arctic amplification, the most northern latitudes warm two times faster (or more) than the globe as a whole does. As this figure from the study shows, the rate of warming for the Arctic is projected to quickly exceed 1.0°F (0.55°C) per decade.



The decadal rate of temperature change for 40-year periods over various regions — if humanity takes moderate climate action. Rates of change are averages over land plus ocean in each region. Via PNNL.

Such rapid Arctic warming would be ominous for several reasons. First, it would likely speed up the already staggering rate of loss of Arctic sea ice. Second, if, as considerable recent research suggests, Arctic amplification has already contributed to the recent jump in extreme weather, then the next few decades are going to be utterly off the charts.

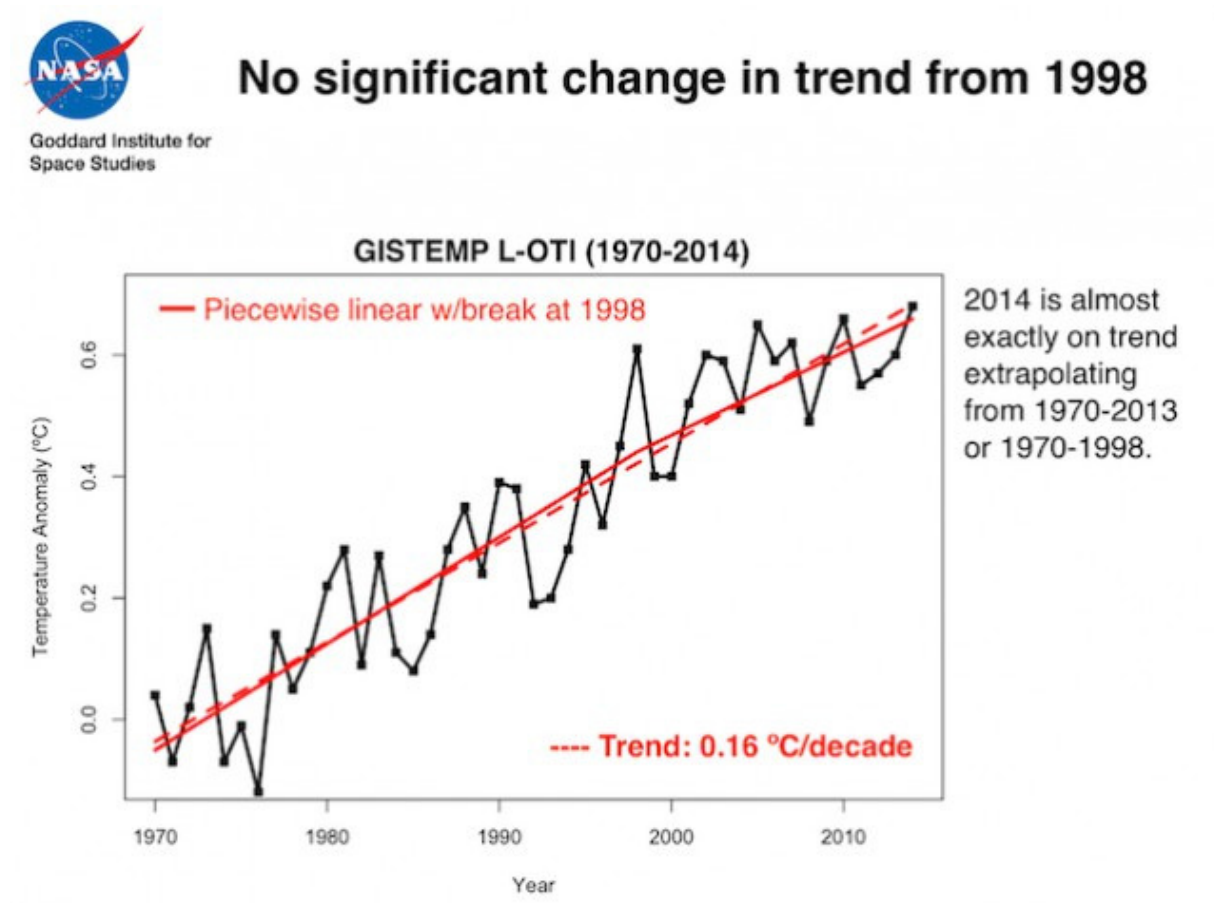
Third, such rapid Arctic warming implies that the rapidly-melting Greenland ice sheet — already made unstable by human-caused warming — is likely to start disintegrating even faster, which in turn will push sea level rise higher than previously estimated, upwards of six feet this century.

Fourth, such rapid warming would serve to accelerate the release of vast amounts of carbon from defrosting permafrost — the dangerous amplifying carbon cycle which has already been projected to add up to 1.5°F to total global warming by 2100.

There is, of course, “internally generated variability” in the Earth’s climate system — which has been linked to variability in the Pacific Ocean — that can cause the rate of warming to slow down or speed up for a decade (and occasionally longer). That was the point of a February study on what has mistakenly been called the “hiatus” in global warming.

That hiatus was in fact merely an apparent slowdown in the *rate* of warming, primarily found in the U.K. Met Office’s dataset. But the Met Office uses the Hadley temperature record, which excludes the Arctic (!) — the very place on the planet that has been warming the fastest. When scientists incorporated Arctic warming into the Met/Hadley record using other data sources (such as the satellites), the slowdown all but vanished.

With 2014 setting the record for warmest year, NASA (and NOAA) data make crystal clear that there was no actual pause even in the rate of warming, as this NASA chart shows:

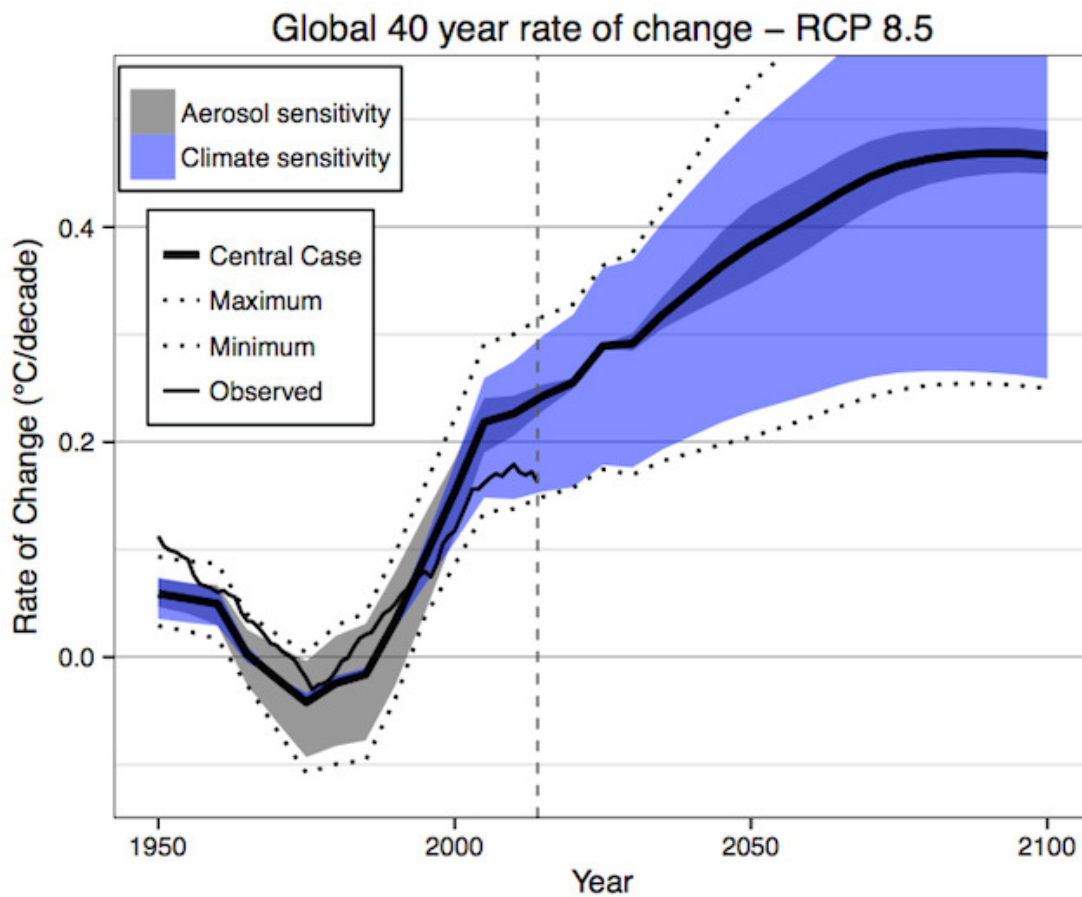


NASA temperature data how neither a recent “pause” in surface temperature warming or even been a significant change in trend.

The new study makes clear that the only “pause” there has been was in the long-expected acceleration of warming. That is, while the rate of global warming has been roughly constant for the last few decades, it should have started to speed up (see chart below). But multiple studies, include this latest one, say that we should expect a speed up very soon.

The new study notes that when the “variability-driven” apparent slowdown ends, “we also show that there is an increased likelihood of accelerated global warming associated with release of heat from the sub-surface ocean and a reversal of the phase of decadal variability in the Pacific Ocean.”

Here is what has happened so far — and what we can expect if we keep taking little or no action to reduce carbon pollution (the RCP8.5 scenario):



Global rates of decadal temperature change over 40-year periods. Results are shown for: central climate assumptions (thick solid line), range due to uncertainty in aerosol forcing (grey shading), and range due to uncertainty in climate sensitivity (blue shading). The outer bounding cases are shown as dotted lines. The thin solid black line shows the historical rate of change using the HADCRU4 observational data. The vertical dashed line indicates 2014. Via PNNL.

This chart shows that the observed decadal warming rate (temperature rise per decade) has been constant for the past decade in the Met/Hadley record. While this is within the range of model uncertainty, the study suggests it should have kept increasing. Many recent studies project that will happen very soon — and indeed it may already have started.

In the do-little RCP8.5 scenario, the rate of warming post-2050 becomes so fast that it is likely to be beyond adaptation for most species — and for humans in many parts of the world. The warming rate in the central case hits a stunning 1°F per decade — Arctic warming would presumably be at least 2°F per decade. And this goes on for decades.

No rational civilization would ever risk anything like that happening. Nor would they even risk the “moderate” warming of the RCP4.5 case. So let’s not!