

How much

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We know that global warming is taking place and its main cause is increasing levels of carbon dioxide in the atmosphere.

The Paris climate agreement provides a rallying call to nations to limit carbon emissions and to keep global temperature rise well below 2°C above the pre-industrial period. This would significantly reduce the risks and impact of climate change.

What is important for policy makers is – how much time is left before we reach the Paris warming targets?

If there is only a few years, we'll need to focus on mitigating the adverse effects of a warming climate. Whereas if we have many decades then there is more opportunity to develop and implement new technologies and policies for a more carbon-efficient future.

A new approach

We are not the first team to make a prediction about this, but we can be confident in our findings because of the new approach we applied.

Many previous simulations of global warming do not work well if you try to get them to simulate what has happened in the past. We think that is an important test for a simulation – if it can't replicate the past, it probably is less reliable for projecting the future.

To get our results, we ran 100 million simulations of carbon emissions and warming. Then we took only the results that recreated past climate accurately, which left us with about 30,000 projections for the next century.

TIME IS LIMITED

We have found that, if nothing is done to curb increasing carbon emissions, we will reach 2°C warming in 30 years and 1.5°C of warming in under 20 years.

When do we reach 2°C? It all comes down to emissions

To keep below 2°C of warming, we found that the total amount of carbon emitted from the start of 2018 needs to remain less than

time is left to meet the

Paris climate agreement?

1,300 to 1,830 gigatonnes of carbon dioxide. The sooner we emit that much carbon, the sooner we reach 2°C.

Without action to curb emissions, 2°C warming will be reached between 2038 and 2050.

A range

All our results are in ranges because there are some factors we can't be certain about. For example, we are uncertain as to the exact effect of clouds on warming, or the effects of dust in the atmosphere in reflecting sunlight, but we have a fairly good idea of the upper and lower limits of these effects, so we run lots of versions of the simulation within those limits. That gives us lots of slightly different results and you can see the median result shown on this graph in the dark blue line. The wider, light blue shading shows the upper and lower uncertainty ranges of our distribution of projections.

Time to act

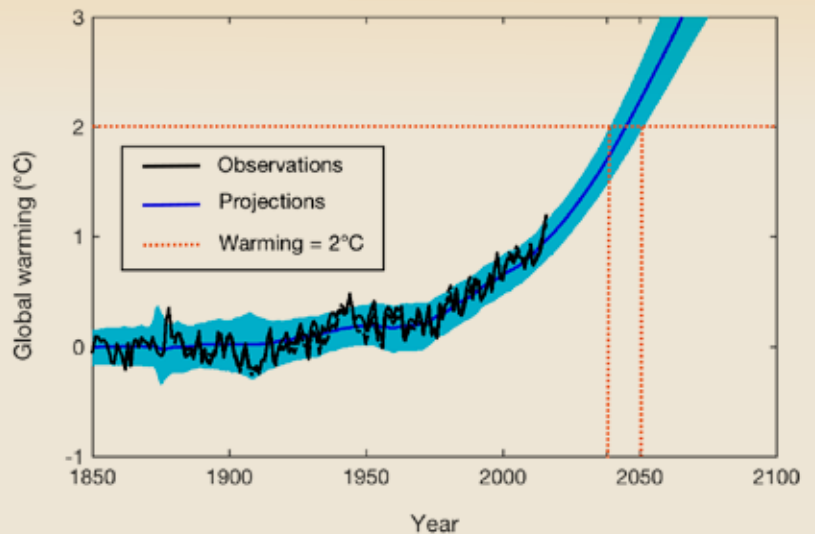
To develop a more carbon-efficient and ultimately carbon-neutral future, we need to develop and adopt new technologies, and plan and organise our societies to use energy more efficiently and reduce carbon emissions. We also need to explore ways of capturing carbon to reduce how much carbon dioxide is in the atmosphere.

Achieving this goal is very challenging within 10 to 20 years, so we are unlikely to stay below 1.5°C, but we might be able to manage it within 30 to 40 years and stay under 2°C.

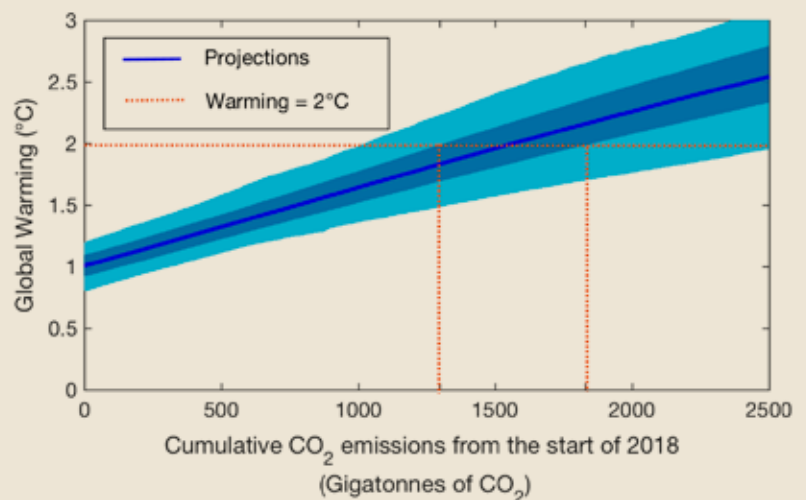
We all face challenges in making this transition, but the earlier that we start moving towards a more carbon-efficient future the easier it will be to meet these warming targets.

If we don't make a concerted effort now, within a couple of decades we'll be trying to decide how to cope in a warmer world and trying to find out how much warmer the world might become.

WARMING PROJECTIONS



This graph shows when we are likely to reach 2°C warming if there is no change in emissions.



This graph shows when we are likely to reach 2°C warming in relation to carbon emissions.

Find out more about this work in their recent article in *Nature Geoscience*: doi: 10.1038/s41561-017-0054-8.

www.nature.com/articles/s41561-017-0054-8