

Five questions from students about climate change

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In late 2017 I was contacted by a group of students at a high school in Europe asking if I would answer some questions on climate change for a project they were working on.

Here are the questions they asked, and the answers I gave them.

1. What is behind global warming?

Over the last 150 years there have been influences due to strengthening solar output, land-use changes, increased greenhouse gases and natural variability, among other things. The dominant school of thought in climatology is that rising greenhouse gas levels explain most of the overall warming trend since the 1950s. There are good reasons to support this, although the climate system is too complex to assume the matter is settled. The mechanisms by which the sun affects the climate are not well understood, nor are the mechanisms behind clouds, ocean-atmosphere interactions and other basic processes. The relative lack of warming in the tropical troposphere and over the South Pole are not easily explained under the theory that greenhouse gas levels dominate the climate system.

2. What can we do to prevent global warming?

If it is a natural process, nothing. If it is mainly due to rising greenhouse gas levels we need to ask instead whether we would want to prevent it. It would require complete cessation of fossil fuel use, which would cause intolerable economic and social costs and would only yield small changes in the time path of global warming for the next century or more. Even large-scale emission reductions (such as under the Paris and Kyoto treaties) would only cause a small slowdown in the accumulation of CO₂ in the atmosphere by 2100, so any benefits from such policies are likewise tiny, yet the costs would be enormous. The small warming that took place since the early 20th century was largely beneficial, and the astonishing social and economic benefits associated with cheap fossil energy far outweighed any problems it might have created. It is likely that this will be true over the next century as well.

3. If we don't do anything about it, how does it affect us and our descendants?

Humans flourish in every climate on earth from the tropics to the polar regions. We are very adaptable. The only issue is whether changes take place so quickly that we cannot adapt, but history shows this to be a rare situation. Climate processes are slow, and if the climate models are correct, the changes are gradual and predictable. People can adapt to warming conditions more easily than to cooling conditions. The IPCC predicted that over the next hundred years, changes in economies and technology will have a much larger effect on peoples' lives than changes in climate.

4. What will happen in the future, and what are the alternatives for us, if the Earth becomes unlivable?

There is no chance that greenhouse gases will make the Earth unlivable. If an asteroid hits, or another ice age begins, or something like that, then we face catastrophe. But the question essentially asks, what happens if we all die? The answer is, we all die.

5. How can we save Earth if it isn't too late?

To ask the question is to reveal that you greatly overestimate your size in relation to the Earth. We could not ruin the Earth even if we tried, nor could we save it if it faced ruin. Our planet is a remarkably adaptable and robust home. We don't live in a giant china shop where everything is fragile and breakable, it's more like a playground where everything is made to withstand considerable wear and tear. Over the Earth's history the amount of CO₂ in the air has typically been 2-10 times higher than at present yet the plants, animals and oceans flourished. Much of the past half million years have been ice age conditions which wiped out life on the northern continents, yet it always came back as soon as the ice retreated. If you take the view that the ordinary human pursuit of prosperity and happiness will somehow destroy the planet you will end up adopting an anti-human outlook. This is both a scientific and an ethical error. Set your sights on a more modest scale, by trying to be a good citizen and be helpful to the people around you, and you will make much better decisions than if you are thinking in terms of faraway abstract categories like saving the Earth.

Good luck with your studies.