



SCRIPPS INSTITUTION OF OCEANOGRAPHY CLIMATE CHANGE F.A.Q.

QUESTION: If climate changes naturally over time, why isn't the current warming just another natural cycle?

ANSWER: Earth's climate does change naturally, but the current warming is not natural. Known natural causes of warming, such as the sun, have been constant in the past 30 years, so they cannot explain the warming of the past 30 years. The pattern of the current warming is also highly unnatural. For example, it is warming more at night than during the day; this is expected for CO₂-caused heat trapping, because CO₂ works at night, whereas natural warming would be more in the day. A long list of similar patterns (a "fingerprint" of human-caused warming) proves conclusively that the warming isn't natural.

QUESTION: It snowed last winter! There can't be global warming!
(Or: My neighborhood is cooling! There can't be global warming!)

ANSWER: The warming trend is superimposed on significant natural variability.

QUESTION: Scientists can't predict the weather next week. Why do they think they can predict the climate in 50 years?

ANSWER: If you flip a coin, you can't predict whether it will land as heads or tails, but you can be absolutely confident that you have a 50% chance of heads and a 50% chance of tails. Predicting climate is predicting the probability of events, not the actual occurrence of events. Global warming is a forced problem. Imagine loaded dice, and that every week you put more loading weight in them. The loading factor here is CO₂. More and more of it every year, known for 100 years to warm the planet.

QUESTION: Climate scientists can't predict when we will pass an irreversible threshold into catastrophe, whether it's 10 years from now or 100 years from now, so why believe them at all?

ANSWER: It has been known since 1869 that CO₂ traps heat. This is settled physics. It has been shown beyond a shadow of doubt that



humans have increased CO₂ in the atmosphere by 30% in the last 150 years. Basic physics plus remedial math, and the rest is details. It is true that climate scientists can't predict when irreversible thresholds will be crossed, because we don't yet fully understand the behavior of Earth's complex climate system. But that does not mean that the basic understanding that CO₂ causes warming is flawed. To use a medical analogy, just because your doctor can't tell you the precise date and time that you will have a heart attack doesn't mean you should ignore his advice and keep on eating fatty, high-calorie food. Medical science is imperfect, just like climate science.

QUESTION: Scientists disagree. We don't know the science well enough yet, so why should we do anything?

ANSWER: Actually, there is strong scientific consensus on the reality of human-caused climate change. See the consensus/position statements of: National Academy of Sciences - Intergovernmental Panel on Climate Change (IPCC) - American Geophysical Union (AGU) - American Meteorological Society (AMS) - American Association for the Advancement of Science (AAAS). Oreskes (*Science*, 2004) analyzed all abstracts in refereed scientific publications from 1993-2003 with the keywords "global climate change" (928 papers). None disagreed with the consensus position that human activities are causing the current warming.

QUESTION: Climate change and its effects are too uncertain. Why should we do anything?

ANSWER: Even the most conservative models show significant disruption. All decisions are made against a background of uncertainty. While it's true that scientists can't completely predict the future, that doesn't mean we should give up all attempts at planning according to our best knowledge.

QUESTION: Since it's snowing more on land-based ice sheets due to the warming, wouldn't this make sea level fall rather than rise?

ANSWER: It is indeed snowing more than it used to in the interiors of Antarctica and Greenland, because warmer air holds more moisture, but the mass gain in the interiors is more than offset by the mass loss around the margins due to glaciers sliding faster into the ocean in response to warming. So the net change is one of mass loss from the ice sheets, which is causing sea level to rise. This is responsible for about half of the observed 3 mm rise per year. The mass loss of Antarctica has been recently verified by the GRACE gravity satellite, which showed that gravity over Antarctica is weakening due to the loss of mass.

QUESTION: Isn't the urban heat island effect (that elevates temperatures in large cities relative to rural areas) responsible for the measured increase in global temperature?

ANSWER: There is no urban heat island effect in the oceans, which cover nearly 3/4 of Earth's surface, yet sea surface and deep ocean temperatures are also increasing, consistent with what's occurring on land.

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