

The past explains the future.

The issue:

Just how will the increases world wide of carbon dioxide in the atmosphere affect our weather, climate, and life in general? Rather than guess at or use models we need to look at the evidence for this in the geological record. Some of the best evidence comes from the PETM (Paleocene-Eocene Thermal maximum) 55.8ma when carbon dioxide levels rose quickly and there were major environmental effects. The warming lasted 100000-170000 years before the CO₂ levels stabilised. This carbon dioxide increase mirrors what is happening today. Geologists still don't know exactly where the carbon dioxide came from but come it did and we can read the rocks to show its effects.

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Evidence from the PETM (55.8ma)

During the PETM, around 5 billion tons of CO₂ was released into the atmosphere per year. The Earth warmed around 6°C over 20,000 years; although some estimates are that the warming was more like 9°C. Using the low end of that estimated range, the globe warmed around 0.025°C every 100 years. Today, the globe is warming at least ten times as fast, anywhere from 1 to 4°C every 100 years. In 2012, our fossil fuel burning released 35 billion tons of CO₂ into the atmosphere. How fast carbon enters the atmosphere translates to the how fast temperature increases, and the environmental and societal consequences of warming at such a break-neck speed could be devastating.

My personal response:

We are told that increasing carbon in the atmosphere will have a detrimental effect on Earth. When we have a look in the past to the PETM we see this response is true. All the projections by scientists have happened in the past and are linked with large amounts of CO₂ going into the atmosphere. The effects in the Paleocene – Eocene boundary was dramatic and stressed the environment for over 100 000years. This was when only 5 billion tonnes was added to the atmosphere annually. Today we are adding 35 billion tonnes annually. The geological record says change the CO₂ in the atmosphere and the environments will become unstable.

My personal view is bad times are ahead of us. Now that we humans have introduced global warming, there are some useful lessons from the past we can show:

- The rapid pulse of PETM CO₂ followed by rapid warming indicates high climate sensitivity.
- CO₂ does indeed appear to have a long atmospheric lifetime.
- Ocean acidification (of the deep sea at least) can occur even under conditions of CO₂ release much slower than today.
- Present acidification of the ocean is far greater than the PETM, and is probably unprecedented in the last 65 million years.

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