

+++ Missing feedbacks in climate models

Climate models have missed important climate feedbacks, which means the models have underestimated the dangers of climate change. A recent paper (Feb 2023), [Many risky feedback loops amplify the need for climate action](#) by Ripple et al. says

Many feedback loops significantly increase warming due to greenhouse gas emissions. However, not all of these feedbacks are fully accounted for in climate models. Thus, associated mitigation pathways could fail to sufficiently limit temperatures. A targeted expansion of research and an accelerated reduction of emissions are needed to minimize risks.

[Many risky feedback loops amplify the need for climate action](#), Ripple et al.

I've had a few interactions with UK Government on feedbacks. First with the Climate Change Committee in 2009, where I said:

It's methane that worries me - it's a strong greenhouse gas and a big danger. It probably caused mass extinctions in the past.

Their reply included:

On the subject of methane and climate feedback; we do not assign probabilities to methane release because we do not yet know enough about these processes to include them in our models projections.

Later, the Chief Scientific Advisor to the Department for Energy and Climate Change (DECC), Professor David McKay, agreed with me that this was inappropriate saying:

I agree with you that it will be good, as soon as possible, to include in models the feedback possibilities that have hitherto effectively been given zero probability.

In 2013 during the preparation for [POSTNote 454, Risks from Climate Feedbacks](#), by the Parliamentary Office of Science and Technology, I sent notes worrying about permafrost thaw and carbon emissions. I got answers that pointed me only to an partial estimate permafrost carbon loss.

However, in 2016 I got an answer from scientists at DECC that surprised me in its frankness. It listed climate feedbacks that were missing in the climate models (including melting permafrost emissions, forest fires and wetlands decomposition). I had come to believe that UK government sources were deliberately underplaying climate problems - and in particular the UK's contribution to climate change. I still believe this and the frankness of this reply was an exception.

The lead up to this frank answer started when I asked Pete Betts a question about feedbacks missing from climate models at a meeting at the London School of Economics. At DECC he was a "lead negotiator for the EU as well as the UK in the UN on climate". He is not a climate scientist and may have thought it was just a technical question with little political overloading. He promised me an answer from scientists at DECC. After some follow up emails, I got the frank reply.

I had been told that there was a meeting convened to discuss this reply, which can be seen as [A straightforward answer from DECC](#) on brusselsblog.co.uk. The reply came shortly before the DECC was dissolved and the climate brief taken over by a new business department, the Department for Business, Energy & Industrial Strategy (BEIS). BEIS took over the climate brief but dropped "climate" from its name.