

ProClim Flash

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A major success for climate science

Editorial



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The Paris Agreement is a major success for climate science. The modulations of global carbon emissions illustrate that we could be finally moving away from a fossil-fuel intensive future, but not (yet) to a path of near-zero emissions and stable climate. The climate research community needs to continue the hard work of understanding the climate system, and grow the equally hard work of supporting public debate and responses to climate change.

The Paris Agreement has two elements that directly come out of scientific recommendations: first it has an ambition to limit climate change well below 2 °C rise above pre-industrial

levels; second it has a requirement to achieve the balance between the sources and sinks of greenhouse gases in the second half of this century. Not only science but also diplomacy contributed to this success – although the contributions of each country do not add up to ‘well below’ 2 °C but are more consistent with warming of 3 °C, the agreement includes a timeline to revise the national contributions at intervals of 5 years.

CO₂ emissions have to go down to near zero

Atmospheric CO₂ is increasing and its growth rate has increased in the past 60 years, its concentration just crossed 400 ppm and continues to rise, while global surface temperature rise just

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exceeded 1 °C warming, with large natural variability both on interannual and decadal time scales. Emissions from fossil fuels accounted for about 90% of the total CO₂ emissions in the last decade. Less than half of the total emissions remain in the atmosphere, because of the absorption of CO₂ by the ocean and land carbon reservoirs. These carbon 'sinks' play a huge service by slowing down the rate of warming, but the sinks will respond to climate change in a way that exacerbates the increase of CO₂ in the atmosphere.

To achieve climate stabilisation, the atmospheric CO₂ concentration needs to stop rising and the emissions have to go down to near zero, unless we were able to create artificial sinks at large scales.

From the synthesis of models and observations we conclude that there are no more 'missing sinks' in the carbon cycle. The carbon budget provides a consistency check on global emissions, but the uncertainty in the carbon sinks are of the same order as the uncertainty in emissions, and therefore we can't provide further constraints on emissions with carbon data. To reduce the uncertainty we need a much finer network and high resolution models applied at regional level and better understanding of underlying processes.

We have already burned 2/3 of the total emissions quota that we can burn to limit climate change well below 2 °C. The emissions need to go down rapidly. If the future relies primarily on fossil-fuel as energy source, it would lead to 3–5 °C warming by the end of the century. The Paris Agreement includes commitments that take us away from the most fossil-fuel intensive pathways, but not yet to the pathways that keep to well below 2 °C.

Knowledge transfer is an important tool

How can we as a research community inform the policy makers to lead to the best possible decisions? We should continue to clarify the risks of different levels of climate change, by breaking it down into the details and paying particular attention to the difference between 3, 2 and 1.5 °C. This means to understand and clarify the thresholds, extremes, regional impacts in physi-

cal climate science and their implications for a wide range of impacts. Also we need to make explicit the synergies and trade-offs between climate actions and societal priorities, in particular the Sustainable Development Goals. We need to understand what happens today and explain it clearly. Recent trends in temperature, rainfall, storminess all need an explanation. What is the contribution of climate change versus natural variability? How fast are countries decarbonising, what works, where are the obstacles, where are the opportunities? These are all important questions.

We need to raise the voice of the research community

The research community plays an important role in supporting the actions that will take us on a well below 2 °C pathway: we have a Paris Agreement largely because of all the scientists who worked to raise awareness of the risks of climate change and to identify solutions. We need to continue to clarify the risks and identify the solutions. But to ensure evidence is at the heart of the responses, we also need to raise the voice of the research community one notch.

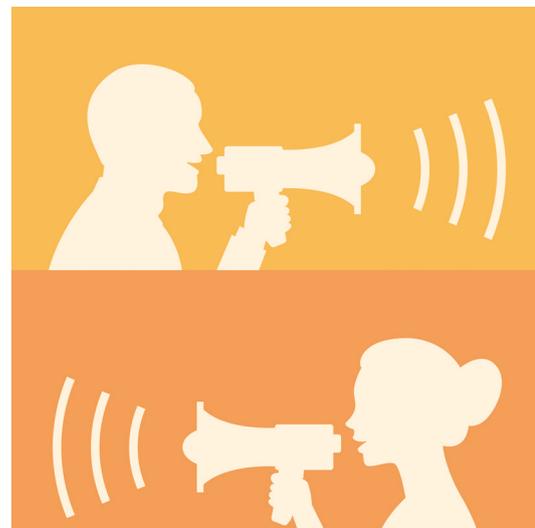


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In my view, all scientists should spend 20% of their time dedicated to interactions with people outside academia, to grow our societal support in this important transition.