Geophysical Research Abstracts
Vol. 16, EGU2014-12868-4, 2014
EGU General Assembly 2014

An alternative approach to comparing long- and short-lived emissions in light of the 2°C global temperature limit

Stephen Smith (1,3), Niel Bowerman (2), Jason Lowe (3), Chris Huntingford (4), Dave Frame (5), Myles Allen (2,6), Laila Gohar (3), and Richard Millar (2)

(1) Committee on Climate Change, London, UK (stephen.smith@theccc.gsi.gov.uk), (3) Met Office, Exeter, UK, (2) Department of Physics, University of Oxford, UK, (4) Centre for Ecology and Hydrology, Wallingford, UK, (5) New Zealand Climate Change Research Institute, Victoria University of Wellington, New Zealand, (6) Oxford University Centre for the Environment, University of Oxford, UK

International climate policy has defined its goal in terms of limiting global average temperature, specifically to 2°C above pre-industrial levels. Emissions of several different greenhouse gases (GHGs) are currently aggregated and traded in terms of their carbon dioxide equivalent. The metric used for aggregating and trading is the 100-year Global Warming Potential (GWP100). Importantly though, the GWP100 does not measure temperature and so does clearly indicate the relative value of different emissions in the context of a global temperature limit.

Recent developments in climate research have led to two different, potentially conflicting, perspectives on priorities in reducing emissions. First, a clear link has been demonstrated between cumulative emissions of carbon dioxide and peak temperature. This emphasises the need for carbon dioxide emissions to fall to near zero and provides a conceptually neat way to frame policy, but says little about the role of other GHGs. Second, other studies have shown that emissions of short-lived climate pollutants (SLCPs), many of which currently lie outside climate policy, have a substantial near-term effect on climate. It has been suggested that immediate SLCP reductions will therefore increase the chance of staying below 2°C and may even "buy time" for carbon dioxide reductions.

This presentation summarises two recent papers which clarify the roles of SLCPs and long-lived GHGs in determining peak global temperature, and propose new emission metrics to reflect these. SLCP emissions reductions in a given decade have a significant impact on peak temperature only if carbon dioxide emissions are already falling. Immediate action on SLCPs might potentially "buy time" for adaptation by reducing near-term warming, but it does not buy time to delay reductions in carbon dioxide compared with delayed SLCP reductions.

Peak temperature is ultimately constrained by cumulative emissions of several long-lived gases (including carbon dioxide) and sustained emission rates of a separate basket of shorter-lived species (including methane and other SLCPs). For these two baskets we develop an emissions-equivalence metric which allows trading within, but not between, each basket. The 2°C limit could therefore be met by setting a limit to cumulative long-lived emissions while setting a maximum future rate for short-lived emissions.