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From up to date climate and ocean evidence with updated UN emissions projections, the time is now to recommend an immediate massive effort on CO_2.

Peter Carter
Climate Emergency Institute

This paper provides further compelling evidence for 'an immediate, massive effort to control CO_2 emissions, stopped by mid-century' (Cai, Lenton & Lontzek, 2016). Atmospheric CO_2 which is above 405 ppm (actual and trend) still accelerating, despite flat emissions since 2014, with a 2015 >3ppm unprecedented spike in Earth history (A. Glikson),is on the worst case IPCC scenario. Atmospheric methane is increasing faster than its past 20-year rate, almost on the worst-case IPCC AR5 scenario (Global Carbon Project, 2016). Observed effects of atmospheric greenhouse gas (GHG) pollution are increasing faster. This includes long-lived atmospheric GHG concentrations, radiative forcing, surface average warming, Greenland ice sheet melting, Arctic daily sea ice anomaly, ocean heat (and rate of going deeper), ocean acidification, and ocean de-oxygenation. The atmospheric GHG concentration of 485 ppm CO_2 eq (WMO, 2015) commits us to 'about 2°C' equilibrium (AR5). 2°C by 2100 would require 'substantial emissions reductions over the next few decades' (AR5). Instead, the May 2016 UN update on 'intended' national emissions targets under the Paris Agreement projects global emissions will be 16% higher by 2030 and the November 2016 International Energy Agency update projects energy-related CO_2 eq emissions will be 30% higher by 2030, leading to 'around 2.7ºC by 2100 and above 3°C thereafter'. Climate change feedback will be positive this century and multiple large vulnerable sources of amplifying feedback exist (AR5). 'Extensive tree mortality and widespread forest die-back linked to drought and temperature stress have been documented on all vegetated continents' (AR5). 'Recent studies suggest a weakening of the land sink, further amplifying atmospheric growth of CO_2' (WMO, 2016). Under all but the best-case IPCC AR5 scenario, surface temperature is projected to increase above 2ºC by 2100, which is above 3°C (equilibrium) after 2100, with ocean acidification still increasing at 2100. Ocean heat is increasing under all scenarios at 2100. For all producing regions 'With or without adaptation, negative impacts on average crop yields become likely from the 2030s' (AR5). Crop models do not capture all adverse effects. The climate change of 2030 is practically locked in. NASA NEX downscaled daily maximum temperature projections at 1.5°C are incompatible with today's crop yields in major agricultural regions. Climate-change-related impacts from extreme events are high at 1.5ºC (AR5) and add to modeled crop declines. 'Some unique and threatened systems are already at risk from climate change (high confidence)' with 'risk of severe consequences' higher with warming of around 1.5ºC (AR5). At today's surface temperature increase, 'risks associated with tipping points become moderate' and 'increase disproportionately' as temperature increases above 1.5°C (AR5). According to mitigation projections, global emissions would decline forthwith for a better than 66% chance of a 2ºC limit by 2100 (over 3°C after 2100). Failure to do so would risk the future sustainability of civilization and the human population. The IPCC does not make recommendations so this falls on scientists. By recommending immediate (emergency) massive action on CO_2, the science community would make a momentous contribution to the future of humanity.