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What climate science tells us (briefly): based on the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report

1. Between 1880 and 2012, global average surface temperature warmed 0.85°C above preindustrial levels.[1] In 2016, global average surface temperature had risen to 1.1°C above preindustrial levels.[2]

2. Since 1951, human activities have been responsible for the largest part of warming.[3] These activities include fossil fuel extraction and burning, black carbon, deforestation, industrial agriculture and most animal-based agriculture, industry, transport, and buildings.[4] Because human activities are the root causes of current warming, climate change is referred to as 'anthropogenic' climate change.

3. Our rate of greenhouse gas (GHG) emissions is currently near the highest emissions scenario of the 5th Assessment Report (RCP 8.5)[5]. Without urgent reductions in our GHG emissions, humanity is on track for global average surface temperature rise of up to 4.8°C by 2100 compared to pre-industrial levels. [6]

4. This rate of global temperature rise would be, to the best of scientific knowledge, unprecedented in our human history. The global average surface temperature rate of rise between the last ice age and the current warm period (20,000 to 10,000 AD) was approximately 0.5°C to 1°C per 1,000 years.[7]

5. Temperatures can rise higher. Adding more carbon dioxide to the atmosphere will cause surface temperatures to continue to increase.[8]

6. Concentrations of carbon dioxide, methane, and nitrous oxide now substantially exceed the highest concentrations recorded in ice cores during the past 800,000 years. Carbon dioxide concentrations have increased by 40% since pre-industrial times.[9]

7. The Arctic is experiencing the fastest rate of warming. This results not only in the melting of ice sheets, which raise sea levels, but also in the melting of permafrost, which releases carbon dioxide and methane.

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[1] Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report, Working Group I, 'The Physical Science Basis', Summary for Policy Makers, page 3, https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf

[2] http://www.metoffice.gov.uk/news/releases/2017/2016-record-breaking-year-for-global-temperature

[3] Climate Change 2014, The Synthesis Report, p.5 http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

[4] Ibid, p.88.

[5] Glen P. Peters, Robbie M. Andrew, Tom Boden, Josep G. Canadell, Philippe Ciais, Corinne Le Quéré, Gregg Marland, Michael R. Raupach and Charlie Wilson (collaboration of the Global Carbon Project) in Nature Climate Change, online publication, 2 December 2012, p.2 http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf

[6] Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report, Working Group III Summary for Policy Makers, p.8 http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf

[7] Jeremy Shakun, et all, *Global Warming Preceded by Increasing Carbon dioxide Concentrations During the Last Deglaciation*, Nature, 5 April 2012, Volume 484, p. 49-55, and Shaun Marcott et all, *A Reconstruction of Regional and Global Temperature for the Past 11,300 Years*, Science Mag, 8 March 2013, Volume 339, p. 1198-1201.

[8] https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/question-8/ and https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf Figure SPM.5(b) on page 9 shows the warming predicted in 2100 as a function of the total accumulated amount of CARBON DIOXIDE emitted by humankind 1870-2100, very simply the greater the total amount emitted the greater the warming.

[9] Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report, Working Group I, 'The Physical Science Basis', Summary for Policy Makers, page 11, https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf

8. At current GHG emission levels, we have some five years to limit warming to 1.5°C.[10] Holding temperature rise to 1.5°C is important because a rise of 2°C could more significantly affect our ability to grow food, the survival vulnerable communities, Arctic sea ice melting and sea level rises.[11]

9. Globally, economic and population growth continue to be the most important drivers of increased carbon dioxide emissions from fossil fuel combustion.[12] From 1970 to 2010, emissions of carbon dioxide from fossil fuel combustion and industrial processes contributed about 78% of the total GHG emission increase due to human activities.[13]

10. The oceans have absorbed more than 90% of the energy accumulated and about 30% of anthropogenic carbon dioxide, causing ocean acidification and threatening marine eco-systems.[14] Global ocean oxygen content declined by 2% in the last 50 years. Increased carbon dioxide and warming oceans led to the greatest marine extinction so far, 252 million years ago.[15]

11. Human activities influencing climate change influence other environmental crises. These include crises in land use change and soil erosion, chemical pollution (especially nitrogen), and the highest species extinction rate in human history[16]. Transformation of polluting behaviors helps to heal other environmental crises.

12. Current GHG emission levels, unless substantially reduced, will undermine our water resources and our ability to grow food and work outdoors,[17] threatening the collapse of eco-systems and thus the long-term survival of our current human civilization.

13. We have a choice. It is possible to limit warming below 2°C if we commit to 70% global anthropogenic GHG emissions reduction by 2050 (compared to 2010 levels) and near zero or below by 2100.[18]

14. The phase-out of GHGs, especially from fossil fuels, can be achieved in ways that are both socially just and economically prosperous. The range of co-benefits include a better, more stable economic system, greater equity, increased health and well-being, strengthened communities and improved relationships with nature.[19]

15. Effective climate change responses can be a way to build a richer, more resilient, fundamentally more vibrant world. Access to low-carbon energy can improve health and livelihoods, while also protecting the climate.[20]

We call on our leaders to make the courageous decisions needed to implement a fair, sufficient and effective international climate change agreement. The goal is achievable but priorities will need to change; financial support for climate action is profoundly insufficient, while global expenditure on military approximately $1.6 trillion dollars in 2015. The choices we make now, personal and collective, can ensure that the poorest and most vulnerable peoples now, and all our future generations, do not suffer profoundly as a consequence of our actions. Our faith in common humanity gives us hope: love, rather than fear, can lead us through this crisis.[21]

This is a call to conscience.

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[10] Ibid, p.64

[11] http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf , p 30-33.

[12] Ibid, p.5

[13] Ibid, p.5

[14] Ibid. p.4.

[15] http://www.ed.ac.uk/news/2015/acidoceans-090415 and Schmidtko et al., Nature 2017 http://www.nature.com/nature/journal/v542/n7641/abs/542303a.html

[16] *The Nine Planetary Boundaries:* http://www.stockholmresilience.org/21/research/research-programmes/planetary-boundaries.html

[17] Climate Change 2014, The Synthesis Report, p.15 http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

[18] Ibid. p 20

[19] For example, as outlined in *Whose Getting Ready for Zero?,* Centre for Alternative Technology and Track 0, p. 6+7, http://zerocarbonbritain.org/images/pdfs/wgrz-full-report.pdf

[20] Katharine Mach, Director of Science, IPCC Working II Technical Support Unit.

[21] Britain Yearly Meeting, June 2009, http://old.quaker.org.uk/quaker-response-crisis-climate-change and the Quaker Statement on Climate Change, 2014 http://quno.org/resource/2015/11/quaker-statement-climate-change