

## Tipping Points



Tipping point definition: 1. the time at which a change or an effect cannot be stopped:

<https://dictionary.cambridge.org/dictionary/english/tipping-point>

Most of what we read about global warming concerns information about the rise and continued increase in the warming of Earth. Why is there not more emphasis on the fact that at some point in recent years we reached a tipping point with changes in the rate of change in the increasing levels of  $CO_2$  in the troposphere.

This is similar to altering the circuitry of a voltage regulator such that an increase of the output voltage results in positive feedback rather than negative feedback until the regulator burns up. However, if the wires were just crossed and the variable resistor left unaltered, the voltage would increase at a steady, predictable rate.

With  $CO_2$ , we are experiencing variably increasing, positive feedback with unequal ratios.

Thus predictability is limited. This leads to considerable uncertainty.

It is this uncertainty which swings back to bite the backsides of climate scientists and encourages the efforts of paid dissenters to sow doubt in the minds of the public.

Regardless of the unpredictable rate of change, there is enough data collected to recognise an alarming, no frightening state of runaway positive feedback!



"If fossil fuels continue to be extracted at the same rate over the next 28 years as they were between 1988 and 2017, says the report, global average temperatures would be on course to rise by 4°C by the end of the century. This is likely to have catastrophic consequences including substantial species extinction and global food scarcity risks."

The Carbon Majors Database CDP Carbon Majors Report 2017

<https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/327/original/Carbon-Majors-Report-2017.pdf?1499691240>

"Analysis of NOAA (National Oceanic and Atmospheric Administration) measurements show the growth rate of CO<sub>2</sub> in the atmosphere is accelerating. It averaged about 1.6 ppm per year in the 1980s and 1.5 ppm per year in the 1990s, but increased to 2.2 ppm per year during the last decade."

<https://scripps.ucsd.edu/programs/keelingcurve/2018/06/07/another-climate-milestone-falls-at-mauna-loa-observatory/>

"On May 9, 2013, the daily average concentration of carbon dioxide (CO<sub>2</sub>) in the atmosphere surpassed 400 parts per million (ppm) for the first time at the Mauna Loa Observatory in Hawaii, where the modern record of observations began back in 1958."

"Carbon dioxide levels measured at NOAA's Mauna Loa Atmospheric Baseline Observatory averaged more than 410 parts per million in April and May, 2018, the highest monthly averages ever recorded."

"The annual mean rate of growth of CO<sub>2</sub> in a given year is the difference in concentration between the end of December and the start of January of that year."

<https://www.esrl.noaa.gov/gmd/obop/mlo/>



Year by year readings since 1959 taken from the NOAA's Mauna Loa Atmospheric Baseline Observatory.

<u>Increase ppm/yr</u>	<u>Amount of increase ppm/yr</u>	<u>% increase</u>
<b>Increase 59 - 68</b>		
1959 0.94		
1968 1.03	.9	9%
<b>Increase 69 - 78</b>		
1969 1.31		
1978 1.31	0	0%

<u>Increase ppm/yr</u>	<u>Amount of increase ppm/yr</u>	<u>% increase</u>
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**Increase 79 - 88**

1979	1.79	
1988	2.16	.37
		20%

**Increase 89 - 98**

1989	1.36	
1998	2.93	.57
		42%

**Increase 99 - 08**

1999	0.93	
2008	1.57	.64
		69%

**Increase 09 - 18**

2009	2.02	
2018	3.12	1.10
		54%

So, the rate of increase in the increasing amounts of CO<sub>2</sub> has risen from 9 % in the 1959 to 1968 decade to 69% in the decade of 1999 to 2008 and 54% in the decade 2009 to 2018. Let us take the lower amount of increase in the last 2 decades, at a 54% increase every 20 years and look at the Monthly Average Mauna Loa CO<sub>2</sub> reading sitting at 408.2ppm in November, 2018. In the next 20 years, using a low estimate of the next increase of the rate of increase at, let's say, 10%, we have a figure of 64% increase in the rate of increase. That's a total of 54% as of today plus 74% higher over the next 20 years. So the amount of CO<sub>2</sub> would be: **710.3ppm**.

.74 of 408.2 = X or X = .74 times 408.2 X = 302.068

408.2 + 302.068 = **710.3ppm**. Almost certainly this figure will be higher, but I don't know a mathematical model to use to make an estimate.

In a BBC News article reporting on the contents of the IPCC Fourth Assessment Report Summary, we find: "Greenhouse gas emissions have risen by 70% since 1970, and will rise by between 25% and 90% over the next 25 years under 'business as usual'. That rise will mainly be caused by an expansion in the use of fossil fuels, which are set to continue as the world's dominant energy source."

"If we continue to do what we are doing now, we are in deep trouble," observed Ogunlade Davidson, a senior author on the report.

Just reading the statistics explained in this paper, especially realising the runaway positive feedback of greenhouse gas emissions, should enable the reader to understand what Professor Davidson means by "deep trouble."



### **CO2 amounts in decadal groups**

These readings show that the amount of increase of CO2 per decade almost tripled in nearly 60 (59) years.

		Amount of Increase
1959	315.97ppm	
1968	323.04 ppm	7.07
1978	335.40 ppm	12.36
1988	351.57 ppm	16.17
1998	366.70 ppm	15.13
2008	385.60 ppm	18.9
2017	406.55 ppm	20.95
2018	408.2 ppm	1.65 1 year

Notice above that the amount of CO<sub>2</sub> that increased from the 1959 to 1968 decade almost tripled from 2008 to 2017. In other words, the amount of CO<sub>2</sub> per decade almost tripled in 59 (nearly 60) years. The following readings reveal that the rate of increase of the increasing CO<sub>2</sub> amounts is now increasing by over 50% per decade. This percentage of increase will continue to increase due to the following major causes. (1) Anthropogenic burning of fossil fuels. (2) Destruction of rainforest. (3) Melting of methane clathrate (ice) \*\*This is an easy to visualize positive feedback mechanism. Clathrate melts, methane escapes, additional greenhouse gas, increased warming, more clathrate melts and around the spiral we go!\*\* (4) Warmer oceans (a) release CO<sub>2</sub> as they warm (b) absorb less CO<sub>2</sub> from the air above them. (5) Greenhouse gas emissions from the agricultural sector. (6) Forest fires. These cause a double whammy by (1) releasing previously stored CO<sub>2</sub> and (2) eliminating a valuable carbon sequestering service.

All of the causes above totalled may have a long term disastrous; most likely fatal to life as we know it, effect on the Earthen environment Scientists, particularly Professor Andre Berger\*, have been able to plot the various orbital cycles and produce a table going back a million years. This table also contains insolation figures. Thankfully, the tables are available for download from the internet. An analysis of the tables reveals two rather worrying facts which due to the complexity I won't explain now, have also not been revealed by the media.

One, the event that should have triggered a cooling cycle - minimum tilt that favours a cooling trigger - has passed its nadir and is now increasing. Another nadir is not due for another 40,000 years. Very possibly, atmospheric conditions may forever prohibit an ice age.

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\*André Léon Georges Chevalier Berger is a Belgian professor and climatologist. He is best known for his significant contribution to the renaissance and further development of the astronomical theory of

paleoclimates and as a cited pioneer of the interdisciplinary study of climate dynamics and history. Wikipedia

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Two, eccentricity(deviation of orbit from circularity). is now nearly as low as it ever been in the last million years and will become even lower for the next few thousand years. So the Earth's orbit is almost circular. This means that the past reinforcement and coincidence of cycle overlaps that have triggered colder winters and global cooling, for instance, will be missing for many thousands of years. (Google Milankovitch cycles)

Professor Andre Berger and Marie-France Loutre propose that we will not see another ice age for many thousands of years. See August 23<sup>rd</sup>, 2002 Issue of *Science*.



Sky McCain  
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