



## Something you should know

This is at <http://guymcpherson.com/2013/01/climate-change-summary-and-update/> (where the links work)

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American actress Lily Tomlin is credited with the expression, “No matter how cynical you become, it’s never enough to keep up.” With respect to climate science, my own efforts to stay abreast are blown away every week by new data, models, and assessments. It seems no matter how dire the situation becomes, it only gets worse when I check the latest reports.

The response of politicians, heads of non-governmental organizations, and corporate leaders remains the same. They’re mired in the dank Swamp of Nothingness. As Hallor Thorgeirsson, a senior director with the United Nations Framework Convention on Climate Change, said on 17 September 2013: “We are failing as an international community. We are not on track.” These are the people who know about, and presumably could do something about, our ongoing race to disaster (if only to sound the alarm). Tomlin’s line is never more germane than when thinking about their pursuit of a buck at the expense of life on Earth.

Worse than the aforementioned trolls are the media. Fully captured by corporations and the corporate states, the media continue to dance around the issue of climate change. Occasionally a forthright piece is published, but it generally points in the wrong direction, such as suggesting climate scientists and activists be killed (e.g., [James Delingpole’s 7 April 2013 hate-filled article in the Telegraph](#)).

Even mainstream scientists minimize the message at every turn. As we’ve known for years, [scientists almost invariably underplay climate impacts](#). I’m not implying conspiracy among scientists. Science selects for conservatism. Academia selects for extreme conservatism. These folks are loathe to risk drawing undue attention to themselves by pointing out there might be a threat to civilization. Never mind the near-term threat to our entire species (they couldn’t care less about other species). If the truth is dire, they can find another, not-so-dire version. The concept is supported by an [article in the February 2013 issue of Global Environmental Change](#) pointing out that climate-change scientists routinely underestimate impacts “by erring on the side of least drama.” Ever late to the party, the Intergovernmental Panel on Climate Change (IPCC) admits global warming is irreversible without geoengineering in a [report released 27 September 2013](#). As [pointed out](#) in the 5 December 2013 issue of *Earth System Dynamics*, [known strategies for geoengineering are unlikely to succeed](#).

If you’re too busy to read the evidence below, here’s the bottom line: On a planet 4 C hotter than baseline, all we can prepare for is human annihilation (from [Oliver Tickell’s 2008 synthesis in the Guardian](#)). Tickell is taking a conservative approach, considering humans have not been present at 3.5 C above baseline (i.e., the beginning of the Industrial Revolution, commonly accepted as 1750). According to the [World Bank’s 2012 report](#), “Turn down the heat: why a 4°C warmer world must be avoided” and an [informed assessment](#) of “[BP Energy Outlook 2030](#)” put together by Barry Saxifrage for the *Vancouver Observer*, our path leads directly to the 4 C mark. The 19th Conference of the Parties of the UN Framework Convention on Climate Change (COP 19), held in November 2013 in Warsaw, Poland, was warned by professor of climatology Mark Maslin: “We are already planning for a 4°C world because that is where we are heading. I do not know of any scientists who do not believe that.”

I’m not sure what it means to plan for 4 C (aka extinction). I’m not impressed that civilized scientists claim to be planning for it, either.

[According to Colin Goldblatt](#), author of a [paper published online in the 28 July 2013 issue of Nature Geoscience](#), “The runaway greenhouse may be much easier to initiate than previously thought.” Furthermore, as [pointed out in the 1 August 2013 issue of Science](#), in the near term Earth’s climate will change orders of magnitude faster than at any time during the last 65 million years. Tack on, without the large and growing number of self-reinforcing feedback loops we’ve triggered recently, [the 5 C rise in global average temperature 55 million years ago during a span of 13 years](#), and it looks like trouble ahead for the wise ape. This conclusion ignores the [long-lasting, incredibly powerful greenhouse gas discovered 9 December 2013 by University of Toronto researchers](#): perfluorotributylamine (PFTBA) is 7,100 times more powerful than carbon dioxide as a greenhouse gas in the atmosphere, and it persists hundreds of years in the atmosphere.

Finally, far too late, the *New Yorker* posits a relevant question on 5 November 2013: [Is It Too Late to Prepare for Climate Change?](#) Joining the too-little, too-late gang, the Geological Society of London [points out on 10 December 2013](#) that Earth’s climate could be twice as sensitive to atmospheric carbon as previously believed.

All of the above information fails to include the excellent work by Tim Garrett, which points out that only [complete collapse avoids runaway greenhouse](#). Garrett reached the conclusion in a paper submitted in 2007 (personal communication) and [published online by Climatic Change in November 2009](#) (outcry from civilized scientists delayed formal publication until February 2011). The paper remains largely ignored by the scientific community, having been cited fewer than ten times since its publication.

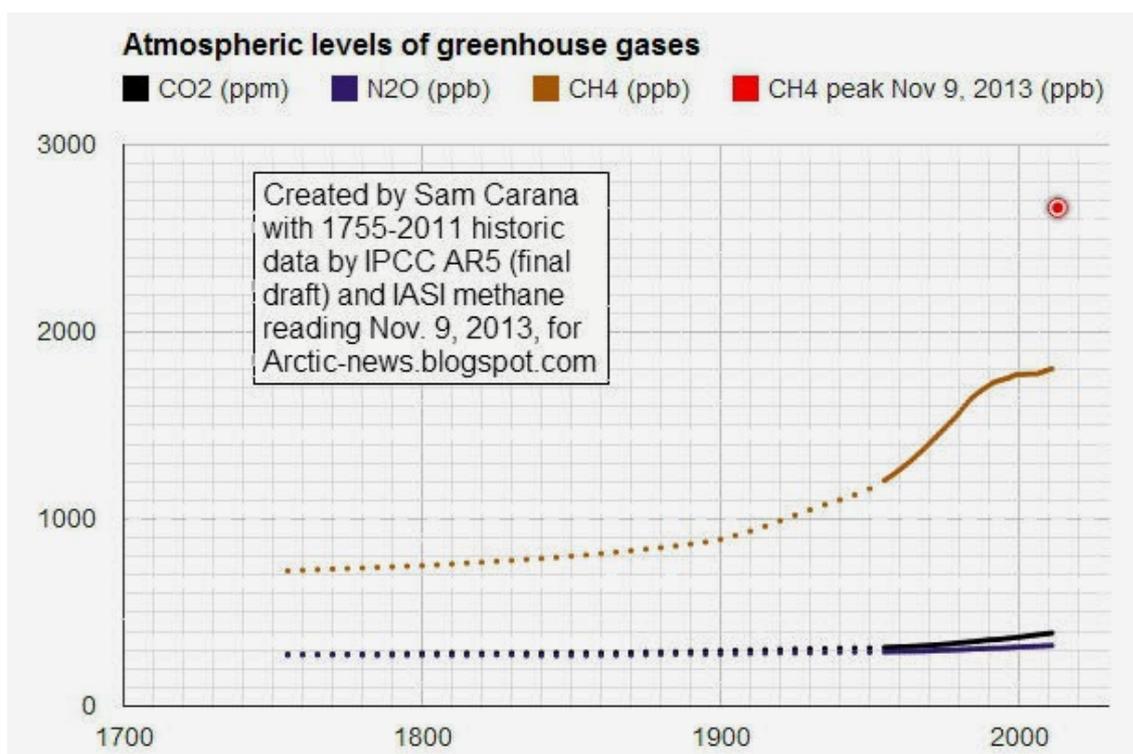
[According to Yvo de Boer](#), who was executive secretary of the United Nations Framework Convention on Climate Change in 2009, when attempts to reach a deal at a summit in Copenhagen crumbled with a rift between industrialized and developing nations, “the only way that a 2015 agreement can achieve a 2-degree goal is to shut down the whole global economy.” Politicians finally have caught up with Tim Garrett’s excellent paper in *Climatic Change*.

Writing for the Arctic Methane Emergency Group, [John Davies concludes](#): “The world is probably at the start of a runaway Greenhouse Event which will end most human life on Earth before 2040.” He considers only atmospheric carbon dioxide concentration, not the many self-reinforcing feedback loops described below. Tacking on only one feedback loop, and writing on 28 November 2013 — methane release from the Arctic Ocean — [Sam Carana expects up to 20 C warming by 2050](#). Small wonder atmospheric methane can cause such global catastrophe considering its dramatic rise during the last few years, as [elucidated by Carana on 5 December 2013](#) in the figure below.

### Tipping points

On the topic of tipping points, we crossed the Rubicon in 2007 at about 0.76 C warming. At this point, according to David Spratt’s excellent [September 2013 report, “Is Climate Already Dangerous?”](#), not only had Arctic sea-ice passed its tipping point, but the Greenland Ice Sheet was not far behind, as the Arctic moves to sea-ice-free conditions in summer (the [U.S. Navy predicts an ice-free Arctic by summer 2016](#)), a year later than expected by the United Kingdom Parliament, which [points out](#) that the six lowest September ice extents have occurred in the last six years. Glaciologist Jason Box, an expert on Greenland ice, agrees. Box was [quoted in a 5 December 2012 article in the Guardian](#): “In 2012 Greenland crossed a threshold where for the first time we saw complete surface melting at the highest elevations in what we used to call the dry snow zone. ... As Greenland crosses the threshold and starts really melting in the upper elevations it really won’t recover from that unless the climate cools significantly for an extended period of time which doesn’t seem very likely.”

If you think we’ll adapt, think again. The [rate of evolution trails the rate of climate change by a factor of 10,000](#), according to a [paper in the August 2013 issue of Ecology Letters](#). And it’s not as if extinction events haven’t happened on this planet, as explained in the BBC program, [The Day the Earth Nearly Died](#).



The rate of climate change clearly has gone beyond linear, as indicated by the presence of the myriad self-reinforcing feedback loops described below, and now threatens our species with extinction in the near term. Anthropologist [Louise Leakey ponders our near-term demise in her 5 July 2013 assessment at Huffington Post](#) and Canadian wildlife biologist Neil Dawe joins party of near-term extinction in an [interview 29 August 2013](#) and musician-turned-activist Sir Bob Geldof joins the fray in a [Daily Star article from 6 October 2013](#). In the face of near-term human extinction, most Americans view the threat as distant and irrelevant, as illustrated by a [22 April 2013 article in the Washington Post](#) based on poll results that echo the long-held sentiment that elected officials should be focused on the industrial economy, not far-away minor nuisances such as climate change.

Supporters of carbon farming — the nonsensical notion that industrial civilization can be used to overcome a predicament created by industrial civilization — claim all we need to do is [fill the desert with non-native plants to the tune of an area three-quarters the size of the United States](#). And, they say, we'll be able to lower atmospheric carbon dioxide by a whopping 17.5 ppm in only two decades. Well, how exciting. At that blistering pace, atmospheric carbon dioxide will be all the way back down to the reasonably safe level of 280 ppm in only 140 years, more than a century after humans are extinct from climate change.

According to the plan presented in the 23 August 2013 issue of *Scientific American*, the nonnative plants, irrigated with increasingly rare fresh water pumped by increasingly rare fossil-fuel energy, will sequester carbon sufficient to overcome contemporary emissions. Never mind the emissions resulting from pumping the water, or the desirability of converting thriving deserts into monocultures, or the notion of maintaining industrial civilization at the expense of non-civilized humans and non-human species. Instead, ponder one simple thought: When the nonnative plants die, they will emit back into the atmosphere essentially all the carbon they sequestered. A tiny bit of the carbon will be stored in the soil. The rest goes into the atmosphere as a result of decomposition.

This essay brings attention to recent projections and positive feedbacks. I presented much of this information at the [Bluegrass Bioneers conference](#) (Alex Smith at Radio Ecoshock evaluates my presentation [here](#)). More recently, I presented an [updated version](#) on the campus of the University of Massachusetts. All information and sources are readily confirmed with an online search, and links to information about feedbacks can be found [here](#).

## Large-scale assessments

Intergovernmental Panel on Climate Change (late 2007): 1 C by 2100

Hadley Centre for Meteorological Research (late 2008): 2 C by 2100

Later in 2008, Hadley Center's head of climate change predictions Dr. Vicky Pope calls for a worst-case outcome of more than 5 C by 2100. Joe Romm, [writing for Grist, claims](#), "right now even Hadley [Centre] understands it [ $> 5$  C] is better described as the 'business-as-usual' case."

United Nations Environment Programme (mid 2009): 3.5 C by 2100

Hadley Centre for Meteorological Research (October 2009): 4 C by 2060

Global Carbon Project, Copenhagen Diagnosis (November 2009): 6 C, 7 C by 2100

United Nations Environment Programme (December 2010): up to 5 C by 2050

These assessments fail to account for significant self-reinforcing feedback loops (i.e., positive feedbacks, the term that implies the opposite of its meaning). The IPCC's vaunted Fifth Assessment will continue the trend as it, too, [ignores important feedbacks](#). On a positive note, major assessments fail to account for economic collapse. However, due to the four-decade lag between [emissions and temperature rise](#) as well as the feedback loops described below, I strongly suspect it's too late for economic collapse to extend the run of our species.

## Taking a broad view

Astrophysicists have long believed Earth was near the center of the habitable zone for humans. [Recent research](#) published in the 10 March 2013 issue of *Astrophysical Journal* [indicates](#) Earth is on the inner edge of the habitable zone, and lies within 1% of inhabatability (1.5 million km, or 5 times the distance from Earth to Earth's moon). A minor change in Earth's atmosphere removes human habitat. Unfortunately, we've invoked major changes.

The northern hemisphere is particularly susceptible to accelerated warming, [as explained](#) in the 8 April 2013 issue of *Journal of Climate*. Two days later, a paper in *Nature* confirmed that [summers in the northern hemisphere are hotter than they've been for 600 years](#). As [pointed out by Sherwood and Huber in](#)

[the 25 May 2012 issue](#) of the *Proceedings of the National Academy of Sciences* and then by James Hansen who [points out in his 15 April 2013 paper](#), humans cannot survive a wet-bulb temperature of 35 C (95 F).

As described by the [United Nations Advisory Group on Greenhouse Gases in 1990](#), “Beyond 1 degree C may elicit rapid, unpredictable and non-linear responses that could lead to extensive ecosystem damage” (link mirrored [here](#)). [James Hansen and crew finally caught up to the dire nature of 1 C warming 23 years after the U.N. warning](#), 28 self-reinforcing feedback loops too late. Planetary instruments indicate Earth has warmed about 1 C since the beginning of the industrial revolution. However, plants in the vicinity of Concord, Massachusetts — where the instrumental record indicates warming of about 1 C — indicate [warming of 2.4 C since the 1840s](#).

Whether you believe the plants or the instruments is irrelevant at the point. We’ve clearly triggered the types of positive feedbacks the United Nations warned about in 1990. Yet my colleagues and acquaintances think we can and will work our way out of this horrific mess with permaculture (which is not to denigrate permaculture, the principles of which are implemented at the mud hut). Reforestation doesn’t come close to overcoming combustion of fossil fuels, as [pointed out in the 30 May 2013 issue of Nature Climate Change](#). Furthermore, forested ecosystems do not sequester additional carbon dioxide as it increases in the atmosphere, as disappointingly [explained in the 6 August 2013 issue of New Phytologist](#). Adding egregious insult to spurting wound, the [latest public-education initiative in the United States](#) — the [Next Generation Science Standards](#) — buries the relationship between combustion of fossil fuels and planetary warming. The misadventures of the corporate government continue, even as collapse of ecosystems is fully under way. As [pointed out in the April 2013 issue of PLoS ONE](#) — too little, too late for many ecosystems — “catastrophic collapses can occur without prior warning.”

Let’s ignore the models for a moment and consider only the results of a [single briefing to the United Nations Conference of the Parties in Copenhagen \(COP15\)](#). Regulars in this space will recall COP15 as the climate-change meetings thrown under the bus by the Obama administration. A summary of that long-forgotten briefing contains this statement: “THE LONG-TERM SEA LEVEL THAT CORRESPONDS TO CURRENT CO2 CONCENTRATION IS ABOUT 23 METERS ABOVE TODAY’S LEVELS, AND THE TEMPERATURES WILL BE 6 DEGREES C OR MORE HIGHER. THESE ESTIMATES ARE BASED ON REAL LONG TERM CLIMATE RECORDS, NOT ON MODELS.”

In other words, near-term extinction of humans was already guaranteed, to the knowledge of Obama and his administration (i.e., the Central Intelligence Agency, which runs the United States and controls presidential power). Even before the dire feedbacks were reported by the scientific community, the administration abandoned climate change as a significant issue because it knew we were done as early as 2009. Rather than shoulder the unenviable task of truth-teller, Obama did as his imperial higher-ups demanded: He lied about collapse, and he lied about climate change. And he still does.

Ah, those were the good ol’ days, back when atmospheric carbon dioxide concentrations were below 400 parts per million (ppm). We’ll [blow through the 400 ppm mark soon, probably for the first time in 3.2 to 5 million years](#). And, as [reported in the journal Global and Planetary Change in April 2013](#), [every molecule of atmospheric carbon dioxide since 1980 comes from human emissions](#). Not to be outdone, [methane levels reached an average mean of 1800 parts per billion \(ppb\) on the morning of 16 June 2013](#). [Seeps are appearing in numerous locations off the eastern coast of the United States, leading to rapid destabilization of methane hydrates](#) (according to the 25 October 2013 issue of *Nature*). On land, anthropogenic emissions of methane in the United States have been severely underestimated by the Environmental Protection (sic) Agency, [according to a paper in the 25 November 2013 issue of Proceedings of the National Academy of Sciences](#). This figure is 1100 ppb higher than pre-industrial peak levels. Methane release tracks closely with temperature rise throughout Earth history — specifically, [Arctic methane release and rapid global temperature rise are interlinked](#) — including a temperature rise up to about 1 C per year over a decade, [according to data from ice cores](#).

### Positive feedbacks

1. Methane hydrates are [bubbling out the Arctic Ocean](#) (*Science*, March 2010). According to [NASA’s CARVE project, these plumes were up to 150 kilometers across as of mid-July 2013](#). Global-average temperature is expected to rise as much as 4.5 C by 2030 and 10 C by 2039 based solely on methane release from the Arctic Ocean, according to [Sam Carana’s research \(see especially Image 24\)](#). Whereas [Malcolm Light’s 9 February 2012 forecast of extinction of all life on Earth by the middle of this century](#) appears premature because his conclusion of exponential methane release during summer 2011 was based on data subsequently revised and smoothed by U.S. government agencies, subsequent information — most notably from NASA’s CARVE project — indicates the grave potential for catastrophic release of methane. (I doubt industrial civiliza-

tion manages to kill all life on Earth, although that clearly is the goal.) Catastrophically rapid release of methane in the Arctic is further supported by [Nafeez Ahmed's thorough analysis in the 5 August 2013 issue of the \*Guardian\*](#) as well as [Natalia Shakhova's 29 July 2013 interview with Nick Breeze](#) (note the look of abject despair at the eight-minute mark). In early November 2013, [methane levels well in excess of 2,600 ppb were recorded at multiple altitudes in the Arctic](#). Later that same month, Shakhova and colleagues published a paper in [Nature Geoscience suggesting](#) "significant quantities of methane are escaping the East Siberian Shelf" and indicating that a [50-billion-tonne "burst" of methane could warm Earth by 1.3 C](#). Such a burst of methane is "[highly possible at any time](#)." By [15 December 2013, methane bubbling up from the seafloor of the Arctic Ocean had sufficient force to prevent sea ice from forming in the area](#).

2. Warm Atlantic water is defrosting the Arctic as it shoots through the Fram Strait (*Science*, January 2011).

3. Siberian methane vents have increased in size from less than a meter across in the summer of 2010 to about a kilometer across in 2011 (*Tellus*, February 2011)

4. Drought in the Amazon triggered the release of more carbon than the United States in 2010 (*Science*, February 2011). In addition, ongoing deforestation in the region is driving declines in precipitation at a rate much faster than long thought, as [reported in the 19 July 2013 issue of \*Geophysical Research Letters\*](#).

5. Peat in the world's boreal forests is decomposing at an astonishing rate (*Nature Communications*, November 2011)

6. Invasion of tall shrubs warms the soil, hence destabilizes the permafrost (*Environmental Research Letters*, March 2012)

7. [Greenland ice is darkening](#) (*The Cryosphere*, June 2012)

8. Methane is being released from the Antarctic, too (*Nature*, August 2012). According to a [paper in the 24 July 2013 issue of \*Scientific Reports\*](#), melt rate in the Antarctic has [caught up to the Arctic](#) and the West Antarctic Ice Sheet is losing over 150 cubic kilometres of ice each year [according to CryoSat observations published 11 December 2013](#), and Antarctica's crumbling Larsen B Ice Shelf is poised to finish its collapse, [according to Ted Scambos, a glaciologist at the National Snow and Ice Data Center at the annual meeting of the American Geophysical](#)

[Union. Further confirmation of large methane releases is revealed by noctilucent clouds over the southern hemisphere from 21 November 2013 to 6 December 2013](#).

9. Russian forest and bog fires are growing (NASA, August 2012), a phenomenon consequently [apparent throughout the northern hemisphere](#) (*Nature Communications*, July 2013). The *New York Times* [reports](#) hotter, drier conditions leading to huge fires in western North America as the "new normal" in their 1 July 2013 issue. A [paper in the 22 July 2013 issue of the \*Proceedings of the National Academy of Sciences\*](#) indicates boreal forests are burning at a rate exceeding that of the last 10,000 years.

10. [Cracking of glaciers accelerates in the presence of increased carbon dioxide](#) (*Journal of Physics D: Applied Physics*, October 2012)

11. The [Beaufort Gyre apparently has reversed course](#) (U.S. [National Snow and Ice Data Center, October 2012](#))

12. [Exposure to sunlight increases bacterial conversion of exposed soil carbon, thus accelerating thawing of the permafrost](#) (*Proceedings of the National Academy of Sciences*, February 2013)

13. The microbes have joined the party, too, according to a [paper in the 23 February 2013 issue of \*New Scientist\*](#)

14. [Summer ice melt in Antarctica is at its highest level in a thousand years](#): Summer ice in the Antarctic is melting 10 times quicker than it was 600 years ago, with the most rapid melt occurring in the last 50 years ([Nature Geoscience, April 2013](#)). Although scientists have long expressed concern about the instability of the West Antarctic Ice Sheet (WAIS), a research paper published in the 28 August 2013 of *Nature* [indicates the East Antarctic Ice Sheet \(EAIS\) has undergone rapid changes in the past five decades](#). The latter is the world's largest ice sheet and was previously thought to be at little risk from climate change. But it has undergone rapid changes in the past five decades, signaling a potential threat to global sea levels. The EAIS holds enough water to raise sea levels more than 50 meters.

15. Increased temperature and aridity in the southwestern interior of North America facilitates [movement of dust from low-elevation deserts to high-elevation snowpack](#), thus accelerating snowmelt, as [reported in the 17 May 2013 issue of \*Hydrology and Earth System Sciences\*](#).

16. [Floods in Canada are sending pulses of silty water out through the Mackenzie Delta and into the Beaufort Sea, thus painting brown a wide section of the Arctic Ocean near the Mackenzie Delta brown](#) (NASA, June 2013)

17. Surface meltwater draining through cracks in an ice sheet can warm the sheet from the inside, softening the ice and letting it flow faster, [according to a study accepted for publication in the Journal of Geophysical Research: Earth Surface](#) (July 2013). It appears a Heinrich Event has been triggered in Greenland. Consider the description of such an event as [provided by Robert Scribner on 8 August 2013](#):

In a Heinrich Event, the melt forces eventually reach a tipping point. The warmer water has greatly softened the ice sheet. Floods of water flow out beneath the ice. Ice ponds grow into great lakes that may spill out both over top of the ice and underneath it. Large ice dams (sic) may or may not start to form. All through this time ice motion and melt is accelerating. Finally, a major tipping point is reached and in a single large event or ongoing series of such events, a massive surge of water and ice flush outward as the ice sheet enters an entirely chaotic state. Tsunamis of melt water rush out bearing their vast floatillas (sic) of ice burls (sic), greatly contributing to sea level rise. And that's when the weather really starts to get nasty. In the case of Greenland, the firing line for such events is the entire North Atlantic and, ultimately the Northern Hemisphere.

18. Breakdown of the thermohaline conveyor belt is [happening in the Antarctic as well as the Arctic](#), thus leading to [melting of Antarctic permafrost](#) (*Scientific Reports*, July 2013)

19. Loss of Arctic sea ice is reducing the temperature gradient between the poles and the equator, thus [causing the jet stream to slow and meander](#). One result is the creation of [weather blocks such as the recent very high temperatures in Alaska](#). As a [result, boreal peat dries and catches fire like a coal seam](#). The resulting soot enters the atmosphere to fall again, coating the ice surface elsewhere, thus reducing albedo and hastening the melting of ice. Each of these individual phenomena has been reported, albeit rarely, but to my knowledge the dots have not been connected beyond this space. The inability or unwillingness of the media to connect two dots is not surprising, and has been routinely reported (recently including [here](#) with respect to climate change and wildfires) (July 2013)

20. [Arctic ice is growing darker, hence less reflective](#) (*Nature Climate Change*, August 2013)

21. [Extreme weather events drive climate change, as reported in the 15 August 2013 issue of Nature](#) (*Nature*, August 2013)

22. [Ocean acidification leads to release of less dimethyl sulphide \(DMS\) by plankton](#). DMS shields Earth from radiation. (*Nature Climate Change, online 25 August 2013*). Plankton form the base of the marine food web, and are [on the verge of disappearing completely](#), [according to a paper](#) in the 17 October 2013 issue of *Global Change Biology*.

23. [Sea-level rise causes slope collapse, tsunamis, and release of methane](#), as [reported in the September 2013 issue of Geology](#). [In eastern Siberia, the speed of coastal erosion has nearly doubled during the last four decades as the permafrost melts](#).

24. [Rising ocean temperatures will upset natural cycles of carbon dioxide, nitrogen and phosphorus, hence reducing plankton](#) (*Nature Climate Change, September 2013*)

25. Earthquakes trigger methane release, and consequent warming of the planet triggers earthquakes, as [reported by Sam Carana](#) at the Arctic Methane Emergency Group (October 2013)

26. [Small ponds in the Canadian Arctic are releasing far more methane than expected based on their aerial cover](#) (*PLoS ONE*, November 2013)

27. Mixing of the jet stream is a catalyst, too. High methane releases follow fracturing of the jet stream, accounting for past global-average temperature rises up to 16 C in a decade or two ([Paul Beckwith via video](#) on 19 December 2013).

28. [Arctic drilling](#) was fast-tracked by the Obama administration during the summer of 2012

29. [Supertankers are taking advantage of the slushy Arctic](#), demonstrating that every catastrophe represents a business opportunity, as pointed out by Professor of journalism Michael I. Niman and [picked up by Truthout](#) (ArtVoice, September 2013)

As nearly as I can distinguish, only the latter two feedback processes are reversible at a temporal scale relevant to our species. Once you pull the tab on the can of beer, there's no keeping the carbon dioxide from bubbling up and out. These feedbacks are not additive, they are multiplicative. Now that we've entered the era of expensive oil, I can't imagine we'll voluntarily terminate the process of drilling for oil and gas in the Arctic (or anywhere else). Nor will we willingly forgo a few dollars by failing to take advantage of the long-sought Northwest Passage.

Robin Westenra provides an [assessment of these positive feedbacks at Seemorerocks](#) on 14 July 2013. It's worth a look.

### See how far we've come

Never mind that American naturalist George Perkins Marsh [predicted anthropogenic climate change as a result of burning fossil fuels in 1847](#). Never mind that [climate risks have been underestimated for the last 20 years, or that the IPCC's efforts have failed miserably](#). After all, climate scientist Kevin Anderson [tells us](#) what I've known for years: politicians and the scientists writing official reports on climate change are lying, and we have less time than most people can imagine. Never mind David Wasdell [pointed out in 2008](#) that we must have a period of negative radiative forcing merely to end up with a stable, non-catastrophic climate system. Never mind that even the *Atlantic* is [displaying](#) "five charts about climate change that should have you very, very worried." Never mind that [atmospheric carbon dioxide is affecting satellites](#). Never mind that even the occasional economic analyst is [telling climate scientists to be persuasive, be brave, and be arrested](#). Never mind that [Peruvian ice requiring 1,600 years to accumulate has melted in the last 25 years](#), according to a paper in the 4 April 2013 issue of *Science*. And never mind that warming in the interior of large continents in the northern hemisphere has outstripped model predictions in racing to 6-7 C already, according to a [paper that tallies temperature rise in China's interior](#) in the [15 May 2013 issue of the Proceedings of the National Academy of Sciences](#).

Never mind all that: Future temperatures likely will be at the [higher end of the projected range because the forecasts are all too conservative](#) and also because [climate negotiations won't avert catastrophe](#).

[Through late March 2013, global oceans have risen approximately ten millimeters per year during the last two years](#). This rate of rise is over three times the rate of sea level rise during the time of satellite-based observations from 1993 to the present. Ocean temperatures are rising, and have been impacting global fisheries for four decades, [according to the 16 May 2013 issue of Nature](#).

Actually, catastrophe is already here, although it's not widely distributed in the United States. Well, not yet, even though the [continental U.S. experienced its highest temperature ever in 2012, shattering the 1998 record by a full degree Fahrenheit](#). But the [east coast of North America experienced its hottest water temperatures all the way to the bottom of the ocean](#). The [epic dust bowl of 2012 grew and grew and grew all summer long](#). As [pointed out](#) in the March 2004 issue of *Geophysical Research Letters*, disappearing

sea ice is expectedly contributing to the drying of the western United States (more definitive research on the topic [appeared in the December 2005 issue of Earth Interactions](#)). Equally expectedly, the [drought arrived 40 years early](#).

Even [James Hansen and Makiko Sato are asking whether the loss of ice on Greenland has gone exponential \(while ridiculously calling for a carbon tax to "fix" the "problem"\)](#), and the tentative answer is not promising, based on [very recent data](#), including a [nearly five-fold increase in melting of Greenland's ice since the 1990s](#) and a stunning [melting of 98 percent of Greenland's ice surface between 8 and 15 July 2012](#). The mainstream media are finally taking notice, with the [18 July 2013 issue of Washington Post](#) reporting the ninth highest April snow cover in the northern hemisphere giving way to the third lowest snow cover on record the following month (relevant records date to 1967, and the article is headlined, "Snow and Arctic sea ice extent plummet suddenly as globe bakes").

On a particularly dire note for humanity, [climate change causes early death of 400,000 people each year](#). Adding to our misery are interactions between various aspects of environmental decay. For example, [warming in the Arctic is causing the release of toxic chemicals long trapped in the region's snow, ice, ocean and soil](#), according to [research published in the 24 July 2011 issue of Nature Climate Change](#).

Greenhouse-gas emissions keep rising, and keep setting records. According to 10 June 2013 report by the International Energy Agency, the horrific trend [continued in 2012](#), when carbon dioxide emissions set a record for the fifth consecutive year. The trend puts disaster in the cross-hairs, with the ever-conservative International Energy Agency claiming we're headed for a temperature in excess of 5 C.

[Completely contrary to the popular contrarian myth, global warming has accelerated, with more overall global warming in the past 15 years than the prior 15 years](#). This warming has resulted in about 90% of overall global warming going into heating the oceans, and the oceans have been warming dramatically, according to a paper published in the March 2013 issue of *Geophysical Research Letters*. Even [Slate magazine figured it out by 5 November 2013](#), and [The Guardian's headline from 13 November 2013 announces](#), "Global warming since 1997 more than twice as fast as previously estimated, new study shows." [November 2013 was the hottest global November surface temperature on record](#), according to the [latest data from NASA](#). About 30% of the ocean warming over the past decade has occurred in the deeper oceans below 700 meters, which is unprecedented over at least the past half century. According

to a [paper in the 1 November 2013 issue of \*Science\*](#), the [rate of warming of the Pacific Ocean during the last 60 years is 15 times faster than at any time during the last 10,000 years](#). The death spiral of Arctic sea ice is well under way, as shown in the video below. <http://guymcpherson.com/2013/01/climate-change-summary-and-update/>

In the category of myth busting comes recent research [published in the August 2013 issue of \*Proceedings of the National Academy of Sciences\*](#). Contrary to the notion that changing solar radiation is responsible for rising global temperature, [the amount of solar radiation passing through Earth's atmosphere and reaching the ground globally peaked in the 1930s, substantially decreased from the 1940s to the 1970s, and changed little after that](#). Indeed, [the current solar activity cycle is the weakest in a century](#).

[Global loss of sea ice](#) matches the trend in the Arctic. Sea ice is down, down, and down some more, with the five lowest values on record all happening in the last seven years (through 2012). As [reported](#) in a June 2013 issue of *Science*, the Antarctic's ice shelves are melting from below. When interviewed for the [associated article](#) in the 13 June 2013 issue of *National Geographic*, scientists expressed surprise at the rate of change. Color me shocked. Three months later, the [13 September 2013 issue of \*Science\* contains another surprise for mainstream scientists](#): [The Pine Island Glacier is melting from below as a result of warming seawater](#).

### Then see where we're going

The climate situation is much worse than [I've led you to believe](#), and is [accelerating far more rapidly than accounted for by models](#). Even the U.S. Centers for Disease Control and Prevention [acknowledges, in a press release dated 6 June 2013](#), potentially lethal heat waves on the near horizon. Piling on a month later, the World Meteorological Organization [pointed out](#) that Earth experienced unprecedented recorded climate extremes during the decade 2001-2010, contributing to more than a 2,000 percent increase in heat-related deaths.

[Ice sheet loss continues to increase at both poles](#), and warming of the West Antarctic Ice Sheet is [twice the earlier scientific estimate](#). [Arctic ice at all-time low, half that of 1980](#), and the [Arctic lost enough sea ice to cover Canada and Alaska in 2012 alone](#). In short, [summer ice in the Arctic is nearly gone](#). Furthermore, the [Arctic could well be free of ice by summer 2015](#), an event that last occurred some three million years ago, before the genus *Homo* walked the planet. Among the consequences of declining Arctic ice is [extremes in cold weather in northern continents](#) (thus illustrating why "climate change" is a better term than "global warming"). In a turn surprising only to

mainstream climate scientists, [Greenland ice is melting rapidly](#).

Even the conservative [International Energy Agency \(IEA\) has thrown in the towel, concluding that "renewable" energy is not keeping up with the old, dirty standard sources](#). As a result, the [IEA report dated 17 April 2013](#) indicates the development of low-carbon energy is progressing too slowly to limit global warming.

The Arctic isn't Vegas — what happens in the Arctic doesn't stay in the Arctic — it's the planet's air conditioner. In fact, as [pointed out 10 June 2013 by research scientist Charles Miller of NASA's Jet Propulsion Laboratory](#): "Climate change is already happening in the Arctic, faster than its ecosystems can adapt. Looking at the Arctic is like looking at the canary in the coal mine for the entire Earth system." In addition, ["average summer temperatures in the Canadian Arctic are now at the highest they've been for approaching 50,000 years"](#) (and [perhaps up to 120,000 years](#)) according to a [paper published online 23 October 2013](#) in *Geophysical Research Letters*. On the topic of rapidity of change, [a paper in the August 2013 issue of \*Ecology Letters\*](#) points out that rates of projected climate change dramatically exceed past rates of climatic niche evolution among vertebrate species. In other words, vertebrates cannot evolve or adapt rapidly enough to keep up with ongoing and projected changes in climate.

How critical is Arctic ice? Whereas nearly 80 calories are required to melt a gram of ice at 0 C, adding 80 calories to the same gram of water at 0 C increases its temperature to 80 C. Anthropogenic greenhouse-gas emissions add more than 2.5 trillion calories to Earth's surface every hour (ca. [3 watts per square meter](#), continuously).

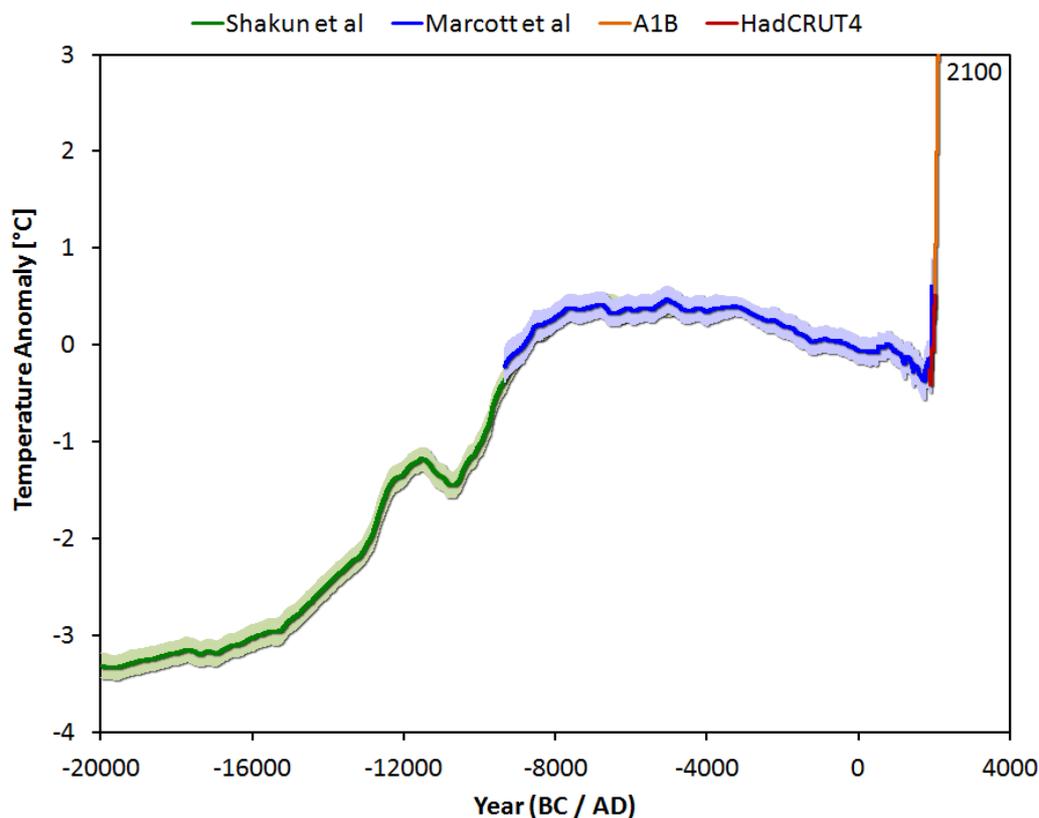
Ocean acidification associated with increased atmospheric carbon dioxide is [proceeding at an unprecedented rate](#) — the [fastest in 300 million years](#) — leading to [great simplification of ecosystems](#), and [capable of triggering mass extinction](#) by itself. Already, [half the Great Barrier Reef has died during the last three decades](#). As with many attributes, [the Arctic Ocean leads the way in acidification](#). And ocean acidification is hardly the only threat on the climate-change front. As one little-discussed example, [atmospheric oxygen levels are dropping to levels considered dangerous for humans](#), particularly in cities.

An increasing number of [scientists agree that warming of 4 to 6 C causes a dead planet. And, they go on to say, we'll be there by 2060](#). Earth-system scientist Clive Hamilton concludes in his April 2013 book *Earthmasters* that "without [atmospheric sulphates associated with industrial activity] ... Earth would be

an extra 1.1 C warmer.” In other words, collapse takes us directly to 2 C within a matter of weeks. According to a [paper in the 24 November 2013 issue of \*Nature Climate Change\*](#), warming of the planet will continue long after emissions cease. Several other academic scientists have concluded, in the refereed journal literature no less, that the 2 C mark is essentially impossible (for example, see the [review paper by Mark New and colleagues](#) published in the 29 November 2010 issue of the *Philosophical Transactions of the Royal Society A*). The [German Institute for International and Security Affairs](#) concluded 2 June 2013 that a 2 C rise in global-average temperature is [no longer feasible](#) (and [Spiegel agrees, finally, in their 7 June 2013 issue](#)), while the ultra-conservative International Energy Agency [concludes that](#), “coal will nearly overtake oil as the dominant energy source by 2017 ... without a major shift away from coal, average global temperatures could rise by 6 degrees Celsius by 2050, leading to devastating climate change.” At the 11:20 mark of [this video](#), climate scientist Paul Beckwith indicates Earth could warm by 6 C within a decade. If you think his view is extreme, consider (1) [the 5 C rise in global-average temperature 55 million years ago during a span of 13 years](#) (reported in the 1 October 2013 issue of *Proceedings of the National Academy of Sciences*), and also (2) the reconstruction of regional and global temperature for the past 11,300 years published in *Science* in March 2013. One result is shown in the figure below.

It’s not merely scientists who know where we’re going. The Pentagon is bracing for public dissent over climate and energy shocks, as [reported](#) by Nafeez Ahmed in the 14 June 2013 issue of the *Guardian*. According to Ahmed’s article: “Top secret US National Security Agency (NSA) documents disclosed by the *Guardian* have shocked the world with revelations of a comprehensive US-based surveillance system with direct access to Facebook, Apple, Google, Microsoft and other tech giants. New Zealand court records suggest that data harvested by the NSA’s Prism system has been fed into the Five Eyes intelligence alliance whose members also include the UK, Canada, Australia and New Zealand.” In short, the “Pentagon knows that environmental, economic and other crises could provoke widespread public anger toward government and corporations” and is planning accordingly. Such “activity is linked to the last decade of US defence planning, which has been increasingly concerned by the risk of civil unrest at home triggered by catastrophic events linked to climate change, energy shocks or economic crisis — or all three.” The global police state [has arrived](#), and it’s [accompanied by a subtle changes in Earth’s rotation that result from the melting of glaciers and ice sheets](#) (i.e., climate change is causing Earth’s poles to shift).

Earlier versions of this essay are permalinked at [Counter Currents](#), [Goldilocks Zone](#), [Seemorerocks](#), [Climates of Canada](#), [Island Breath](#), and [Seemore-rocks](#).



### ***Is Guy McPherson right?***

It hardly matters whether what he describes is really happening now or not. The events reported are just what would be expected sooner or later, all taking place together at about the same time and lagging their causes so as to make intervention or recovery impossible. Since there clearly has never been any serious intention to prevent climate change, the consequences he describes were always inevitable eventually.

When it comes to what to do about it, it actually doesn't matter much whether it is already too late or not. No matter what tipping points we may have passed, any logical response will include the extreme emissions restraint that would have been sufficient if done earlier, but may well now be ineffectual.

Contrary to what we like to pretend, western democratic governments and big business would actually prefer the world not to be progressively destroyed. They organise the destruction because we consumers and voters seem to demand it, so they comply in order to retain their positions. Tackling climate change therefore involves ordinary individual people reducing their fossil emissions to as near zero as survival allows (which I think a handful of scientists have done already) and desperately fast introduction of nuclear generation for electricity and fertiliser and synthetic replacement of all liquid and gas fuel. There is no point in doing anything less, unless it is merely to delude or comfort ourselves. Since the sustainable emissions level for fossil carbon is zero, even this level of restraint may still take us over some catastrophic threshold. Geo-engineering needs to be tried as well now (and not left until later) despite the great risks.

There is the obvious objection that it might be better for humanity to quickly become extinct and thus cease to cause future damage. However, complete human extinction seems unlikely to be imminent as a result of environmental effects. Extinction of other life will be massive even if humanity is destroyed almost immediately, so it is best that we try to deal with the problem.

Many of us, because of our age or relative wealth, might not experience the consequences of climate change, but I surely even we would benefit from not poisoning our lives with the responsibility for it. Wouldn't we?