**A scientific refutation of the Intergovernmental Panel on Climate Change’s (IPCC) UNFCCC Article 1 and 2 enforced key-risk assessment, its inaccurate climate forecasts, and the underlying radiative forcing theory, as detailed in the Fifth Assessment Report (AR5)**

In the interests of ensuring the safety of 7.7 billion world citizens this document is provided as a scientific refutation of the IPCC’s radiative forcing theory, its highly inaccurate climate forecasts (1986-2016), and the validity of its UNFCCC Article 2 dictated climate change key-risk assessment. The notion that the IPCC’s version of climate change represents a consensus of the international scientific community is also refuted. Normal science does not operate by consensus.

An alternative climate change theory and key-risk assessment are proposed, based on analyzing the repertoire of climate, solar activity, and volcanic eruption data that science possesses: “*Earth entered a new ice age after the Holocene Climate Optimum millennia ago and will re-enter this ice age during the 21st century. Catastrophic natural climate change risks are posed during this climate-switch and its associated grand solar minimum period, which have been left unmitigated.”* These natural climate change risks were erroneously dismissed, omitted, or veiled from common view by the IPCC process. This [hyperlinked document](https://grandsolarminimum.com/2019/08/26/the-ipccs-climate-change-key-risk-assessment-is-refuted/) (and summary [PDF slide deck](https://grandsolarminimum.com/presentation/)) and my [free eBook](https://amzn.to/2PyQsxV) “Revolution: Ice Age Re-Entry”[[1]](#endnote-1) **constitute the definitive thesis** supporting this scientific refutation and my newly proposed climate change theory.

Having thoroughly reviewed all IPCC assessment reports ([AR1-5/SREX](https://www.ipcc.ch/reports/)), it is crystal clear that the IPCC’s unnatural version of climate change and its key-risk assessments are scientifically flawed and biased, and they prioritize policymakers over human safety and normal-science.[[2]](#endnote-2),[[3]](#endnote-3),[[4]](#endnote-4),[[5]](#endnote-5)

We are categorically told by the IPCC’s Working Group 2 (WG2) of the restricted and contrived nature of their key-risk assessment; “*Key risks are potentially severe impacts relevant to Article 2 of the UN Framework Convention on Climate Change, which refers to “dangerous anthropogenic interference with the climate system*,” and that we can reduce the impact of climate change (and therefore the “key-risks”) by reducing our emissions. The “*key-risks*” promulgated in AR5 documents are **only those linked** to hypothetical anthropogenic global warming (AGW), while unrealistically assuming there will be no major volcanic eruptions, cooling, glaciation, or secular changes in solar activity.[[6]](#endnote-6),[[7]](#endnote-7),[[8]](#endnote-8),[[9]](#endnote-9),(10,11)

This UNFCCC Article 2 diktat means important perennial natural climate change risks most pertinent to this stage of the glacial cycle were wrongly omitted from the IPCC’s key-risk assessment. These **21st century relevant natural climate change key-risks** include *global cooling* and its *associated extreme seasonal weather, glaciation, climate-forcing volcanism (big eruptions), rapid climate change, and pandemic influenza*.

To **undermine any scientific contestation** to its four Representative Concentration Pathway global warming scenarios, the IPCC have inadvertently **disoriented governments and society** as to our real glacial cycle stage, 8,000 years after the Arctic’s Holocene Climate Optimum. This disorientation was achieved by erroneously delaying the next ice age by an unprecedented and refutable 30,000-50,000 years[[10]](#endnote-10),[[11]](#endnote-11); by incorrectly stating that the last ice age ended “*about 10,000 years ago*;”[[12]](#endnote-12) and by focusing government and society’s attention on a post-1880 fragment of a natural warming phase that started in the Arctic in 1700 CE (i.e., before significant human greenhouse gas emissions).[[13]](#endnote-13) Crucially, the global temperature indices used by the IPCC in its assessment reports have been **sequentially altered** with each new index version, thus accentuating the global warming and making them **unfit for policy sensitive decision-making**.[[14]](#endnote-14),[[15]](#endnote-15),[[16]](#endnote-16)

Underpinning the IPCC’s key-risk assessment are the following cited global warming projections, which include, “*The global mean surface temperature change for the period 2016–2035 relative to 1986–2005 will likely be in the range of 0.3°C to 0.7°C (medium confidence). This assessment is based on multiple lines of evidence and assumes there will be* ***no major volcanic eruptions or secular changes in total solar irradiance.***”[[17]](#endnote-17)

According to four different climate indices the global mean surface temperature (**GMST) declined by an average of 0.47°C since early 2016**,[[18]](#endnote-18) rendering the IPCC’s 2016-2035 GMST forecast inaccurate. This recurring GMST forecast inaccuracy *exacerbates* the IPCC’s self-disclosed multi-decade legacy of generating *highly inaccurate GMST* *forecasts*.[[19]](#endnote-19) This under-forecasting (1986-1998; 84%) and then over-forecasting (1998-2012; 97%), while 100% failed to predict the 15-year climate hiatus (1998-2012),[[20]](#endnote-20) as well as the fall in GMST since 2016, confirms **something else is controlling the GMST** **oscillations** (**and therefore the climate risks)**. Moreover, the 15-year climate hiatus occurred while CO2’s atmospheric concentrations increased by 8.0%, and the Q1-2016 to Q2-2019 GMST decline occurred when CO2 concentrations increased by 2.8%.[[21]](#endnote-21) This indicates that CO2 does not control the GMST rise—just as the ignored science tells us.[[22]](#endnote-22),[[23]](#endnote-23),[[24]](#endnote-24),[[25]](#endnote-25),[[26]](#endnote-26)

This failure to accurately predict the GMST for thirty years **refutes the IPCC’s radiative forcing theory**, its **GMST forecasts,** and the **validity of its UNFCCC Article 2 dictated** climate change key-risk assessment.

In case you overlooked this fact, *no detailed-comparative correlation analysis was ever provided* by WG1 (in ARs1-5 since 1990) between the GMST and carbon dioxide (CO2), covering decadal-, centennial-, millennial-, and glacial cycle-time scales, **to justify the IPCC’s radiative forcing theory** (see [PDF](https://grandsolarminimum.com/presentation/) slide deck #9 and 10). Instead, UNFCCC Articles 1 and 2 (**read** *the natural climate change corrupting and hijack-enabling definitions*),[[27]](#endnote-27),[[28]](#endnote-28), [[29]](#endnote-29) and IPCC confirmation-bias enabling processes and procedures5 were used to install (in 1990) and maintain their radiative forcing theory’s scientific dictatorship. This non-scientific foundation to the IPCC’s theory then explains their abysmal GMST forecasting inaccuracy, and the IPCC’s biased and contrived arguments and their buttressing (i.e., hallmarked by the overuse of terms like, “*with a high or low certainty or confidence,*” without P-values <0.05), and why the world should be seriously concerned about this **UNFCCC Article 2 contrived-dictated key-risk assessment.**

There are *scientific reasons for this post-2016 GMST cooling* that become obvious when the Arctic climate at the Holocene Climate Optimum 8,000 years ago is **used as the climate ‘reference point’**. By contrast we have no glacial cycle bearing by relying on the GMST since 1880, with all possible bearing corrupted by our reliance on altered climate indices that accentuated the recent global warming (HadCRUT4, NOAA, NASA(14,15,16)).

This UNFCCC Article 1 and 2-led corruption of “normal-science” (Kuhn and Popper-like) presented to governments by the IPCC has serious **potential for crimes against humanity (i.e., Genocide)** in a future natural climate change catastrophe, whose prospect the Intergovernmental Panel on Climate Change (IPCC) has categorically dismissed, omitted or veiled (see the next two sections). This ‘deprived’ governments and society the opportunity to mitigate the usurped-veiled natural climate change risks and hazards decades ago. This potential future genocide will **majorly impact** the developing and northern nations, the world’s poor and city dwelling, and those nations without a pandemic influenza vaccine production capability.

Read and comprehend the incriminating evidence the IPCC placed in the public domain, and the real and natural climate change risks sitting on our 21st century horizon.

**Earth entered a new ice age millennia ago. Meanwhile the IPCC has disoriented governments as to our real glacial cycle stage**

By delaying the ice age 30,000-50,000 years and telling governments that the last ice age ended ‘about 10,000 years ago,’ without subjecting those erroneous assumptions to peer review scrutiny or reflecting the full repertoire of climate data that science possesses, catastrophic natural climate change risks were biasedly veiled from common view.

To help you understand fact from IPCC opinion and academia’s unchanging-archaic dogma it is necessary to review the climate data relative to common points of glacial cycle reference i.e., the **climate optimum and glacial maximum** (see endnote details).[[30]](#endnote-30) Being consistent across all glacial cycles, the **last ice age ended just after the last glacial maximum** (LGM), which corresponded with the lowest glacial cycle temperature just prior to its Holocene interglacial temperature rise. The LGM was reached between 24,098 and 22,010 years ago in Greenland (GISP2[[31]](#endnote-31) and GRIP[[32]](#endnote-32) respectively), between 19,300 years and 18,953 years ago in Antarctica (Dome Fuji[[33]](#endnote-33) and Antarctic Dome-C[[34]](#endnote-34) respectively), and globally 19,600 years ago.[[35]](#endnote-35)

The Holocene Climate Optimum on the other hand corresponded with the peak glacial cycle temperature, at the end of the Holocene interglacial temperature rise. After a glacial cycle’s climate optimum, an ice age begins and the temperature declines. The HCO was reached in Antarctica between 10,570 years (Dome-C,) and 10,100 years ago (Dome Fuji), in the Arctic between 7,800 (see31) to 7,890,[[36]](#endnote-36) and 9,384[[37]](#endnote-37) years ago, and globally by 2,100 years ago.[[38]](#endnote-38) In all cases the polar and global temperatures declined in an oscillatory manner after the Holocene Climate Optimum, **reflecting our ice age entry.**

The IPCC obviously ignored the above two paragraphs widely cited climate data and their readily retrievable glacial cycle reference points because they told governments, “*Since the end of the last ice age,* ***about 10,000 years ago****, global surface temperatures have probably fluctuated by little more than 1°C*.”[[39]](#endnote-39) The timing facts are somewhat different from this **data-less opinion,** in that by “*about 10,000 years ago*” the global sea level had *already* risen 80% and the temperature 90%, of their total Holocene interglacial rise.[[40]](#endnote-40) The IPCC’s timing for the **end of the last ice age is categorically refuted**.

Looking closer at the Greenland ice core, it is clear a new ice age already commenced 8,000 years ago in the North Pole because the temperature declined by 4.86°C between the Holocene Climate Optimum (5980 BCE) and 1700 CE.[[41]](#endnote-41) This Arctic temperature decline represented one-fifth of its Holocene interglacial temperature rise (in absolute magnitude).[[42]](#endnote-42) Likewise, a new ice age commenced in Antarctica 10,500 years ago, because the temperature declined by 4.56°C between 8577BCE and 1738CE.[[43]](#endnote-43) It is vital to understand that these polar temperature declines occurred in a *devolving oscillatory manner*, on multi-decade to centennial time scales—meaning earth exists in warm and cold phases that get colder and colder as we progress into the ice age (see below).

Orbitally induced changes in solar irradiance data (i.e., precession of the summer solstice modified irradiance) also confirm that **earth entered a new ice** age 8,000 to 10,000 years ago in the Arctic. Precession modified solar irradiance **declined 40-50 Watts/m2** since its Holocene Climate Optimum peak (at 65°N latitudes).[[44]](#endnote-44),[[45]](#endnote-45),[[46]](#endnote-46) (i.e., 15 times today’s putative human radiative forcing impact). This millennial-scale decline in solar irradiance paralleled the decline in northern hemisphere temperatures over the same period.[[47]](#endnote-47),[[48]](#endnote-48)

This current ice age inception’s long-term decline in the northern hemisphere temperature that paralleled the precession modified solar irradiance (at 65°N) *helps explain* the significant glacier ice buildup that took place after the Holocene Climate Optimum (HCO), which hallmarked our early ice age inception (oddly ‘only’ referred to as *neoglaciation, rather than ice age inception*). Less glacier ice was present in both poles at the HCO than today.[[49]](#endnote-49),[[50]](#endnote-50),[[51]](#endnote-51),[[52]](#endnote-52) From about **five millennia ago significant ice mass began accumulating at both poles**, particularly during the second millennium CE.[[53]](#endnote-53),[[54]](#endnote-54),[[55]](#endnote-55),[[56]](#endnote-56) Glacier size peaked by the end of the Little Ice Age.[[57]](#endnote-57),[[58]](#endnote-58) Since the mid-19th century the Arctic’s ice melted significantly.[[59]](#endnote-59),[[60]](#endnote-60),[[61]](#endnote-61) WG1 remind us that this melt-initiation started in the 19th century “*before significant anthropogenic RF had started, and was probably the result of warming associated with the termination of the Little Ice Age*.”[[62]](#endnote-62) That is to say, natural climate change was controlling the rising temperature and ice melt before the putative anthropogenic global warming **hijacked** it from 1880 CE. Even with this post-19th century ice melt the inner **Antarctic ice domes are still 100 meters higher today** than at the HCO.[[63]](#endnote-63)

From 1700CE Greenland’s climate then entered a warming phase and raised 2.87°C by 1940 (data end; 1960). This warming phase initiation preceded significant greenhouse gas emissions, meaning something else caused/controlled the warming. This 1700CE initiated warming phase is *the most extreme outlier of 39 Arctic warming phases over the last 8,000 years*, exceeding +0.99°C from its deepest trough to its tallest peak. Even with this extreme warming, today’s temperature is still 2-4°C lower than at the HCO.13,[[64]](#endnote-64),[[65]](#endnote-65),[[66]](#endnote-66) (see Revolution’s Figures 4.1-4.2 and [PDF](https://grandsolarminimum.com/presentation/) slide deck #6).

Given the above-cited climate data sets and their Holocene Climate Optimum time-temperature reference points it is almost comical, veiled catastrophes aside, that the IPCC’s AR4 WG1 **erroneously delayed** the next ice age by an *unprecedented* 30,000 years, and advised governments that this represented a “*robust finding.*”[[67]](#endnote-67) AR5’s WG1 further extended the ice age to a contingent 50,000 years, while also telling governments it is “*virtually certain*” that glaciation will not occur within the next 1,000 years.[[68]](#endnote-68) This virtual certainty fails to reflect five millennia of ice build up and our limited ‘proven’ oil and gas reserves (see endnotes219-228) to warm the planet as they predict.

None of these biased ice age delay opinions were subject to peer review scrutiny. The 50,000-year contingent delay also assumed the Article 1 and 2-installed radiative forcing theory was correct, even though the IPCC was unable to accurately predict GMST over the last 30 years using that theory. WG1 failed to provide any **statistical validation** for extending the already longest inter-climate optimum interval in 2 million years, by another 30,000 years. A 30,000-year delay would create an extreme outlier (P-value <0.05) and convert two million years (33 glacial cycles) of global inter-climate optimum interval data from a normal to a non-normal distribution,[[69]](#endnote-69) thus falsifying this putative ice age delay. Two other **statistical falsifications** of this 30,000-year delay are detailed in the following citations (i.e., impacting the Antarctic-to-global climate optimum phasing gaps, and the interglacial durations, for 800,000 to one million years of glacial cycles).[[70]](#endnote-70),[[71]](#endnote-71)

The previously cited precession modified solar irradiance and the corresponding millennial scale decline in the temperature also **falsifies** the IPCC’s *theoretical* 30,000-year ice age delay.(67) WG1’s opinion that, “*The* *Milankovitch, or ‘orbital’ theory of the ice ages is now well developed,*”[[72]](#endnote-72) is scientifically contentious.[[73]](#endnote-73),[[74]](#endnote-74),[[75]](#endnote-75),[[76]](#endnote-76),[[77]](#endnote-77),[[78]](#endnote-78) More simplistically, you only have to analyze the mean inter-climate optimum intervals globally (average 93,000 years) and in Antarctica (average 97,000 years) from the last one-million years, and their approximate20,000 year standard deviation, to realize there is no Milankovitch “100,000 year eccentricity clockwork-pacemaker” controlling the start (or end) of ice ages.[[79]](#endnote-79) **This ice age delay opinion is categorically refuted**.

The above paragraphs highlight that by not reflecting polar climate change before 1880 CE and back to the Last Glacial Maximum/Holocene Climate Optimum, we **lack a bearing on the real stage of the glacial cycle that we exist in.** This lack of bearinghas enabled our systematic manipulation over decades by the UN/IPCC, while veiling catastrophic natural climate change risks most pertinent to the 21st century.

By analyzing the Greenland ice core climate oscillations our **21st century abrupt climate-switching fate becomes evident**. All previously discussed 39 Arctic-warming phases in the last 8,000 years, exceeding +0.99°C from their deepest trough to their tallest peak, **switched to a cooling phase** after an average of 80 years. This extreme outlier Arctic warming phase initiated in 1700 was *long overdue a switch of phase to its cooling mode decades ago* (on average; -2°C within 40 years, P-value <0.05), and long before significant human greenhouse gas emissions.[[80]](#endnote-80),13 To give you perspective, the second most extreme Arctic warming phase in 8,000 years occurred just prior to the 4.2 kiloyear rapid climate change event that was associated with the collapse of ancient Egypt’s Old Kingdom,[[81]](#endnote-81),[[82]](#endnote-82) Mesopotamia’s Akkadian Empire,[[83]](#endnote-83) and the Indus Valley Culture.[[84]](#endnote-84)

Additional support for a climate-switch to a global cooling phase is evident when comparing the temperature declines after the climate optima, for all glacial cycles in the last 800,000 years (Antarctica) and two million years (Global). This analysis shows that this current ice age inception is the slowest to decline in temperature compared with all other glacial cycles in 800,000 years (Antarctica) and two million years (Global). Antarctica’s current ice core temperature is 3.1°C higher than the average 10,500 years after the Antarctic climate optimum. Similarly, the current global temperature is 1.26°C higher than the average 2,100 years after the global climate optimum. If the climate system reverted to the glacial cycle mean, then **we are in for a cold surprise**. Just to clarify, this slow declining temperature trajectory long preceded significant human greenhouse gas emissions (see [PDF](https://grandsolarminimum.com/presentation/) Slide deck #8, and Revolution’s Figures 3.5-3.6).[[85]](#endnote-85),[[86]](#endnote-86)

**Catastrophic natural and rapid climate change risks were dismissed or omitted in the IPCC’s key-risk assessment**

Just because [AR5/SREX](https://www.ipcc.ch/reports/) reports mention a specific climate risk, or exemplars of rapid climate change, with plenty of argument-supporting citations, it does not mean **a relevant, comprehensive, and unbiased risk assessment** was conducted.

Key word searches of AR5 documents for the Younger Dryas, the Little Ice Age (LIA), volcanism, and abrupt or rapid climate change, make it crystal clear the bias and argument buttressing associated with their mention, dismissal, or omission from the climate change key-risks. Poignantly, these reports tell us why **we can’t extrapolate lessons** from the LIA or post-Holocene Climate Optimum (HCO) rapid climate change events, in to today’s world.[[87]](#endnote-87) While the IPCC may have met its obligation under the politically motivated UNFCCC Article 2 diktat, the general public, government administrations, and the business world are unaware of this *restricted key-risk contrivance that dismisses or omits the most relevant natural climate change risks we will face during the early-mid 21st century*.

Working Group 1 **only** reviewed theoretical abrupt or rapid climate change risks relevant to anthropogenic global warming, and according to a restricted definition. The IPCC **dismissed the prospect of near term abrupt climate change** by telling us, “*The likelihood of such changes is generally lower for the near term than for the long term*.”[[88]](#endnote-88) This near-term dismissal was then used to focus our attention on hypothetical-contrived long-term abrupt climate change risks, which were then **dismissed and/or were irrelevant to our stage of the glacial cycle**. A small number of causations of potentially catastrophic abrupt climate change linked only to *global warming* were reviewed (i.e., Atlantic Meridional Overturning Circulation or AMOC collapse, Dansgaard-Oeschger and Heinrich events, and abrupt methane release from clathrates etc.), but their prospect was dismissed(see next). Critically, **no abrupt climate change risks appear in the IPCC’s promoted key-risks** (global cooling related).6,7,8,9

WG1 reviewed and then dismissed the theoretical prospect of abrupt methane release during the 21st century from land and oceanic clathrate sources due to anthropogenic global warming.[[89]](#endnote-89),[[90]](#endnote-90) Catastrophic methane release last occurred during the Paleocene-Eocene thermal maximum about 55 million years ago,[[91]](#endnote-91) when global temperatures were twice as high as today’s ice age epoch climate trough and when no polar ice caps existed (i.e., *this page-filling detail is irrelevant to the post-Holocene Climate Optimum period*).

WG1 (and WG2) tell us, “*The most prominent abrupt climate change periods in the recent geological record, developing within 10 to 100 years, are associated with Dansgaard-Oeschger and Heinrich events (WGI AR5 Section 5.7), which occurred repetitively during the last 120 kyr.*”[[92]](#endnote-92),[[93]](#endnote-93) These events occur after the Arctic ice cap has already formed in the depths of an ice age (i.e., *this page-filling obfuscating detail is irrelevant to the post-Holocene Climate Optimum period*).

In reality, **the most prominent** **abrupt or rapid climate change events** or periods in the recent geological record (i.e., since just before the Holocene Climate Optimum), developing within 10 to 100 years, were the *Younger Dryas*, the 8.2, 5.9, and 4.2 kiloyear *rapid climate change events* (among others), the *Little Ice Age*, and the multitude of climate-forcing (<-5W/m2) or *large magnitude volcanic* e*ruptions (VEI 6-7)* that impacted climate change within one year*.*

A keyword search of AR5’s five documents reveals 61 instances mentioning abrupt climate change (ACC) and 44 instances mentioning rapid climate change (RCC). The vast majority of ACC/RCC mentions relate to end of chapter citations, with a minority of mentions linked to **theoretical** discussions on global warming. One ACC mention was associated with the 8.2Kyr rapid climate change event, which was linked with a discussion on AMOC recovery times (i.e., *its warming phase, rather than its catastrophic rapid cooling-drought phase*; see Younger Dryas discussion below).[[94]](#endnote-94) The only mention of ACC/RCC risks linked to risk-mitigation related to theoretical risks associated with the inane idea of geoengineering the unproven anthropogenic global warming.[[95]](#endnote-95)

None of these ACC/RCC mentions, quantified or reviewed the human mortality and destructive impact (i.e., on societies and civilizations), or analyzed data (i.e., human mortality, climate, solar activity, and volcanic eruption data, and their correlations) associated with the well-known 8.2Kyr, 5.9Kyr, and 4.2Kyr rapid climate events, the current era’s climate forcing volcanic eruptions, the Little Ice Age, or the Younger Dryas.

Well-known ACC/RCC events that took place since just before Greenland’s Holocene Climate Optimum are highly relevant to our 21st century climate context. In summary, these RCC events were characterized by abrupt (i.e., annual to decadal) and sustained (i.e., over centuries) cooling periods in the Poles, which reverberated globally. Arctic ice core temperatures declined between 3°C and 6°C and were associated with significant ice sheet expansions and a more general global cooling. Droughts and desertification also intensified across Northern Africa, the Middle East, parts of Asia, and the tropics. Some of these RCC events and their catastrophic impact on ancient societies are cited, including the 8.2 kiloyear,[[96]](#endnote-96),[[97]](#endnote-97),[[98]](#endnote-98),[[99]](#endnote-99) the 5.9Kyr,[[100]](#endnote-100) and the 4.2Kyr events [[101]](#endnote-101),[[102]](#endnote-102),[[103]](#endnote-103)[[104]](#endnote-104),[[105]](#endnote-105),[[106]](#endnote-106),[[107]](#endnote-107),[[108]](#endnote-108),[[109]](#endnote-109),[[110]](#endnote-110),[[111]](#endnote-111),[[112]](#endnote-112),[[113]](#endnote-113),[[114]](#endnote-114),[[115]](#endnote-115),[[116]](#endnote-116),[[117]](#endnote-117),[[118]](#endnote-118),[[119]](#endnote-119) (multiple citations review the varying geographical and societal impacts).

One of the most catastrophic rapid climate change events of the Holocene interglacial period was the Younger Dryas (12,900-11,700 YBP). Within the space of a few decades, the temperature in the Arctic ice core dropped by about 9°C,[[120]](#endnote-120) and the Arctic ice sheets advanced. The Younger Dryas was associated with the most pronounced fauna extinctions of the Holocene interglacial, including dozens of mammalian and avian species.[[121]](#endnote-121),[[122]](#endnote-122) The human species was also majorly curtailed in affected regions, with humans being forced to migrate to survive.[[123]](#endnote-123) How will the world cope with the need to ***move tens of millions of people*** if such an event took place during this current grand solar minimum period?

AR5s suite of five documents mentioned the Younger Dryas (YD) ten times. Three YD mentions focus our attention on the rate of regional warming in the recovery phase of the YD (allegedly comparable to all four global warming scenarios), *rather than thoroughly examine the rapid cooling* that was associated with **numerous** **mammalian species extinctions**.[[124]](#endnote-124) One other significant mention of the YD was to **dismiss the prospect** of a 21st century Atlantic Meridional Overturning Circulation (AMOC) weakening linked to anthropogenic global warming.[[125]](#endnote-125)

A review of AR5 documents highlights 218 instances mentioning AMOC. The vast majority of AMOC mentions focus on global warming and theoretical model simulations supporting the IPCC’s conclusion, “*It is* *very unlikely that the AMOC will undergo an abrupt transition or collapse in the 21st century for the scenarios considered (****high confidence****)”* (i.e., linked to the IPCC’s four global warming scenarios).[[126]](#endnote-126) WG1 also dismissed the prospect of a northern hemisphere cooling resulting from a strong AMOC reduction, under all four RCP warming scenarios. This AMOC-linked cooling dismissal was counter to the FIO-ESM modeled outputs,(126) which were inconvenient to the IPCC’s biased key-risk assessment. This FIO-ESM AMOC-linked cooling dismissal was also in the full knowledge that significant radiative forcing cooling factors (i.e., secular changes in solar activity and volcanism) were excluded from the IPCC GMST forecasts and its heavily redacted and non-natural version of the climate system.(19,[[127]](#endnote-127),[[128]](#endnote-128))

The impact of secular changes in solar activity (i.e., irradiance and magnetized solar wind) and volcanism on abrupt AMOC changes (and other atmospheric and ocean circulation systems) were also *omitted* from the IPCC’s promoted key-risks. This omission is despite the IPCC telling us that stratospheric processes, the North Atlantic Oscillation, sea surface temperatures, sea ice, and external forcing (i.e., solar activity, volcanism) can lead to atmospheric blocking associated with AMOC changes.[[129]](#endnote-129) (See also other literature[[130]](#endnote-130),[[131]](#endnote-131),([[132]](#endnote-132))). This AMOC collapse dismissal was also made in the full knowledge of the *significant* *limitations of the IPCC promoted* CMIP5 *models* to simulate post-volcanic radiative and dynamic responses.[[133]](#endnote-133)

Importantly, prior to AR5’s release in 2013,[[134]](#endnote-134), [[135]](#endnote-135),[[136]](#endnote-136) and subsequently,[[137]](#endnote-137),[[138]](#endnote-138) the science has emerged to define a putative multi-decadal- to centennial-scale Arctic ice accumulation mechanism, linked to climate forcing volcanism, secular changes in solar activity (i.e., grand solar minima), sea ice exports, and changes in Arctic-Atlantic ocean and sea circulations. Revolution’s Chapters 4-7 provides many literature citations and the science detailing how the sun ‘**controls**’ earth’s ‘**regulating**’ climate system (via solar irradiance **AND** magnetized solar wind mechanisms).[[139]](#endnote-139)

A keyword search of AR5’s suite of five documents reveals 61 instances mentioning the “Little Ice Age (LIA),” with 25 mentions associated with end of chapter citations, and 11 associated with annotations. Most pertinent of all of the remaining LIA mentions is that we are told **we can’t extrapolate lessons** from this six century catastrophic period in to today’s world,[[140]](#endnote-140) for what amounts to argument-buttressing confirmation bias.

The next most pertinent LIA mentions relate to what is known about the LIA’s regional varying climate change (i.e., cold, snow, mega-droughts and high rainfall periods), and the melting of the glaciers after the LIA (i.e., whose melt-initiation preceded significant human activity).[[141]](#endnote-141) In this prior citation **WG1 tell us that external orbital, solar and volcanic forcing “*contributed substantially”*** to the LIA’s climate change. Despite knowing of this “substantial contribution” (i.e., via the LIA’s multiple grand solar minimum periods, and 11 Volcanic Explosivity Index 6-7 (VEI 6-7) large magnitude volcanic eruptions and a raft of VEI 4-5 eruptions[[142]](#endnote-142)), the IPCC **conveniently omitted** secular changes in solar activity (i.e., this grand solar minimum period) and volcanic forcing from its climate forecasts (i.e., thereby eliminating potent cooling factors), key-risk assessments, and risk-mitigation advice to governments.

Crucially, there is no mention, emphasis, or quantification in the AR5 documents of the widespread human catastrophes associated with the LIA’s successive and prolonged periods of cold and climate extremes, despite the literature detailing this.[[143]](#endnote-143),[[144]](#endnote-144),[[145]](#endnote-145),[[146]](#endnote-146),[[147]](#endnote-147) For example, in China the number of **war outbreaks and population collapses was significantly correlated** with northern hemisphere temperature variations. All the *periods of turmoil* in China occurred in the **cold phases of the LIA**. On two such occasions **during the LIA China lost nearly half of its population**, while the Black Plague culled one-third of Europe’s population (during the Wolf minimum).[[148]](#endnote-148)

My review of the literature indicates the strongest cooling impact during the Little Ice Age occurred in the North Atlantic and the northern latitudes of Europe, Asia, and North America. By contrast, there was either more droughts or more rainfall at the lower latitudes, which was atmospheric circulation and monsoon system dependent. In each region differing climate extremes were known to have occurred, and were associated with secular changes in solar activity i.e., *the LIA’s numerous grand solar minima periods*. The various LIA citations for Europe,[[149]](#endnote-149),[[150]](#endnote-150),[[151]](#endnote-151),[[152]](#endnote-152),[[153]](#endnote-153),[[154]](#endnote-154) North America,[[155]](#endnote-155),[[156]](#endnote-156) China,[[157]](#endnote-157),[[158]](#endnote-158),[[159]](#endnote-159),[[160]](#endnote-160),[[161]](#endnote-161),[[162]](#endnote-162) India,[[163]](#endnote-163),[[164]](#endnote-164),[[165]](#endnote-165),[[166]](#endnote-166) Africa,[[167]](#endnote-167),[[168]](#endnote-168),[[169]](#endnote-169),[[170]](#endnote-170)South America,[[171]](#endnote-171),[[172]](#endnote-172),[[173]](#endnote-173),[[174]](#endnote-174) Caribbean and the Yucatan Peninsula,[[175]](#endnote-175),[[176]](#endnote-176),[[177]](#endnote-177),[[178]](#endnote-178) provide you the regionally specific climate change facts of science.

There is also **no mention** in AR5 documents of the climate predictions published by scientists expert in solar activity driven climate change, linked to this grand solar minimum period. These **experts warn us** in a consensus-like manner of a return to Little Ice Age-like conditions during this grand solar minimum (2020-2060 CE).[[179]](#endnote-179),[[180]](#endnote-180),[[181]](#endnote-181),[[182]](#endnote-182),[[183]](#endnote-183),[[184]](#endnote-184),([[185]](#endnote-185),[[186]](#endnote-186)) Instead the IPCC **dismissed the prospect and impact of this grand solar minimum**, while only mentioning the term once in all five AR5 documents (i.e., one end of chapter citation). Despite **only one mention of grand solar minimum** and the following quote, “*the most recent solar minimum was the lowest and longest since 1920*,” WG1 had an unwarranted “*low confidence”* in expert projections of a much quieter sun in the decades ahead.[[187]](#endnote-187) Their assessment does not constitute a credible scientific risk assessment for grand solar minimum periods. **Who is the IPCC to dismiss another discipline’s science** (i.e., solar activity) and its predictions, when national space agencies, the military, and numerous industries rely on that same predictive science?

For your information, there exists a significant (r=-0.78, P-value <0.00001) and superior correlation (compared with CO2), between the northern hemisphere temperature and the 18-year moving average (mav) Beryllium-10 concentration anomaly (i.e., **proxy for magnetized solar wind**) *since 1400 CE*.[[188]](#endnote-188) The temperature and mav-Beryllium-10 concentration anomalies *vary inversely together* on multi-annual, multi-decadal, and multi-centennial time scales, unlike the atmospheric CO2 concentration. The correlation coefficients also strengthen during grand solar minimum and maximum periods (see Revolution’s Figures 4.3, 4.4 and 6.2, and [PDF](https://grandsolarminimum.com/presentation/) slide deck #7 and #10). This data indicates that the climate lags solar activity by at least one 11-year solar cycle, and that **cold climates always follow the sun’s decline in magnetic activity during grand solar minimum periods**. This data fully supports the solar activity-climate experts’ cooling predictions for this grand solar minimum period.

The implications of the above seven paragraphs is obvious; **(1)** this current grand solar minimum has not been reflected in IPCC climate forecasts, key-risks, and risk-mitigation advice. **(2)** Climate change *risk-mitigation advice must be unshackled* from its UNFCCC Article 2 constraint and be regionally bespoked, based on the Little Ice Age and rapid climate change precedents.

While it is clear the IPCC recognizes that volcanic activity can have a dramatic impact on the global climate (i.e., cooling), crucially the IPCC’s climate forecasts,[[189]](#endnote-189) promoted key-risks(6,7,8,9), and **risk-mitigation advice unrealistically does not include** the occurrence of climate-forcing volcanic eruptions (see [PDF](https://grandsolarminimum.com/presentation/) Slide deck #13). Upon reviewing AR5 WG3’s Mitigation of Climate Change report and the Final Synthesis report linked to volcanism, the only *risk-mitigation* discussion associated with volcanism was linked to the inane idea of artificial stratospheric aerosol injections to counter the unproven anthropogenic global warming.[[190]](#endnote-190) **There is no mention** of our need to mitigate the risks of large magnitude volcanism on *world energy supplies and solar PV/CSP systems, or on climate-adapting our global agriculture, bolstering food stockpiles and emergency food production capabilities, readying cold-adapted crop seed banks, improving global food supply resilience, or ensuring sustainable water supply in drought prone regions* (see Revolution’s Chapters 8-12).

Just to remind you. Climate-forcing volcanism was periodically catastrophic after the Holocene Climate Optimum, and during the Little Ice Age (LIA).[[191]](#endnote-191),[[192]](#endnote-192),[[193]](#endnote-193),[[194]](#endnote-194) The Rinjani eruption (1257 CE, a VEI 7 eruption during a grand solar maximum) was one of the largest volcanic eruptions of the current era, and was thought to have triggered the LIA.[[195]](#endnote-195) This eruption was associated with climate disruptions in Europe and Eurasia in the ensuing years, causing cold winters and summers, and severe flooding. This led to grain shortages, food price inflation, and famines associated with high mortality over the ensuing years-decades.[[196]](#endnote-196),[[197]](#endnote-197),([[198]](#endnote-198)) Similarly, Tambora (1815 CE, a VEI 7 eruption during the Dalton minimum) caused disastrous crop failures across the northern hemisphere the following year. The year 1816 was dubbed the “*year without a summer*.” This also led to widespread famine, social unrest, and caused a major human death toll in Europe, Asia, and North America.[[199]](#endnote-199),[[200]](#endnote-200),([[201]](#endnote-201))

Since AR5’s publication, scientists indicate that a repeat of a Laki-like volcanic eruption (Iceland, 1783) would wipe out *one year’s worth of food for one-third of the world’s population*.[[202]](#endnote-202) **How will governments and 7.7 billion people cope with a Laki-, or Rinjani- or Tambora-like eruption without a global risk-mitigation plan?**

Grand solar minima and maxima represent high-risk periods for climate-forcing volcanism. These grand solar minima and maxima are putatively acting as a *climate oscillator* through their impact on climate-forcing volcanism, and the previously mentioned Arctic ice accumulation mechanism (see Revolution’s Chapter 5 and [PDF](https://grandsolarminimum.com/presentation/) Slide deck #11). Revolution’s Figure 5.1 highlights that 77 percent of volcanic eruptions of more than a -5W/m2 climate forcing impact, over the last 11,000 years, occurred at or within a decade of a grand solar minimum or maximum (determined by tree-ring C14 reconstructed sunspot numbers[[203]](#endnote-203)) (and 87% at or within two decades).[[204]](#endnote-204) A similar result was obtained with the VEI 6-7 eruptions from the Volcano Global Risk Identification and Analysis Project (VOGRIPA) database (82 percent at or within a decade).[[205]](#endnote-205)

Revolution’s Figure 5.2.A (and [PDF](https://grandsolarminimum.com/presentation/) Slide deck #12) shows that 5 of the 11 large magnitude volcanic eruptions (VEI 6-7) during the LIA and since Rinjani’s grand solar maximum associated eruption (1257 CE), took place at or near the trough of grand solar minima periods. A further 3 of 11 large magnitude volcanic eruptions occurred half way into a grand solar minimum, while the remaining 3 of 11 eruptions occurred at grand solar maximum sunspot number peaks. Similarly, Revolution’s Figure 5.2.B highlights that the **8.2-kiloyear RCC** event (**associated with an AMOC collapse**) took place at or near the trough of a *deep grand solar minimum period*, which was associated with a *cluster of climate-forcing volcanic eruptions* (of less than a -5W/m2 forcing).[[206]](#endnote-206)

This section has reviewed the history, science, and data associated with natural climate change risks (i.e., the famine inducing; prolonged regional-global cooling and drought periods, the rapid climate change events, and climate forcing volcanism) since just before the Holocene Climate Optimum. These natural climate change risks and their putative links with grand solar minimum periods *do not support their collective dismissal or omission by the* IPCC in its climate forecasts, key-risk assessments, and regionally specific risk-mitigation advice.

**A grand solar minimum period accompanied by cold and glaciation poses heightened risks for an influenza pandemic**

Unbeknown to science is the observation that grand solar minimum associated cold-glaciation periods pose increased pandemic influenza risk. Pandemic influenza outbreaks demonstrate a high frequency of association with: **(A)** peaks and troughs (±1 year) of the 11-year solar cycle, embedded in numerous solar activity related parameters,[[207]](#endnote-207),[[208]](#endnote-208),[[209]](#endnote-209),[[210]](#endnote-210) **(B)** specific thresholds of solar activity- and climate-related parameters,207,208,[[211]](#endnote-211),[[212]](#endnote-212),[[213]](#endnote-213),[[214]](#endnote-214) while **(C)** numerous significant correlations (r>±0.9, P-value <0.05) are evident between the number of pandemics[[215]](#endnote-215) per century and/or the average pandemic interval per century through the Little Ice Age, and the prior cited solar activity and climate change parameters.[[216]](#endnote-216),[[217]](#endnote-217) (see Revolution’s Figures 14.1 and [PDF](https://grandsolarminimum.com/presentation/) Slide deck #16). **WHO Influenza**, various National Health Ministries and Centers for Disease Control, and academic groups **were provided the above-cited data** and provisional conclusions on numerous occasions. No replies have been forthcoming since 02/2018.

Arguably, we should be on or approaching **red-alert**, but our perception of pandemic risk is undermined by the IPCC’s dismissal of solar activity’s control of natural climate change and its 30,000-50,000 year ice age delay. With highly pathogenic avian H5N1 and H7N9 influenza strains (among others) continuing their mutation and animal-to-human infections,[[218]](#endnote-218) we should be **very** **concerned about a pandemic outbreak during this high-risk grand solar minimum period**.

Making matters worse, WHO presides over an obsolete (70 years old) global vaccine and immunization strategy for pandemic influenza that leaves humans immunologically vulnerable to an influenza pandemic, when technologically this no longer needs to be the case. This archaic WHO-led global vaccine strategy recommends the manufacture of a vaccine and immunization after a pandemic outbreak, rather than beforehand. Given 2009’s swine influenza pandemic vaccine supply debacle, WHO is aware that population immunity can not be equitably achieved before the peak of a pandemic under this vaccine strategy, irrespective of global manufacturing capacity (i.e., the lead time to a pandemic flu vaccine's marketing approval is broadly the same as the time to a pandemic's peak incidence and mortality) (see Revolution’s Chapter 14 and [PDF](https://grandsolarminimum.com/presentation/) Slide deck #17 for the solution).

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Given the IPCC’s dismissal-omission of catastrophic natural climate change risks relevant to the early-mid 21st century and our imminent ice age re-entry**;** our governments' failure to mitigate the most relevant natural climate change and related key-risks**;** our limited ‘proven’ oil and gas reserves (AR4-5 WG3[[219]](#endnote-219),[[220]](#endnote-220)),[[221]](#endnote-221) the highly guesstimated-overstated nature of our unproven oil and gas reserves,[[222]](#endnote-222),[[223]](#endnote-223) and with peak oil and gas discovery being history (all undermining our perception of energy scarcity)**;**[[224]](#endnote-224),[[225]](#endnote-225),[[226]](#endnote-226),[[227]](#endnote-227),[[228]](#endnote-228) I am fully justified in refuting the UN/IPCC’s key-risk assessment on behalf of 7.7 billion global citizens.

Part 2 of Revolution reviews how we can **urgently mitigate the key-risks and hazards** for the energy, water, and food nexus. This is pitched at the level of central and local governments, communities, and people living at home. This composite strategy promotes a **switching of the world’s energy system** to renewables and the implementation of **centralized/decentralized sustainable development and living**, with a **great** **sense of urgency and equality**. It also promotes **prepandemic immunization** of the world’s population against high-risk pandemic influenza threats, using existing market approved influenza vaccine technologies (upgraded).

Yours sincerely

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Advocate/Activist for Natural Climate Change Risk-Mitigation: Switching to Renewable Energy, and Implementing Decentralized/Centralized Sustainable Development and Prepandemic Influenza Immunization (**Urgently**)

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**Endnote Citations and incriminating IPCC Quoted Disclosures**

1. **Ice Age entry/re-entry thesis**: My free ebook “Revolution: Ice age Re-Entry” plus the appended [PDF](https://grandsolarminimum.com/presentation/) slide-deck (available at https://grandsolarminimum.com/presentation/) contains the definitive thesis supporting this ice age entry/re-entry theory. This thesis was intentionally placed in the public domain beyond IPCC, academia, and academic publishing control. This Amazon best selling book is freely available at all Amazon stores (US link; <https://amzn.to/2PyQsxV>) , Google Play (<http://bit.ly/2JFHz08>), Kobo (<http://bit.ly/2F3DdRQ>), and Researchgate (<http://bit.ly/2UnTBju>). [↑](#endnote-ref-1)
2. **The IPCC confirms its scientific bias (1).** Climate Change: The IPCC Scientific Assessment (1990). Report prepared for Intergovernmental Panel on Climate Change by Working Group 1. J.T. Houghton, G.J. Jenkins and J.J. Ephraums (eds.). Cambridge University Press, Cambridge, Great Britain, New York, NY, USA and Melbourne, Australia 410 pages. [See the Preface, “*The result is the most authoritative and strongly supported statement on climate change made by the international scientific community. The issues confronted with full rigor include: global warming, greenhouse gases, the greenhouse effect, sea level changes, forcing of climate, and the history of Earth's changing climate.*” **NB:** i.e., there is no mention of the other climate science sub-fields linked to natural climate change]. [↑](#endnote-ref-2)
3. **The IPCC confirms its scientific bias (2).** IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp. [See the Preface Page vii. “*The Working Group I report focuses on those aspects of the current understanding of the physical science of climate change that are judged to be* ***most relevant to policymakers****. It* ***does not attempt to review the evolution of scientific understanding or to cover all of climate science****.*” **NB:** this confirms its scientific bias.]. [↑](#endnote-ref-3)
4. **The IPCC confirms its scientific bias (3).** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See the Preface page vii, “*Underlying all aspects of the report is a strong commitment to assessing the science comprehensively,* ***without bias and in a way that is relevant to policy*** *but not policy prescriptive*,” and “*Focused on those aspects of the current understanding of the science of climate change that were judged to be most relevant to policymakers*.” **NB:** confirming the IPCC’s bias directly (i.e., relevant to policy makers) and indirectly (i.e., manipulatively telling us “without bias,” which is diversionary). See page 661 Chapter 8, Executive Summary. *“As in previous IPCC assessments, the fifth assessment report uses the radiative forcing (RF) concept, but it also introduces effective radiative forcing (ERF)*.” **NB:** without reflecting the tremendous progress made by other climate science sub-fields]. [↑](#endnote-ref-4)
5. **InterAcademy Council confirms the IPCC’s scientific bias and its bias-enabling procedures.** Climate Change Assessments. Review of the processes and procedures of the IPCC. October 2010. Committee Review of the Intergovernmental Panel on Climate Change. Report available at <http://reviewipcc.interacademycouncil.net/>. [Page 18; **Critiquing the IPCC’s “confirmation bias.”** Page 14; Government provided and politically aligned scientists. We are told that governments do not always put forward the names of the best climate scientist volunteers for the IPCC work. Political considerations are prioritized over scientific expertise and qualifications in the IPCC scientist selection process. Page 14; **“Author selection” enables scientific bias.** Co-chairs select lead and coordinating authors from a list of nominees provided by governments. Page 21; **lack of independent review of AR1-4 arises** because the working group co-chairs also select the review editors. Page 23; final synthesis reports are **not written by independent expert scientists**, but results from negotiations among government representatives and the IPCC chair and working group co-chairs. Page 24; **line-by-line negotiation results in differences** between the assessment reports and the final politicized synthesis report provided to governments.]. [↑](#endnote-ref-5)
6. **WG2 tell us the climate key risks are only those relevant to UNFCCC Article 2 (anthropogenic global warming) while rapid climate change is dismissed/omitted:** IPCC, Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [See page 59, Section B-1. Key Risks across Sectors and Regions, “***Key risks are potentially severe impacts relevant to Article 2 of the UN Framework Convention on Climate Change****, which refers to “dangerous anthropogenic interference with the climate system*.” See pages 59-65 for the IPCC’s projected *key risks associated only with anthropogenic global warming*. See page 59, “*Key risks are integrated into five complementary and overarching reasons for concern (RFCs) in Box TS.5*.” See page 61, “*They (i.e., RFCs) provide one starting point for evaluating dangerous anthropogenic interference with the climate system*.” NB: All RFC’s are linked to elevated temperature thresholds. See page 62, “***The overall risks of climate change impacts can be reduced by limiting the rate and magnitude of climate change*** (NB: i.e., temperature rise)*.* ***Risks are reduced substantially under the assessed scenario with the lowest temperature projections (RCP2.6 – low emissions) compared to the highest temperature projections*** *(RCP8.5 – high emissions)*,.” See page 63, “*Box TS.6 | Consequences of Large Temperature Increase.*” See page 64, “*Table TS.4,* ***Climate-related drivers of impacts: Warming trend, extreme temperature, drying trend, extreme precipitation, damaging cyclone, flooding, storm surge, ocean acidification****.*” NB: these climate-related drivers are only those associated with anthropogenic global warming. See page 11, “*Key risks are potentially severe impacts relevant to Article 2 of the United Nations Framework Convention on Climate Change, which refers to “dangerous anthropogenic interference with the climate system.” Risks are considered key due to high hazard or high vulnerability of societies and systems exposed, or both. Identification of key risks was* ***based on expert judgment*** *using the following specific criteria:*” See page 12, “*The key risks that follow, all of which are identified with high confidence, span sectors and regions*. (NB: **associated with global warming**).” See page 13 for the risks linked to anthropogenic global warming i.e., sea level rise and flooding, extreme weather events, food and water insecurity, and loss of biodiversity.]. [↑](#endnote-ref-6)
7. **WG2 claim climate risks can be reduced by cutting emissions:** IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [**(1)** See page 14. “*Increasing magnitudes of warming increase the likelihood of severe, pervasive, and irreversible impacts. Some risks of climate change are considerable at 1 or 2°C above preindustrial levels (as shown in Assessment Box SPM.1). Global climate change risks are high to very high with global mean temperature increase of 4°C or more above preindustrial levels in all reasons for concern (Assessment Box SPM.1).*” *“The overall risks of climate change impacts* ***can be reduced by limiting the rate and magnitude of climate change.******Risks are reduced substantially under the assessed scenario with the lowest temperature projections*** *(RCP2.6 – low emissions) compared to the highest temperature projections (RCP8.5 – high emissions), particularly in the second half of the 21st century (very high confidence).”*]. [↑](#endnote-ref-7)
8. **Key climate risks assessed by the IPCC are only those linked to anthropogenic global warming, while rapid climate change was omitted/dismissed.** IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pages [See Pages 13-19, from section SPM 2.3 Future risks and impacts caused by a changing climate, including page 14’s Figure SPM.8 Representative key risks for each region, to understand **the risks are linked only to global warming, and that no rapid climate change risks are detailed**. See page 13, “***Rising rates and magnitudes of warming and other changes in the climate system****, accompanied by ocean acidification, increase the risk of severe, pervasive and in some cases irreversible detrimental impacts. Some risks are particularly relevant for individual regions (Figure SPM.8), while others are global. The* ***overall risks of future climate change impacts can be reduced by limiting the rate and magnitude of climate change****, including ocean acidification*.” “*A large fraction of species faces increased extinction risk due to climate change during and beyond the 21st century, especially as climate change interacts with other stressors (high confidence).*” See page 14, Extracts from: “*Figure SPM.8 | Representative key risks14 for each region, including the potential for risk reduction through adaptation and mitigation, as well as limits to adaptation. Risk levels are presented for three time frames: present, near term (here, for 2030–2040) and long term (here, for 2080–2100). In the near term, projected levels of global mean temperature increase do not diverge substantially across different emission scenarios.* ***For the long term, risk levels are presented for two possible futures (2°C and 4°C global mean temperature increase*** *above pre-industrial levels).*” See page 16, SPM 2.4 Climate change beyond 2100, irreversibility and abrupt changes; “***Warming will continue beyond 2100 under all RCP scenarios except RCP2.6****. Surface temperatures will remain approximately constant at elevated levels for many centuries after a complete cessation of net anthropogenic CO2 emissions*.” **NB:** even if we exhaust proven oil and gas reserves in the coming decades, and peak-discovery is history]. [↑](#endnote-ref-8)
9. **IPCC climate forecasts unrealistically assume no major volcanic eruptions or secular changes in solar irradiance (unrealistic, not based on science).** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See page 20. Section E.1 Atmosphere Temperature. “***It is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase****. It is very likely that heat waves will occur with a higher frequency and duration.* ***Occasional*** *cold winter extremes will continue to occur.” “The global mean surface temperature change for the period 2016–2035 relative to 1986–2005 will likely be in the range of 0.3°C to 0.7°C (medium confidence). This assessment is based on multiple lines of evidence and assumes* ***there will be no major volcanic eruptions or secular changes in total solar irradiance****.*”]. [↑](#endnote-ref-9)
10. **WG1 (AR4) deferred the ice age 30,000 years without subjecting that erroneous assumption to peer review (falsifiable; see endnotes 67-79).** IPCC, Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pages [See page 56, Box TS.6. “*The Milankovitch, or ‘orbital’ theory of the ice ages is now well developed. Ice ages are generally triggered by minima in high-latitude NH summer insolation, enabling winter snowfall to persist through the year and therefore accumulate to build NH glacial ice sheets.”* Followed by*, “Available evidence indicates that the current warming will not be mitigated by a natural cooling trend towards glacial conditions. Understanding of the Earth’s response to orbital forcing indicates that the Earth would not naturally enter another ice age for at least 30,000 years. {6.4, FAQ 6.1}.*” See page 85 section TS.6.2.4 Paleoclimate under “***Robust Findings***” “***It is very unlikely that the Earth would naturally enter another ice age for at least 30,000 years****. {6.4}*”).]. [↑](#endnote-ref-10)
11. **WG1 (AR5) dismissed the ice age by 50,000 years without subjecting that erroneous assumption to peer review (falsifiable; see endnotes 67-79).** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See Page 70, “***It is virtually certain that orbital forcing will be unable to trigger widespread glaciation during the next 1000 years****. Paleoclimate records indicate that, for orbital configurations close to the present one, glacial inceptions only occurred for atmospheric CO2 concentrations significantly lower than pre-industrial levels. Climate models simulate no glacial inception during the next 50,000 years if CO2 concentrations remain above 300 ppm. {5.8.3, Box 6.2}.”* **NB:** Given the IPCC’s 3-decade legacy of generating highly inaccurate climate forecasts this opinion **serious caution is merited**.]. [↑](#endnote-ref-11)
12. **The last ice age ended about 10,000 years ago (falsifiable, see endnotes 39-40)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See page 124, Table 1.1. “***Since the end of the last ice age, about 10,000 years ago****, global surface temperatures have probably fluctuated by little more than 1°C.*” **NB:** a falsifiable assumption]. [↑](#endnote-ref-12)
13. **The Greenland ice core data highlights 8 millennia of devolving climate oscillations from the Holocene Climate Optimum to 1700CE (Temperatures declined 4.86°C).** Data: (1) B.M. Vinther et al., 2009, “Holocene thinning of the Greenland ice sheet.” Nature, Vol. 461, pp. 385-388, 17 September 2009. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Greenland Ice Sheet Holocene d18O, Temperature, and Surface Elevation. doi:10.1038/nature08355. https://www.ncdc.noaa.gov/paleo-search/study/11148. Downloaded 05/05/2018. (2) HadCRUT4 near surface temperature data set for the Northern Hemisphere. <http://www.metoffice.gov.uk/hadobs/hadcrut4/data/current/download.html>. Downloaded 25 July 2018. Analysis: Between the Holocene Climate Optimum 5980 BCE (+3.55°C anomaly) and the deepest temperature trough in 1700 CE (-1.31°C anomaly) **the temperature declined 4.86°C**. Between 1700 and 1940 the temperature then rose 2.87°C. This means that the 1940 temperature was still 2°C lower than at the Holocene Climate Optimum. This decline to 1700 CE and then increase in temperature (1700-1940) occurred in a devolving oscillatory manner, comprising 39 trough-to-peak warming and then cooling phases. All 39 climate trough-to-peak temperature rises exceeding +0.99°C, between 5980 BCE (Greenland/Arctic glacial cycle peak temperature) and 1940 CE were extracted from the temperature data, derived from the Greenland ice core, for group analysis (range, +0.99°C to +2.87°C, average 77.4 years trough-to-peak, n=39). These trough-to-peak temperature increases started from the deepest temperature trough to the following tallest peak. A goodness-of-fit test of all 39 trough-to-peak temperature rises showed that the data did not follow a normal distribution. This indicates the possibility that more than one global warming process may be involved with the bigger climate oscillation outliers (i.e., for example an extreme grand solar maximum phase, or a large climate forcing volcanic eruption). Results: Prior to stratifying the data an Iglewicz and Hoaglin's robust test (two-sided test) for multiple outliers was performed using a modified Z score of ≥1.5 and ≥5 as the outlier criteria. The modified Z score of ≥1.5 highlighted significant outliers above +1.77°C. A higher modified Z score of ≥5 yielded **the most extreme outlier trough-to-peak** warming phase **between 1700 and 1940** (**+2.87°C**)**.** Given the outliers that were revealed, the data was then stratified into two groups (Group 1 ≥ 1.77°C and Group 2 0.99°C - 1.77°C). This stratification yielded 2 normally distributed groups (Group-1, N=5, Group-2 N=34), that were, statistically, significantly different from one another (unpaired Welch T-Test, 2-tailed P-value = 0.007). Group 1’s smallest temperature rise was 0.21°C greater than Group 2’s largest temperature rise, highlighting the temperature gap between the two groups. On the basis of the above, the peak-to-trough temperature rise from 1700 to 1940 (+2.87°C) was confirmed as the most significant outlier. This process was repeated for the grafted peak from 1840-2016 (+2.81°C) as detailed in Revolution’s Figures 4.1-4.2. The modified Group-1 that swapped the +2.87°C with the +2.81°C, was also significantly different from Group-2 (unpaired Welch T-Test, two-sided P-value = 0.0061). Conclusion: Group-1 (N=5) composed of trough-to-peak outliers ≥ 1.77°C were significantly larger global warming phases than Group-2 (N=34), and the +2.87°C or +2.81°C (i.e., Devil’s advocate peak from 1840 plus a 20-year moving average graft to 2016’s peak defined by the HadCRUT4 GMST/Northern hemisphere data) were the largest outliers. [↑](#endnote-ref-13)
14. **Data alterations between the current and older versions of global climate indices (UK, USA) accentuate recent global warming. These indices were commonly used by the IPCC.** Data: The UK MetOffice, HadCRUT4 versus 3 versions: Anomaly differences were calculated by subtracting the HadCRUT3 global annual anomalies from the HadCRUT.4.6.0.0 (current version) global annual anomalies. https://www.metoffice.gov.uk/hadobs/hadcrut4/data/versions/previous\_versions.html, https://crudata.uea.ac.uk/cru/data/crutem3/HadCRUT3-gl.dat. NASA GISTemp 2017 versus 2000 versions: Anomaly differences were calculated by subtracting the 2000 NASA GISTemp from the 2017 NASA GISTemp anomalies. Data: https://go.nasa.gov/2KFY3IZ using data files; (1) 2000\_12\_v2\_GLB.Ts.csv, (2) 2017\_07\_v3\_GLB.Ts.csv. [Conclusions: This data analysis, complemented by the following two endnote citations, supports the conclusion that **global climate indices provided by US/UK government agencies are** **unfit for policy sensitive decision making**. The following two endnotes cite research demonstrating that significant alterations have taken place between old and new versions of HadCRUT GMST, NASA GISTemp, and NOAA GAST global temperature indices. **These alterations included the significant changing** of stations, time of observation, significant errors and missing data, the impact of population growth and urban heat island effect, the changing of land and sea observation ratios, and the introduction of new measuring technology. In 1990, when the IPCC’s Article 1 and 2 climate science dictatorship came to power, there was a major station dropout (75%), leaving an urban bias of temperature stations (heat island effect) with **49% of the stations being located at airports**. This is tantamount to **data fiddling**.

     [↑](#endnote-ref-14)
15. **The fiddling of global climate index data by US government agencies accounts for most of the recent global warming.** Craig Idso, 2017. On the Validity of NOAA, NASA and Hadley CRU Global Average Surface Temperature Data & The Validity of EPA’s CO2 Endangerment Finding. https://www.heartland.org/publications-resources/publications/on-the-validity-of-noaa-nasa-and-hadley-cru-global-average-surface-temperature-data--the-validity-of-epas-co2-endangerment-finding [Conclusion: “*This paper shows the* ***global temperature data used to estimate global average temperatures*** *and thus* ***make climate policy is flawed*** *with* ***politicized adjustments accounting for almost all the warming*** *since the middle of the 20th century*.” Craig Idso is a member of the Nongovernmental International Panel on Climate Change (NIPCC), an international panel of expert climate scientists established to provide an independent evaluation of the scientific evidence (or lack of) relating to carbon dioxide-induced global warming. “*NIPCC scientists* ***concluded the IPCC was biased with respect to making future projections of climate change****, discerning a significant human-induced influence on current and past climatic trends, and evaluating the impacts of potential carbon dioxide-induced environmental changes on Earth’s biosphere.*”]. [↑](#endnote-ref-15)
16. McLean, John D. (2017). An audit of uncertainties in the HadCRUT4 temperature anomaly dataset plus the investigation of three other contemporary climate issues. PhD thesis, James Cook University. https://doi.org/10.4225/28/5afb68f31fb3f. https://researchonline.jcu.edu.au/52041/. [↑](#endnote-ref-16)
17. **IPCC climate forecasts unrealistically assume no major volcanic eruptions or secular changes in solar irradiance (unrealistic)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See page 20. Section E.1 Atmosphere Temperature. “*It is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase. It is very likely that heat waves will occur with a higher frequency and duration. Occasional cold winter extremes will continue to occur.” “The global mean surface temperature change for the period 2016–2035 relative to 1986–2005 will likely be in the range of 0.3°C to 0.7°C (medium confidence). This assessment is based on multiple lines of evidence and* ***assumes there will be no major volcanic eruptions or secular changes in total solar irradiance****.*”]. [↑](#endnote-ref-17)
18. **Data sources:** The following global / global land and ocean surface temperature data files register **an average of a 0.47°C decline** in the global (land and ocean) surface temperature **since their respective Q1-2016 peaks (each index peak)**. http://berkeleyearth.lbl.gov/auto/Global/Land\_and\_Ocean\_complete.txt, https://data.giss.nasa.gov/gistemp/tabledata\_v3/GLB.Ts.txt, https://data.giss.nasa.gov/gistemp/tabledata\_v3/GLB.Ts+dSST.txt, https://www.metoffice.gov.uk/hadobs/hadcrut4/data/current/time\_series/HadCRUT.4.6.0.0.annual\_ns\_avg.txt. [↑](#endnote-ref-18)
19. **The IPCC’s highly inaccurate climate forecasts spanning 3-decades, and their scientifically poor explanations ignore natural climate change (i.e., are biased and unscientific).** IPCC, Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See pages 61-63, Box TS.3, Climate Models and the Hiatus in Global Mean Surface Warming of the Past 15 Years. **(1)** “*However, an analysis of the full suite of CMIP5 historical simulations (augmented for the period 2006–2012 by RCP4.5 simulations) reveals that* ***111 out of 114 realizations show a GMST trend over 1998–2012 that is higher than the entire HadCRUT4 trend ensemble*** *(Box TS.3, Figure 1a; CMIP5 ensemble mean trend is 0.21°C per decade)*.” “*During the 15-year period beginning in 1998, the ensemble of HadCRUT4 GMST trends lies below almost all model-simulated trends (Box TS.3, Figure 1a), whereas* ***during the 15-year period ending in 1998, it lies above 93 out of 114 modelled trends*** *(Box TS.3, Figure 1b; HadCRUT4 ensemble mean trend 0.26°C per decade, CMIP5 ensemble mean trend 0.16°C per decade)*”. **(2)** **Scientifically weak explanation**: “*This difference between simulated and observed trends could be caused by some combination of (a) internal climate variability, (b) missing or incorrect RF, and (c) model response error. These potential sources of the difference, which are not mutually exclusive, are assessed below, as is the cause of the observed GMST trend hiatus. {2.4.3, 9.3.2, 9.4.1; Box 9.2}.*” **(3)** **Rather than refute its own radiative forcing theory and climate models**: “*The discrepancy between simulated and observed GMST trends during 1998–2012 could be explained in part by a tendency for some CMIP5 models to simulate stronger warming in response to increases in greenhouse-gas concentration than is consistent with observations.”* Which is followed by, “*As a consequence, it is argued in Chapter 11 that near-term model projections of GMST increase should be scaled down by about 10%. This downward scaling is, however, not sufficient to explain the model mean overestimate of GMST trend over the hiatus period. {10.3.1, 11.3.6}.*” **(4)** **Despite this abject failure to accurately forecast** the global mean surface temperature, “*There is hence very high confidence that the CMIP5 models show long-term GMST trends consistent with observations, despite the disagreement over the most recent 15-year period.*” (i.e., climate hiatus.). **(5)** Note: This high inaccuracy of global temperature forecasts can simply be explained by the fact that the IPCC dismisses or omits the role of the natural climate system in its weak explanation, its radiative forcing theory, and forecasting models. See page 14. “*Figure SPM.5, Radiative forcing estimates in 2011 relative to 1750 and aggregated uncertainties for the main drivers of climate change.*” **NB:** According to these radiative forcing estimates, nearly all (98%) radiative forcing factors driving climate change are attributable to anthropogenic causes. This prior quotation contradicts the following statement, “*Although the forcing uncertainties are substantial, there are no apparent incorrect or missing global mean forcings in the CMIP5 models over the last 15 years that could explain the model–observations difference during the warming hiatus. {9.4.6}.*” **NB:** Yes there are missing climate forcings, commonly referred to as the natural climate system, which the IPCC has dismissed or omitted. The natural climate system (NCC) ‘controls’ seasonal-, annual-, decadal-, centennial-, millennial-scale, glacial cycle, and epochal temperature oscillations, just as it has done for billions of years. The NCC system includes solar activity (short term and secular changes to solar irradiance and magnetism), orbital modulation of solar outputs reaching earth, geomagnetism, cosmic rays and low clouds, volcanic aerosols and atmospheric blocking, solar-earth orbital/rotational modulation of atmospheric and ocean circulations, ice cover-albedo, other cloud feedbacks (different latitudes and altitudes), and water vapor (natural), in addition to anthropogenic ‘climate-modifiers’ (land use, deforestation, greenhouse gases like water vapor from irrigation and fossil fuel combustion, and CO2), etc.]. [↑](#endnote-ref-19)
20. **Data sources:** The following six global / global land and ocean surface temperature data files register **an average of a 0.04°C decline** (Standard deviation 0.04°C) in the **global temperature between 1998 and 2012**. http://berkeleyearth.lbl.gov/auto/Global/Land\_and\_Ocean\_complete.txt, https://data.giss.nasa.gov/gistemp/tabledata\_v3/GLB.Ts.txt, https://data.giss.nasa.gov/gistemp/tabledata\_v3/GLB.Ts+dSST.txt, https://www.metoffice.gov.uk/hadobs/hadcrut4/data/current/time\_series/HadCRUT.4.6.0.0.annual\_ns\_avg.txt, https://www.ncdc.noaa.gov/cag/time-series/global/globe/land\_ocean/p12/12/1880-2017.csv, http://www-users.york.ac.uk/~kdc3/papers/coverage2013/had4\_krig\_v2\_0\_0.txt. (Data downloaded 30/07/2019). [↑](#endnote-ref-20)
21. **Changes in atmospheric CO2 concentration between 1998 and 2012, and 2016 and 2018.** NOAA ESRL monthly carbon dioxide data (CO2 expressed as a mole fraction in dry air, micromol/mol, abbreviated as ppm, since 1958) was obtained from www.esrl.noaa.gov/gmd/ccgg/trends/ using the following data file ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2\_mm\_mlo.txt (Downloaded 03/08/2019). [Data: The atmospheric CO2 concentration (ppm) in 01/1998 was 365.3 ppm and in 12/2012 was 394.3 ppm, yielding an **8.0% increase**. The Atmospheric CO2 concentration (ppm) in 01/2016 was 402.6 and 06/2019 was 413.9 ppm, yielding a **2.8% increase**.]. [↑](#endnote-ref-21)
22. Ole Humlum et al., “The phase relation between atmospheric carbon dioxide and global temperature.” Global and Planetary Change. Volume 100, January 2013, 51-69. [↑](#endnote-ref-22)
23. Manfred Mudelsee, “The phase relations among atmospheric CO2 content, temperature and global ice volume over the past 420 ka.” Quaternary Science Reviews 20 (2001) 583-58. [↑](#endnote-ref-23)
24. Eric Monnin et al., “Atmospheric CO2 Concentrations over the Last Glacial Termination.” By Science 05 Jan 2001: 112-114. [↑](#endnote-ref-24)
25. N. Caillon et al., 2003, “Timing of atmospheric CO2 and Antarctic temperature changes across Termination III.” Science 299: 1728-1731. [↑](#endnote-ref-25)
26. H. Fischer et al., 1999, “Ice core records of atmospheric CO2 around the last three glacial terminations.” Science, 283, 1712-1714. [↑](#endnote-ref-26)
27. **A restricted definition of climate change and its risk-mitigation were enforced by UNFCCC Articles 1 and 2 (blaming and reducing human greenhouse gas emissions).** United Nations Framework Convention on Climate Change. United Nations 1992. FCCC/INFORMAL/84, GE.05-62220 (E), 200705. [See page 3 and 4 for Article 1 and 2 definitions. **Article 1 definition:** “*Climate change means a change of climate which is* ***attributed directly or indirectly to human activity*** *that alters the composition of the global atmosphere and* ***which is in addition to natural climate variability*** *observed over comparable time periods.*” **Article 2 objective:** “*The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention,* ***stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system****. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.*” Note: This definition for climate change was present at the IPCC’s 1988 founding. In other words, the science of climate change was predetermined (human activity, greenhouse gases) and had nothing to do with an international scientific consensus (other than via carefully selected government scientists living in the UN member states). Article 2’s objective is focused on stabilizing atmospheric greenhouse gases at levels that would prevent dangerous human interference with the climate system, while ensuring food production and sustainable economic development. In other words, in 1988 Article 2 had already determined that human activity was dangerous and that it needed to be mitigated.]. [↑](#endnote-ref-27)
28. **The radiative forcing theory was installed in 1988 by UNFCCC Articles 1 and 2, without a correlation analysis supporting the cause and effect relationship between CO2 and GMST.** Climate Change: The IPCC Scientific Assessment (1990). Report prepared for Intergovernmental Panel on Climate Change by Working Group 1. J.T. Houghton, G.J. Jenkins and J.J. Ephraums (eds.). Cambridge University Press, Cambridge, Great Britain, New York, NY, USA and Melbourne, Australia 410 pages [See the Preface’s Introduction. “*The Intergovernmental Panel on Climate Change (IPCC) was jointly established by our two organizations in 1988. Under the chairmanship of Professor Bert Bolin, the Panel was charged with: assessing the scientific information that is related to the various components of the climate change issue, such as emissions of major greenhouse gases and modification of the Earth's radiation balance resulting therefrom, and that needed to enable the environmental and socio-economic consequences of climate change to be evaluated, (ii) formulating realistic response strategies for the management of the climate change issue*.” NB: this confirms the bias in the IPCC’s scientific assessment in its first scientific assessment in 1990, and that the radiative forcing theory was predetermined from the IPCC’s outset.]. [↑](#endnote-ref-28)
29. **On Maurice Strong – one of the UNFCCC Articles 1 and 2 strategic architects, who fell from UN-grace (worthy of a read to understand the cunning plan behind the UN’s Agenda21).** The Heartland Institute.Nongovernmental International Panel on Climate Change. http://climatechangereconsidered.org/about-the-ipcc/. [Exposé: This page also cited John Izzard’s blog. “Maurice Strong, Climate Crook.” Quadrant Online December 02nd 2015. Available at http://quadrant.org.au/opinion/doomed-planet/2010/01/discovering-maurice-strong/.Maurice Strong. (last accessed 21/03/2018)]. [↑](#endnote-ref-29)
30. **Clarification of glacial cycle nomenclature and points of glacial cycle reference.** It is important to clarify glacial cycle nomenclature linked to the dynamic interplay between the temperature, ice volume, and sea level changes over glacial cycle time scales. For **consistency** across all glacial cycles, ice ages end after the glacial maximum (i.e., for analytical purposes this corresponds to a glacial cycle’s lowest temperature data point, and its associated lowest sea level and maximum ice volume). Thereafter, the interglacial temperature, and sea level rises, and ice volume reduces, **in an oscillatory manner**. Ice age’s commence after the climate optimum (i.e., for analytical purposes this corresponds to a glacial cycle’s peak temperature data point at the end of the sustained interglacial rise, and its associated highest sea level and lowest ice volume). Thereafter, the ice age inception temperature declines, the ice volume slowly increases, and the sea level declines, in an oscillatory manner. These temperature, ice volume, and sea level changes and glacial cycle reference points are evidenced by analyzing the following three million year global climate data reconstruction: R. Bintanja and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. [↑](#endnote-ref-30)
31. R.B. Alley, 2004, “GISP2 Ice Core Temperature and Accumulation Data.” National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. <https://www.ncdc.noaa.gov/paleo/study/2475>. Downloaded 05/05/2018. [↑](#endnote-ref-31)
32. Sigfus J. Johnsen et al., 1997, “The d18O record along the Greenland Ice Core Project deep ice core and the problem of possible Eemian climatic instability.” Journal of Geophysical Research: Oceans, 102(C12), 26397-26410. doi: 10.1029/97JC00167. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. GRIP Ice Core 248KYr Oxygen Isotope Data. https://www.ncdc.noaa.gov/paleo-search/study/17839. [↑](#endnote-ref-32)
33. R.V. Uemura et al., 2012, “Ranges of moisture-source temperature estimated from Antarctic ice cores stable isotope records over glacial-interglacial cycles.” Climate of the Past, 8, 1109-1125. doi: 10.5194/cp-8-1109-2012. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Dome Fuji 360KYr Stable Isotope Data and Temperature Reconstruction. https://www.ncdc.noaa.gov/paleo-search/study/13121. Downloaded 05/05/2018. [↑](#endnote-ref-33)
34. J. V. Jouzel et al., 2007, “Orbital and Millennial Antarctic Climate Variability over the Past 800,000 Years.” Science, Volume 317, No. 5839, 793-797, 10 August 2007. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. EPICA Dome C - 800KYr Deuterium Data and Temperature Estimates. <https://www.ncdc.noaa.gov/paleo/study/6080>. Download data: Downloaded 08/02/2016. [↑](#endnote-ref-34)
35. R. Bintanja and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. [↑](#endnote-ref-35)
36. B.M. Vinther et al., 2009, “Holocene thinning of the Greenland ice sheet.” Nature, Vol. 461, pp. 385-388, 17 September 2009. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Greenland Ice Sheet Holocene d18O, Temperature, and Surface Elevation. doi:10.1038/nature08355. https://www.ncdc.noaa.gov/paleo-search/study/11148. Downloaded 05/05/2018. [↑](#endnote-ref-36)
37. Sigfus J. Johnsen et al., 1997, “The d18O record along the Greenland Ice Core Project deep ice core and the problem of possible Eemian climatic instability.” Journal of Geophysical Research: Oceans, 102(C12), 26397-26410. doi: 10.1029/97JC00167. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. GRIP Ice Core 248KYr Oxygen Isotope Data. https://www.ncdc.noaa.gov/paleo-search/study/17839. [↑](#endnote-ref-37)
38. R. Bintanja and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. [↑](#endnote-ref-38)
39. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See page 124, Table 1.1. “*Since the end of the last ice age, about 10,000 years ago, global surface temperatures have probably fluctuated by little more than 1°C.*”]. [↑](#endnote-ref-39)
40. **The last ice age did not end “about 10,000 years ago” (falsifiable)**. Data: R. Bintanja and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. Analysis: Using the above-cited file, the temperature and sea level data were extracted since the Last glacial maximum (i.e., minimum glacial cycle temperature 19,600 years ago and ≈maximum ice mass and ≈minimum sea level) to the Holocene Climate Optimum (i.e., maximum glacial cycle temperature 2,100 years ago and ≈minimum ice mass and ≈maximum sea level), and the corresponding data for 10,000 years ago. Results: **(A)** **By 10,000 years ago the sea level had already risen about 80% and the temperature 91% of their total Holocene interglacial rise** (from glacial maximum to climate optimum). This confirms the last ice age did not end “*about 10,000 years ago*.” **(B)** This global climate data also highlights that the northern hemisphere glaciers (i.e., Eurasian and North American ice volume) contributed 87% of the total Holocene interglacial sea level rise making the Arctic key to understanding climate change.].

     [↑](#endnote-ref-40)
41. B.M. Vinther et al., 2009, “Holocene thinning of the Greenland ice sheet.” Nature, Vol. 461, pp. 385-388, 17 September 2009. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Greenland Ice Sheet Holocene d18O, Temperature, and Surface Elevation. doi:10.1038/nature08355. https://www.ncdc.noaa.gov/paleo-search/study/11148. Downloaded 05/05/2018. Analysis: Between the Holocene Climate Optimum 5980 BCE (+3.55°C anomaly) and the deepest temperature trough in 1700 CE (-1.31°C anomaly) the temperature declined 4.86°C. Between 1700 and 1940 the temperature then rose 2.87°C.]. [↑](#endnote-ref-41)
42. R.B. Alley, 2004, “GISP2 Ice Core Temperature and Accumulation Data.” National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. <https://www.ncdc.noaa.gov/paleo/study/2475>. Downloaded 5/5/2018. [Last Glacial Maximum’s deepest temperature trough was 24,098 years ago (-53°C) and the Holocene Climate Optimum was 7,800 years ago (-28.86°C). The difference between these time points is 16,297 years and 24.56°C.] [↑](#endnote-ref-42)
43. J. V. Jouzel et al., 2007, “Orbital and Millennial Antarctic Climate Variability over the Past 800,000 Years.” Science, Volume 317, No. 5839, 793-797, 10 August 2007. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. EPICA Dome C - 800KYr Deuterium Data and Temperature Estimates. <https://www.ncdc.noaa.gov/paleo/study/6080>. Download data: Downloaded 08/02/2016. [↑](#endnote-ref-43)
44. H. Wanner et al., “Structure and origin of Holocene cold events.” Quaternary Science Reviews (2011), doi:10.1016/j.quascirev.2011.07.010. [Comment: See Figure 5a, page 9, depicting the steady decline in Northern Hemisphere summer solar insolation at north 15 and 65 degree latitudes, and indicating that **insolation has declined by about 40 W/m2.** This is based on the landmark research by Berger, 1978 (André Berger, Long-Term Variations of Daily Insolation and Quaternary Climatic Changes. 1978. Journal of the Atmospheric Sciences 35(12):2362-2367. DOI: 10.1175/1520-0469(1978)035<2362:LTVODI>2.0.CO;2).]. [↑](#endnote-ref-44)
45. D.S. Kaufman et al., “Holocene thermal maximum in the western Arctic (0–180°W).” Quaternary Science Reviews, Volume 23, Issues 5–6, 2004, 529-560. <https://doi.org/10.1016/j.quascirev.2003.09.007>. [Comment: See the abstract. We are told that the **precession-driven summer insolation anomaly peaked 12,000-10,000 years ago.** See also Figure 9a which depicts the 65°N insolation anomaly at different times of the year, indicating a ≈**50 Wm-2 decline in summer solstice insolation from its peak** 12,000-10,000 years ago.]. [↑](#endnote-ref-45)
46. I. Borzenkova et al., 2015. Climate Change During the Holocene (Past 12,000 Years). In: The BACC II Author Team (eds) Second Assessment of Climate Change for the Baltic Sea Basin. Regional Climate Studies. Springer. https://link.springer.com/content/pdf/10.1007%2F978-3-319-16006-1.pdf [↑](#endnote-ref-46)
47. G.H. Miller et al., 2012, “Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks.” Geophysical Research Letters, 39, L02708, doi:10.1029/2011GL050168. [Comment: We are told in the opening sentence that the **Northern Hemisphere summer temperatures track a precession-driven decline in summer insolation for 8,000 years, and that the summer temperature changes are the greatest in the Arctic.** This article cites CAPE Project Members, 2001; Kaufman et al., 2004; Vinther et al., 2009.]. [↑](#endnote-ref-47)
48. Y. Zhong et al., “Centennial-scale climate change from decadally-paced explosive volcanism: a coupled sea ice-ocean mechanism.” Climate Dynamics (2011) 37: 2373. <https://doi.org/10.1007/s00382-010-0967-z>. [Comment: The abstract tells us the **Northern Hemisphere Holocene summer cooling was driven largely by the decline in precession- modulated summer insolation.** This summer decline in insolation from 8,000 years ago in the Northern Hemisphere **led to glacier ice expansion,** especially from 5,000 years ago.]. [↑](#endnote-ref-48)
49. Nicolaj K. Larsen et al., “The response of the southern Greenland ice sheet to the Holocene thermal maximum.” Geology ; 43 (4): 291–294. doi: https://doi.org/10.1130/G36476.1. [↑](#endnote-ref-49)
50. J.P. Briner et al., “Holocene climate change in Arctic Canada and Greenland.” Quaternary Science Reviews (2016), http://dx.doi.org/10.1016/j.quascirev.2016.02.010. [↑](#endnote-ref-50)
51. Leonid Polyak et al., “History of sea ice in the Arctic.” Quaternary Science Reviews 29 (2010) 1757–1778, https://doi.org/10.1016/j.quascirev.2010.02.010. [↑](#endnote-ref-51)
52. Ó. Ingólfsson et al., 1998, “Antarctic glacial history since the Last Glacial Maximum: An overview of the record on land. “Antarctic Science, 10(3), 326-344. doi:10.1017/S095410209800039X. [↑](#endnote-ref-52)
53. Leonid Polyak et al. “History of sea ice in the Arctic.” Quaternary Science Reviews 29 (2010) 1757–1778, https://doi.org/10.1016/j.quascirev.2010.02.010 [↑](#endnote-ref-53)
54. N.L. Balascio et al. “Glacier response to North Atlantic climate variability during the Holocene.” Climate of the Past, 11, 1587-1598, https://doi.org/10.5194/cp-11-1587-2015, 2015. [↑](#endnote-ref-54)
55. The RAISED Consortium1, Michael J. Bentley et al., “A community-based geological reconstruction of Antarctic Ice Sheet deglaciation since the Last Glacial Maximum.” Quaternary Science Reviews. Volume 100, 15 September 2014, 1-9. [↑](#endnote-ref-55)
56. M. Frezzotti1 et al. “A synthesis of the Antarctic surface mass balance during the last 800 years.” The Cryosphere, 7, 303–319, 2013. www.the-cryosphere.net/7/303/2013/doi:10.5194/tc-7-303-2013 © Author(s) 2013. CC Attribution 3.0 License. [↑](#endnote-ref-56)
57. O.N. Solomina et al., 2016, “Glacier fluctuations during the past 2000 years.” Quaternary Science Reviews, 149, 61-90. DOI: 10.1016/j.quascirev.2016.04.008. [See Figure 5, page 276. This figure collates a stacked time series of the number of glacier advances and recessions in each region into a global total.]. [↑](#endnote-ref-57)
58. Michael E Mann. “Little Ice Age.” Volume 1, The Earth system: physical and chemical dimensions of global environmental change, 504–509. In Encyclopedia of Global Environmental Change (ISBN 0-471-97796-9). [↑](#endnote-ref-58)
59. Leonid Polyak et al., “History of sea ice in the Arctic.” Quaternary Science Reviews 29 (2010) 1757–1778, https://doi.org/10.1016/j.quascirev.2010.02.010. [↑](#endnote-ref-59)
60. Christophe Kinnard et al., “A changing Arctic seasonal ice zone: Observations from 1870–2003 and possible oceanographic consequences.” Geophysical Research Letters, Volume 35, L02507, doi:10.1029/2007GL032507, 2008. [↑](#endnote-ref-60)
61. O.N. Solomina et al., (2016). “Glacier fluctuations during the past 2000 years.” Quaternary Science Reviews, 149, 61-90. DOI: 10.1016/j.quascirev.2016.04.008. [See Figure 5, page 276. This figure collates a stacked time series of the number of glacier advances and recessions in each region into a global total.]. [↑](#endnote-ref-61)
62. **The massive glacier ice-melt after the Little Ice Age was initiated before significant human greenhouse gas emissions (i.e., something else caused/controlled the melt).** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See page 1151, “*The combined records indicate that* ***a net decline of global glacier volume began in the 19th century, before significant anthropogenic RF had started****, and was probably the result of warming associated with the termination of the Little Ice Age (Crowley, 2000; Gregory et al., 2006, 2013b).*”] [↑](#endnote-ref-62)
63. The RAISED Consortium1, Michael J. Bentley et al. “A community-based geological reconstruction of Antarctic Ice Sheet deglaciation since the Last Glacial Maximum.” Quaternary Science Reviews. Volume 100, 15 September 2014, 1-9. [↑](#endnote-ref-63)
64. Nicolaj K. Larsen et al., “The response of the southern Greenland ice sheet to the Holocene thermal maximum.” Geology ; 43 (4): 291–294. doi: https://doi.org/10.1130/G36476.1. [↑](#endnote-ref-64)
65. D.S. Kaufman et al., “Holocene thermal maximum in the western Arctic (0–1800W).” Quaternary Science Reviews 23 (2004) 529–560. [↑](#endnote-ref-65)
66. J.P. Briner et al., “Holocene climate change in Arctic Canada and Greenland.” Quaternary Science Reviews (2016), http://dx.doi.org/10.1016/j.quascirev.2016.02.010. [↑](#endnote-ref-66)
67. **WG1 (AR4) deferred the ice age 30,000 years without subjecting that perilously dangerous and erroneous assumption to peer review.** IPCC, Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pages [See page 56, Box TS.6. “*The Milankovitch, or ‘orbital’ theory of the ice ages is now well developed. Ice ages are generally triggered by minima in high-latitude NH summer insolation, enabling winter snowfall to persist through the year and therefore accumulate to build NH glacial ice sheets.”* Followed by*, “Available evidence indicates that the current warming will not be mitigated by a natural cooling trend towards glacial conditions. Understanding of the Earth’s response to orbital forcing indicates that the Earth would not naturally enter another ice age for at least 30,000 years. {6.4, FAQ 6.1}.*” See page 85 section TS.6.2.4 Paleoclimate under “***Robust Findings***” “***It is very unlikely that the Earth would naturally enter another ice age for at least 30,000 years.*** *{6.4}*”).]. [↑](#endnote-ref-67)
68. **WG1 (AR5) dismissed the ice age by 50,000 years without subjecting that perilously dangerous and erroneous assumption to peer review.** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See Page 70, “*It is virtually certain that orbital forcing will be unable to trigger widespread glaciation during the next 1000 years. Paleoclimate records indicate that, for orbital configurations close to the present one, glacial inceptions only occurred for atmospheric CO2 concentrations significantly lower than pre-industrial levels. Climate models simulate no glacial inception during the next 50,000 years if CO2 concentrations remain above 300 ppm. {5.8.3, Box 6.2}.”*]. [↑](#endnote-ref-68)
69. **Falsifying the IPCC’s 30,000 ice age delay based on a statistical analysis of the climate data from the last two million years (which the IPCC omitted to do). (1).** Inter-climate optimum intervals: Data: Bintanja, R. and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. Analysis: The following table data summary was created detailing 2,026,800 years of global climate optima timings and intervals (from peak-to-peak; Kiloyears). Without any change to the 2.1Kyr climate optimum recorded in the data 2,100 years ago (i.e., without a 30,000-year extension to the Holocene interglacial period), the current largest climate optimum interval of 122.7 kiloyears (i.e., 2.1-124.8Kyr peak) is not a statistically significant outlier (P>0.05) compared with the group (N=33). However, when this interglacial period is extended 30,000 years the revised climate optima interval (154.8 kiloyears) becomes a statistically significant outlier (P<0.05). For the revised dataset (with the 30,000-year extension): the Mean = 62.3, standard deviation = 30.2, N = 33. Outlier detected? Yes. Significance level: 0.05 (two-sided). Critical value of Z: 2.95. A goodness of fit was pre-assessed for the original unmodified data (i.e., no 30Kyr delay) using the d'Agostino-Pearson test: P = 0.095. On this basis the Grubb's outlier test was selected because the original data was normally distributed. When the 122.7Kyr climate optimum interval was substituted with the 154.8Kyr data point the d'Agostino-Pearson test: P = 0.011. This 30,000-year modification changed the data-population distribution to a non-normal distribution. This change in data distribution adds further support that the 30,000-year delay can not be statistically justified.

     [↑](#endnote-ref-69)
70. **Falsifying the IPCC’s 30,000 ice age delay based on statistical analysis of the climate data from the last 800,000 years (which the IPCC omitted to do) (2).** Antarctic-to-Global Climate Optima phasing gaps: Data: (1) Jouzel, J., V. et al. 2007. “Orbital and Millennial Antarctic Climate Variability over the Past 800,000 Years.” Science, Volume 317, No. 5839, 793-797, 10 August 2007. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. EPICA Dome C - 800KYr Deuterium Data and Temperature Estimates. <https://www.ncdc.noaa.gov/paleo/study/6080>. Download data: Downloaded 08/02/2016. (2) R. Bintanja and R.S.W. van de Wal, North American ice-sheet dynamics and the onset of 100,000-year glacial cycles. Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. Analysis: The data is tabulated below and details 787,300 years of Antarctic-to-global climate optima phasing gaps (Kiloyears). A Grubb’s test was performed on the Antarctic-to-global climate optima phasing gaps to determine if the IPCC’s proposed 30,000 year ice age delay created a statistically significant outlier from the other 8 glacial cycle comparator phasing gaps (Antarctica versus global; glacial cycles 1-9). By delaying the Holocene Climate Optima 30,000 years, the phasing gap changes from the current 8,400 years to a statistically significant outlier at 40,500 years (P<0.05)(40,500 years =30,000+2,100+8,400 years). The 30,000-year phasing gap increase was only applied to the global climate data’s climate optimum because Antarctica’s climate optimum was set in the ice record 10,500 years ago and new ice has accumulated since, indicating its ice age has already started (i.e., the inner domes are 100 meters higher today than it was at the Holocene Climate Optimum). A goodness of fit test was performed with the original data using the d'Agostino-Pearson test: P = 0.678, indicating the original group was not different from a Gaussian or normal distribution. On this basis the Grubbs test was selected to test for an outlier. By delaying the Holocene 30,000 years the phasing gap was increased to 40,500 years and the d'Agostino-Pearson test: P< 0.001. This 30,000-year interglacial extension also changed the data-population distribution from a normal to a non-normal distribution. This change in data distribution adds further support that the 30,000-year delay can not be statistically justified.

     [↑](#endnote-ref-70)
71. **Falsifying the IPCC’s 30,000 ice age delay based on statistical analysis of the climate data from the last one million years (which the IPCC omitted to do) (3).** Interglacial Interval Extension: Data: Bintanja, R. and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. Analysis: The first 965,300 years of global interglacial periods (Kiloyears) were extracted from the global data. A Grubb’s test was performed to determine if the IPCC’s proposed 30,000-year extension to the Holocene interglacial period created a statistically significant outlier in this group of ten glacial cycle comparators. To test the statistical validity, the current interglacial duration of 17,500 years (19,600 to 2,100 YBP) was extended by 30,000, plus 2,100 years from its existing climate optimum peak to bring it up to today, yielding a revised 49,600 year interglacial period. By extending this current interglacial by 30,000 years the group interglacial duration mean was 21.1Kyr, standard deviation 11.2Kyr, N=11, and an outlier was detected (two-sided P<0.05). The critical value of Z = 2.35. A goodness of fit test was performed with the original data using the d'Agostino-Pearson test: P = 0.386, indicating the original group was not different from a Gaussian or normal distribution. On this basis the Grubbs test was selected to test for an outlier. By delaying the Holocene 30,000 years the interglacial period was extended to 49,600 years and the d'Agostino-Pearson test: P = 0.011. This 30,000 year interglacial extension changed the data-population distribution to a non-normal or non-Gaussian distribution. This change in data distribution adds further support that the 30,000-year delay can not be statistically justified. The complexities linked to the 492.2Kyr bi-phasic/amputated sub-peak mean this was removed from the analysis (i.e., this interglacial period contains a prior “amputated” peak inserted into the interglacial period that confuses matters, which is similar to the Dome-C data. This interglacial period was therefore removed from the analysis).

     [↑](#endnote-ref-71)
72. **WG1 (AR4) tells us the Milankovitch theory of ice ages is now well developed (incorrect - It is scientifically contentious).** IPCC, Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pages [See page 56, “*The Milankovitch, or ‘orbital’ theory of the ice ages is now well developed*.”]. [↑](#endnote-ref-72)
73. D. H. Tarling, “Milankvitch Cycles in Climate Change.” Geology and Geophysics. Proc. 6th International Symposium on Geophysics, Tanta, Egypt (2010), 1- 8. [↑](#endnote-ref-73)
74. Mark A. Maslin and Andy J. Ridgwell, “Mid-Pleistocene revolution and the ‘eccentricity myth’.” Geological Society, London, Special Publications, 247, 19-34, 1 January 2005, <https://doi.org/10.1144/GSL.SP.2005.247.01.02>. Available online at http://sp.lyellcollection.org/content/247/1/19. [↑](#endnote-ref-74)
75. Richard A. Muller and Gordon J. MacDonald, “Spectrum of 100-kyr glacial cycle: Orbital inclination, not eccentricity.” Proc. Natl. Acad. Sci. USA Volume 94, 8329–8334, August 1997 Colloquium Paper. Available online at http://www.pnas.org/content/pnas/94/16/8329.full.pdf [↑](#endnote-ref-75)
76. J. A. Rial, 2004, “Earth's orbital eccentricity and the rhythm of the Pleistocene ice ages: The concealed pacemaker.” Global and Planetary Change, 41(2), 81-93. DOI:10.1016/j.gloplacha.2003.10.003. [↑](#endnote-ref-76)
77. J. Kirkby et al., “The glacial cycles and cosmic rays.” CERN-PH-EP/2004-027. https://arxiv.org/abs/physics/0407005. [↑](#endnote-ref-77)
78. Gerald E. Marsh, “Interglacials, Milankovitch Cycles, and Carbon Dioxide.” DOI: 10.1155/2014/345482. Available at https://arxiv.org/abs/1002.0597. [↑](#endnote-ref-78)
79. **Tabulated data** of the Antarctic, Arctic, and global inter-climate optimum intervals and the phasing gaps between the corresponding global and Antarctic climate optima.

     [↑](#endnote-ref-79)
80. **Extreme outlier Arctic warming oscillations fall abruptly upon switching phase to their cooling mode**. Data: (1) B.M. Vinther et al., 2009, “Holocene thinning of the Greenland ice sheet.” Nature, Vol. 461, pp. 385-388, 17 September 2009. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Greenland Ice Sheet Holocene d18O, Temperature, and Surface Elevation. doi:10.1038/nature08355. https://www.ncdc.noaa.gov/paleo-search/study/11148. Downloaded 05/05/2018. Analysis: Groups 1 and 2 previously defined in end note citation 8 were compared by their magnitudes of decline from the temperature peak to see if there was a difference between them once the climate switched to a cooling phase. The time to reach the first post-peak trough, and to their maximum troughs was calculated. Each group of peak to trough decline phases had a normal distribution (d'Agostino-Pearson test and Shapiro-Wilks test: P>0.05) but a different variance. As such a Welch T-test (unpaired) was used to assess group differences. Results: Group 1 (≥1.77°C trough-to-peak) showed a mean temperature decline at the 1st trough after the main peak of 1.92°C versus Group 2’s (≤1.77°C trough-to-peak) mean temperature decline of 1.03°C. This Group 2 decline represented a statistically significant difference in temperature decline over Group 1 (2-tailed P-value = 0.043). Group 1 showed a mean temperature decline at the maximum trough after the peak of 1.92°C versus Group 2’s mean temperature decline of 1.23°C, but this difference was not significantly different (-0.69°C, P-value 0.08). Moreover, Group 1 rapidly declined such that its first post-peak trough was the same as its maximum trough i.e., **Group 1 temperature fell abruptly**. Group 2 showed a difference between its first and maximum trough of -0.20°C, which was significantly different from its first post-peak trough (P-value = 0.002). Group 1 took two 45 years on average to drop -1.92°C with its first and maximum trough being the same (-1.92°C). By contrast, Group 2 took an average of 36 years to reach its first trough and 63 years to reach its deepest trough. Conclusion: The higher the preceding trough-to-peak temperature rise (i.e., a statistical outlier, high temperature peak, or large warming phase) **the greater and more abrupt the temperature falls to near its maximum trough when the climate switches**. [↑](#endnote-ref-80)
81. Robert K. Booth et al., “A severe centennial-scale drought in midcontinental North America 4200 years ago and apparent global linkages.” The Holocene. Volume 15, Issue 3, 321 – 328. 2005. https://doi.org/10.1191/0959683605hl825ft. [↑](#endnote-ref-81)
82. J. Stanley et al., 2003, “Nile flow failure at the end of the Old Kingdom, Egypt: Strontium isotopic and petrologic evidence.” Geoarchaeology, 18: 395-402. doi:10.1002/gea.10065. [↑](#endnote-ref-82)
83. Ann Gibbons, "How the Akkadian Empire Was Hung Out to Dry". Science 20 Aug 1993: Volume 261, Issue 5124, DOI: 10.1126/science.261.5124.985. [↑](#endnote-ref-83)
84. Jianjun Wang, “The abrupt climate change near 4,400 year BP on the cultural transition in Yuchisi, China and its global linkage.” Scientific Reports | 6:27723 | DOI: 10.1038/srep27723. https://www.nature.com/articles/srep27723.pdf. [↑](#endnote-ref-84)
85. Data: R. Bintanja and R.S.W. van de Wal, “North American ice-sheet dynamics and the onset of 100,000-year glacial cycles.” Nature, Volume 454, 869-872, 14 August 2008. doi:10.1038/nature07158. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions. https://www.ncdc.noaa.gov/paleo-search/study/11933. Downloaded 10/27/2015. Personal Research: The temperature data for the first 2,100 years from the climate optimum was extracted for the last 34 glacial cycles. This temperature time-series was rebased to zero degrees and zero time so all glacial cycles could be compared on the same basis, i.e., from their peaks. The temperature declined by 0.61°C after the Holocene Climate Optimum, which was 1.26°C above the average of all other glacial cycles in 2,026,800 years. The current glacial cycle’s slow decline was not a significant outlier in the group. [↑](#endnote-ref-85)
86. Data: J.V. Jouzel et al., 2007, “Orbital and Millennial Antarctic Climate Variability over the Past 800,000 Years.” Science, Volume 317, No. 5839, 793-797, 10 August 2007. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. EPICA Dome C - 800KYr Deuterium Data and Temperature Estimates. <https://www.ncdc.noaa.gov/paleo/study/6080>. Download data: Downloaded 08/02/2016. Personal Research: The global temperature for this current ice age inception has declined 1.2°C since the Holocene Climate Optimum 10,500 years ago. By contrast, the temperature had declined by an average of 4.3°C 10,500 years after the climate optimum for all eight previous glacial cycles from the last 800,000 years. The current glacial cycle’s slow decline was not a significant outlier in the group.]. [↑](#endnote-ref-86)
87. **WG2 dismissed lessons from historical climate catastrophes as irrelevant for today.** IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [See page 771-772. “*There is a specific research field that explores the relationship between large-scale disruptions in climate and the collapse of past empires.*” *“DeMenocal (2001) summarizes evidence that suggests that major changes in weather patterns coincided with the collapse of several previously powerful civilizations, including the Anasazi, the Akkadian* (**NB:** associated with the **4.2Kyr rapid climate change event**)*, Classic Maya, Mochica, and Tiwanaku empires. Other historical reference points of the interaction of climate with society emerge from analysis of the* ***Little Ice Age****. Some studies show that the Little Ice Age in the mid-17th century was associated with more cases of political upheaval and warfare than in any other period (Parker, 2008; Zhang et al., 2011), including in Europe (Tol and Wagner, 2010), China (Brook, 2010), and the Ottoman empire (White, S., 2011).”* This is then followed by **WG1’s dismissal of the relevance** of these historical catastrophes in today’s world; *“****The precise causal pathways*** *that link these changes in climate to changes in civilizations are not well understood due to data limitations. Therefore, it should be noted that these findings from* ***historical antecedents are not directly transferable to the contemporary globalized world.****”* (**NB:** the same lack of understanding of ‘precise causal pathways’ applies to forecasting the even far more complex global temperature, so why make the exception now? The reason these catastrophic natural climate change risks were dismissed as not directly transferable to today, was because they were **inconvenient to the UN/IPCC’s political narrative**). See page 1001, section 18.4.5. “*Some studies have suggested that levels of warfare in Europe and Asia were relatively high during the Little Ice Age (Parker, 2008; Brook, 2010; Tol and Wagner, 2010; White, 2011; Zhang et al., 2011), but for the same reasons the detection of the effect of climate change and an assessment of its importance can be made only with low confidence.*” (**NB**: once again this exemplifies the IPCC’s dangerous confirmation bias.]. [↑](#endnote-ref-87)
88. **WG1 dismissed the prospect of abrupt climate change (linked only to its anthropogenic global warming scenarios)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See Page 70, “TFE.5. Irreversibility and Abrupt Change. *“There is information on potential consequences of some abrupt changes, but in general there is low confidence and little consensus on the likelihood of such events over the 21st century. Examples of components susceptible to such abrupt change are the strength of the* ***Atlantic Meridional Overturning Circulation (AMOC), clathrate methane release****, tropical and boreal forest dieback, disappearance of summer sea ice in the Arctic Ocean, long-term drought and monsoonal circulation.”* See page 84 *“TS.5.4.7 Possibility of Near-term Abrupt Changes in Climate: There are various mechanisms that could lead to changes in global or regional climate that are abrupt by comparison with rates experienced in recent decades.* ***The likelihood of such changes is generally lower for the near term******than for the long term.*** *For this reason the relevant mechanisms are primarily assessed in the TS.5 sections on long-term changes and in TFE.5. {11.3.4}”* See page 1114, “*Section 12.5.5 Potentially Abrupt or Irreversible Changes: This report adopts the definition of abrupt climate change used in Synthesis and Assessment Product 3.4 of the U.S. Climate Change Science Program CCSP (CCSP, 2008b).”* See page 1115, “*Table 12.4: Components in the Earth system that have been proposed in the literature as potentially being susceptible to abrupt or irreversible change. Column 2 defines whether or not a potential change can be considered to be abrupt under the AR5 definition. Column 3 states whether or not the process is irreversible in the context of abrupt change, and also gives the typical recovery time scales. Column 4 provides an assessment, if possible, of the likelihood of occurrence of abrupt change in the 21st century for the respective components or phenomena within the Earth system****, for the scenarios considered in this chapter****.*” **NB**: Under this restrictive definition WG1 only details theoretical abrupt climate change risks relevant to anthropogenic global warming and its CMIP5 modeled scenarios. WG1 **constrained or limited the definition of abrupt climate change**, rather than comprehensively review/analyze the abrupt climate change catastrophes that took place just before and after the Holocene Climate Optimum (HCO) i.e., the **Younger Dryas, the 8.2Kyr, 5.9Kyr, 4.2Kyr rapid climate change events (and others), the Little Ice Age,** and **climate forcing volcanism** throughout the **post-HCO period**.]. [↑](#endnote-ref-88)
89. **Abrupt methane release last happened 55 million years ago. A theoretically irrelevant example of abrupt climate change is detailed, and then dismissed (irrelevant page fill).** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [Page 70-71, TFE.5, Irreversibility and Abrupt Change. In a theoretical discussion focused only on methane release (from wetlands, permafrost, and ocean hydrates), we are told; *“It is very unlikely that CH4 from clathrates will undergo catastrophic release during the 21st century (high confidence).”* (CH4 = methane)]. [↑](#endnote-ref-89)
90. **Abrupt methane release last happened 55 million years ago. A theoretically irrelevant example of abrupt climate change is detailed, and then dismissed (irrelevant page fill).** IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [See page 1079. “*WGI AR5 finds “low confidence in modelling abilities to simulate transient changes in hydrate inventories, but large CH4 release to the atmosphere during this century is unlikely” (WGI AR5 Section 6.4.7.3)*.”]. [↑](#endnote-ref-90)
91. Hans Renssen et al., The climatic response to a massive methane release from gas hydrates: Numerical experiments with a coupled climate model. Faculty of Earth and Life Sciences, Vrije Universiteit Amsterdam, Netherlands https://www.geo.vu.nl/~renh/methane-pulse.html. [↑](#endnote-ref-91)
92. **Irrelevant page-filling Dansgaard-Oeschger rapid warming episodes and Heinrich events were reviewed and then dismissed (i.e., they occur during the depths of an ice age):** IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [See page 421. “*The most prominent abrupt climate change periods in the recent geological record, developing within 10 to 100 years, are associated with Dansgaard-Oeschger (DO) and Heinrich events (WGI AR5 Section 5.7), which occurred repetitively during the last 120 kyr.”*]. [↑](#endnote-ref-92)
93. **Irrelevant page-filling Dansgaard-Oeschger rapid warming episodes and Heinrich events were reviewed and then dismissed (i.e., they occur during the depths of an ice age):** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [Exposé; See page 432, “*Section 5.7: Evidence and Processes of Abrupt Climate Change. This assessment of abrupt climate change on time scales of 10 to 100 years focuses on Dansgaard-Oeschger (DO) events and iceberg/melt-water discharges during Heinrich events.*”]. [↑](#endnote-ref-93)
94. **The 8.2 kiloyear Rapid or Abrupt Climate Change Event only reviewed its warming recovery phase, rather than its catastrophic rapid cooling phase:** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See page 433, “*The abrupt climate-change event at 8.2 ka permits the study of the recovery time of the AMOC to freshwater perturbation under near-modern boundary conditions (Rohling and Pälike, 2005)*.”]. [↑](#endnote-ref-94)
95. **The risk of rapid climate change associated with solar radiation management (i.e., geoengineering the theoretical and unproven anthropogenic global warming).** IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages. [See page 454. “*Termination of SRM after its implementation involves* ***the risk of rapid climate change*** *and more severe effects on ecosystems (Russell et al., 2012).*” SRM = solar radiation management]. [↑](#endnote-ref-95)
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124. **The IPCC’s review of the most destructive rapid climate event in the last 12 millennia (i.e., the Younger Dryas) focused on its warming recovery phase.** Part A: IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp. [See page 280. “***Rapid, regional warming before and after the Younger Dryas cooling event (11.7 to 12.9 ka) provides a relatively recent analogy for climate change at a rate approaching, for many regions, that projected for the 21st century for all Representative Concentration Pathways*** *(RCPs; Alley et al., 2003; Steffensen et al., 2008). Ecosystems and species responded rapidly during the Younger Dryas by shifting distributions and abundances, and there were some notable large animal extinctions, probably exacerbated by human activities (Gill et al., 2009; Dawson et al., 2011). In some regions, species became locally or regionally extinct (extirpated), but there is no evidence for climate-driven global-scale extinctions during this period (Botkin et al., 2007; Willis, K.J. et al., 2010). However, the Younger Dryas climate changes differ from those projected for the future because* ***they were regional rather than global; may have only regionally exceeded rates of warming projected for the future;*** *and started from a baseline substantially colder than present (Alley et al., 2003)*.”]. [↑](#endnote-ref-124)
125. **The IPCC dismissed the prospect of a rapid AMOC weakening during the 21st century**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [Page 1119. “*Abrupt Saharan vegetation changes of the Younger Dryas are linked with a rapid AMOC weakening which is considered very unlikely during the 21st century and unlikely beyond that as a consequence of global warming.*” **NB:** The IPCC recognize that rapid AMOC weakening was associated with accelerated Saharan desertification.] [↑](#endnote-ref-125)
126. **Global warming induced Atlantic Meridional Overturning Circulation (AMOC) collapse is dismissed (i.e., rapid climate change)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [Exposé; See page 24, Section E4 Ocean. “*It is very unlikely that the AMOC will undergo an abrupt transition or collapse in the 21st century for the scenarios considered*.” (With reference to the IPCC’s 4 promoted Representative Concentration Pathway global warming scenarios.). See Page 70, “TFE.5. Irreversibility and Abrupt Change. *“Abrupt Climate Change Linked with AMOC New transient climate model simulations* (i.e., theoretical models are prone to assumption errors) *have confirmed with high confidence that strong changes in the strength of the AMOC produce abrupt climate changes at global scale with magnitude and pattern resembling past glacial Dansgaard–Oeschger events and Heinrich stadials.” “It also remains very unlikely that the AMOC will undergo an abrupt transition or collapse in the 21st century for the scenarios considered (high confidence) (TFE.5, Figure 1).”* See page 1115,*“****The FIO-ESM model shows cooling over much of the NH* (i.e.,** northern hemisphere**) *that may be related to a strong reduction of the AMOC in all RCP scenarios*** *(even RCP2.6), but the limited output available from the model precludes an assessment of the response and realism of this response. Hence it is not included the overall assessment of the likelihood of abrupt changes.”* **NB:** This *FIO-ESM model* dismissal represents confirmation bias, because the model output is at odds with the IPCC’s global warming scenarios and the political narrative.]. [↑](#endnote-ref-126)
127. **WG1 erroneously-biasedly dismissed secular changes in solar activity from its climate forecasts (i.e., known cooling factors)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [Exposé: See page 1009 sub-section 11.3.6.3 point 4 for solar irradiance and volcanism, “*As discussed in Section 11.3.6.2, the RCP scenarios assume* ***no underlying trend in total solar irradiance****.” “there is low confidence in projected changes in solar irradiance (Chapter 8)*. *Consequently the possible effects of future changes in natural forcings are excluded from the assessment here*.” See page 1007 for how the IPCC dismissed the impact of solar forcing during this grand solar minimum, “*As discussed in Chapter 8 (Section 8.4.1.3), the Sun has been in a ‘grand solar maximum’ of magnetic activity on the multi-decadal time scale. However,* ***the most recent solar minimum was the lowest and longest since 1920****, and some studies (e.g., Lockwood, 2010) suggest there could be a continued decline towards a much quieter period in the coming decades, but there is low confidence in these projections (Section 8.4.1.3).*” **NB:** This conveniently eliminates any form of natural cooling, that would counter the IPCC’s global warming projections = Confirmation bias.]. [↑](#endnote-ref-127)
128. **WG1 erroneously-biasedly dismissed the climate forcing impact of volcanic eruptions from its climate forecasts (i.e., known cooling factors)**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See pages 1008-1009, “FAQ 11.2, How Do Volcanic Eruptions Affect Climate and Our Ability to Predict Climate?” While detailing over 1.5 pages about the planetary cooling impact of large magnitude volcanic eruptions we are informed, “***The future projections in this report do not include future volcanic eruptions****.*” See page 1009 sub-section 11.3.6.3 point 4 for solar irradiance and volcanism, “*As discussed in Section 11.3.6.2, the RCP scenarios assume no underlying trend in total solar irradiance and no future volcanic eruptions. Future volcanic eruptions cannot be predicted and there is low confidence in projected changes in solar irradiance (Chapter 8)*. *Consequently the possible effects of future changes in natural forcings are excluded from the assessment here*.” **NB:** This conveniently **eliminates any form of natural cooling, that would counter the IPCC’s global warming projections** = Confirmation bias.]. [↑](#endnote-ref-128)
129. **Atmospheric blocking can cause abrupt AMOC changes**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See page 1247, Box 14.2 Blocking (Atmospheric blocking). “*At interannual time scales, there are statistically significant relationships between blocking activity and several dominant modes of atmospheric variability, such as the NAO (Section 14.5.1) and wintertime blocking in the Euro-Atlantic sector (Croci-Maspoli et al., 2007a; Luo et al., 2010), the winter PNA (Section 14.7.1) and blocking frequency in the North Pacific (Croci-Maspoli et al., 2007a), or the SAM (Section 14.5.2) and winter blocking activity near the New Zealand sector (Berrisford et al., 2007). Multi-decadal variability in winter blocking over the North Atlantic and the North Pacific seem to be related, respectively, with the Atlantic Meridional Overturning Circulation (AMOC; Häkkinen et al., 2011; Section 14.7.6) and the Pacific Decadal Oscillation (PDO; Chen and Yoon, 2002; Section14.7.3), although this remains an open question. Other important scientific issues related to the blocking phenomenon include the mechanisms of blocking onset and maintenance, two way interactions between blocking and stratospheric processes (e.g., Martius et al., 2009; Woollings et al., 2010), influence on blocking of slowly varying components of the climate system (sea surface temperature (SST), sea ice, etc., Liu et al., 2012b), and* ***external forcings.*** *The most consistent long-term observed trends in blocking for the second half of the 20th century are the reduced winter activity over the North Atlantic (e.g., Croci-Maspoli et al., 2007b), which is consistent with the observed increasing North Atlantic Oscillation (NAO) trend from the 1960s to the mid-1990s (Section 2.7.8), as well as an eastward shift of intense winter blocking over the Atlantic and Pacific Oceans (Davini et al., 2012). The apparent decreasing trend in SH blocking activity (e.g., Dong et al., 2008) seems to be in agreement with the upward trend in the SAM.*”]. [↑](#endnote-ref-129)
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131. M.F. Knudsen et al., 2014. Evidence for external forcing of the Atlantic Multidecadal Oscillation since termination of the Little Ice Age. Nature Communications, Volume 5, Article number 3323. [↑](#endnote-ref-131)
132. D. Swingedouw et al., Bidecadal North Atlantic ocean circulation variability controlled by timing of volcanic eruptions. Nature Communications volume 6, Article number: 6545 (2015). [↑](#endnote-ref-132)
133. **Key limitations of CMIP5 models were known to the IPCC (i.e., CMIP5 models do not adequately reflect dynamic responses to climate-forcing volcanism).** S. Driscoll et al., ( 2012). Coupled Model Intercomparison Project 5 (CMIP5) simulations of climate following volcanic eruptions, J. Geophysical Research, 117, D17105, doi:10.1029/2012JD017607. [“*All available models submitted to the CMIP5 archive as of April 2012 that had a reasonably realistic representation of volcanic eruptions and number of samples have been analyzed for their ability to simulate post-volcanic radiative and dynamic responses. With substantially different dynamics between the models it was hoped to find at least one model simulation that was dynamically consistent with observations, showing improvement since S06. Disappointingly, we found that again, as with S06, despite relatively consistent post volcanic radiative changes, none of the models manage to simulate a sufficiently strong dynamical response.*” **NB:** This reference was cited by Working Group 1 on page 833, meaning the **limitations of CMIP5 models were known to the IPCC**.]. [↑](#endnote-ref-133)
134. F. Lehner et al., 2013, “Amplified inception of European Little Ice Age by sea ice–ocean–atmosphere feedbacks.” J. Climate, 26, 7586–7602. https://doi.org/10.1175/JCLI-D-12-00690.1. [↑](#endnote-ref-134)
135. Odd Helge Otterå et al., “External forcing as a metronome for Atlantic multidecadal variability.” Nature Geoscience Volume 3, 688–694 (2010). [↑](#endnote-ref-135)
136. Y. Zhong et al., “Centennial-scale climate change from decadally-paced explosive volcanism: a coupled sea ice-ocean mechanism.” Climate Dynamics (2011) 37: 2373. https://doi.org/10.1007/s00382-010-0967-z. [↑](#endnote-ref-136)
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139. See over 200 of “Revolution: Ice Age Re-Entry’s” scientific publications that were not reflected in the IPCC’s non-natural version of the climate system: https://grandsolarminimum.com/scientific-publication-hyperlinks/. [↑](#endnote-ref-139)
140. **WG2 dismissed lessons from historical climate catastrophes as irrelevant today**. IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pages [See page 771-772. “*There is a specific research field that explores the relationship between large-scale disruptions in climate and the collapse of past empires.*” *“DeMenocal (2001) summarizes evidence that suggests that major changes in weather patterns coincided with the collapse of several previously powerful civilizations, including the Anasazi, the Akkadian* (**NB:** associated with the **4.2Kyr rapid climate change event**)*, Classic Maya, Mochica, and Tiwanaku empires. Other historical reference points of the interaction of climate with society emerge from analysis of the* ***Little Ice Age****. Some studies show that the Little Ice Age in the mid-17th century was associated with more cases of political upheaval and warfare than in any other period (Parker, 2008; Zhang et al., 2011), including in Europe (Tol and Wagner, 2010), China (Brook, 2010), and the Ottoman empire (White, S., 2011).”* This is then followed by **WG1’s dismissal of the relevance** of these historical catastrophes in today’s world; *“The precise causal pathways that link these changes in climate to changes in civilizations are not well understood due to data limitations* (**NB:** the same limitation applies to forecasting the even far more complex global temperature)*. Therefore, it should be noted that these findings from* ***historical antecedents are not directly transferable to the contemporary globalized world.****”* (**NB:** because the precise causal pathways are not well understood, these risks were dismissed i.e., not directly transferable to today). See page 1001, section 18.4.5. “*Some studies have suggested that levels of warfare in Europe and Asia were relatively high during the Little Ice Age (Parker, 2008; Brook, 2010; Tol and Wagner, 2010; White, 2011; Zhang et al., 2011), but for the same reasons the detection of the effect of climate change and an assessment of its importance can be made only with low confidence.*” **NB**: once again this exemplifies the IPCC’s perilously dangerous confirmation bias.]. [↑](#endnote-ref-140)
141. **The IPCC acknowledge that solar and volcanic activity contributed substantially to the LIA’s climate change, yet ignored this science in their forecasts and key-risk assessment.** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See Pages 37, “*Based on the comparison between reconstructions and simulations, there is* ***high confidence that not only external orbital, solar and volcanic forcing****, but also internal variability,* ***contributed substantially to the spatial pattern and timing of surface temperature changes*** *between the Medieval Climate Anomaly and the Little Ice Age (1450–1850). {5.3.5, 5.5.1}.*” “*There is high confidence for droughts during the last millennium of greater magnitude and longer duration than those observed since the beginning of the 20th century in many regions. There is medium confidence that more megadroughts occurred in monsoon Asia and wetter conditions prevailed in arid Central Asia and the South American monsoon region during the Little Ice Age (1450–1850) compared to the Medieval Climate Anomaly (950–1250). {5.5.4, 5.5.5}.*” See page 77 “*Based on the comparison between reconstructions and simulations, there is high confidence that not only external orbital, solar and volcanic forcing but also internal variability contributed substantially to the spatial pattern and timing of surface temperature changes between the Medieval Climate Anomaly and the Little Ice Age (about 1450 to 1850). However, there is only very low confidence in quantitative estimates of their relative contributions. It is* ***very unlikely that NH temperature variations from 1400 to 1850 can be explained by internal variability alone****. There is medium confidence that external forcing contributed to Northern Hemispheric temperature variability from 850 to 1400 and that* ***external forcing contributed to European temperature variations over the last centuries****. {5.3.5, 5.5.1, 10.7.2, 10.7.5; Table 10.1}*.” Page 112 Floods and Droughts: “*On millennial time scales, there is high confidence that proxy information provides evidence of droughts of greater magnitude and longer duration than observed during the 20th century in many regions. There is* ***medium confidence that more megadroughts occurred in monsoon Asia and wetter conditions prevailed in arid Central Asia and the South American monsoon region during the Little Ice Age (1450 to 1850)*** *compared to the Medieval Climate Anomaly (950 to 1250). {2.6.2, 5.5.4, 5.5.5, 10.6.1}*.” See Page 408 “*The median of the NH temperature reconstructions (Figure 5.7) indicates mostly warm conditions from about 950 to about 1250 and* ***colder conditions from about 1450 to about 1850****; these time intervals are chosen here to represent the MCA and the LIA, respectively*.” See page 885, “*There is medium confidence that both external solar and volcanic forcing, and internal variability, contributed substantially to the spatial patterns of surface temperature changes between the MCA and the LIA, but very low confidence in quantitative estimates of their relative contributions (Sections 5.3.5.3 and 5.5.1).* ***The combined influence of volcanism, solar forcing*** *and a small drop in greenhouse gases (GHGs)* ***likely contributed to Northern Hemisphere cooling during the LIA*** *(Section 10.7.2). Solar radiative forcing (RF) from the Maunder Minimum (1745) to the satellite era (average of 1976–2006) has been estimated to be +0.08 to +0.18 W m–2 (low confidence, Section 8.4.1.2). This may have contributed to early 20th century warming (low confidence, Section 10.3.1)*.” See Page 918, “***Detection and attribution studies support results from modelling studies that infer a strong role of external forcing in the cooling of NH temperatures during the Little Ice Age (LIA;*** *see Chapter 5 and Glossary)*.” See page 1151, “*The combined records indicate that* ***a net decline of global glacier volume began in the 19th century, before significant anthropogenic RF had started,*** *and was probably the result of warming associated with the termination of the Little Ice Age (Crowley, 2000; Gregory et al., 2006, 2013b).*”] [↑](#endnote-ref-141)
142. **Large magnitude and climate-forcing volcanic eruption data awaits the IPCC’s analysis**. Data: **(1)** Helen Sian Crosweller et al., “Global database on large magnitude explosive volcanic eruptions (LaMEVE).” Journal of Applied Volcanology Society and Volcanoes 20121:4. <https://doi.org/10.1186/2191-5040-1-4>. Volcano Global Risk Identification and Analysis Project database (VOGRIPA), British Geological Survey. Data Access: http://www.bgs.ac.uk/vogripa/. Data downloaded 07/05/2018. **(2)** S.K. Solanki et al., 2004, “An unusually active Sun during recent decades compared to the previous 11,000 years.” Nature, Volume 431, No. 7012, 1084-1087, 28 October 2004. Data: S.K. Solanki et al., 2005, “11,000 Year Sunspot Number Reconstruction.” IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series #2005-015. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www.ncdc.noaa.gov/paleo-search/study/5780. Downloaded 05/06/2018. [↑](#endnote-ref-142)
143. David D. Zhang et al., “Global climate change, war, and population decline in recent human history.” Proceedings of the National Academy of Sciences December, 2007, 104 (49) 19214-19219; DOI: 10.1073/pnas.0703073104. [↑](#endnote-ref-143)
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150. B. Stefanie et al., “Holocene flood frequency across the Central Alps - solar forcing and evidence for variations in North Atlantic atmospheric circulation.” Quaternary Science Reviews 80 (2013) 112e128. [↑](#endnote-ref-150)
151. Laurent Fouinat et al., “Paleoflood activity and climate change over the last 2000 years recorded by high altitude alpine lake sediments in Western French Alps.” Geophysical Research Abstracts. Volume 17, EGU2015-11555, 2015 EGU General Assembly 2015 © Author(s) 2015. CC Attribution 3.0 License. [↑](#endnote-ref-151)
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153. B. Stefanie et al., “A 2000 year long seasonal record of floods in the southern European Alps.” Geophysical Research Letters, Volume 40, 4025–4029, doi:10.1002/grl.50741, 2013. [↑](#endnote-ref-153)
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169. James M. Russell et al., “Spatial complexity of ‘Little Ice Age’ climate in East Africa: sedimentary records from two crater lake basins in western Uganda.” The Holocene. Volume 17, Issue 2, 183 – 193. 2007. https://doi.org/10.1177/0959683607075832. [↑](#endnote-ref-169)
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187. **The IPCC dismissed the prospect and impact of this current grand solar minimum that the sun has entered, without any authoritative expertise or credible review of the science and data.** IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages. [See page 1022 Chapter citation mention of “*grand solar minimum*.” See page 1007. “*As discussed in Chapter 8 (Section 8.4.1.3), the Sun has been in a ‘grand solar maximum’ of magnetic activity on the multi-decadal time scale. However, the most* ***recent solar minimum was the lowest and longest since 1920****, and some studies (e.g., Lockwood, 2010) suggest there could be a* ***continued decline towards a much quieter period in the coming decades, but there is low confidence in these projections*** *(Section 8.4.1.3). Nevertheless,* ***if there is such a reduction in solar activity, there is high confidence*** *that the variations in TSI RF will be much smaller than the projected increased forcing due to GHGs (Section 8.4.1.3)*.” **NB:** once again this exemplifies the IPCC’s perilously dangerous confirmation bias. [↑](#endnote-ref-187)
188. **Northern Hemisphere temperature and solar activity are significantly correlated since 1400 CE**. Data: **(1)** A.M. Berggren et al., 2009, “A 600-year annual 10Be record from the NGRIP ice core, Greenland.” Geophysical Research Letters, 36, L11801, doi:10.1029/2009GL038004. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. North GRIP - 600 Year Annual 10Be Data. <https://www.ncdc.noaa.gov/paleo-search/study/8618>. Downloaded 05/05/2018. **(2)** T. Kobashi et al., 2013, “Causes of Greenland temperature variability over the past 4000 year: implications for Northern Hemispheric temperature changes.” Climate of the Past, 9(5), 2299-2317. doi: 10.5194/cp-9-2299-2013. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Northern Hemisphere 4000 Year Temperature Reconstructions. https://www.ncdc.noaa.gov/paleo/study/15535. Downloaded 05/05/2018. Analysis: See Revolution’s Figure 4.4.A.) Spearman rank correlation r= -0.76, two-tailed P-value = <0.00001, N=484 annual pairings. Both the Northern Hemisphere temperature and the 18-year moving average Beryllium-10 concentration anomaly anomalies were not normally distributed, though they did not contain outliers. A scatter plot of the data indicated a linear relationship. A Spearman rank correlation was utilized given the non-normal distributions. The correlation was optimized using an 18-year moving average Beryllium-10 concentration anomaly. This 18-year moving average was selected using the scatterplot trend line in Microsoft Excel to maximize the R-squared (versus an 11-year, 5-year, and no moving average). Revolution’s Figure 4.4.B) A Spearman rank correlation r= -0.876, two-tailed P-value = <0.00001, N=205 annual pairings. A Pearson correlation r= -0.91, two-tailed P-value = <0.00001, N=205. The grand solar minima temperature decline phases and their corresponding 18-year trailing average Beryllium-10 data were extracted from the full data set and compiled into a single time series (as linked sequential periods). Each grand solar minimum period was analyzed as a stand-alone grand solar minimum data set (Data not shown) and as fusion of four grand solar minima. The results and conclusion are the same. The temperature data is normally distributed. The 18-year moving average Beryllium-10 concentration anomaly is not normally distributed, indicated by a d'Agostino-Pearson test that yielded a p=0.019, indicating a non-normal distribution. However, the scatter plot demonstrates a linear relationship, and there were no outliers. The correlation was optimized using a 18-year moving average Beryllium-10 concentration anomaly, selected using the scatterplot trend line in Microsoft Excel to maximize the R-squared (versus an 11-year, 5-year, and no moving average). Note: A Pearson correlation was also calculated for both data sets supporting Revolution’s Figures 4.4.A and B, yielding a similar level of correlation, statistical significance, and the same conclusion (Data not shown). [↑](#endnote-ref-188)
189. **WG1 dismissed the climate forcing impact of volcanic eruptions from its climate forecasts and key-risk assessments**. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pages [See pages 1008-1009, “*FAQ 11.2. How Do Volcanic Eruptions Affect Climate and Our Ability to Predict Climate?*” While detailing over 1.5 pages about the planetary cooling impact of large magnitude volcanic eruptions we are informed, “*The* ***future projections in this report do not include future volcanic eruptions****.*” See page 1009 sub-section 11.3.6.3 point 4 for solar irradiance and volcanism, “*As discussed in Section 11.3.6.2, the RCP scenarios assume no underlying trend in total solar irradiance and no future volcanic eruptions.* ***Future volcanic eruptions cannot be predicted*** *and there is low confidence in projected changes in solar irradiance (Chapter 8)*. *Consequently the* ***possible effects of future changes in natural forcings are excluded*** *from the assessment here*.” **NB**: The assumption that future eruptions can’t be predicted (i.e., like the global temperature) is an incorrect-biased opinion. By calculating the historical century average eruptions across different magnitude/radiative forcing groupings, we can “probabilistically” determine their 21st century frequencies.]. [↑](#endnote-ref-189)
190. **Geoengineering climate cooling with stratospheric aerosol injection (i.e., an inane idea to counter AGW).** IPCC, 2014: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [See Page 486, Section 6.9.2 Solar radiation management. 6.9.2.1 Proposed solar radiation management methods and characteristics. “*Stratospheric aerosol injection would attempt to imitate the global cooling that large volcanic eruptions produce (Budyko and Miller, 1974; Crutzen, 2006; Rasch et al., 2008). This might be achieved by lofting sulphate aerosols (or other aerosol species) or their precursors to the stratosphere to create a high-altitude reflective layer that would need to be continually replenished. Section 7.7.2.1 of WG I assessed that there is medium confidence that up to 4 W/m2 of forcing could be achieved with this approach.*”]. [↑](#endnote-ref-190)
191. J. Slawinska and A. Robock, 2018, “Impact of Volcanic Eruptions on Decadal to Centennial Fluctuations of Arctic Sea Ice Extent during the Last Millennium and on Initiation of the Little Ice Age.” J. Climate, 31, 2145–2167, https://doi.org/10.1175/JCLI-D-16-0498.1. [↑](#endnote-ref-191)
192. Clive Oppenheimer, “Climatic, environmental and human consequences of the largest known historic eruption: Tambora volcano (Indonesia) 1815.” Progress in Physical Geography: Earth and Environment (2003). Volume 27, Issue 2, 230 – 259. https://doi.org/10.1191/0309133303pp379ra. [↑](#endnote-ref-192)
193. Anthony J. McMichael, “Insights from past millennia into climatic impacts on human health and survival.” Proceedings of the National Academy of Sciences March 2012, 109 (13) 4730-4737; DOI: 10.1073/pnas.1120177109. [See page 4735, column 2, paragraph 2]. [↑](#endnote-ref-193)
194. C. Oppenheimer, (2003). “Ice core and paleoclimate evidence for the timing and nature of the great mid‐13th century volcanic eruption.” International Journal of Climatology, 23: 417-426. doi:10.1002/joc.891. [↑](#endnote-ref-194)
195. C. Newhall et al., 2018, “Anticipating future Volcanic Explosivity Index (VEI) 7 eruptions and their chilling impacts.” Geosphere, v. 14, no. 2, p. 1–32, doi:10.1130/GES01513.1. [↑](#endnote-ref-195)
196. R.B. Stothers, “Climatic and Demographic Consequences of the Massive Volcanic Eruption of 1258.” Climatic Change (2000) 45: 361. https://doi.org/10.1023/A:1005523330643. [↑](#endnote-ref-196)
197. C. Oppenheimer, 2003, “Ice core and paleoclimate evidence for the timing and nature of the great mid‐13th century volcanic eruption.” International Journal of Climatology, 23: 417-426. doi:10.1002/joc.891. [↑](#endnote-ref-197)
198. Michael J. Puma et al., “Exploring the potential impacts of historic volcanic eruptions on the contemporary global food system.” PAGES Magazine. Science Highlights. Volcanoes and Climate. Volume 23, No 2, December 2015. [↑](#endnote-ref-198)
199. Anthony J. McMichael, “Insights from past millennia into climatic impacts on human health and survival.” Proceedings of the National Academy of Sciences Mar 2012, 109 (13) 4730-4737; DOI: 10.1073/pnas.1120177109. [See page 4735, column 2, paragraph 2]. [↑](#endnote-ref-199)
200. Clive Oppenheimer, Climatic, environmental and human consequences of the largest known historic eruption: Tambora volcano (Indonesia) 1815. Progress in Physical Geography: Earth and Environment (2003). Volume 27, Issue 2, 230 – 259. https://doi.org/10.1191/0309133303pp379ra. [↑](#endnote-ref-200)
201. C.C. Raible et al., 2016, “Tambora 1815 as a test case for high impact volcanic eruptions: Earth system effects.” WIREs Climate Change, 7: 569-589. doi:10.1002/wcc.407. [↑](#endnote-ref-201)
202. Michael J. Puma et al., “Exploring the potential impacts of historic volcanic eruptions on the contemporary global food system.” Pages Magazine. Science Highlights. Volcanoes and Climate. Volume 23, No 2, December 2015. [↑](#endnote-ref-202)
203. **Magnetized solar wind is associated with earth system risks**. I.G.M. Usoskin et al., “Solar activity, cosmic rays, and Earth’s temperature: A millennium-scale comparison.” Journal of Geophysical Research, 110, A10102, doi:10.1029/2004JA010946. [Exposé: See page 1. This tells us cosmogenic isotopes (Beryllium-10, Carbon-14) are used as proxies for solar activity, and that their production is caused by galactic cosmic ray flux, which is influenced by the solar system’s (heliospheric) magnetic field and is modulated by solar activity. Comment: Magnetized solar wind modulates the solar system’s magnetic shield (i.e., the heliosphere) and the earth’s magnetic shield (i.e. the magnetosphere), thereby regulating cosmic ray entry into the solar system and the earth system respectively. Cosmic ray entry into the upper atmosphere from space is modulated by solar activity and geomagnetism. Lower solar activity and lower geomagnetism permit more cosmic ray entry into the atmosphere, and conversely. Increased cosmic ray levels are associated with increased low-cloud formation, which is associated with planetary cooling, and conversely. The cosmic ray and low-cloud cooling effect are concentrated into the polar regions. Cosmogenic isotopes (Carbon-14, Beryllium-10) are generated by cosmic rays in the atmosphere, with more cosmic rays generating more cosmogenic isotopes, and conversely. Cosmogenic isotopes are then embedded in earth repositories (i.e., tree rings, ice cores) and therefore indirectly tell us about solar activity and the resulting magnetized solar wind that contacts the earth’s magnetosphere. By utilizing cosmogenic isotopes to assess relationships between the sun and earth systems (i.e., climate and volcanism) we know that the solar activity that is being assessed in this specific situation is mediated by magnetized solar wind]. [↑](#endnote-ref-203)
204. **The majority of the post-Holocene Climate Optimum climate-forcing volcanic eruptions (<-5W/m2) were associated with grand solar minima and maxima (mediated by magnetized solar wind).** Data: (1) Takuro Kobashi et al., 2017, “Volcanic influence on centennial to millennial Holocene Greenland temperature change.” Scientific Reports, 7, 1441. doi: 10.1038/s41598-017-01451-7. Data provided by the National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. <https://www.ncdc.noaa.gov/paleo-search/study/22057>. Data accessed 21/08/2018. (2) Solanki, S.K., et al. 2004. “An unusually active Sun during recent decades compared to the previous 11,000 years.” Nature, Volume 431, No. 7012, 1084-1087, 28 October 2004. Data: Solanki, S.K., et al. 2005. “11,000 Year Sunspot Number Reconstruction.” IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series #2005-015. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www.ncdc.noaa.gov/paleo-search/study/5780. Downloaded 05/06/2018. Analysis: Revolution’s Figure 5.1.A: Using the above-cited climate-forcing volcanic eruption data a quantitative filter was utilized to identify the largest climate forcing eruptions, and to group all eruption events into climate-forcing categories for sub-analysis. Each volcanic eruption started with the first data point in a group series, and this group series magnitude was represented by the maximum volcanic forcing magnitude data point (i.e., the most negative Watts/meter-squared value) of that group series (i.e., a 1-year value from within a range of 1-10 years). This was completed for the entire time series spanning 11,054 years. In this manner 403 volcanic events were identified over the 11,054 year period. The eruption events were preliminarily assigned to groups based on their maximum solar forcing impact, as follows: Group-1, ≤-10 W/m2 (N=23). Group-2, -5.0 to <-9.99 W/m2 (N=50). Group-3, -2.0 to <-4.99 W/m2 (N=89). Group-4, 0 to <-1.99 W/m2 (N=241). Volcanic events were then grouped and compiled into 500, 400, and 300 year bin totals spanning the last 5,000, 8,000, and 11,000 years. The average sunspot numbers were calculated for each bin period. A goodness of fit and outlier tests were then conducted for all groupings. Pearson and Spearman rank correlations and their significance levels were calculated for each 5,000, 8,000, and 11,000 year periods to help understand if any relationships existed. Results: The 500-year bin totals (Group 1 and 2 combined) generated the highest and most significant correlations, and the **8,000 period maximized the correlation coefficients**. The correlation values were reduced for the 11,000-year period versus the 8,000-year period, and were marginally smaller for 400-year bins, and much smaller for 300-year bins (Data not shown) compared with the 500-year bins. On this basis, the 8,000-year duration and 500-year bin totals (Group 1 and 2 eruption events combined) represented the optimum grouping which maximized the correlation and duration of the relationship i.e., **since the Holocene Climate Optimum**. The outcome of this analysis was to compile Groups 1 and 2 into a single group and set the c**limate-forcing eruption threshold at ≤ -5.0 Watts/meter-squared** i.e., 73 climate-forcing volcanic eruptions. All 73 large climate-forcing volcanic eruptions were plotted against the above-cited Solanki et al. sunspot numbers to derive Figure 5.1.A’s graphic. Revolution’s Figure 5.1.B: The 73 climate-forcing eruptions selected above were tabulated alongside the above-cited Solanki et al. sunspot numbers in the year of the eruption’s occurrence. The number of periods (at a 10-year resolution) was counted to the previous or next big (grand solar) and small (sub-) peak or trough for all eruption events. An eruption was then assigned to a big or little peak or trough based on its closest proximity to one of those events. [↑](#endnote-ref-204)
205. **Grand solar minimum and maximum extremes of solar activity putatively act as a climate oscillator (via climate-forcing volcanism).** Data: (1) Helen Sian Crosweller et al., “Global database on large magnitude explosive volcanic eruptions (LaMEVE).” Journal of Applied Volcanology Society and Volcanoes 20121:4. <https://doi.org/10.1186/2191-5040-1-4>. Volcano Global Risk Identification and Analysis Project database (VOGRIPA), British Geological Survey. Data Access: http://www.bgs.ac.uk/vogripa/. Data downloaded 07/05/2018. (2) S.K. Solanki et al., 2004, “An unusually active Sun during recent decades compared to the previous 11,000 years.” Nature, Volume 431, No. 7012, 1084-1087, 28 October 2004. Data: S.K. Solanki et al., 2005, “11,000 Year Sunspot Number Reconstruction.” IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series #2005-015. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www.ncdc.noaa.gov/paleo-search/study/5780. Downloaded 05/06/2018. Analysis: A total of 67 VEI 6 and 7 eruptions were extracted from the LaMEVE database. These were plotted alongside the above-cited Solanki et al. sunspot numbers. The number of 10-year periods was counted from each eruption to the previous or next sunspot number peak or trough. The data is tabulated above, at the start of the endnotes and referencing this endnote. Results: 82 percent of VEI 6-7 eruptions occurred at or within one decade of a sunspot number peak or trough. This peak and trough occurrence coincides with either a grand solar maximum or minimum, or a smaller sub-peak or sub-trough of sunspot numbers. [↑](#endnote-ref-205)
206. **Large magnitude volcanism’s association with the Little Ice Age’s grand solar minimum and maximum, and the 8.2Kyr rapid climate change event.** Data: (1) Helen Sian Crosweller et al., “Global database on large magnitude explosive volcanic eruptions (LaMEVE).” Journal of Applied Volcanology Society and Volcanoes 20121:4. <https://doi.org/10.1186/2191-5040-1-4>. Volcano Global Risk Identification and Analysis Project database (VOGRIPA), British Geological Survey. Data Access: http://www.bgs.ac.uk/vogripa/. Data downloaded 07/05/2018. (2) S.K. Solanki et al., 2004, “An unusually active Sun during recent decades compared to the previous 11,000 years.” Nature, Volume 431, No. 7012, 1084-1087, 28 October 2004. Data: Solanki, S.K., et al. 2005. 11,000 Year Sunspot Number Reconstruction. IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series #2005-015. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www.ncdc.noaa.gov/paleo-search/study/5780. Downloaded 05/06/2018. (3) Takuro Kobashi et al., 2017, “Volcanic influence on centennial to millennial Holocene Greenland temperature change.” Scientific Reports, 7, 1441. doi: 10.1038/s41598-017-01451-7. Data provided by the National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. <https://www.ncdc.noaa.gov/paleo-search/study/22057>. Data accessed 21/08/2018. Analysis: (1) Revolution’s Figure 5.2.A: The 11 total VEI 6 and 7 eruptions between 1235 and 1885 were extracted from the LaMEVE database and graphically plotted as discrete events on the above-cited Solanki et al. reconstructed sunspot number data within this same period. In this manner, the occurrence of VEI 6-7 eruptions can be viewed relative to the grand solar maximum or minimum, or going into or coming out of a grand solar minimum trough. (2) Revolution’s Figure 5.2.B: Two periods running from grand solar maxima-to-minima-to-maxima were extracted from the above-cited Solanki et al. sunspot number data (including the 8.2Kyr rapid climate change event). The corresponding climate forcing volcanic eruptions from the Takuro Kobashi, et al. volcanic eruption data (the same as utilized for Revolution’s Figure 5.1.A) were plotted in the periods that they occurred. This highlights the association of large climate-forcing volcanic eruptions with either a grand solar maximum or minimum, or a smaller sub-peak or sub-trough of sunspot numbers going into or coming out of a grand solar minimum. [↑](#endnote-ref-206)
207. **Total solar irradiance (Associated with influenza pandemics)**. Reconstruction was based on NRLTSI2 (Coddington et al., BAMS, 2015 doi: 10.1175/BAMS-D-14-00265.1). <http://spot.colorado.edu/~koppg/TSI/TIM_TSI_Reconstruction.txt>. [↑](#endnote-ref-207)
208. **Cosmic ray intensity (Associated with influenza pandemics)**. Usoskin, I.G., et al. 2008. Cosmic Ray Intensity Reconstruction. IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series # 2008-013. NOAA/NCDC Paleoclimatology Program, Boulder CO, USA. Original References: 1) I.G. Usoskin et al., 2002, A physical reconstruction of cosmic ray intensity since 1610. Journal of Geophysical Research, 107(A11), 1374. Downloaded May 2018. <ftp://ftp.ncdc.noaa.gov/pub/data/paleo/climate_forcing/solar_variability/usoskin-cosmic-ray.txt>. [↑](#endnote-ref-208)
209. **Solar modulation function (MeV) (Associated with influenza pandemics)**. R. Muscheler et al., 2008. Radionuclide-based Solar Activity Reconstructions for the Last Millennia. IGBP PAGES/World Data Center for Paleoclimatology. Data Contribution Series # 2008-024. NOAA/NCDC Paleoclimatology Program, Boulder CO, USA. https://www1.ncdc.noaa.gov/pub/data/paleo/climate\_forcing/solar\_variability/muscheler2007solar-mod.txt. [↑](#endnote-ref-209)
210. **Sunspot numbers (Associated with influenza pandemics)**. Sunspot data from the World Data Center SILSO, Royal Observatory of Belgium, Brussels. http://sidc.be/silso/datafiles#total. [↑](#endnote-ref-210)
211. **Northern Hemisphere temperature anomaly (Associated with influenza pandemics)**. T. Kobashi et al., 2013. Causes of Greenland temperature variability over the past 4000 year: implications for northern hemispheric temperature changes. Climate of the Past, 9(5), 2299-2317. doi: 10.5194/cp-9-2299-2013. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Northern Hemisphere 4000 Year Temperature Reconstructions. https://www.ncdc.noaa.gov/paleo/study/15535. [↑](#endnote-ref-211)
212. **Greenland temperature anomaly (Associated with influenza pandemics).** T. Kobashi et al., 2017. Volcanic influence on centennial to millennial Holocene Greenland temperature change. Scientific Reports, 7, 1441. doi: 10.1038/s41598-017-01451-7. https://www.ncdc.noaa.gov/paleo-search/study/22057. [↑](#endnote-ref-212)
213. **Arctic Sea-ice Cover proxy (Associated with influenza pandemics)**. Jochen Halfar et al., 2013, Arctic sea-ice decline archived by multicentury annual-resolution record from crustose coralline algal proxy. Proceedings of the National Academy of Sciences. doi: 10.1073/pnas.1313775110. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. Arctic Northwest Atlantic 646 Year Coralline Algae Sea Ice Record. https://www.ncdc.noaa.gov/paleo/study/15454. [↑](#endnote-ref-213)
214. **Ice accumulation rate (Associated with influenza pandemics)**. Beryllium-10 concentration anomaly data is based on; A.M. Berggren et al., 2009, A 600-year annual 10Be record from the NGRIP ice core, Greenland. Geophysical Research Letters, 36, L11801, doi:10.1029/2009GL038004. National Centers for Environmental Information, NESDIS, NOAA, U.S. Department of Commerce. North GRIP - 600 Year Annual 10Be Data. <https://www.ncdc.noaa.gov/paleo-search/study/8618>. [↑](#endnote-ref-214)
215. **Publications used to derived a consensus of influenza pandemic outbreak dates from 1500 CE**. (1) David M. Morens\* and Jeffery K. Taubenberger. Pandemic influenza: certain uncertainties. Rev. Med. Virol. 2011; 21: 262–284. DOI: 10.1002/rmv.689. (2) Svenn-Erik Mamelund. Influenza, Historical. December 2008. International Encyclopedia of Public Health, First Edition (2008), vol. 3, pp. 597-609. DOI: 10.1016/B978-012373960-5.00372-5. (3) J.K. Taubenberger(1),\* and D.M. Morens(2). Pandemic influenza – including a risk assessment of H5N1. Rev Sci Tech. 2009 April ; 28(1): 187–202. (4) David M. Morens, Jeffery K. Taubenberger. Historical thoughts on influenza viral ecosystems, or behold a pale horse, dead dogs, failing fowl, and sick swine. (5) Bruno Lina. Chapter 12: History of Influenza Pandemics. In: Raoult D., Drancourt M. (eds) Paleomicrobiology. Springer, Berlin, Heidelberg. © Springer-Verlag Berlin Heidelberg 2008. (6) C.W. Potter. A history of influenza. Journal of Applied Microbiology 2001, 91, 572-579. (7) Eugenia Tognotti. Emerging Problems in Infectious Diseases Influenza pandemics: a historical retrospect. J Infect Dev Ctries 2009; 3(5):331-334. [↑](#endnote-ref-215)
216. **Pacific Decadal Oscillation Reconstruction (Associated with influenza pandemics)**. C. Shen et al., 2006. A Pacific Decadal Oscillation record since 1470 AD reconstructed from proxy data of summer rainfall over eastern China. Geophysical Research Letters, vol. 33, L03702, February 2006. doi:10.1029/2005GL024804. https://www1.ncdc.noaa.gov/pub/data/paleo/historical/pacific/pdo-shen2006.txt. [↑](#endnote-ref-216)
217. **Warm Season Arctic Oscillation Reconstructions (AO-SAT and AO-SLP) (Associated with influenza pandemics)**. R.D. D’Arrigo et al., 2003, Warm Season Arctic Oscillation Reconstructions. International Tree-Ring Data Bank. IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series #2003-045. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www1.ncdc.noaa.gov/pub/data/paleo/treering/reconstructions/ao\_darrigo2003.txt. [↑](#endnote-ref-217)
218. **WHO Influenza viral surveillance**. Antigenic and genetic characteristics of zoonotic influenza viruses and development of candidate vaccine viruses for pandemic preparedness. https://www.who.int/influenza/vaccines/virus/201902\_zoonotic\_vaccinevirusupdate.pdf?ua=1. [↑](#endnote-ref-218)
219. **The IPCC discloses our limited oil and gas reserves AR5 (without emphasis).** IPCC, Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [See page 379. “*There is little controversy that oil and gas occurrences are abundant, whereas the reserves are more limited, with some 50 years of production for oil and about 70 years for natural gas at the current rates of extraction (Rogner et al., 2012). Reserve additions have shifted to inherently more challenging and potentially costlier locations, with technological progress outbalancing potentially diminishing returns (Nakicenovic et al., 1998; Rogner et al., 2012)*.” Question: How will humans generate the carbon dioxide required to produce the global warming predicted by the IPCC for the 21st century with only 50 years of proven oil and gas left, while peak-discovery is history?]. [↑](#endnote-ref-219)
220. **The IPCC discloses our limited oil and gas reserves AR4 (without emphasis).** IPCC, Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [Exposé: See page 265, section 4.3.1. “*The proven and probable reserves of oil and gas are enough to last for decades and in the case of coal, centuries (Table. 4.2). Possible undiscovered resources extend these projections even further.*” Question: How will humans generate the carbon dioxide required to produce the global warming predicted by the IPCC for the 21st century with only decades of proven oil and gas left?]. [↑](#endnote-ref-220)
221. **Energy Information Administration Data. 50 years of proven oil and gas reserves (see Revolution’s Chapter 8):** Energy Information Administration data was obtained from: International Energy Statistics. These calculations utilized the following data files. Natural gas <https://bit.ly/2LC6GBo>, Crude Oil https://bit.ly/2IWeEaP, Coal data <https://bit.ly/2L6pk3w>. [Analysis: These reserve timeline estimates are calculated by dividing the 2013 Energy Information Agency’s proven global oil, natural gas, and coal reserves by 2013 levels of production. This calculation tells us there are 50 years of proven oil and gas, and 130 years of coal reserves left. These reserve timeline estimates do not assume any population or economic growth, or a switch to a cold climate regime, which would accelerate energy demand and reduce the reserve timelines.]. [↑](#endnote-ref-221)
222. **U.S. Energy Information Administration report guesses the unproven reserves.** Technically Recoverable Shale Oil and Shale Gas Resources. An Assessment of 137 Shale Formations in 41 Countries Outside the United States. June 2013. [Critique: See Table 2, page 3 for proven and unproven conventional and non-conventional energy reserves. The US Energy Information Agency reserve revisions mean that one-third of world gas and one-tenth of world oil resources are projections for shale resources. These revisions also mean that **50 percent and 70 percent of total conventional and unconventional oil and gas projections respectively are classified as unproven reserves (i.e., guesstimates)**. See pages 15-19, Methodology: These 2013 reserve revisions were based on predictions involving the application of historic US shale oil and gas recovery rates to foreign petroliferous basins with similar geophysical characteristics. These revisions assumed the same optimum operating context internationally as in the USA. See Chapter 8 of my book for a more detailed critique on this tenuous assumption.]. [↑](#endnote-ref-222)
223. **U.S. Geological Survey guess unproven reserves**. T.R. Klett et al., 2015, U.S. Geological Survey assessment of reserve growth outside of the United States: U.S. Geological Survey Scientific Investigations Report 2015–5091. <http://dx.doi.org/10.3133/sir20155091>. [Critique: (1) See page 1; “*The U.S. Geological Survey estimated volumes of potential additions to oil and gas reserves for the United States by reserve growth in discovered accumulations. These volumes were* ***derived by using a new methodology*** *developed by the U.S. Geological Survey.*” **NB:** a new non-validated methodology. (2) See page 4; Assessment of Reserve Growth Outside of the United States “*Because recoverable volumes for individual reservoirs were not reported for many fields outside of the United States, the individual accumulation analysis was not used. Data acquired from individually analyzed U.S. accumulations were used as analogs in this study.*” Critique: Significant increases in US fossil fuel reserves resulted from the deployment of a new and non-validated forecasting methodology. Internationally, the reserve revisions were guesstimates, based on transferring historical precedents for the USA to overseas. None of these methods involved physically verifying the new reserves in the oil and gas wells or fields. That means these are unproven reserves]. [↑](#endnote-ref-223)
224. All-time low for discovered resources in 2017: Around 7 billion barrels of oil equivalent was discovered. December 21, 2017. https://www.rystadenergy.com/newsevents/news/press-releases/all-time-low-discovered-resources-2017/. [↑](#endnote-ref-224)
225. Declining Reserve Replacement Ratios Deceiving In Resource Play Environment. November. 28, 2017. View Issue. Maurice Smith. JWN Energy. Daily Oil Bulletin. https://www.sproule.com/application/files/2415/1188/2978/Sproule-Declining-Reserve-Replacement-Ratios-Nora-Stewart-Steve-Golko.pdf. [↑](#endnote-ref-225)
226. Tom Whipple, Online article. “Peak Oil Review.” December 26, 2017. Originally published by ASPO-US. December 26, 2017. https://www.resilience.org/stories/2017-12-26/peak-oil-review-dec-26-2017/ [↑](#endnote-ref-226)
227. Kjell Aleklett and Colin J. Campbell, "The peak and decline of world oil and gas production." Minerals and Energy-Raw Materials Report 18.1 (2003): 5-20. [↑](#endnote-ref-227)
228. Ian Chapman, 2014, “The end of Peak Oil? Why this topic is still relevant despite recent denials.” Energy Policy, 64 . 93-101. http://insight.cumbria.ac.uk/id/eprint/1708/. [↑](#endnote-ref-228)