Science of Climate Change

Volume 3.4
2023

https://scienceofclimatechange.org

Published by: Klimarealistene (Org. no. 995 314 592)

ISSN 2703-9080 (print) ISNN 2703-9072 (online)

Wonderful Copenhagen! Venue for the 2023 Nordic Climate Conference!

Copenhagen, host to the 2023 Climate Conference is the capital and most populous city of Denmark, with a population of around 660 000 in the municipality and 1.4 million in the urban area.

Copenhagen was once a Viking fishing settlement, and you can still find traces of the Norse explorers here. Visit reconstructed villages, the remains of a 1,000-year-old castle, and museums dedicated to the notorious raiders. Copenhagen also features a blend of modern architecture and historical artifacts such as the Round Tower observatory – a wonderful example of 17th-century architecture. Art galleries, narrow streets, canals, parks, and Baroque churches round out the city's cultural attractions.

The city is the cultural, economic and governmental centre of Denmark; it is one of the major financial centres of Northern Europe with the Copenhagen Stock Exchange. Copenhagen's economy has developed rapidly in the service sector, especially through initiatives in information technology, pharmaceuticals and clean technology. Since the completion of the Øresund Bridge, Copenhagen has increasingly integrated with the Swedish province of Scania and its largest city, Malmö, forming the Øresund Region. With several bridges connecting the various districts, the cityscape is characterised by parks, promenades, and waterfronts and a large number of cyclists. Copenhagen's landmarks such as Tivoli Gardens, the Little Mermaid statue, the Amalienbog and Christianbog palaces, Rosenborg Castle, Frederik's Church, Børsen, and many museums, restaurants and nightclubs are significant tourist attractions.

Copenhagen is also home to the University of Copenhagen, the Technical University of Denmark, Copenhagen Business School and the IT University of Copenhagen. The University of Copenhagen, founded in 1479, is the oldest university in Denmark

A preconference seminar lead by Jens Olav Pepke Pedersen was held at DTU, the Technical University. DTU was founded in 1829 as the "College of Advanced Technology" The Physicist Hans Christian Ørsted, at that time a professor at the University of Copenhagen, was one of the driving forces behind this initiative. He was inspired by the École Polytechnique in Paris, France which Ørsted had visited as a young scientist. The new institution was inaugurated on 5 November 1829 with Ørsted becoming its Principal, a position he held until his death in 1851.[4]

DTU has 25 departments ranging from Aqua to Space and 17 research Centers as well as a staff of 3500 and 11 000 students.

The main conference, however, was held in The Christiansborg Palace (*Christiansborg Slot*) a palace and government building on the islet of Slotsholmen in central Copenhagen.

It is the seat of the Danish Parliament (*Folketinget*),[1] the Danish Prime Minister's Office,[2] and the Supreme Court of Denmark.[1] Also, several parts of the palace are used by the Danish monarch, including the Royal Reception Rooms, the Palace Chapel and the Royal Stables.[3]

The palace is thus home to the three supreme powers: the executive power, the legislative power, and the judicial power. It is the only building in the world that houses all three of a country's branches of government. The name Christiansborg is thus also frequently used as a metonym for

the Danish political system, and colloquially it is often referred to as ***Rigsborgen*** ('the castle of the realm') or simply ***Borgen*** ('the castle').[4]

The present building, the third with this name, is the last in a series of successive castles and palaces constructed on the same site since the erection of the first castle in 1167. Since the early fifteenth century, the various buildings have served as the base of the central administration; until 1794 as the principal residence of the Danish kings and after 1849 as the seat of parliament.

The Conference was held in a great hall and we were welcomed not by a scientist, but by Pernille Vermund, Member of parliament and political leader of party “Nye Borgerlige”. The highlight of the day was the Keynote Speech by Marcel Crok, Director of Clintel. Clintels new book on the many serious faults in IPCC AR6 was sold by the entrance to the hall. For other speakers we refer to the program.

The standing conference lunch was very good, as always in Copenhagen, and during the stroll along famous street Strøget back to the hotel, some of us gathered in a restaurant and enjoyed the famous Tubog green beer.

The Christiansborg Castle

SCIENCE OF CLIMATE CHANGE

Volume 3.4

December 2023

ISSN 2703-9072

Klimarealistene, P.O. Box 33, 3901 Porsgrunn, Norway

Preface

This is a special issue of Science of Climate Change which contains extended abstracts from the 4th Nordic Climate Conference which took place in Copenhagen September 14-15, 2023. The previous Nordic Conferences were held in Stockholm October 7-9 2016, Göteborg, February 16-17 2018, and in Oslo October 18-19 2019. Proceedings from the Oslo-conference are published in SCC Vol 2.1 (2022).

At the Oslo-conference it was announced that the next Nordic conference should be held in Copenhagen the following year with the Danish Parliament (Folketinget) as venue. However, due to restrictions on travel and meeting during the Covid pandemic, no meeting could be held in 2020 - 2022. When the meeting was finally announced in 2023, the SCC got the permission to collect and publish abstract from the conference. The collection and editing of abstracts were done by Stein Bergsmark and is presented in this special issue of SCC.

For the main conference in the Parliament September 15, we publish in the following pages the program for the main conference and the welcome address by the meeting organizer Karl-Iver Dahl Madsen.

The day before the main conference, September 14, a preconference seminar took place at the Danish Technical University, Lyngby. From this event we publish an opening speech by Jens Olaf Pepke Pedersen and in total 11 abstracts in the same sequence as the program schedule.

In this issue we also include an article about ice in the Artic by Alan Astrup Jensen, who had taken notes of the dates with minimum yearly Arctic ice for a long time. This article was inspired by talks at the seminar.

We also include a book review by Tege Tornvall *The Frozen View of the IPCC*, which was the main topic on the conference, and also sold at the main conference.

Jan-Erik Solheim and Stein Storlie Bergsmark
Editors

A digital version of this volume can be found here: https://doi.org/10.53234/SCC202310/45

The main Conference

The Climate Emergency is Cancelled

Venue: The Danish Parliament

Friday September 15, 2023, 9-17

9:00-9:15 Welcome

- Welcome from the Danish Parliament: Pernille Vermund, Member of Parliament and Political Leader of party "Nye Borgerlige"
- Welcome from the Danish Climate Realists, Karl Iver Dahl-Madsen, President of Danish Climate Realists
- Welcome from the Norwegian Climate Realists, Sverre Alhaug Høstmark, President of the Norwegian Climate Realists
- Wellcome from the Swedish Climate Realists, Professor Ingemar Nordin, Editor of Klimatupplysningen

9:15-10:00 Keynote Speech

- Keynote: Marcel Crok, Founder & CEO of Clintel: *The Frozen Views of IPCC*

10:30-12:00 About Natural Climate Science

- Henrik Svensmark. Senior Researcher at DTU Space: *On the Role of the Sun*
- Martin Hovland, Professor Emeritus from the University of Tromsø: *The Holocene Climate Change*

13:00-14:30 About Economic Climate Science

- Otto Brøns-Petersen, Chief of Analysis at CEPOS: *What is the essence of climate economics?*
- Ralph G. Schoellhammer, Assistant Professor of International Relations at Webster Vienna Private University: *Climate Alarmism is an Elite Phenomena*
- Lars Tvede (On Video), Entrepreneur, Investor and Author: *Energy Technologies: Populism, Realism and a Possible End-Game*

15:00-16:30 Critique of the Green Transition

- Karl Iver Dahl-Madsen, President of the Danish Climate Realists: *Human Flourishing is Dependent on Fossile Fuels*
- Tege Tornvall, Independent Consultant on Business, Political and Journalism studies: *Resource and Energy shortage for Electric Vehicles*
- Egil Bergsager, Geologist. Educated at University of Oslo and UCLA California: *The Political Climate Debate in Norway*

16:30-17:00 Concluding Discussion and Remarks

Table of Contents

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:

allan.astrup.jensen@gmail.com

Vol. 3.4 (2023)
pp. 353-358

Time Trend of the Arctic Sea Ice Extent

Since 2007 no significant decline has been observed

Allan Astrup Jensen

Nordic Institute of Product Sustainability, Environmental Chemistry and Toxicology, Denmark

Abstract

The NSIDC website, IPCC's reports and some scientific papers have announced that the Arctic Sea ice extent, when it is lowest in September month, in recent years has declined dramatically, and in few decades the sea ice is supposed to disappear completely in the summer. In that way new and shorter ships routes will open up north of the continents.

The facts are, that the Arctic Sea ice extent measured by satellites since 1978 expresses annual variations and it has declined considerably from 1997 to 2007. However, before that time period, from 1978 to 1996, the downward trend was minimal, and in the last 17 years from 2007 to 2023 the downward trend has also been about zero. Therefore, there is no indication that we should expect the Arctic Sea summer ice to disappear completely, as predicted, in one or two decades.

Regarding the extent of the summer (February) sea ice at the Antarctic, the downward trend during the years 1979-2021 was very small but in 2022 and 2023 a considerable decline was observed, and a decline was also clearly observed for the whole period of 2007- 2023. That was in contradiction to what happened in the Arctic. The pattern of the annual levels was not the same for the Arctic and Antarctic, indicating different drivers in the North and the South.

These data show that there is no apparent correlation between the variable extent of the Arctic and the Antarctic Sea ice and the gradually increasing CO_2-concentrations in the atmosphere as proposed by NSIDC, IPCC and others, also for these areas of cold climate.

Keywords: Arctic Sea ice; Antarctic sea ice; annual sea ice trends; satellite sea ice data.

Submitted 2023-10-13, Accepted 2023-11-02. https://doi.org/10.53234/scc202310/23

1. Introduction

The paper of Serreze and Stroeve (2015) discussed the Arctic Sea ice average extent in September month over the period of satellite observation from 1979 to 2014 and found some interannual variability and a strong downward and steepening trend in ice extent. The paper presents a figure adapted from the National Snow and Ice Data Center (NSIDC) illustrating their conclusion.

A similar type of figure has been shown in some of IPCC's reports and is found, regularly updated, on the website of NSIDC. The latest from October 5th, 2023 is shown in copy in Figure 1 below:

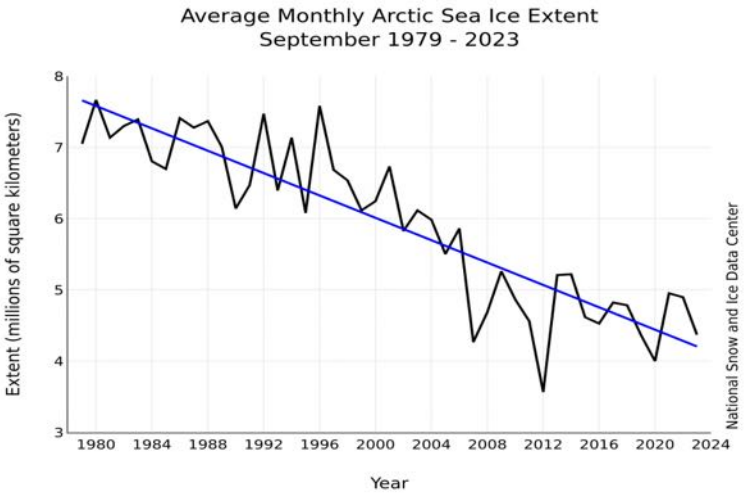


Figure 1: Average monthly Arctic Sea ice extend in September 1979-2023.

The trendline appears to show that the ice extent declines with about 10 % per decade and rather soon will be gone. The y-scale selected may suggest to the casual observer that the ice has almost disappeared.

During the years many predictions have been made concerning decline of the Arctic Sea ice. Overland and Wang (2007) made regional projections of Arctic Sea ice from the 20 models provided through the International Panel on Climate Change Fourth Assessment Report process. Based on the selection of a subset of models that closely simulate observed regional ice concentrations for 1979-1999, they found considerable evidence for a gradual loss of sea ice area of greater than 40 % by 2050 in summer for the marginal seas of the Arctic basin caused by greenhouse gas impacts. However, since the dramatical decline of the ice extent in 2007, the summer Arctic Sea ice area has not declined further.

This sharp decline in 2007 got Mark Serreze from NSIDC to predict that the Arctic Sea ice could melt completely as early as 2030.[1]

In 2007 when Al Gore (and IPCC) received the Nobel Peace Prize, he mentioned in his acceptance speech both NSIDC's prediction and another study that estimated that the North Polar ice cap could be completely gone during summer in seven years' time.[2] Al Gore mentioned and took ownership of similar aggressive predictions in many talks at many occasions in the following years e. g. at COP15 in Copenhagen in December 2009, where he in a talk predicted that the summer ice could be gone in 2014 or 2016, as referred by USA TODAY online and CBS News, December 14, 2009. However, Figure 1 shows that in 2014 and 2016 the ice extent was much greater than in 2007 and 2009.

In the online edition of the British newspaper "The Guardian" September 17, 2012, professor Peter Wadhams from the Polar Ocean Physics Research Group at the University of Cambridge predicted a final collapse of the Arctic Sea ice in four years. That prediction was based on the all-time low sea ice extent in September 2012. Figure 1 shows that the ice cap did not collapse the following years but rather increased!

Further, in their 2021 report IPCC writes: "The September Arctic Sea ice is projected (by CMIP6 model simulations) to be practically ice-free near mid-century under mid and high GHG emissions scenarios."

[1] https://earthobservatory.nasa.gov/images/8074/record-arctic-sea-ice-loss-in-2007#:~:text=According%20to%20the%20National%20Snow,percent%20below%20the%202005%20record.

[2] https://www.snopes.com/fact-check/ice-caps-melt-gore-2014/

A recent modelling paper by Kim et al. (2023) predicted that the summer Arctic Sea ice would be completely absent in one to two decades, and one author was quoted for, on The Guardian website[3] and other places, that it now was too late to save the summer ice, which had shrunk by 13 % a decade since satellite records began in 1979.[4] That prediction/statement was of course wrong, unsubstantiated, unscientific, absurd and alarmistic.

2. The actual data on the development of the Arctic Sea ice extent

The website of NSIDC[5] publishes spreadsheets with daily sea ice extents and monthly averages of sea ice extents since the satellite measurements began in 1978/79. The lowest levels are always in September month. The column diagram in Figure 2 shows the lowest daily sea ice extent in September together with the average sea ice minimum extent for September month for all years with satellite measurement of the Arctic Sea ice extent.

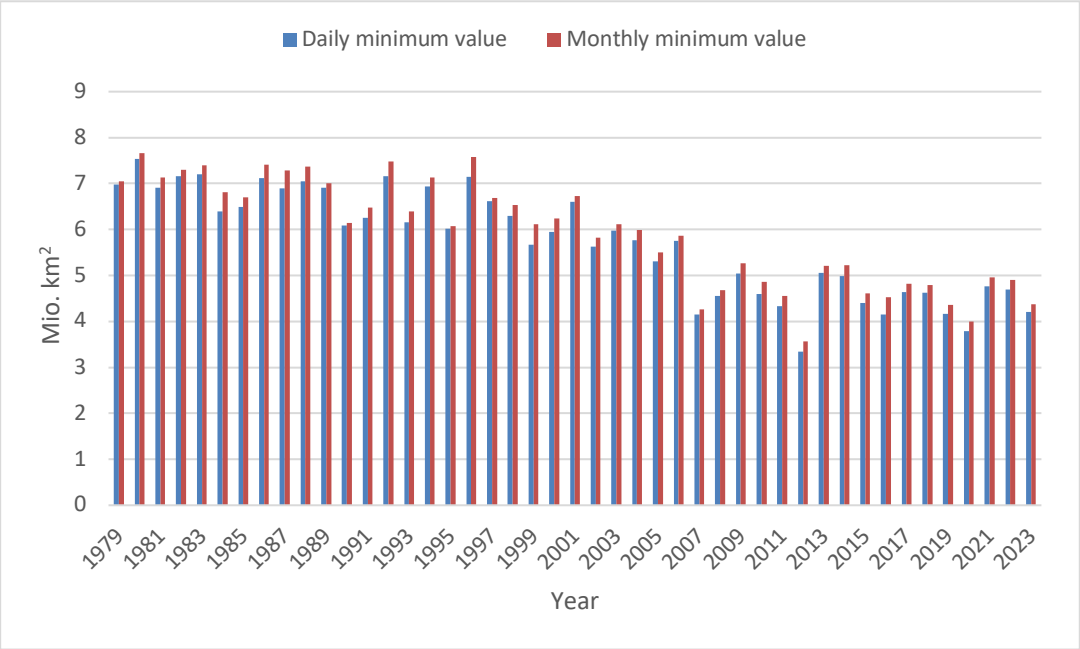


Figure 2: Arctic Sea daily and monthly minimum ice extent values (data from NSIDC.org).

It is of course clear that the day minimum values are lower than the monthly averages. The day minimum value may happen on different September days.

According to the spreadsheet data, the lowest sea ice extent in 2022 was 4.69 Mio. km^2 on September 15th. In 2023, the lowest daily extent was on September 17th with 4.21 Mio. km^2, however NSIDC selected on their website September 19th with 4.23 Mio. km^2 as the September minimum extent in 2023.

When comparing Figures 1 and 2, it seems that a downward trend is not apparent from 1979 to 1996 and from 2007 to 2023. Moreover, it is clear that even the lowest sea ice extents measured are very far from zero! The plateaux in the earlier and later periods of measurements can also be seen in Figure 1, ignoring the inserted trendline.

Figure 3 shows a column diagram with the average minimum sea ice extent in September month, but only for the latest years 2007 to 2023.

[3] https://www.theguardian.com/environment/2012/sep/17/arctic-collapse-sea-ice

[4] https://www.theguardian.com/environment/2023/jun/06/too-late-now-to-save-arctic-summer-ice-climate-scientists-find

[5] http://noaadata.apps.nsidc.org/NOAA/G02135/seaiceanalysis

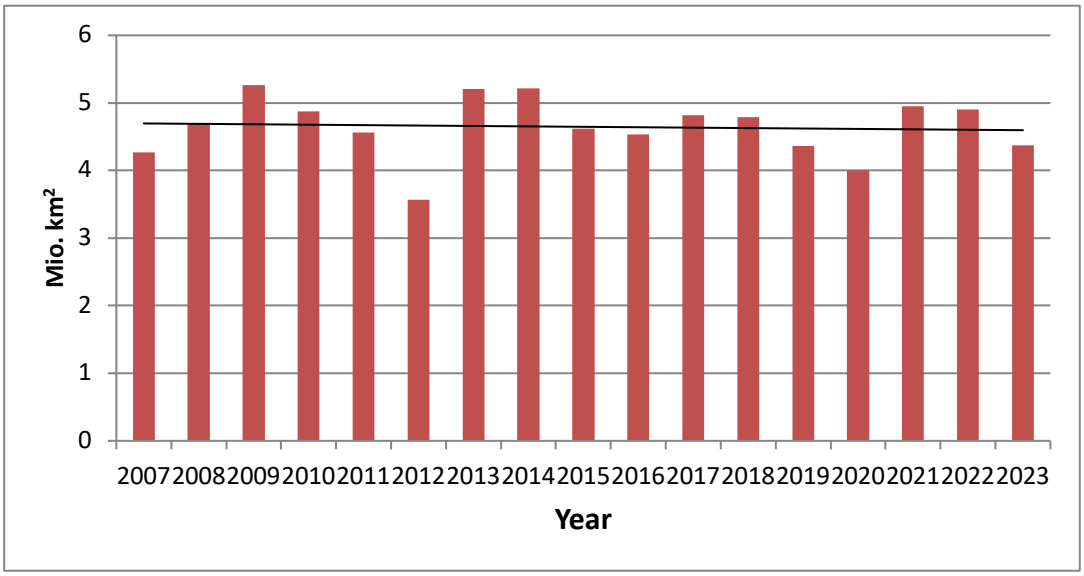


Figure 3: Average monthly minimum Arctic Sea ice extent for September 2007-2023 with trend-line (data from http://nsidc.org).

According to this diagram, even with the rather low ice extent in 2023, there is no significant downward trend during the last 17 years (almost two decades) of satellite measurements.

3. Sea ice extent in the Antarctic

The sea ice extent in the Antarctic has also been measured in the years 1979-2023. The minimum ice extent is in February. In Figure 4 the data are shown in a column diagram with a trendline.

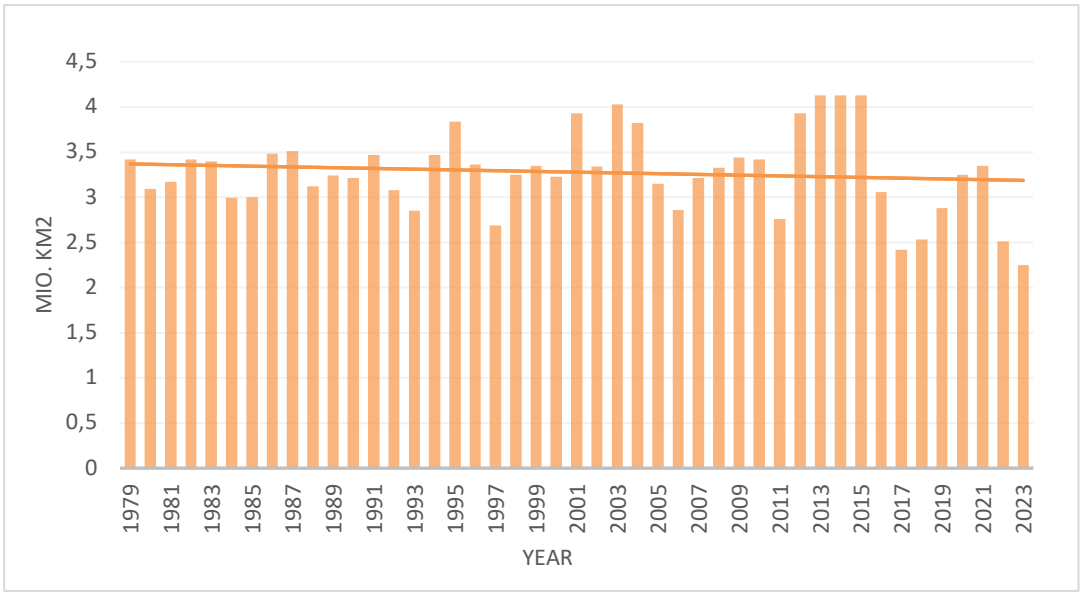


Figure 4: The minimum extent of the sea ice at Antarctic in February month 1979-2023 (data from NSIDC.org)

The trendline has a small decline, because of low extents measured in the last two years. However, before that time the downward trend was minimal in the Antarctic, in contrast to what happened in the Arctic.

Figure 5 shows that during the last 17 years there has been a clear downward trend as opposed to the lacking downward trend in the Arctic.

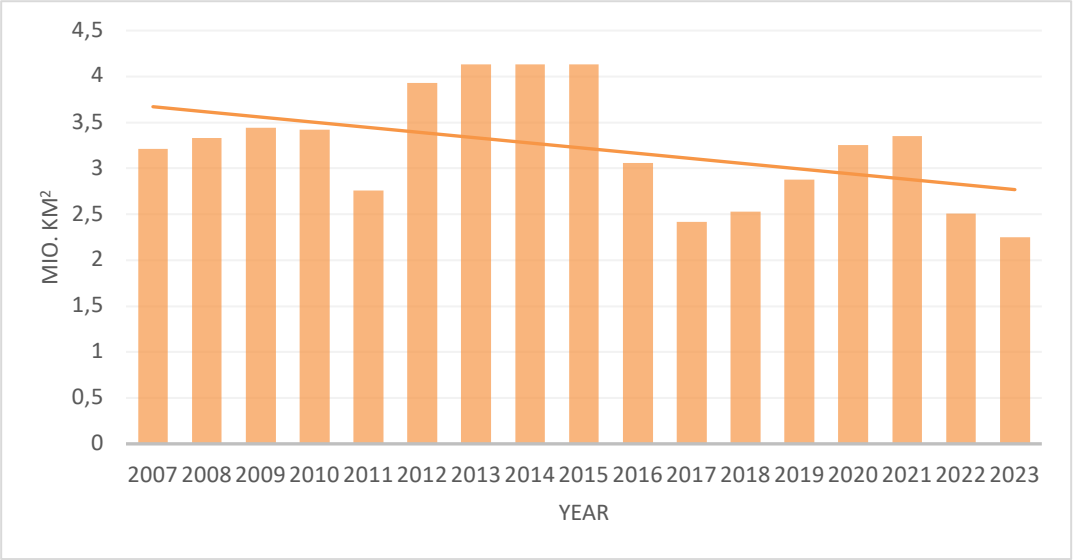


Figure 5: The minimum extent of the sea ice at Antarctica in February month 2007-2023 (data from NSIDC.org)

4. Discussion and conclusion

The Arctic Sea ice extent is measured by satellites and varies by day, month and year, and the yearly minimum ice extent will occur in a day of September month every year.

The ice extent is much lower now (2023) than in 1978, when the satellite measurements began. However, it has not been a gradual decline. A major decline happened during the years 1997 - 2007. Before that the decline was minimal and after that period, there was no significant downward trend.

Since the very low Arctic Sea Ice extent which happened in 2007, many scientists, organisations, media and communicators, including vice-president and Nobel Prize winner Al Gore, have predicted that the sea ice in the summer may completely disappear in few years or one to two decades. In that way new and shorter ships routes north of the continents will open up.

These predictions ignore the fact that the Arctic Sea ice extent during the last 17 years from 2007 to 2023 – almost two decades – has been stable without a downward trend. Therefore, there is no indication that we should expect the summer Arctic Sea summer ice to disappear completely in one or two decades, as predicted.

Regarding the extent of the summer (February) sea ice at Antarctic, the downward trend during the years 1979-2021 was very small, but in 2022 and 2023 a considerable decline was observed, and a decline was also clearly observed for the whole period of 2007- 2023. That was in contradiction to what happened in the Arctic. The pattern of the annual variation was not the same for the Arctic and Antarctic, indicating different drivers in the North and South.

These data shows that there is no apparent correlation between the variable extent of the Arctic and Antarctic Sea ice and the gradually increasing CO_2-concentrations in the atmosphere, as proposed by NSIDC, IPCC and others.

Funding

No external funding of the work.

Guest-Editor: Stein Storlie Bergsmark **Reviewers:** Anonymous

References

Kim, Y-H., Min S-K., Gillett N.P., Notz D., Malinina E., 2023: *Observationally-constrained projections of an ice-free Arctic even under a low emission scenario*. Nature Communication, v. 14, 3139. https://doi.org/10.1038/s41467-023-38511-8

Overland, J. E., Wang M., 2007: *Future regional Arctic Sea ice declines.* Geophysics. Res. Lett., v. 34, L17705. https://doi.org/10.1029/2007GL030808

Serreze, M. C., Stroeve, J., 2015: *Arctic Sea ice trends, variability and implications for seasonal ice forecasting.* Phil. Trans. R. Soc. A, v. 373: 20140159. http://dx.doi.org/10.1098/rsta.2014.0159

https://doi.org/10.53234/scc202310/30

The Climate Emergency is Cancelled

Climate Conference – Copenhagen 2023

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072
Correspondence:
karliver@klimarealisme.dk
Vol. 3.4 (2023)
p. 359

Karl Iver Dahl-Madsen

Chief Conference Organizer - Denmark

The climate science is clear. Climate change does not pose an existential threat to humanity. In one hundred years, humans will be about 4 – 5 times richer than now, but climate change may reduce this large increase in wealth by around 5 %.

This is well in line with messages from the IPCC, in that weather and climate are minor factors in ruling wealth and prosperity for humanity. This is for everyone to see, because humans live and thrive both in cold, warm, moist and dry climate zones, in areas below sea surface and on mountain tops. Rich and clever people can adapt to all kinds of weather.

During the latest 100 years, where the temperature has risen one degree and the global sea level with 30 cm, we have become four times as many humans on earth. Child mortality has been reduced by a factor 4, lifetime expectancy doubled, we have become 8 times richer, the part of humans living below the poverty limit has been reduced from 70 to 10 %, analphabetism from 67 to 15 % and agriculture products have been more than tripled.

The main cause for this great development – which seems to continue as far as we can look into the future, is basically our new ideas and initiatives, but this development would not have been possible without access to abundant, cheap, and stable stored solar energy, in the form of coal, oil and gas.

The advantages of using coal, oil and gas, are many times in excess of the disadvantages, and we cannot force ourselves into a future without coal, oil and gas, because climate economists tell us that this will have far more negative consequences for humanity than even the most speculative net negative effects of climate change. So, the cure may then be much worse than the disease.

A current energy- and climate policy should be based on the fact that climate change is only one of the many problems in the world, and by no means the greatest.

Energy security is, however, crucial for the further development of the world. All the people in the world, especially in the developing countries, should have full access to coal, oil and gas for many years to come. The use of coal for production of electricity should be phased out on market terms, since coal in this way will become more rare and more expensive, and some time will be replaced by the only adequate replacement we know today, nuclear power. Oil and gas may still be used for peak hours and for transportation a long time into the future since there is no climate gain in reducing coal- based emissions to zero.

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
jopp@space.dtu.dk

Vol. 3.4 (2023)

pp. 360-361

Preface to the Preconference Climate Seminar

Jens Olaf Pepke Pedersen

Senior Scientist, DTU, Denmark

Submitted 2023-11-30, Accepted 2023-12-01. https://doi.org/10.53234/scc202310/31

A preconference seminar was held at DTU on 14 September 2023 and featured two sessions on "The Carbon Cycle Controversy" and "The Coming (Litte) Ice Age" respectively. In this issue, we are very pleased to present several extended abstracts from the talks given at the seminar.

Some of the talks presented ideas which are controversial and also sparked a lively debate at the seminar. The talks may turn out not to be correct, but in the interest of scientific openness, we include all of them in this issue. This is unfortunately becoming rare in the field of climate science.

An early warning signal was found already during Climategate in 2009, where leaked e-mails from the inner circles of IPCC authors revealed how they gave friendly peer-reviewed to each other's papers and were able to keep uncomfortable knowledge out of the scientific literature.

One infamous quote is from an e-mail from 2004 to Michael Mann sent by Philip Jones who was at that time director of the Climatic Research Unit (CRU) at the University of East Anglia, and which clearly showed the corruption of the IPCC process: "I can't see either of these papers being in the next IPCC report. Kevin and I will keep them out somehow - even if we have to redefine what the peer-review literature is!".

Another e-mail from Philip Jones in 2005 revealed how he would rather delete climate data than release them for public scrutiny: "If they ever hear there is a Freedom of Information Act now in the UK, I think I'll delete the file rather than send to anyone."

A recent example of how the climate science today is broken, is exposed in a comment given by the lead author of a recent publication in Nature[1] on the effect of climate change on wildfires. In his comment[2] Patric Brown admits that the paper he just published "focuses exclusively on how climate change has affected extreme wildfire behavior", and he adds that "I knew not to try to quantify key aspects other than climate change in my research because it would dilute the story that prestigious journals like Nature and its rival, Science, want to tell."

[1] P. T. Brown et al. (2023) "Climate warming increases extreme daily wildfire growth risk in California", Nature vol. 621, pp. 760–766.

[2] https://www.thefp.com/p/i-overhyped-climate-change-to-get-published

Brown emphasizes that the climate change influence on wildfire risks is very real but notes that "there are also other factors that can be just as or more important, such as poor forest management and the increasing number of people who start wildfires either accidentally or purposely". He admits that "we didn't bother to study the influence of these other obviously relevant factors", not because they did not know how to make the analysis more realistic and useful, but because he "knew that it would detract from the clean narrative centered on the negative impact of climate change and thus decrease the odds that the paper would pass muster with Nature's editors and reviewers."

Another recent example of the corruption of peer review in climate science is the retraction a few months ago of a paper published in 2022 in The European Physical Journal Plus with the title "A critical assessment of extreme events trends in times of global warming".[3]

The paper was based on data in the recent IPCC report and showed how extreme weather events have not become more intense or more frequent as the temperature of the earth's surface has increased. The paper thus concluded that "On the basis of observational data, the climate crisis that, according to many sources we are experiencing today, is not evident yet."

In a recent blog post Roger Pielke has commented on the case and based on the review reports, his conclusion is that this is a clear case of a "politically-motivated retraction of a paper that some climate scientists happened to disagree with".[4] In Pielke's opinion the retracted paper" is not even particularly significant, as it mainly reviews the conclusions of the IPCC on trends in weather extremes". He further adds that "to be clear, there is absolutely no allegation of research fraud or misconduct here, just simple disagreement. Instead of countering arguments and evidence via the peer reviewed literature, activist scientists teamed up with activist journalists to pressure the publisher – Springer Nature, perhaps the world's most important scientific publisher – to retract a paper. Sadly, the pressure campaign worked. The abuse of the peer review process documented here is remarkable and stands as a warning that climate science is as deeply politicized as ever with scientists willing to exert influence on the publication process both out in the open and behind the scenes."

Historically, science has proven to have a strong ability to be self-regulating, so that incorrect theories gradually disappeared from the literature. This process only went wrong in the past when totalitarian forces tried to control what the researchers were allowed to investigate and what they were allowed to conclude. Unfortunately, for decades, climate research has suffered from these unpleasant trends. With the sad state of climate research in mind, it only emphasizes even more the need for workshops and journals that act as breathing holes for new and controversial ideas.

Guest-Editor: Stein Storlie Bergsmark; Reviewers: anonymous.

[3] https://link.springer.com/article/10.1140/epjp/s13360-021-02243-9

[4] https://rogerpielkejr.substack.com/p/think-of-the-implications-of-publishing

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9027

Correspondence:
janesol@online.no

Vol. 3.4 (2023)

pp. 362-367

Challenges in Estimating Atmospheric CO_2

Jan-Erik Solheim

Independent Scientist, Bærum, Norway

Abstract

Atmospheric CO_2 concentrations have been measured since the beginning of the 18th century by chemical analysis with remarkable precision. Since then, methods have changed, and higher precision is achieved. The first observers discovered daily and yearly variations related to plant growth, distance from sea, elevation, and meteorological conditions. In 1938 an infrared gas analyzer was invented, and the first continuous monitoring physical device, later called NDIR was introduced. With this technique continuous observations were started at Mauna Loa volcanic peak at Hawaii around 1960.

To create a continuous curve which followed the history of anthropogenic emission, the chemical observations were heavily manipulated, and a bandy-stick type curve was created. From ice-core drillings it was believed to be possible to measure the CO_2 content in bubbles in the ice far back in time. Surprisingly they showed higher level in 1890'ies, than recorded at Mauna Loa in 1960. This led to the idea that the ice bubbles were open for CO_2 about 80 years later than the age of the bubble, and the bandy stick curve was restored. A peak of nearly 0.04 % CO_2 in about 1940 in the chemical observations was edited away by C. Keeling who started the Mauna Loa observations.

Keywords: Atmospheric CO_2; direct chemical methods; ice-core measurements; comparison of methods

Submitted 2023-09-25, Accepted 2023-10-27. https://doi.org/10.53234/scc202310/15

1. Introduction

My field of research is astrophysics. I started with theoretical work in cosmology in 1960 and finished in 2010 with a review of interacting binary white dwarf stars, a special group of variable stars I had worked on during more than 25 years. As retired, I started to investigate the relation between the Sun and our Climate.

In August 2009 I was visited by Professor Harald Yndestad, who had found a strong correlation between the lunar nodal period and sea level, temperature, and salinity in the North Atlantic and Barents Sea (Yndestad et al. 2008). He asked if there could be other periods involved, and I told him about the solar cycles.

Soon afterwards I got a huge manuscript written by Ernst-Georg Beck in Freiburg. This was about historic atmospheric CO_2 levels reconstructed from direct measurements by chemical methods. It was written in English translated from German, very detailed, and difficult to read by a non-expert, but it was clear that this was a monumental work, that should be published. Beck had been in contact with Yndestad and reported the same lunar nodal periods in the CO_2 data as Yndestad had determined. Beck also found a one-year delay in CO_2 peaks related to sea surface temperature peaks, indicating that sea temperature controls the CO_2 level.

Beck had already published a paper on his analysis of more than 200 000 historic chemical observations (Beck 2007). He also compared wet-chemical measurements with Mauna Loa measurements (Beck 2008). In the revised and larger paper (Beck 2010) the data for selected locations were analyzed together with meteorological observations, and methods were developed to find situations where the ground observations were almost the same as for higher altitudes as Mauna Loa (Massen 2022). The revised paper was submitted to the Journal of Climate in August 2010 but was rejected because it showed CO_2 variations not corresponding to what was estimated from ice core data from Antarctica. However, before the rejection came in November 2010, Beck had died from cancer, and it was not possible to resubmit the paper (Yndestad 2022a).

When Beck died, Professor Yndestad got the permission from his family to publish his work, this became possible in this journal in 2022. We did not find his final edited manuscript, but as Editor of SCC, I worked with a version from February 2010, and this was finally published in our volume 2.2 (Beck 2022).

At the Stockholm climate conference in 2016 Professor Anders Lindroth gave a talk about the Integrated Carbon Observation System (ICOS) European Network. He also invited the delegates to visit one of the stations situated in a boreal forest at Nordunda, north of Uppsala after the conference. Measurements from a 100 m tall tower, is shown in the conference report (Solheim 2022, Figure 3). We invited professor Lindroth to this conference, but he could not come.

In the following I will give a summary of the historic measurements collected by Beck and show the discrepancy with the ice core estimates used by IPCC, which erased the warm period in the 1940'ies and earlier peaks in CO_2 in the 19th Century.

2. Wet-chemical measurements of CO_2

When it was discovered in the beginning of the 19th century that a tiny amount of the gas CO_2 was present in the atmosphere, the invention of accurate gas analyzers made it possible to measure the atmospheric content with increasing precision. Variations during the day, the season, local environment, distance from sea, elevation, flora etc. were reported in a large number of publications during the 19th and 20th century. According to Beck (2007, 2008) about 200 000 samples of air have been collected and analyzed. He found about 100 000 of these had enough information about the environment and local weather to be included in his selection of historical data for estimating the historic level of CO_2. The measuring sites are shown in Figure 1, below.

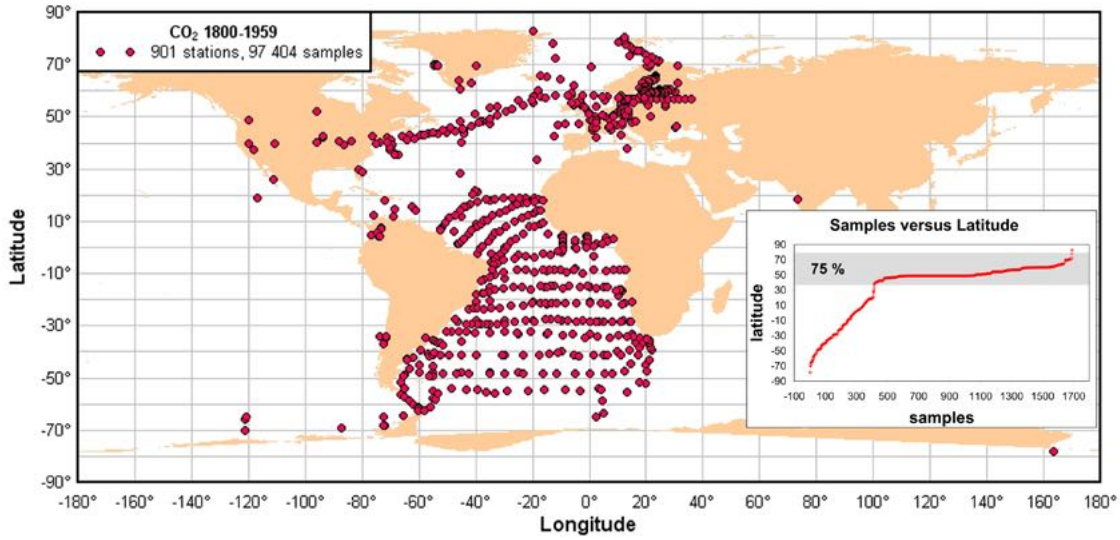


Figure 1: 97 404 samples from 901 stations included in Beck's analysis (Beck 2022, Figure 2a).

3. The Callendar, Keeling and the Siple bandy-stick curve

Guy Calendar, a British railroad engineer, published already in 1938, a CO_2 graph showing increasing CO_2 by using a special selection of historical measurements. He interpreted the rising CO_2 level as a result of combustion of fossil fuels. He can be titled as the inventor of the Anthropogenic Global Warming (AGW) hypothesis. In 1958 he repeated his investigation, and selected data only ±10 % from his predefined «Fuel line». The figure below shows his accepted values in black, compared with other observations collected by Beck (2007) in red.

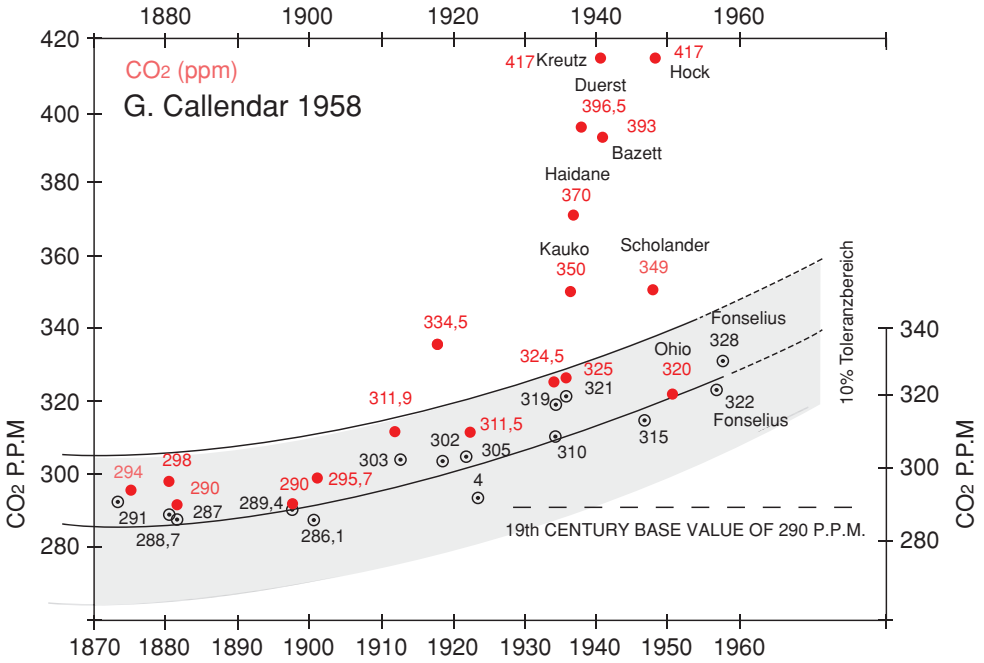


Figure 2: Callendar's "Fuel Line" published in 1958 was based on 30 historical measurements (gray). The gray area represents the ±10% level of tolerance for accepted CO2 data. In red are recalculated values and other important CO_2 observations (Beck 2008, Figure 6)

At the same time another important person entered the scene. A young chemist Charles Keeling started measurements of CO_2 in coastal forests of western USA in 1955, using a self-made manometer. This was a primitive device, needing 90 minutes to obtain a value, compared with existing high precision gas analyzers which could measure accurate values down to 0.33% within minutes. Keeling noticed that the level of CO_2 was rising, and convinced Roger Revelle, the former director of Scripps Institute of Oceanography at La Jolla, California, to start CO_2 measurement series on the largest volcano on the Earth, Mauna Loa on Hawaii, 4000 m above sea level. Keeling convinced Revelle to purchase an expensive gas analyzer which was used until Keeling's death in 2005. A simplified NDIR (non-dispersive infrared) method was developed, and measuring devices with this technique is now used all over the world. These devices are all calibrated by standard flasks delivered by the laboratory of Charles Keeling who owns the global monopoly of calibration of all CO_2 measurements (WMO 2001/2003). The picture below shows a NDIR handheld CO_2 measuring device calibrated with Keeling flasks.

Figure 3: A handheld NDIR CO_2 measuring device calibrated with Keeling flasks. It shows a deviation of +10 ppm from the calibration source.

3.1 The Siple problem

Analyzing air bubbles in ice-core drillings has given temperature and CO_2 values far back in time. Time is determined from layers in the ice, calibrated by ashes or Sulphur from known volcanic eruptions. The resolution diminish as one goes deeper in the ice. It is a question how reliable the time stamps are.

The researchers were surprises when they discovered that the Siple ice cores drillings from Antarctica showed values for 1890 which were considerably higher than what was measured at Mauna Loa in 1960. This is shown the left panel in the figure below.

To restore the CO_2 bandy-curve, the Siple curve was simply shifted 83 years - making the CO_2 in the bubbles 83 year younger than the ice where the bubble was found at a dept of 68 meters. The bandy-curve was saved, but nobody has been able to confirm that a bubble in the ice stays open for the air above the snow or ice layer of 63 m thickness for 83 years.

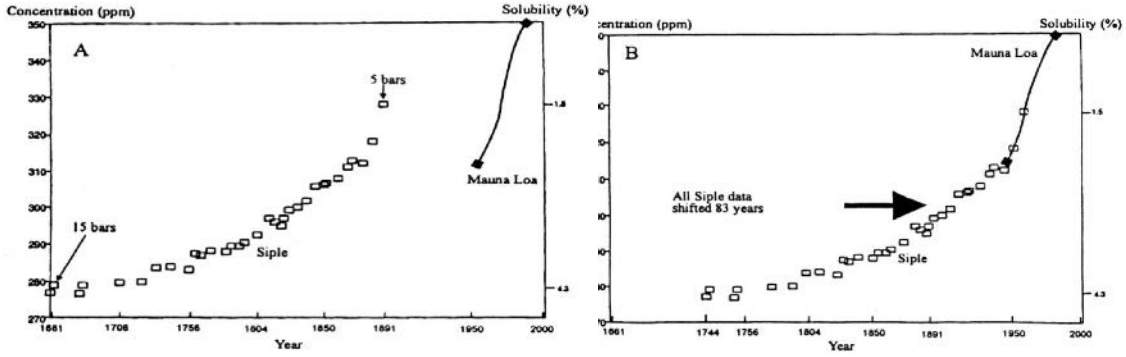


Figure 4: The CO_2 bandy-stick curve restored by making the observed values 83 years younger (Jaworowski 2008, Figure 16).

The timing of CO_2 in ice bubbles, relies on the assumption that the ice bubble is sealed from the outside environment. There should be no leaks or contaminations. But ice under pressure, develop small cracks and big cracks. Water sieves in - bubbles of water or even lakes are found deep inside the ice. More than 20 physical and chemo-physical processes, mostly related to the presence of liquid water, contribute to the alteration of the original air in gas clathrates (gas hydrates) which are solid crystals formed at high pressure by interaction of gas with water. This happens for CO_2 at about 5 bars. Due to this process, CO_2 starts to leave air bubbles at a dept of 200 m and the air bubbles disappear completely at about 1000 m (Jaworowski et al.1992). Making samples younger became a habit, and the lower values of CO_2 observed, bolstered the preconceived idea from Callendar that *the CO_2 level had grown because of humans*.

2.2 The CO_2 bandy-stick accepted by IPCC

IPCC accepted the Siple corrections procedure (Keeling is a co-author of the IPCC reports) and wrote in 2001 (AR3):

> *Before the Industrial Era, circa 1750, atmospheric carbon dioxide (CO_2) concentration was 280 ±10 ppm for several thousand years. It has risen continuously since then, reaching 367 ppm in 1999. The present atmospheric CO_2 concentration has not been exceeded during the past 420,000 years, and likely not during the past 20 million years. The rate of increase over the past century is unprecedented, at least during the past 20,000 years.*

This is still the IPCC mantra. Determination of CO_2 level from stomata-openings in leaves, show higher levels of CO_2 in the 1850'ies and 1940'ies, but this is overlooked by the IPCC.

4. Can Ernst-Georg Beck break the bandy-stick curve?

Ernst-Georg Beck's monumental work was finally published in our journal SCC in 2022 (Beck 2022). Below is his main result, based on 90 000 observations (red), compared with the Law Dome ice core determinations and some stomata values.

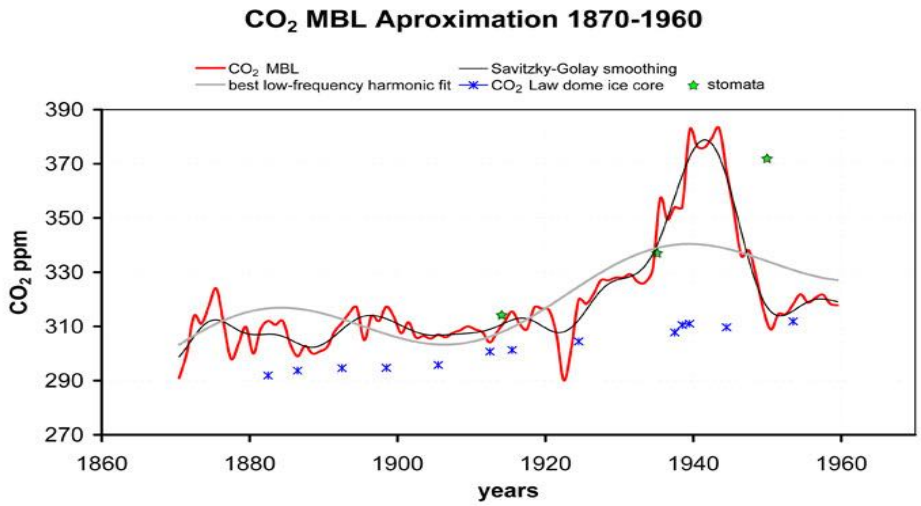


Figure 5: Atmospheric CO_2 background level 1870-1960: black line smoothed by a Savitzky-Golay filter; grey line= estimated best low-frequency harmonic fit (55,17 years = 18,39 x 3); blue stars= CO_2 law dome ice core; green stars=stomata; 1922: phase reversal (Beck 2022, Figure 25).

The most remarkable conclusion from Beck's data is that the CO_2 level between 1930 and 1950 was almost the same as it became in 2010 (380 ppm). This peak breaks the IPCC bandy-stick.

4.1 Comparison between Beck and Mauna Loa Data

When chemical and NDIR measurements of CO_2 were compared 1940 -1970 as shown in Figure 6, one finds that the chemical observations were more precise than the modern NDIR measurements in the period of overlap around 1960. Observations in Vienna, reported by Massen (2002) showed a 10 ppm difference covering the same period in 1958.

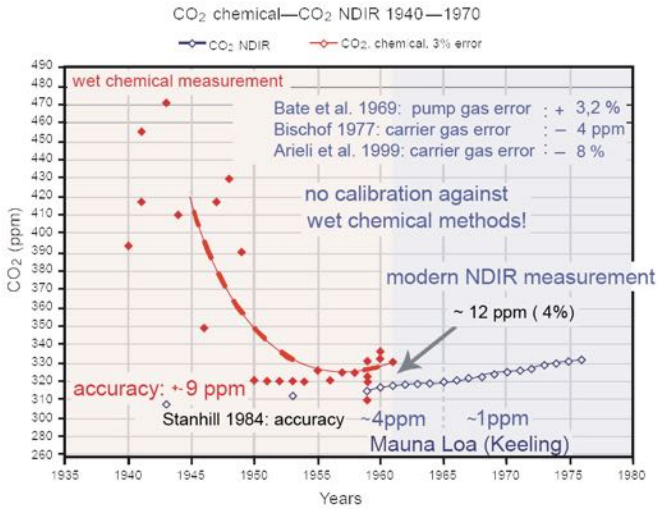


Figure 6: Known calibration and other errors documented in the early measurements of C. Keeling compared to the chemical standards (red). Systematic errors of NDIR also shown (Beck 2008, Figure 7).

5. Conclusions

Beck's CO_2-estimates were supported by a wavelet analysis by Yndestad (2022b), which showed that Beck's data for Atlantic CO_2 growth variability 1870-1960 coincides with Mauna Loa CO_2 growth variability from 1960 as well as global sea surface temperature variability. Harde (2023) was able to model the CO_2 peak observed in the 1940'ies mainly in terms of increased soil respirations resulting from higher land temperatures. SCC also received criticism from Engelbeen (2023) against Beck's 1940 CO_2 peak.

As editor of SCC, I found this discussion healthy for science and welcome more debate on the important question of the origin of the observed rise of CO_2 in the atmosphere. Is it chiefly natural or man-made?

Guest-Editor: Stein Storlie Bergsmark; Reviewers: anonymous.

References

Beck, E.-G. 2007, *180 years of atmospheric CO_2 gas analysis by chemical methods*, Energy & Environment, Vol.18, 259-282. https://doi.org/10.1177/0958305X0701800206

Beck, E.G. 2008, *50 years of continuous measurements of CO_2 on Mauna Loa,* Energy & Environment, Vol. 19, 1017-1028.

Beck, E.-G. 2010, 2022, *Reconstruction of Atmospheric CO_2 Background Levels since 1826 from Diret Measurements near Ground*, Science of Climate Change, Vol.2, 148-211. https://doi.org/10.53234/scc202112/16

Engelbeen, F. 2023, *About Historical CO_2 levels, Discussion of Direct Measurements near Ground since 1828 by E.-G. Beck,* Science of Climate Change, Vol. 3, 190-208. https://doi.org/10.53234/SCC202301/26

Harde, H. 2023, *About Historical CO_2-Data since 1826. Explanation of the Peak around 1940*, Science of Climate Change, Vol. 3, 211-218. https://doi.org/10.53234/SCC202304/21

Jaworowski Z., Segalstad T. V., and Ono N. 1992, *Do glaciers tell a true atmospheric CO_2 story?* The Science of the Total Environment Vol.114, 227-284.

Jaworowski Z. 2008, *Sun warms and cools the Earth*, NZCPR Research, 20. Sept,

Massen F. et al. 2022, *Observed Temporal and Spatial CO_2 Variations Useful for the Evaluation of Regionally Observed CO_2 Data*, Science of Climate Change, Vol.2, 137-147, https://doi.org/10.53234/SCC202206/12

Yndestad H. et al. 2008. *Lunar Nodal Tide Effects on Variability of Sea Level, Temperature, and Salinity in the Faroe-Shetland Channel and the Barents Sea.* Deep Sea Res I. Oceanographic Res. Pap. Vol.55 (10), 1201–1217. https://doi.org/10.1016/j.dsr.2008.06.003

Yndestad H. 2022a, *Publication of Ernst-Georg Beck's Atmospheric CO_2 Time series from 1826-1960*, Science of Climate Change, Vol. 2, 134-136. https://doi.org/10.53234/scc202112/15

Yndestad H. 2022b, *Lunar Forced Mauna Loa and Atlantic CO_2 Variability,* Science of Climate Change, Vol. 2, 258-274. https://doi.org/10.53234/scc202212/13

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
jopp@space.dtu.dk

Vol. 3.4 (2023)

p. 368

The Global Carbon Cycle in an Earth System Model

The DCESS model

Jens Olaf Pepke Pedersen

DTU Space, Centrifugevej 356, DK-2800 Kgs. Lyngby, Denmark

Keywords: Carbon Cycle; Atmospheric CO2; Emissions: Earth system model

Submitted 2023-09-20, Accepted 2023-09-24. https://doi.org/10.53234/scc202310/35

Earth system models are useful tools for understanding past global changes and for projecting future global change. The carbon cycle is a key feature of the Earth system and thus carbon cycle components are central for Earth system models. Among the important components are the ocean, the land biosphere, and the atmosphere, and the challenge is to model both these components and the interactions between them.

The influence of anthropogenic CO_2 emissions on the carbon cycle is a driver of ocean and terrestrial sinks, and modelling interactions between Earth's climate and carbon cycle requires knowledge of at number of feedbacks involved that amplify or dampen carbon emissions.

For example, increasing atmospheric CO_2 increases the efficiency of photosynthesis, which sequesters CO_2, just as it increases the concentration gradient between the atmosphere and the ocean which drives CO_2 dissolution into the ocean.

I the presentation a few examples of the carbon-climate interaction will be discussed, and some of the certainties and uncertainties will be highlighted.

Editors:. Jan-Erik Solheim and Stein Storlie Bergsmark.

Funding: This research did not receive any funding.

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
harde@hsu-hh.de

Vol. 3.4 (2023)

pp. 369-374

Understanding Increasing CO_2 in the Atmosphere

Hermann Harde

Helmut-Schmidt-University, Hamburg, Germany

Abstract

The carbon cycle is of great importance to understand the influence of anthropogenic emissions on the atmospheric CO_2 concentration, and thus, to classify the impact of these emissions on global warming. Different models have been developed, which under simplified assumptions can well reproduce the observed CO_2 concentration over recent years, but they also lead to quite contradictory interpretations of the human impact. In this contribution we consider, how far such suppositions are realistic or must be made responsible for significant misinterpretations. We present own calculations based on the Conservation Law, which reproduce all details of the measured atmospheric CO_2 concentration over the Mauna Loa Era. From these calculations we derive an anthropogenic contribution to the observed increase of CO_2 over the Industrial Era of only 15%. The importance of only one unitary time scale for the removal of anthropogenic and natural CO_2 emissions from the atmosphere, characterized by an effective absorption time, is discussed.

Keywords: Carbon Cycle; atmospheric CO_2; natural emissions; anthropogenic emissions

Submitted 2023-09-20, Accepted 2023-09-24. https://doi.org/10.53234/scc202310/12

1. Introduction

The Copenhagen Climate Conference and Pre-Conference made it possible to exchange different aspects about one of the most controversially discussed topics in climate science, the carbon cycle.

In this contribution we briefly review the Intergovernmental Panel on Climate Change's (IPCC's) view of increasing CO_2, before comparing this with our own approach (Harde 2023).

Most of the presented results derived from a closer cooperation with the late Murry Salby, whose work on the carbon cycle already more than ten years ago raised significant doubts about the IPCC's explanation, particularly the assertion of an exclusively man-made increase of CO_2.

2. IPCC's Explanation of Increasing CO_2

The IPCC assumes, before 1750 and in good approximation before 1850 the carbon cycle was in balance with an atmospheric CO_2 concentration of about 280 ppmv (in short: ppm) and with in- and outfluxes of approximately 80 ppm/yr.

Over the Industrial Era, so the IPCC, this cycle has come out of balance, now with a concentration of about 410 ppm and an additional flux of 26 ppm/yr, only caused by fossil fuels and land uptake (average over ten years: see AR6 - IPCC's Sitxh Assessment Report 2021, Chap. 5, Fig. 5.12).

Actually, human emissions increased to 4.8 % (5.1 ppm, GCB 2022) of the total emissions, from which about 54 % (2.8 ppm) are directly absorbed by the oceans and land, the rest, the so-called airborne fraction *AF* with about 46 % cumulates in the atmosphere. This is made responsible for the rapidly rising CO_2 concentrations C_{CO2} over the Industrial Era with approximately 130 ppm.

The removal of this additional CO_2 from the atmosphere is expected to take up to a few hundred thousand years and is described by different adjustment times τ_{Ai}. On the other hand, the residence time τ_R as ratio of the actual concentration to the total emission or absorption is only 3.8 yr.

As balance of the in- and outfluxes, and thus, the CO_2 changes over time this is described by the Conservation Law of CO_2 in the atmosphere:

$$\frac{C_{CO2}}{dt} = e_A(t) - (1 - AF) \cdot e_A(t) = AF \cdot e_A(t) \qquad (1)$$

with $e_A(t)$ as the anthropogenic emission rate (GCB 2022) and (1-AF)$\cdot e_A(t)$ as absorption rate.

Integration of the balance equation then can directly by compared with the monthly measurements at Mauna Loa, Hawaii (Fig. 1, Blue Triangles, CDIAC 2022).

With an airborne fraction AF = 45.6 % and a CO_2 concentration in 1960 of $C_{CO2}(1960)$ = 314 ppm this gives a surprisingly good agreement shown as Pink Diamonds. The year-to-year AF_y is displayed as Green Squares.

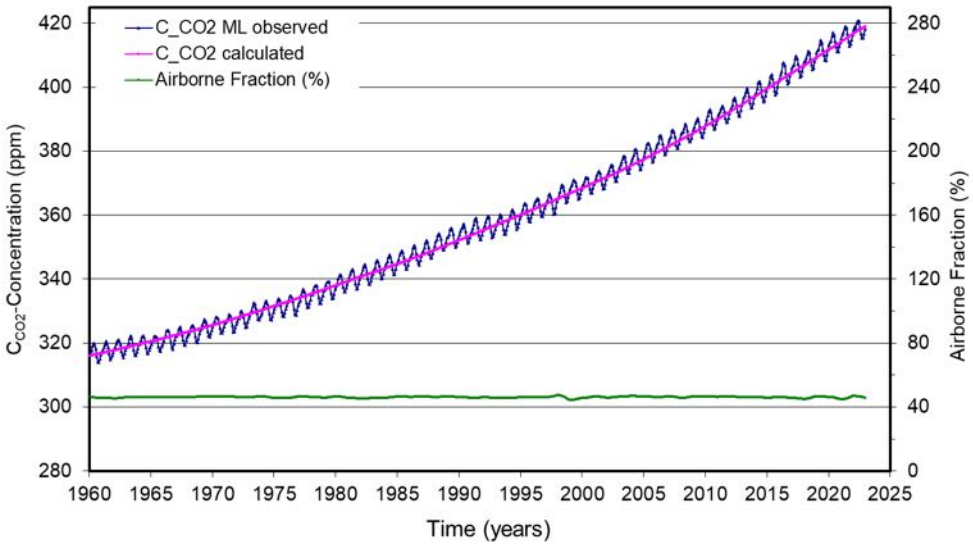


Figure 1: Observed monthly CO_2 concentration at Mauna Loa (Blue Triangles) together with a calculation, only considering anthropogenic emissions $e_A(t)$ and a concentration $C_{CO2}(1960) = 314$ ppm (Magenta Diamonds). Also plotted is the year-to-year airborne fraction AF_y (Green Squares).

But a high correlation is no evidence for the right theory, particularly not, when some basic physical principles are ignored. So, the main inconsistencies of this interpretation are:

- A constant natural cycle and neglection of additional native emissions
  → *contradicts paleoclimatic and actual observations* (Petit et al. 1999; Palmer et al. 2019; Salby & Harde 2021b).
- One fraction of human emissions is cumulating in the atmosphere over several 100.000 yr, the other part is instantaneously absorbed
  → *violation of the Equivalence Principle* (Harde 2019, Subsec. 3.4 and 5.2).
- The absorption is considered to be proportional to the emission, not to the concentration
  → *is in dissent to native decay processes and the ^{14}C-decay after the Nuclear Test Ban Treaty*.
- The more elaborate Bern-Model, also used by the IPCC, considers even 5 different absorption channels, again proportional to the emission and, at least partially, working in series
  → *contradicts observed parallel uptake of different reservoirs* (Harde 2019, Subsec. 5.5).

As some slightly modified version of the simple AF-model, some authors consider a 1st order

absorption $A = C_{A,CO2}/\tau_A$ that scales proportionally to the concentration, but only to the fraction $C_{A,CO2}$ caused by anthropogenic emissions, and which is controlled by a single adjustment time τ_A (e.g.: Siegenthaler & Sarmiento 1993; Dietze 2001; Cawley 2011; Lüdecke & Weiss 2016). Any changes of natural emissions over the Industrial Era are again neglected, instead a constant natural fraction $C_{N,CO2} = 280$ ppmv as in pre-industrial times is assumed. An exchange with extraneous reservoirs is presumed as quasi-closed cycle at a rate $e_N \approx 80$ ppmv/yr and with a turnover or residence time $\tau_R = C_{N,CO2}/e_N = 3.5\ yr$.

For an adjustment time τ_A between 45 yr and more than 100 yr, dependent on the considered boundary conditions, this gives also good agreement with the measurements at Mauna Loa. But again, this results in different timescales and an effectively separate treatment of natural and anthropogenic emissions in these models (see: Harde 2019, Subsec. 5.1; Harde 2023).

3. Our Approach to the Carbon Cycle

3.1 Radiocarbon as Tracer

For a deeper understanding of increasing CO_2, it is worthwhile to look closer to measurements of radiocarbon, which is an ideal tracer for the uptake of atmospheric CO_2 by the biosphere and oceans. While in the early 1960s the concentration of the isotopologue $^{14}CO_2$ was almost twice of the natural concentration, with the stop of the nuclear bomb tests in 1963 it was possible to measure this radiocarbon perturbation over subsequent years.

Plotted in Fig. 2 is the corrected and normalized ^{14}C-anomaly at Vermunt (Levin et al., 1994) as Green Squares, distinguished by seasonal emissions over the first 6 to 7 years, which are explained by the Brewer-Dobson circulation, injecting $^{14}CO_2$ from the stratosphere to the troposphere (see: Harde & Salby 2021; Salby & Harde 2021a). Nevertheless, this decay can be well approximated by a single exponential and an e-folding time τ_{eff} of 10 yr, shown as Magenta Graph. This confirms an absorption proportional to the instantaneous concentration and gives also an orientation for the timescale of this process.

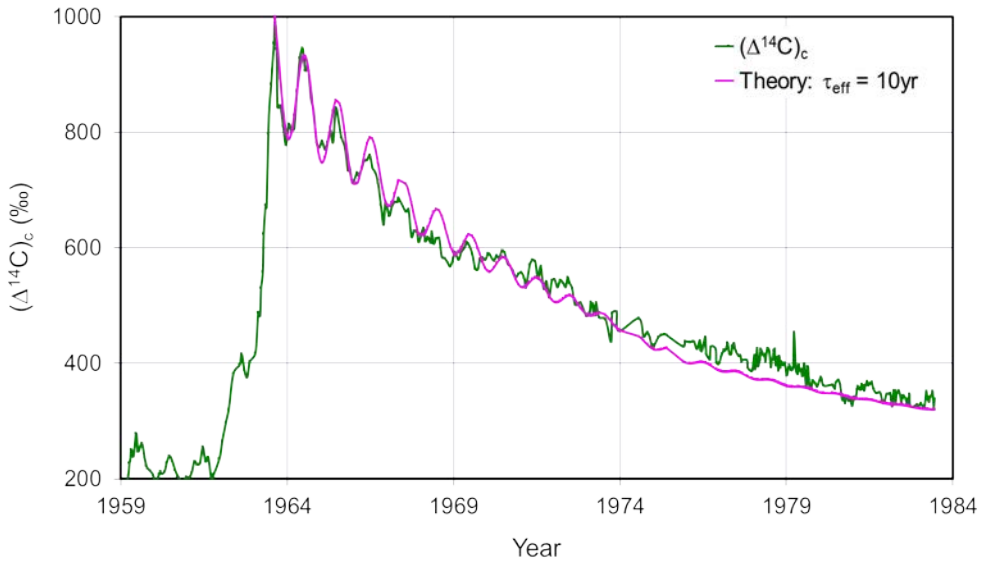


Figure 2: Anomalous ^{14}C measured at Vermunt, $(\Delta^{14}C)_C$ (Green), compared against calculated $(\Delta^{14}C)_C$ with an effective absorption time of $\tau_{eff} = 10\ yr$ (Magenta).

The effective absorption time τ_{eff} accounts for a partial re-emission of directly absorbed $^{14}CO_2$ with a time constant τ, which can even be as short as 1 yr, as follows from these oscillations and similarly, from cross-correlation analyses of interannual CO_2 and temperature fluctuations (Hum-

lum et al. 2013). When these molecules are not completely removed from the upper layers, they can still be re-emitted with a fraction β. The respective balance equation then takes the form:

$$\frac{dC_{C14}}{dt} = e_{NB} + \beta\frac{C_{C14}}{\tau} - \frac{C_{C14}}{\tau} = e_{NB} - (1-\beta)\frac{C_{C14}}{\tau} = e_{NB} - \frac{C_{C14}}{\tau_{eff}}, \qquad (2)$$

with e_{NB} as the native and the attenuating seasonal bomb perturbations (see: Harde & Salby 2021). For an effective absorption time of τ_{eff} = 10 yr and a direct absorption time, e.g., equivalent to the residence time τ_R = 3.8 yr, β becomes 0.62.

What we find for $^{14}CO_2$ as tracer also holds for the total CO_2 cycle.

3.2 Carbon Cycle Including Anthropogenic and Natural Emissions

A consequent approach, which is in agreement with all observations and physical causalities includes also natural emissions (seasonal and temperature dependent contributions), a common CO_2 concentration and only one time scale. The respective Conservation Law then takes the form:

$$\frac{dC_{Co2}}{dt} = e_A(t) + e_N(T,t) - \frac{C_{CO2}}{\tau_{eff}} \qquad (3)$$

with: $e_N(T,t) = e_{N0} + e_T(\Delta T,t) + \frac{e_{S0}}{2}\cdot\{1 + cos(\omega(t-t_0) + \phi_e + m\cdot sin\,\omega\,(t-t_0))\}$,

and with: e_{N0} – undisturbed emission rate; $e_T(\Delta T,t)$ - temperature dependent emission rate with ΔT as the temperature anomaly at Hawaii; e_{S0} - seasonal cycle amplitude; ϕ_e - phase term. Implicitly included is the re-emission term $\beta\cdot C_{CO2}/\tau$.

Integration of the conservation law with an effective absorption time of 10 yr is shown as Magenta Diamonds and almost completely covers the Blue Graph of the Mauna Loa measurement (Fig. 3).

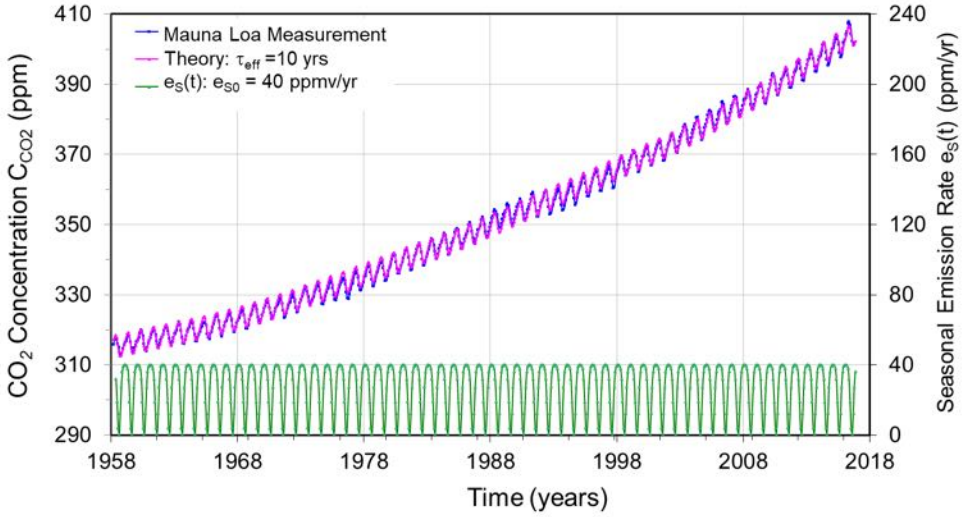


Figure 3: Calculated evolution of CO_2 (Magenta) for an effective absorption time τ_{eff} =10 yr and observed evolution (Blue). Also shown is the seasonal modulation of emission (Green).

The seasonal emission rate with an amplitude of 40 ppm/yr is displayed as Green Triangles and is even 5 to 6 times the human emissions. Not only can the long-time behavior be well reproduced, as with the other models, but even on a magnified scale tracts the calculation the measurement in amplitude and shape, the latter controlled by the phase modulation term (Harde & Salby 2021).

Within some bounds this observed evolution can also be recovered for other values of the emission rate and absorption time. This is a consequence of the fact that the CO_2 concentration is essentially determined by the product of the total emission rate and the absorption time. A change in one can therefore be compensated by a change in the other. However, this only works for τ_{eff}

shorter than 10 -11 yr. For larger absorption times either the long-time evolution is increasing too rapidly, or the seasonal modulation depth gets too small (Harde & Salby 2021). So, these simulations represent an independent but consistent possibility to the ^{14}C-decay to derive an upper limit for the absorption time, which can only be 10 years or shorter.

Fig. 4 shows again the measured CO_2 concentration as Blue Triangles and on top as Magenta Diamonds a calculation for τ_{eff} = 3.8 yrs, equal to the residence time. The anthropogenic emissions, actually with 4.8% of the total flux, is displayed by the lower graph (Plum Squares). Separately plotted is the native CO_2 fraction (Green Dots) and the anthropogenic fraction $C_{A,CO2}$ (Aqua Triangles) with about 20 ppm in 2022 (right abscissa). Relative to the increased concentration of 135 ppm since 1850 the anthropogenic contribution is just 15 %. And this is even a more conservative value, since with a still shorter direct absorption time, as expected under non-equilibrium conditions, the anthropogenic fraction will further reduce (Salby & Harde 2022).

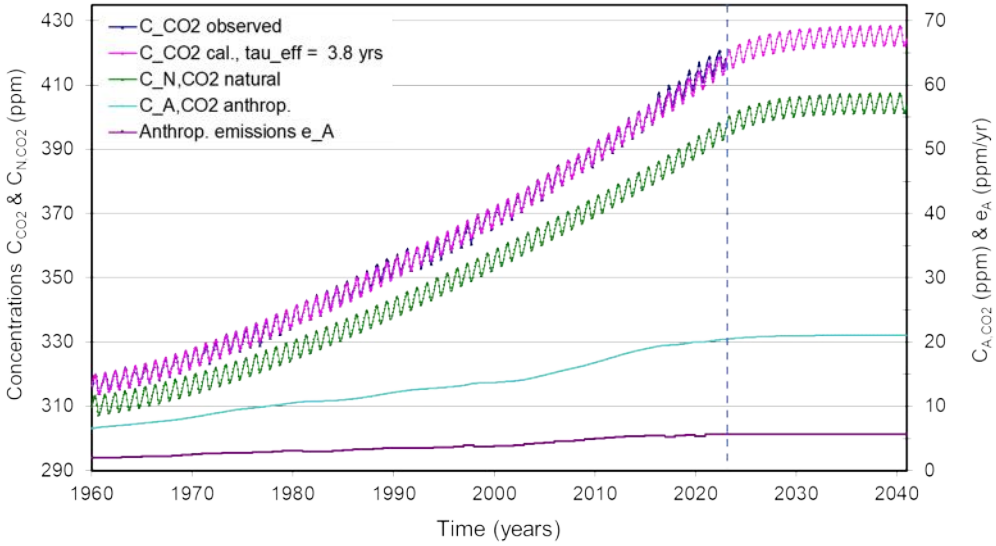


Figure 4: *Observed monthly CO_2 concentration at Mauna Loa (Blue Triangles) together with a calculation for τ_{eff} = 3.8 yr, including anthropogenic and natural emissions (Magenta Diamonds). Also plotted is the concentration $C_{N,CO2}$ (Green Dots) only caused by natural emissions $e_N(t)$, and $C_{A,CO2}$ (Aqua Triangles) caused by the anthropogenic emissions $e_A(t)$ (Plum Squares).*

From these graphs we also see that for a further constant emission (human and natural) the concentration is only additionally increasing by about 10 ppm within less than one decade.

4. Conclusion

Different to the IPCC's interpretation and in agreement with all physical causalities our preceding studies show that the Carbon Cycle is controlled by a 1st order absorption process, acting equivalently for native and anthropogenic emissions and on a single time scale for all molecules.

The effective absorption time cannot be longer than 10 yr, but can even be as short as 1 yr. With anthropogenically caused CO_2 of ≈ 15 % and global warming over the last century by CO_2 of ≈ 0.3°C (see Harde 2022), humans are responsible for global warming of 0.3 °C · 15 % < 0.05 °C.

To further reduce this absolutely negligible contribution, we endanger a secure energy supply and with this a prospering economy and stable standard of living.

Editors:. Jan-Erik Solheim and Stein S. Bergsmark.

Funding: This research did not receive any funding.

References

AR6 – IPCC's Sixth Assessment Report, 2021: V. Masson-Delmotte et al.: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I,* Cambridge University Press.

CDIAC, 2022: Carbon Dioxide Information Analysis Center, https://cdiac.ess-dive.lbl.gov/trends/co2/recent_mauna_loa_co2.html

Cawley, G. C., 2011: *On the Atmospheric Residence Time of Anthropogenically Sourced Carbon Dioxide*, Energy Fuels, Vol. 25, pp. 5503–5513, https://doi.org/10.1021/ef200914u

Dietze, P., 2001: *IPCC's Most Essential Model Errors*, Carbon Model Calculations, http://www.john-daly.com/dietze/cmodcalc.htm.

GCB, 2022: Global Carbon Budget https://www.carbonbrief.org/analysis-global-co2-emissions-from-fossil-fuels-hit-record-high-in-2022/

Harde, H., 2019: *What Humans Contribute to Atmospheric CO_2: Comparison of Carbon Cycle Models with Observations*. Earth Sciences, Vol. 8, No. 3, pp. 139-158, https://doi.org/10.11648/j.earth.20190803.13.

Harde, H., 2022: *How Much CO_2 and the Sun Contribute to Global Warming: Comparison of Simulated Temperature Trends with Last Century Observations*, Science of Climate Change, Vol. 2.2, pp. 105 - 133, https://doi.org/10.53234/scc202206/10.

Harde, H., 2023: *Understanding Increasing Atmospheric CO_2*, Science of Climate Change, Vol. 3.1, pp. 46-67, https://doi.org/10.53234/scc202301/23

Harde, H., M. L. Salby, 2021: *What Controls the Atmospheric CO_2 Level?* Science of Climate Change, Vol. 1.1, pp. 54 - 69, https://doi.org/10.53234/scc202106/22.

Humlum, O., K. Stordahl, and J.-E. Solheim, 2013: *The phase relation between atmospheric carbon dioxide and global temperature*, Global and Planetary Change, vol. 100, pp. 51–69.

Levin, I., B. Krömer, H. Schoch-Fischer, M. Bruns, M. Münnich, D. Berdau, J.C. Vogel, K.O. Münnich, 1994: *Atmospheric $^{14}CO_2$ measurements from Vermunt, Austria, extended data up to 1983*, https://cdiac.ess-dive.lbl.gov/ftp/trends/co2/vermunt.c14

Lüdecke, H.-J., C. O. Weiss, 2016: *Simple Model for the Anthropogenically Forced CO_2 Cycle Tested on Measured Quantities*, JGEESI, Vol. 8, No. 4, pp. 1-12, https://doi.org/10.9734/JGEESI/2016/30532.

Palmer, P., L. Eng, D. Baker, F. Chevallier, H. Bosch and P. Somkuti, 2019: *Net carbon emissions from African biosphere dominate pan-tropical atmospheric CO_2 signal*, Nature Comm., https://doi.org/10.1038/s41467-019-11097-w.

Petit, J.-R., J. Jouzel, D. Raynaud, N. I. Barkov, J.-M. Barnola, I. Basile, M. Bender, J. Chappellaz, M. Davis, G. Delaygue, et al., 1999: *Climate and Atmospheric History of the past 420,000 Years from the Vostok Ice Core, Antarctica,* Nature, vol. 399, no. 6735, pp. 429–436.

Salby, M. L., H. Harde, 2021a: *Control of Atmospheric CO_2 - Part I: Relation of Carbon 14 to Removal of CO_2*, Science of Climate Change, Vol. 1, No.2, pp. 177 - 195, https://doi.org/10.53234/SCC202112/30

Salby, M. L., H. Harde, 2021b: *Control of Atmospheric CO_2 - Part II: Influence of Tropical Warming*, Science of Climate Change, Vol. 1, No.2, pp. 196 - 212, https://doi.org/10.53234/scc202112/12

Salby, M. L., H. Harde, 2022: *Theory of Increasing Greenhouse Gases*, Science of Climate Change, Vol. 2, No.3, pp 212 - 238, https://doi.org/10.53234/scc202212/17.

Siegenthaler, U., J. L. Sarmiento, 1993: *Atmospheric carbon dioxide and the ocean*, Nature 365, pp. 119-125.

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondance
hans@schroder.dk

Vol. 3.4
(2023) pp.
375-380

Understanding the Carbon Cycle

Hans Schrøder

Retired engineer
Skodsborg, Denmark

Abstract

According to the IPCC's popular narrative, the man-made emission of CO_2 accumulates in the atmosphere. A fixed portion stays there, while the rest ends up in land and sea reservoirs. However, the carbon cycle is not a matter of accumulation, but circulation. Flows are not one-way, but two-ways. Accordingly, I depict the carbon cycle as a network of (five) control volumes, symbolizing reservoirs, connected by arrows symbolizing flows. I balance the network by solving five linear simultaneous equations. This makes it clear that there are two emissions of CO_2 to the atmosphere: A natural, and a man-made. The natural emission is ten times the man-made. Over the industrial era, the natural emission increased three times as much as the man-made. The result is that only about 25 percent of the increase in atmospheric CO_2 is man-made. It is time to abandon the popular narrative and recognize that atmospheric CO_2 has increased over the industrial era, not because of man-made emissions, but primarily because of the warming. This is not surprising. After all, it has been known for a long time that CO_2 lags temperature. However, two things are surprising: First, that this understanding of the carbon cycle wasn't established long ago, and second, that it is supported only by a small minority of independent scientists.

Keywords: Atmospheric CO_2; natural emission; man-made emission; carbon cycle model; balanced network; carbon balance; input-output model.

Submitted 2023-09-15, Accepted 2023-09-25. https://doi.org/10.53234/SCC202310/14

1. Introduction

I am a long-retired engineer without any training in climate matters. My interest in the carbon cycle began about five years ago, provoked by the IPCC's claim that there is only one emission of CO_2 to the atmosphere, the man-made. Based on previous work on the nitrogen cycle in Danish agriculture, I did Google-research to the point where I understood the carbon cycle of the planet, like I understood the nitrogen cycle in agriculture, namely as an input-output model, a matter of simultaneous linear equations.

November 10, 2022, the *Science of Climate Change* accepted my paper "Less than half of the increase in atmospheric CO_2 is due to the burning of fossil fuels" on which this presentation is based. The paper shows that there is not one, but two sources of CO_2. All along, my interest in the carbon cycle was nourished by a strong opposition from staunch supporters of the IPCC's popular narrative. I address this opposition, hoping to contribute to bringing an end to the long-standing CO_2 controversy.

It should be possible to end it, because the carbon cycle is a matter of elementary linear algebra. Thus, we stand on an Archimedean point. The present analysis can be checked and reproduced by any bright kid in High School. That is a challenge for supporters of the IPCC's popular narrative.

2. Understanding the Carbon Cycle

2.1 The carbon cycle

Carbon on Planet Earth is found in four reservoirs, also referred to as "boxes", "control volumes" or "systems": Box 1: "Atmosphere"; Box 5: "Fossil fuels"; Box 3: "Biosphere", the biosphere on land, including inland waters, *and* in the sea. The fourth box, Box 4: "Land and sea", is of special interest. It contains organic matter in soils and sediments – subject to bacterial decay. In addition, it contains a (vast) stock of CO_2-C dissolved in the sea. Finally, it contains large stocks of carbon in the lithosphere, e.g., limestone. These stocks are not further dealt with here, since they are not temperature dependent.

I add a fifth box: Box 2. It is not a physical system. It just serves to add two flows, the natural emission and the plant respiration, and forward the sum to the atmosphere, input = output.

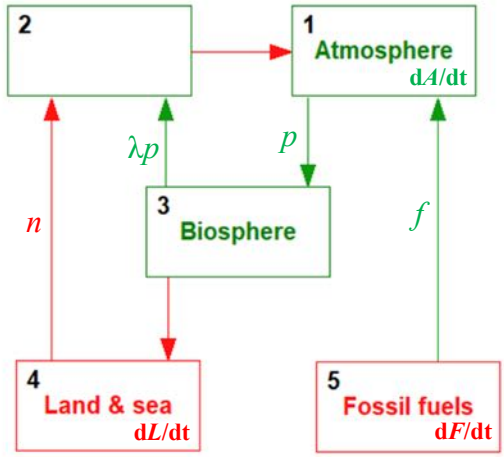


Figure 1: The carbon cycle's flows, reservoirs, and rates of change of stock, e.g., d*A*/dt.

The photosynthesis, p, is the amount of carbon annually fixed by plants on land and in the sea. Annually, it amounts to the equivalent to a quarter of the atmosphere's stock of carbon, in other words, that the residence time of CO_2 in the atmosphere is four years.

The plant respiration is λp, where λ is normally assumed to be about ½. So, while photosynthesis removes p from the atmosphere, plant respiration returns about half of it. Plant respiration is both an input and an output, a circular flow.

The natural emission, n, comes from Box 4, i.e., from the decay of organic matter on land, including inland waters, and in the sea.

Finally, f is the man-made emission from fossil fuels burning and cement production.

2.2 A simple carbon balance model

The conservation of carbon equation, the balance equation, applies to each of the five boxes. It says that the rate of change of the stock in a box equals input into minus output from that box. Consider the atmosphere with a standing carbon stock, A. The rate of change of A, the derivative with respect to time, t, is,

$$\frac{dA}{dt} = input - output$$

$$\frac{dA}{dt} = n + \lambda p + f - p = n + f - (1-\lambda)p$$

$$\frac{dA}{dt} + (1-\lambda)p = n + f$$

We have five balance equations with five unknowns (data or model output). Within limits, the unknowns can be chosen freely. Let Xi,j be the flow from Box i into Box j. In Figure 1, the unknowns are shown in red: X4,2 = n; X2,1 = total respiration; X3,4 = biomass production. The two remaining unknowns are dL/dt, where L is the carbon stock in Box 4; and dF/dt, where F is the carbon stock in Box 5.

In Figure 2, there are six green variables, flows and rates of change. They are data input. The rate of change of stock in Box 2 is zero by definition. In Box 3, it is close to zero. We must enter four variables: p, λp, dA/dt, and f. Hence, if we estimate p, the photosynthesis, and the plant respiration by setting λ=0.5, provide the rate of change of atmospheric carbon, dA/dt, and finally f from energy statistics, then the equations are automatically solved by a piece of software developed by the author, and the network is balanced as shown in Figure 2.

The balanced network, the carbon balance, is not a static, but a dynamic balance valid at any point of time. First, consider the balance close to the present day.

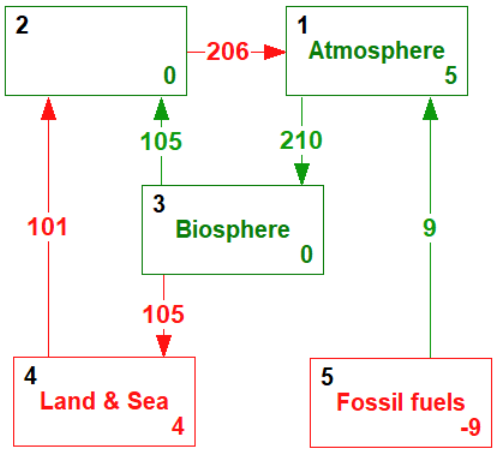


Figure 2: The carbon balance in GtC/yr, average over the 2010s. Numbers in lower right-hand corners of boxes are the rate of change of stock in the box.

The Global Carbon Project (GCP) estimates p = 210 GtC/yr as an average over the 2010s, 120 GtC/yr on land and 90 GtC/yr in the sea. The man-made emission, f = 9 GtC/yr is fairly accurately

known from energy statistics. And finally, d*A*/dt = 5 GtC/yr, is also fairly accurately known from atmospheric CO_2 measurements.

The resulting balanced network for the 2010s is shown in Figure 2. The natural emission is more than ten times the man-made. Notice also that the sum of the stock changes is zero, because the system is closed, *and* that the rate of change of stock in Box 4 is the photosynthesis minus the total respiration: 210 –206 = 4 GtC/yr.

A balanced network can be established at any point in time, and therefore also at the onset of the industrial era, say 1850. At that time, the man-made emission was nearly zero, and the rates of change of all stocks were also nearly zero; the system was in a quasi-steady state. So, all it takes to establish the balance in 1850, is that we estimate the photosynthesis at that time.

This is readily done if we accept the hypothesis that the residence time of CO_2 in the atmosphere is constant, and thus assume that the system behaves like a physical system, e.g., an electric circuit, Berry (2021). Then, the photosynthesis is proportional to the CO_2 concentration, *c*. With *p* = 210 GtC/yr, *c* = 405 ppm in the 2010s, and *c*= 280 ppm in 1850, we get *p* = (280/405)·210= 145 GtC/yr in 1850. The balanced network is shown in Figure 3.

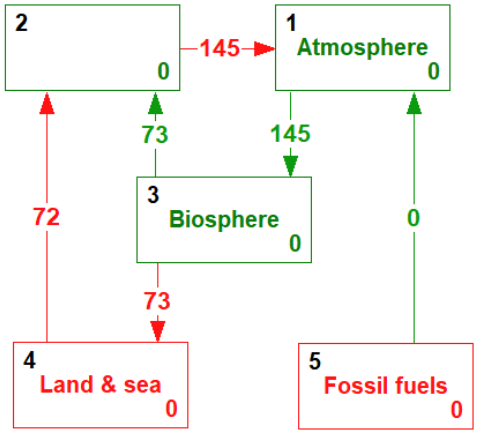


Figure 3: The carbon balance in GtC/yr, around 1850.

2.3 The reasons for the increase in atmospheric CO_2

Atmospheric CO_2 has increased over the industrial era because the natural *and* the man-made emission have increased. The natural emission from 72 GtC/yr in 1850 to 101 GtC/yr in the 2010s, the man-made from 0 to 9 GtC/yr. So, we have $\Delta n = 29$ GtC/yr and $\Delta f = 9$ GtC/yr. The man-made increase in proportion to the total (the observed) increase is,

$$\frac{\Delta f}{\Delta f + \Delta n} = \frac{9}{9 + 29} \simeq 0.25$$

i.e., 25 percent of the increase is man-made, not anywhere near 100 percent as claimed by the IPCC. The rest is due to the warming, which has speeded up the rate of decay of organic matter, and led to outgassing of CO_2 from the sea.

Using a different approach, and strictly IPCC's own data, Berry (2021) found the same result. The agreement is not surprising, since both of us apply the same governing hypothesis, that the residence time of CO_2 in the atmosphere is constant.

3. Discussion

Supporters of the IPCC's popular narrative refuse to accept the idea of the carbon cycle as a balanced network. To make their narrative work, they insist that the network in Figure 2 be simplified by aggregating Box 2, 3, and 4 into Box 4: "Land and sea". The result is shown in Figure 4.

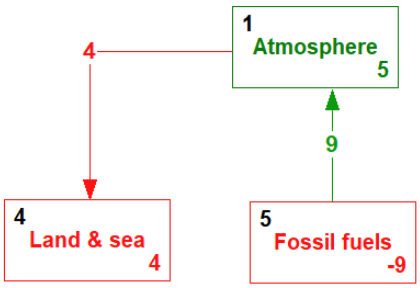


Figure 4: Opponents' carbon "cycle" derived from Figure 2 by aggregating Box 2, 3, and 4 into Box 4.

This not only eliminates the photosynthesis, the 'engine' that drives the carbon cycle. It also creates a one-way (net) flow of carbon from the atmosphere directly into land and sea reservoirs. This makes these reservoirs sinks, which, of course, cannot contribute to any increase in atmospheric CO_2. The inevitable conclusion is that only there is only one emission of CO_2 to the atmosphere: the man-made.

The problem is that the net flow doesn't exist. It is not a physical entity, because we cannot subtract two flows. We can add two flows, but subtracting them doesn't make sense. The net flow is not a flow. Instead, it is the rate of change of stock in Box 4.

The carbon cycle is not a matter of accumulation, but circulation. This simple observation falsifies the popular narrative. The challenge is not that it is complicated. For supporters of the popular narrative, the challenge is that it is simple.

4. Conclusion

The IPCC claims that all, or nearly all, of the increase in atmospheric CO_2 over the industrial era is man-made. The truth is that only about 25 percent is man-made. Climate changes are not man-made, they are primarily natural.

Acknowledgements

I thank Stein Bergsmark for patiently guiding me through the comprehensive the peer-review of my paper, Schrøder (2022), on which this presentation is based. I also thank Erik Arvin for helpful comments on the manuscript.

References

Berry, E. X, 2021: *The Impact of Human CO_2 on Atmospheric CO_2*. Science of Climate Change, v. 1, no. 2. https://doi.org/10.53234/scc202112/13

Schrøder, H., 2022: *Less than half of the increase in atmospheric CO_2 is due to the burning of fossil fuels.* Science of Climate Change, v. 2, no. 3. https://doi.org/10.53234/

Global Carbon Project: https://www.globalcarbonproject.org/carbonbudget/

OPEN ACCESS

Carbon Dioxide Circulation

Antero Ollila

Aalto University (Emer.), Espoo, Finland

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
aveolilla@yahoo.,com

Vol. 3.4 (2023)
pp. 381-382

Submitted 2023-09-20, Accepted 2023-12-04. https://doi.org/10.53234/SCC202310/16

Carbon cycle models referred to by the IPCC are all-encompassing and they apply several sub-models designed for special tasks like CO_2 exchange with plants. The objective of this presentation is to analyze critically the IPCC's carbon cycle model and to compare its key figures to the results of the 1DAOBM-3 model of Ollila.

The CO_2 circulation models referred to by the IPCC show that the increase of atmospheric CO_2 by 240 GtC from 1750 to 2011 is anthropogenic, which corresponds to the permille value of about -13 ‰, for ^{13}C but the observed value is only -8.3 ‰, see Figure 1.

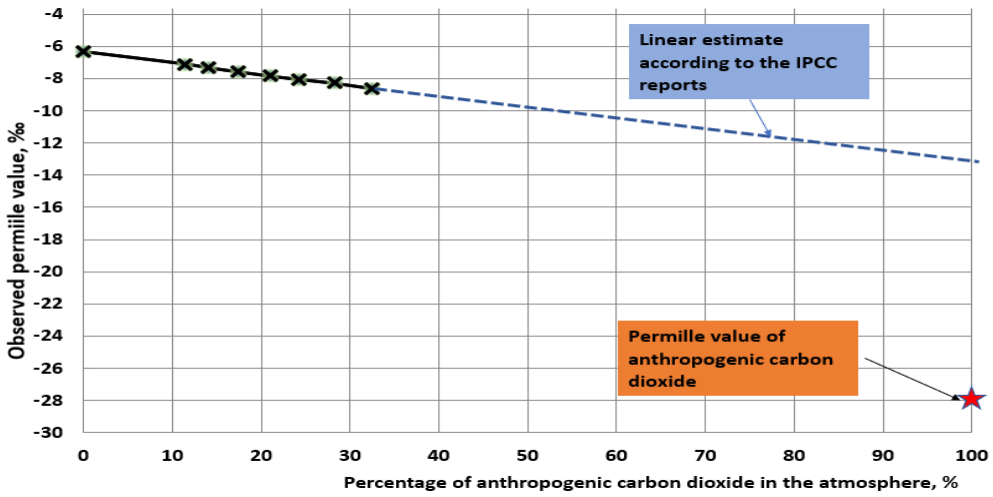


Figure 1. The permille value of the atmospheric $^{13}CO_2$ would be about 13.0 ‰ if it were totally anthropogenic by origin according to the IPCC calculation method.

Because most of the CO_2 circulation models use the buffer-restricted ocean uptake rate of about 2.3 GtC yr^{-1}, they have this same "wrong carbon" problem as in the atmosphere.

This may be the reason why the $\delta^{13}C$ data and analyses are almost nonexistent in Assessment Report 6. The carbon cycle fluxes of the IPCC between the atmosphere, the ocean, and the land show discrepancies. The removal rate of the anthropogenic CO_2 conflicts with the observed decay rate of 64 years of ^{14}C which is an ideal tracer test of anthropogenic CO_2 decaying rate in the atmosphere.

The CO_2 circulation model 1DAOBM-3 of the author is based on 26 equations that describe CO_2 fluxes between the three reservoirs, namely the atmosphere, the ocean, and the land. The CO_2 fluxes and yearly amounts since 1750 have been divided into natural, anthropogenic, and total.

Basic physical processes like mass balances, mixing, and absorption have been utilized. Only one parameter in these equations is based on the observation, namely the permille value of the year 2017. Even though 1DAOBM-3 does not apply the "buffer-factor" approach like in the IPCC models, the maximum net dissolving rate of total CO_2 is only 1.9 GtC yr^{-1}, which is smaller than the maximum uptake rate of 2.3 GtC yr^{-1} found in the IPCC models. The explanation is that the ocean dissolves anthropogenic CO_2 in greater amounts but returns natural CO_2 almost in the same amounts back to the atmosphere which keeps the total uptake amount of the ocean very small.

The author's improved 1DAOBM-3 carbon circulation model shows that the anthropogenic CO_2 amount in 2011 was only 72 GtC, satisfying the observed atmospheric permille values from 1750 to 2017. The CO_2 circulation between the ocean and the atmosphere has increased the amount of atmospheric CO_2 by natural CO_2 198 GtC from the ocean. The fossil fuel CO_2 increase by 2017 has been 433 GtC, divided into three reservoirs: 72 GtG in the atmosphere, 127 GtC in the biosphere and 234 GtC in the ocean, Figure 2.

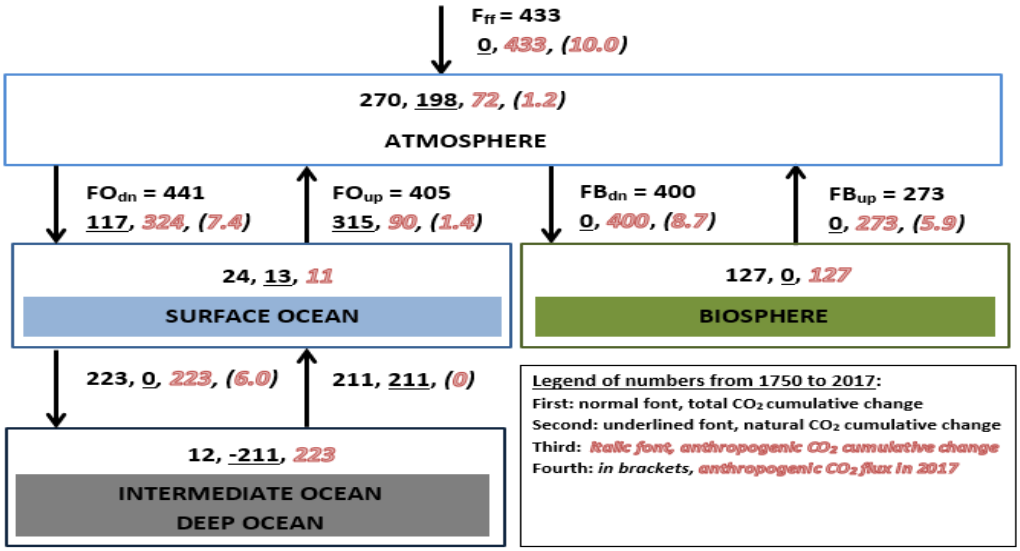


Figure 2. The carbon budget amounts and fluxes according to 1DAOBM-3 model.

The simulations for 1000 GtC emissions by 2100 have been carried out by three models, including 1DAOBM-3, Bern2.5CC, and the mean model of 15 circulation models (called Joos2013). The residence time of 1DAOBM-3 is 16 years for anthropogenic CO_2 impulse, the same as for the radiocarbon decay time. The residence time of the total atmospheric CO_2 approximated with one time constant is about 70 years meaning a relaxation time of 280 years. These values are much shorter than the residence times of two other models, which show that 25±9 % of any anthropogenic CO_2 is still found in the atmosphere after 1,000 years. The reasons have been analyzed. The advantage of 1DAOBM-3 over the other models is that its results are in line with the oceanic and atmospheric observations from 1750 to 2017 like the permille value of the atmosphere, the model-calculated CO_2 concentration, and the decay rate of the anthropogenic CO_2.

Reference

Ollila, A. (2019*). Analysis of the Simulation Results of Three Carbon Dioxide (CO_2) Cycle Models.* DOI: 10.9734/psij/2019/v23i430168

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
johs@qmplus.com

Vol. 3.4 (2023)

pp. 383-390

"CO_2 the Gas of Life" or CO_2 the Oxygen of Life"?

Posters for Kids

Johannes Oraug

Former researcher of agriculture, Norway

Keywords: *Climate change; Teaching climate science; Greta Thunberg*

Submitted 2023-10-15, Accepted 2023-10-31. https://doi.org/10.53234/scc202310/22

1. Introduction

How can we understand climate change – when it requires us to understand several natural science connections? This article shows how I solved the teaching for my six grandchildren, between 10 and 18 years old, because they all know who Greta Thunberg is. Or, rather was! Because after five years of schooling, I have suggested that she should want to change the posters, perhaps like the 30 posters that I have proposed over the following pages.

My motto is "Simple posters" with easy-to-understand context. Academia's tribal language does not seem to provide understanding, neither to grandchildren nor to journalists.

Greta has gone striking every Friday during her 5-year schooling. What gave Greta new understanding about the climate crisis, when she read geology, astronomy, biology and meteorology? I will show the posters and finally five equations.

2. Posters

The posters follow overleaf.

Here are 30 new posters, and finally 5 questions.

Earth has always had a climate crisis, with ice ages and warm ages, with volcanic eruptions, floods and droughts. With the knowledge from the 4 most important science subjects, she now knows why!

Greta's NEW poster suggestions could be these:

OXYGEN - THE FACTS:

The O_2 was not freely available in the air until after 3 billion years, i.e. after the planet got its plant life.

Don't blame CO_2!

It is the "oxygen of life"!

THE GLOBE has record low CO_2 = 0.04 %.

It is 300 million years since we found a geological period with such unusually low

The biologists taught me:

- WITHOUT green nature, no free oxygen.

- Too low a CO_2 concentration, lower than 0.02 %, kills nature.

Then the Milky Way will get another black STONE PLANET.

Humans' challenge: The natural sciences are INVISIBLE!

The CO_2- and the O_2-concentration, the gravitational forces, nano-fungies, microbes, enzymes, are the prerequisites of life.

The tragic thing is that the journalists do not write about the knowledge about the role of the natural sciences in the global climate crisis, the interaction between the "subjects".

On the contrary:

They are made INVISIBLE by the press and TV.

Greta can now say:

"With my posters I strike against INVISIBILITY!"

Astrophysics
taught me:

The reasons for the systematic and dramatic climate events are

The gravitational forces of the solar system.

The geology
taught me:

Earth's history.

CLIMATE changes by

THE FORCE OF GRAVITY:

41 ice ages
+ 41 «heat» ages

Gravitational forces change the tilt of the Earth's axis,

and

changes in the elliptical orbit of the globe:

Longer distance from

the Sun causes ice ages!

The logistics
taught me about

the sequence of events:

Warmer seas first!

Then seas release their

CO_2 storage.

REMEMBER:
It's 50 times more CO_2 in the SEA than in the air!

The biology
taught me about

CO_2 emission sources:
Nature's own = 95 %
The man-made = 5 %!

CONCLUSION:

The UN's IPCC was wrong when they said: "It's a CLIMATE CRISIS" ***"because the Earth is being warmed by man-made CO_2 emissions"***

This is misleading information with serious factual gaps!

FACT: Plants would
not have had a single cell wall without CO_2!

Because ONLY 0.04 %

of the air is CO_2,

it can't heat anything!

Now I know:

Insulation does not heat the house.

The oven does!

Now I know:

In a cold bed, it is my body that warms

up the sheets and duvet!

Now I know:

CO_2 and other greenhouse gases only "keep the heat on"!

- for a short while!

Now I know:

Less CO_2 gives us less O_2.

The oxygen content

drops from 21 % to 18 %

WHAT WARMS THE OCEAN,

besides the Sun and its sunspot activity?

It is deep-sea emission!

sub sea volcanoes

at a depth of 3000 – 5000 m.

Man-made emissions:

600 % more tons of CO_2 emissions

than in 1850.

BUT 567 % disappeared!?

Now I know:

The plants used 567 % for plant growth!

*** Photosynthesis also has a dark reaction! Thanks to the enzyme RUBISKO – the world's most important protein! It loves CO_2. This protein adds extra speed to photosynthesis' production of dextrose (for cell division growth). The greenhouse gardeners know this, and pump in 100 tons of extra CO_2 each year to increase plant**

Now I know:

The soil

has reduced its organic content

from 5 % to below 2 %!

Without CO_2

- no organic soil means

no green nature,
no earthworms
no microbes
no nanofungus
fewer enzymes

When will the IPCC understand that reducing CO_2 is dangerous to life?

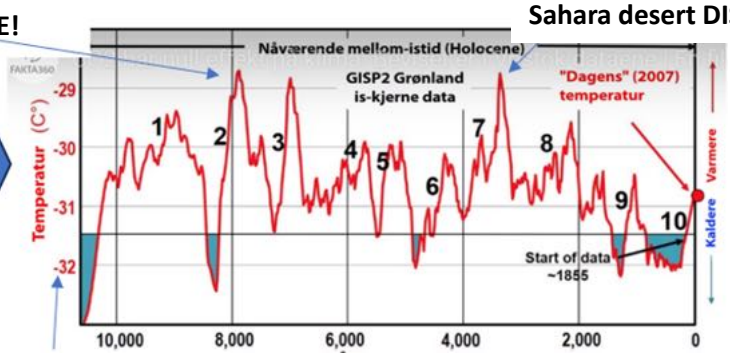
The summaries in the IPCC reports omit FACTS, are "misleading", and punishable, ref. §§ 7 og 8 of the Norwegian legislation.

Earth history from before our era.

The glaciers in the Nordic region GONE!

Sahara desert DISAPPEARED!

"MINI" - cold- and heat times change every 1000 years, in our own heat time of 14,000



Measurements from Greenland ice

This figure shows that the atmosphere's CO2 gas has NEVER had an effect on the climate. Ref. MIT Nov.

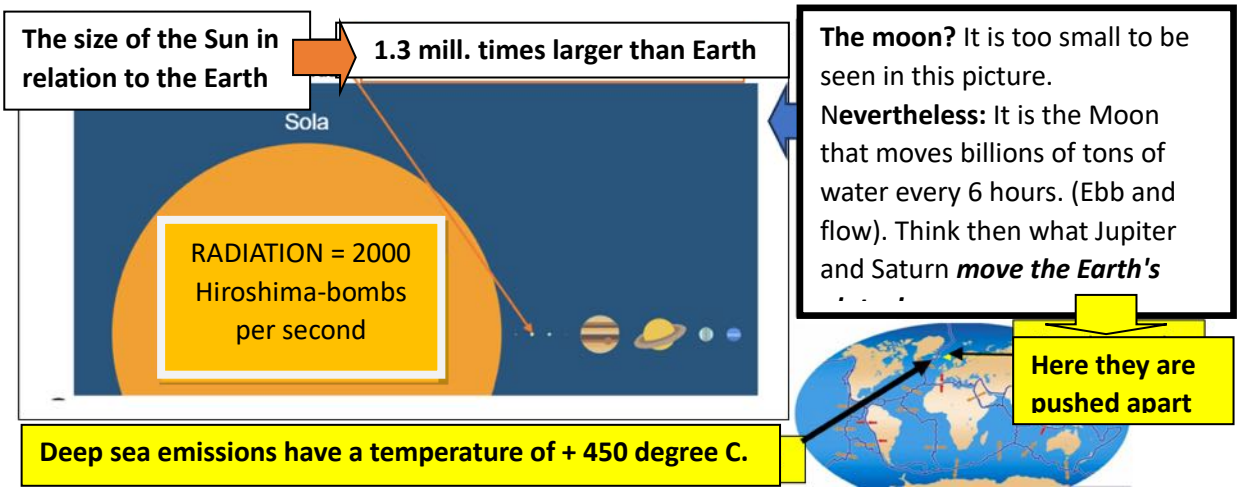
We do not see this figure on TV or in other media. WHY?
Perhaps because the perspectives of knowledge exceed 150 years?

Previous warm times (interglacial times) had 4 to 20 times higher CO_2 concentration than in the last 12 000 years of our time!

Earth's plates float like boats on Earth's inner "sea of fire".

The plate displacements are due to the plates' changes in the solar system's gravitational forces. They create the sea of fire's "ebb and flow" conditions such as volcanoes, earthquakes, tsunamis and ice ages.

The gravitational forces. The sun and the planets create the "ebb and flow of Earths inner sea!



ASSUMPTION:

From 2024 Greta will strike for MORE NATURAL sciences in school,

and she demands that the teachers teach the contexts of natural-sciences!

More CO_2 means more NATURE!

The food platter increases for all living things!

More natural-science in school - not less!

will give more understanding of what all the country's leaders and politicians must take into account if Earth is to remain the Milky Way's only green planet!

THE CLIMATE SOLUTION? = Better preparedness!

The UN countries must WATER dry steppes and deserts, and build BIO cities for new billions of people. We get the water from the atmosphere* and from salt water purification to water the plants, - if the UN wants "MORE NATURE - not less!?".

*There is 6 times more fresh water in the atmosphere than there is in all the earth's rivers and waters! The technology for collecting fresh **water is well known!**

What are we waiting for?

Some questions for Greta:

1. How many hours did you have during the last 5 years in school?

Geology
Biology / biochemistry
Astrophysics
Meteorology

Comments

2. What do you recommend to all the world's schools:

Which science subjects and number of hours per subject per year?

Geology/Earth's climate history
Biology/biochemistry
Astrophysics
Meteorology

Comments:

3. Do you agree to the new proposals with knowledge-based posters?

Yes ☐ No ☐
What do you miss?
What do you want to remove?
and / or improve?

Comments:

4. What do you think should be the SYLLABUS for all journalists and politicians which will convey scientific facts BEFORE public budgets on climate measures are adopted?

SUGGESTIONS:

5. The minimum curriculum is the suggested fact-knowledge posters!

Yes ☐ No ☐

Greta's alternative suggestions and supplements are:

With your answers, we all gain new knowledge and new understanding! Thank you for your involvement!

Funding

No funding received.

***Guest-Editor**: Stein Storlie Bergsmark; Reviewers: Anonymous.*

Acknowledgements

I am indebted to prof. em. Dr. Johan Petter Nystuen, prof. em. Dr. Per-Arne Bjørkum and prof. em. Jan-Erik Solheim for their helpful comments.

References

Aarnes, Halvor: *Global CO_2 and H_2O cycle via the plants*, UiO 2012, p. 6

Koonin, Steven: *Unsettled*. ISBN: 9781950665792, 2021, p. 12

Hessen, Dag O.: *Liv,* ISBN: 9788202751135, 2022, p. 119

OPEN ACCESS

The Carbon Balance shows that Net-Zero is neither Necessary nor Rational

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Karl Iver Dahl-Madsen

Independent Scientist, Denmark

Correspondence:
karliver @dahl-madsen.com

Vol. 3.4 (2023)

p. 391

Keywords: Carbon Cycle; Atmospheric CO_2; Natural emissions; Anthropogenic emissions

Submitted 2023-09-20, Accepted 2023-09-24. https://doi.org/10.53234/scc202310/36

The current increase in atmospheric CO_2 is predominantly caused by human emissions. All other explanations violate the mass conservation law. The speech will present a simple global carbon balance model where the driving force for the observed uptake of excess carbon in the biosphere and the oceans is the difference between the actual concentration in the atmosphere minus a temperature dependent atmospheric equilibrium concentration.

The temperature/CO_2 relation will be using empirical proven climate sensitivity.

Results from 3 scenarios will be shown:

1. No climate actions. Even if we do nothing we will eventually stabilize and decrease atmospheric CO_2 and excess temperature. Firstly, because we can expect the increase in carbon efficiency to continue for a long time. Secondly, because other solid energy production methods like nuclear fission will eventually be less expensive than fossil energy for many purposes, as fossil fuels gets less abundant and more expensive to develop.
2. Net-Zero. The stop of CO_2 emissions will more or less immediately result in an exponential reduction of atmospheric CO_2 towards the equilibrium level, with a subsequent resulting near immediate reduction in excess temperature.
3. A constant CO_2 emission. This will stabilize the atmospheric CO_2 at a level where emissions equal uptake, with a resulting stabilization of excess temperature. This makes it possible for humankind to use fossil fuels for hundreds of years for purposes for which they are eminently suited, such as transportation and raw materials for plastic and chemicals.

Editors:. Jan-Erik Solheim and Stein Storlie Bergsmark.

Funding: This research did not receive any funding.

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
johnparmentola@gmail.com

Vol. 3.4 (2023)

pp. 392-395

Celestial Mechanics and Estimating the Termination of the Holocene Warm Period

John A. Parmentola

The RAND Corporation, Santa Monica, CA 90401 USA

Keywords: Milankovitch cycles; insolation wave; daily-insolation minima and maxima; tempearature trends last 800 000 years; model predictions.

Submitted 2023-10-06, Accepted 2023-10-19. https://doi.org/10.53234/SCC202310/19

Summary of conference speech

This paper addresses several issues concerning Milankovitch Theory and its relationship to paleoclimate data over the last 800,000 years. The insolation is described physically as a time-dependent wave. It is analogous to an AM radio wave. Its wave-like nature is produced by the "beating" of the earth's celestial motions on the solar irradiance (about 1,368 W/m^2) resulting in its complex time-dependent distribution over the earth's surface. Each of the three celestial motions, precession, eccentricity, and obliquity, contributes a wave component to the insolation. Like ordinary waves, they can produce a beat-like structure through constructive and destructive interference. This description begs several questions. How large in magnitude is each of these wave components, and how do they interfere? Does the interference manifest itself in the paleoclimate data, and if so, how? Does the description of the insolation as a wave and its components have any predictive power for determining the reoccurrence and duration of interglacial and glacial periods? The objective of this paper is to answer these questions.

The results are presented in temporal space as opposed to typical frequency space analyses for two reasons. First, paleoclimate data is commonly represented as a time series. The goal of this paper is to present a model that accounts for the features in the data as a function of time. Second, the three basic celestial parameters, the precession, eccentricity, and obliquity, are all quasiperiodic functions of time. They have no fixed period. Their quasi-periodic behaviour is fundamental to understanding the time series paleoclimate data.

The shortest cycle of the three celestial parameters is that of the precession, which, over the last 800,000 years, on average, has been about 21,000 years. That of the obliquity has been about 41,000 years and the eccentricity about 94,000 years. However, the variation in these cycles and their half-cycles is quite large. For example, precession half-cycles vary from 7,000 to 15,000 years, the obliquity half-cycles from 18,000 to 23,000 years, and the eccentricity half-cycles from 30,000 to 70,000 years. In terms of timescales, the precession sets the scale for the time-dependent behaviour of the insolation.

In terms of physical effects, the obliquity primarily affects the angular distribution of the insolation over the earth. In a half-cycle, it shifts the sun's rays south to north and vice versa by about 2.4 degrees in latitude or roughly 267 km. This shift changes the angle the sun's rays make with the vertical at each illuminated point on the earth's surface resulting in a comparatively small overall effect on the insolation amplitude.

The most significant effect on the insolation amplitude comes from the combination of the precession and eccentricity, the precession index (sometimes referred to as the climate precession.) It is defined as the precession modulated by the eccentricity and physically accounts for insolation minima and maxima. For example, when the earth is at perihelion (the closest distance to the sun), and the earth's axis points toward the sun, the insolation approaches a maximum for the northern hemisphere. Fast forward about 11,000 years, an average precession half-cycle, the earth's axis points toward the sun at aphelion (the farthest distance from the sun) the insolation approaches a minimum for the northern hemisphere. The change from maximum to minimum and vice versa can be quite significant (more than 100 W/m^2) at northern latitudes during the summer solstice and is driven by changes in the eccentricity over a precession half-cycle. This qualitative analysis suggests, and is demonstrated in this paper, that the insolation can be approximated by the effects produced by just two parameters, the precession index, and the obliquity at insolation maxima and minima.

Over the last 800,000 years, the insolation has transitioned from maxima to minima and vice versa a total of 74 times. These transitions range in percentage from about +28 % to -19 % with half-cycle durations (the average is about 11,000 years) that range from 4,200 to 16,900 years. However, the number of prominent temperature excursions indicated in the EPICA Dome C paleoclimate data is at best 13. Reconciling the 74 transitions in terms of timing and amplitude with the prominent temperature excursions is a formidable theoretical challenge. These features are affected by eccentricity, precession, and obliquity cyclical behaviours, which have been computed from -250 million to +250 million years. According to the Milankovitch hypothesis, their determination provides a consistent temporal calibration that should correlate insolation changes with features in the paleoclimate data.

These cursory observations raise several questions. What, if any, relationship is there between insolation changes and prominent features in the paleoclimate data? Are there specific insolation changes that are special, or are there trends in the insolation over time that correlate with significant changes in the paleoclimate data? To gain some insight into correlations, one might consider the largest changes in insolation from successive minima to maxima, and vice versa to see if these influenced the paleoclimate data more than other insolation changes. Such an approach would also capture insolation trends (as opposed to just individual changes) that could explain certain reoccurring features in the paleoclimate data over time.

Since the obliquity primarily affects the angular distribution of the solar irradiance over the earth's surface with a comparatively small effect on its amplitude over long cycles and the precession index is the primary driver of the insolation amplitude over shorter cycles, the product of the two contributions should well approximate the insolation at maxima and minima. This approximation partitions these two effects over time and allows for their time series comparison with the paleoclimate data that implicitly includes the quasiperiodic nature of the three celestial parameters.

A partition model is presented that does not include any aspect of the earth's climate. It is a parameter-free kinematic model based on the three celestial motions of the earth and the sun's rays.

The model provides a set of points in time for the obliquity and precession index contributions that represent the percentage change between successive mean-daily-insolation extrema at 65N in June. Its predictions for the insolation are compared with the corresponding theoretical calculations of J. Laskar et al. (2004) showing excellent agreement. An interpolation is made between the set of points for the obliquity and precession index contributions that enables a wave description of these separate contributions to the insolation.

The primary conclusion is the precession index wave dominates the insolation compared to the obliquity wave, which is evident from the following graphical comparison, Figure 1.

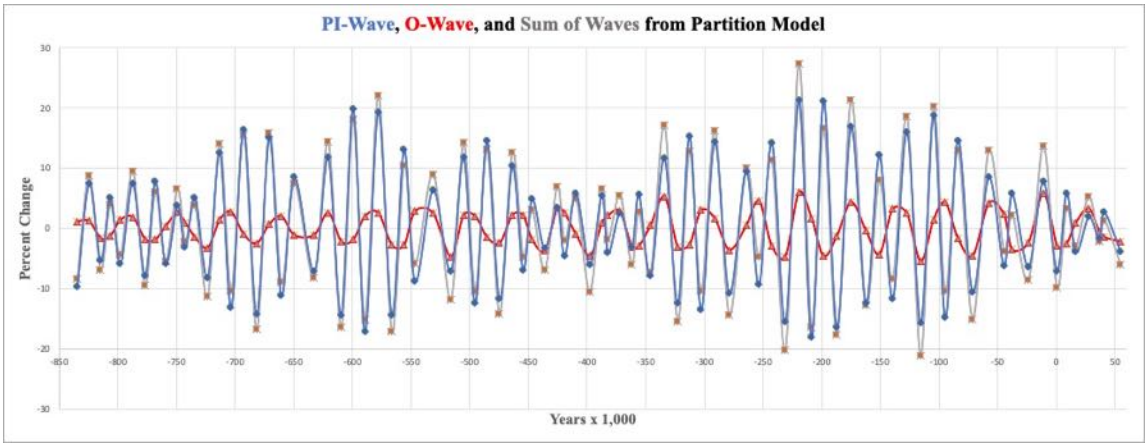


Figure 1: Partition model estimates for the precession index wave (blue curve), obliquity wave (red curve), and their sum (grey curve with red dots) associated with the percentage change between successive mean-daily-insolation maxima and minima at 65N latitude during June from -844,200 to +53,500 years.

The dominance of the precession index wave is also evident from a comparison of its behaviour with the EPICA Dome C ice core data as indicated in the following graph, Figure 2.

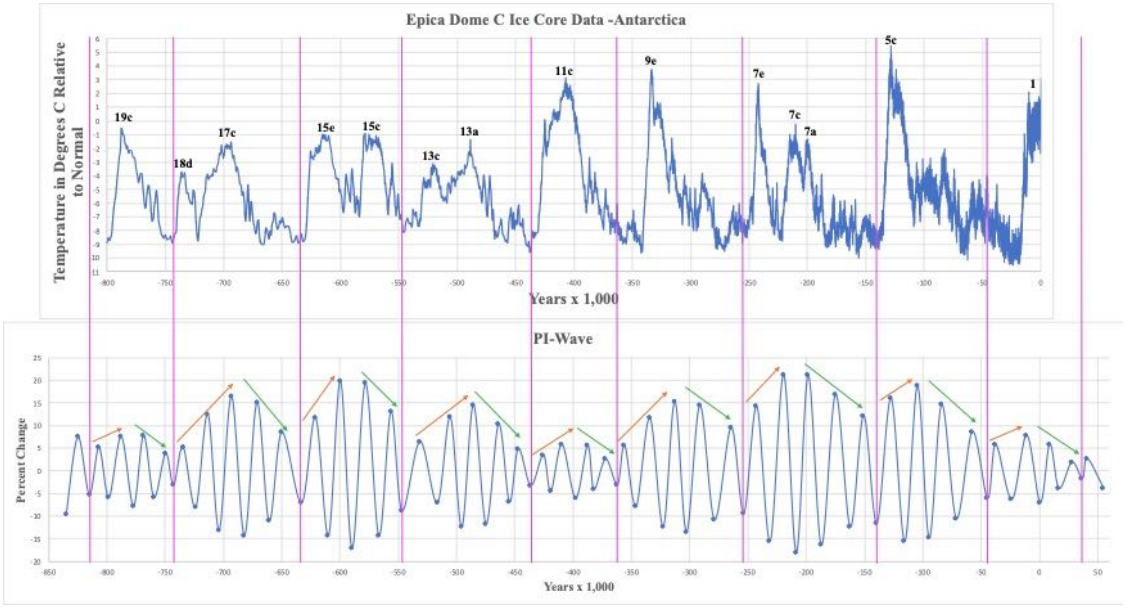


Figure 2: Precession index recurring wave packets (judiciously defined by purple vertical lines) approximately correlate with interglacial and glacial periods over the last 800,000 years. Precession carrier wave maxima trends qualitatively correlate with increasing temperature trends (red arrows) and decreasing maxima trends (green arrows) with decreasing temperature.

Visually, the quasiperiodic precession index wave packets, which are specified by the vertical purple lines, roughly correlate with recurring interglacial and glacial periods indicated by marine isotope stages. To determine occurrences of interglacial and glacial periods, simply follow the recurring precession index wave packets. However, the relationship between the timing of prominent temperature excursions and the partition model predictions also depends on the obliquity wave contributions. As a new timing result from the model, interglacial inceptions and terminations coincide with rare synchronizations (constructive interference) between the precession index and obliquity waves.

The model also predicts that the temperature descent into the next ice age is likely to occur within the next 500 years. Finally, the partition model provides support for the Milankovitch Hypothesis, however, the primary driver for the prominent features in the paleoclimate data over the last 800,000 years is the precession index and not the obliquity.

Editors:. Jan-Erik Solheim and Stein S. Bergsmark.

Funding: This research did not receive any funding.

References

Laskar, J., Robutel, P., Joutel, F., Gastineau, M., Correia, A.C.M., and Levrard, B. 2004, *A Long-Term Numerical Solution for the Insolation Quantities of the Earth*, Astron. Astrophys., Vol. 428, pp. 261-285. https://www.aanda.org/articles/aa/full/2004/46/aa1335/aa1335.html, 2004.

Parmentola, John A. 2023, *Celestial Mechanics and Estimating the Termination of the Holocene Warm Period*, Science of Climate Change. Vol 3.1, https://doi.org/10.53234/SCC202301/11

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
eva-marie@fredriksen.no

Vol. 3.4 (2023)

pp. 397-401

The Little Ice Age

Eva-Marie Brekkestø[1] and Stein Bergsmark[2]

1. *Author and teacher, Norway*
2. *Independent researcher, Norway*

Keywords: Little Ice Age; Volcanoes, Krakatau

Submitted 2023-09-18, Accepted 2023-09-25. https://doi.org/10.53234/SCC202310/13

1. Introduction

To recognize the current climate change in the right perspective, it is vitally important to know climate in the past. The knowledge of past climate, however, has been largely missing. There is the very widespread and convulsive mythos built by a dominant group of climate scientists, that after the end of the last ice age some 12 000 years ago, the earth's climate has varied very little and that the major variations only took place during the last 150 years. Crucial to this belief was the infamous Hockey Stick graph carefully put together by Dr. Michael Mann (Montford 2010).

Over the last 20 - 25 years, this mythos has been firmly rejected by independent scientists, as our climate history clearly shows that during the last millennia, the humans have suffered greatly from serious extreme weather events and climate changes. As late as the start of the 2000's, the misconception that the Medieval Warm Period and the Little Ice Age was minor local phenomena in the Northern part of Europe, dominated the climate history narrative. However, over the last few years, it has been firmly documented that these periods were global, although not always at the same time in the same areas around the globe. This article covers the changing climate during the previous 700 years.

2. The Big Picture – Climate Change on Two Time Scales

2.1 Glacials and Interglacials

Ole Humlum (climate4you.com) gives a very good overview of early climate change, which is in part reproduced here. Five million years ago, a long cooling period started when ice ages have dominated our climate. Since that time, the earth has seen a series of 46 ice ages. This long period started with 33 ice ages, appearing in cycles of about 40 000 years. The last four glacial periods and interglacial periods are shown in Figure 1 below, covering the last 420 000 years of our climate history.

The graph in Figure 1 shows a reconstruction of global temperature based on ice core analysis from the Antarctica. The present interglacial period (the Holocene) is seen to the right (within the red square. The preceding four interglacials are seen at about 125 000, 280 000, 325000 and 415 000 years before now, with much longer glacial periods in between. Alle four previous interglacials are seen to be 1 – 3 deg C warmer than present.

However, the period of interest in this article is the last 11 000 years of the present interglacial

period. The development over this period is illustrated on Figure 2, which shows the air temperature at the summit of the Greenland Ice Sheet as well as atmospheric CO_2 concentration over the same period.

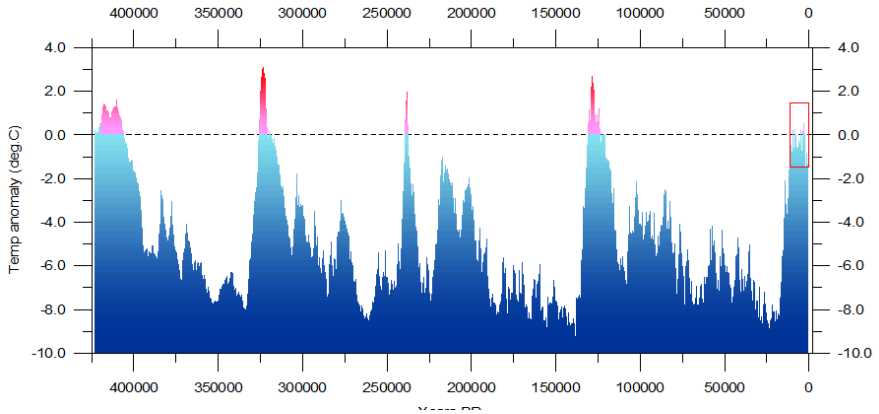


Figure 1. Reconstructed global temperature over the past 420 00 years (Petit et al. 1999, climate4you.com)

The approximate portions of some warm historical period are shown in Figure 2 by green bars, with intervening cold periods. Enclosed within the red area in the upper panel is the Little Ice Age, the main topic of this article. During the last 4000 years the Greenland record is dominated by a trend towards gradually lower temperatures, possibly indicating the early stages of the coming ice age. One very important observation is that there is no correlation between temperature and CO_2 concentration. This is one of the indications or rather proofs, that such correlation is spurious and that CO_2 cannot be the main climate change driver.

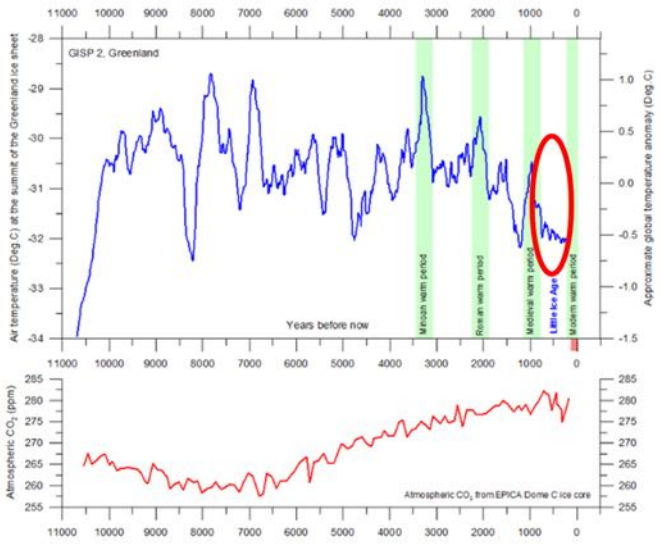


Figure 2. Upper panel. Air temperature at Greenland Ice Sheet (Alley 2000).
Lower panel. Atmospheric CO_2 from EPIC Dome C ice Core (Monnin et al. 2004)

2.2 Causes of Climate Change

Neither continental plate movement nor variations of CO_2 can explain climate change over the last 450 000 years. The most probable cause is the variation of incoming solar radiation due to

the eccentricity of the earth's orbit, as well as the tilt and precession of the earth's axis.

For the shorter-term periods, of special interest here, wavelet analysis shows there are deterministic periods in the climate variability (Yndestad 2022). Also here, there are astronomical causes of climate change. There are clear signatures of the sun as well as the Jovian planets, Jupiter, Saturn, Uranus and Neptune, in temperature time series wavelet analysis. Between 1000 and up to 2250 AD there are 8 deep solar minimum periods. There is a 500-year climate maximum in 2025 and a TSI deep minimum in 2050. We are now moving into a serious 100-year cold period. John Parmentola has estimated that the termination of the Holocene period will take place within the next 500 years (Parmentola 2023).

Quite another issue is variations in cosmic rays from space. The strength of cosmic rays into earth is determined by the activity of the Sun. An active sun emits electrically charged particles which strengthen our magnetic field and reduces inflow of cosmic rays. A less active sun will admit more cosmic rays into our atmosphere to collide with atmospheric molecules. And more cosmic rays lead to more low clouds, less solar irradiation to the earth and finally a somewhat lower temperature.

Finally, on short term, enormous eruptions from volcanoes have had immediate effect on the climate. The Hekla (Iceland) in 1300, The Huayanaputina (Peru) in 1600, the Krakatau (Indonesia) in 1680, the Laki (Iceland) in 1783 and last but not least the Tambora (Indonesia) in 1815. The eruptions send large amounts of particles and aerosols into the atmosphere, which remain in the atmosphere for several years and which literally visibly scatter and reflect the incoming solar irradiation, resulting in a strong reduction of solar heating of the earth surface and the onset of cold or very cold periods.

3. The Little Ice Age – 500 years of extreme weather

The average global temperature was about 2 deg C lower than during the Medieval Warm Period and 1 deg C lower than today. However, the period is characterized by many severe and erratic changes.

During the early 1300 period there was a swift and fierce cooling, due to volcano Hekla eruptions. Monastery yearbooks from Germany, Sweden and Iceland report extreme frost and the lowest temperatures ever. This period had cold winters and dry summers. The rivers Loire, Rhein and Donau could be crossed dry-shod.

The period 1310 – 1322 was cold and wet. There was thick ice on river Thames, and ice in the Channel was blocking sea travel. In China and Japan, the cold and wet summers ruined the crops.

During 1323 – 1340, climate was cold and unstable, with severe winters, violent storms, drought and floods, giving failing crops and widespread hunger. During 1315 – 1335, 1,5 million people died from hunger in Northern Europe.

During 1350 – 1450 the sea ice around Iceland grew, and cold winters and summers made the viking settlers leave Greenland (Fagan 2008), where they in the earlier warm period had cattle, grew barley and brewed beer. In January 1360, De Grote Mandreke, a violent storm and flood in the North Sea led to enormous damage in Netherlands, Germany and Denmark and at least 25 000 people died (Lamb 1977).

The period 1490 – 1550 was mild in many parts of the world, with warm climate, good crops and increased population. However, in western Europe, the years 1527 -29 were very cold with filing crops, hunger and social unrest.

The Little Ice Age changed the agriculture in Europe. While the farmers during earlier centuries lived primarily on certain types of crops, the unstable climate made them gradually convert to more varied crops and keeping domestic animals.

The very coldest period appeared 1680 – 1710, spurred by the Krakatau eruption in May 1680. In

South England the ground was frozen in the upper one meter, and there was ice in the Channel. In 1695 skaters and horse-drawn sledges were having fun on the channels in Netherlands. During the winter 1708 – 1709, deep snow lasted many weeks in the south of England. In France, temperatures down to – 20 degrees ruined the wine stocks and the orange trees in Provence died from cold. In Scandinavia, the Baltic Sea could be crossed on horseback and church bells broke while chiming. Also, in Venice, there was a lot of skating on the laguna ice! Look at Figure 3 below!

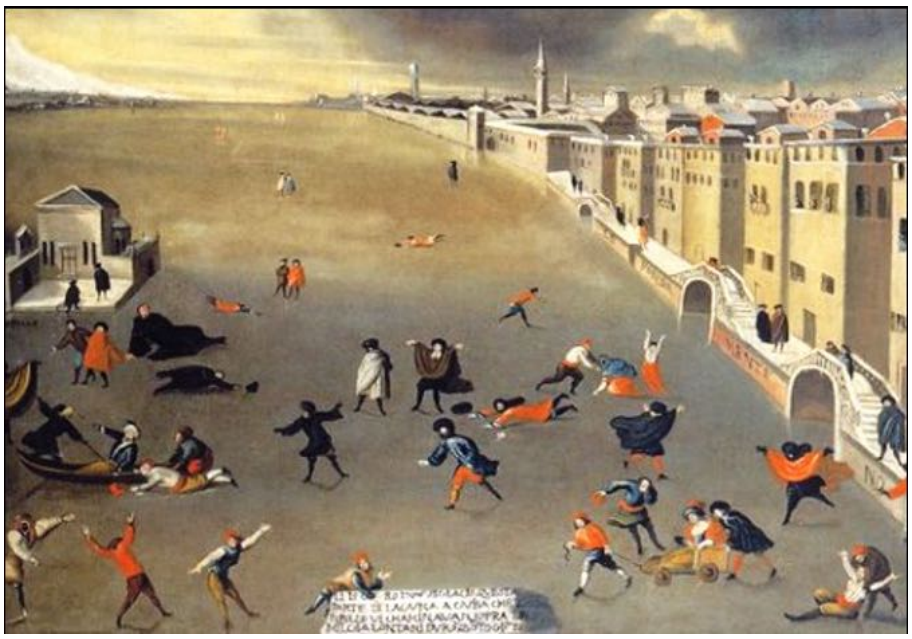


Figure 3. Skaters on the Venice laguna (G. Bella, 1730 – 1799)

The period 1740 – 1800 was very cold in Northern Europe with 5 – 6 degrees below normal. German rivers froze from November, the Baltic Sea was again covered by ice, and there were ice fairs on the frozen river Thames. The European glaciers reached their maximum during the 1750's. The Laki eruptions on Iceland caused the cold winters during the late 1780's. As much as 24 % of Iceland's population died after the eruption.

The winter 1789 was very long and cold, and in Norway the melting of snow started only in July. Large volumes of snow, extreme rain and sudden high temperature led to a very fast melting and an extreme flood named Storofsen, inundating several valleys in the Eastern Norway during July, and causing several large landslides. 60 people lost their lives and in the Gudbrandsdalen valley alone, more than 3000 houses were destroyed. A farmer in the Sunndalen valley is said to have measured 320 mm of rain during two days. The water level in freshwater lake Mjøsa, was 7 meters above normal and this has never happened again, not even in the 2023 flood called 'Hans'.

The year 1816 has been called 'the year with no summer' due to the Tambora eruption in 1815. In May there was frost in Virginia and in July, in Pennsylvania. In many areas cold weather and much rain ruined grain and potato produce.

Several scientists claim that the Little Ice Age, in reality, lasted until the 1920'ies. This final part was still very unstable. In Northern Europe the winter 1821 – 1822 was very mild, while the following winter was very cold. In 1837 – 38, the Skagerrak Sea was completely frozen from Norway to Denmark. In July 1868, there were heat records in London and Paris, with 38 degrees, while in 1879, there were record colds on 3 December with -26,7 degrees in London and -25,6 degrees in Paris (Fagan 2000).

In August 1883, there was the great eruption from volcano Krakatau. This had serious effect on

the climate all around the globe, during the following years. One year after the eruption, the average temperature on the Northern Hemisphere was 1,2 degrees lower than before the eruption, 0,5 degrees globally, and the temperature remained low several years (Schaller 2009). The following winters were very cold. During the 1880'ies, many poor people died from cold. In winter 1894 – 95, river Thames was again frozen.

It is not possible to say when the Little Ice Ages ended. In some regions already around 1850 it approached its end, while in other regions it continued until the beginning of 1900. At Spitsbergen, the warming period started only in the 1920'es, but then very quickly, and temperature rose several degrees in only 10 years.

4. Conclusion

The Little Ice Age was real and is well documented. The conception that our climate was stable until the onset of the industrialization is simply wrong. The cause of the abrupt changes in this period is mainly the interaction between Sun, Earth and the Jovian planets, as well as large eruptions from volcanoes. CO_2 played no role. In fact, there is a negative correlation between the trends in temperature and CO_2-concentration over the last 4 000 years. This period has only natural causes, and since the planetary relations are deterministic, it is very probable that we will have another Little Ice Age in 500 years.

Funding

No funding

Acknowledgements

Without the help and contributions from Ole Humlum and Jan-Erik Solheim, this work had not been possible.

References

Alley, Richard 2000: *The Younger Dryas cold interval as viewed from Central Greenland*, Journal of Quaternary Science Reviews, 19, 213-226. https://doi.org/10.1016/S0277-3791(99)00062-1

Fagan, Brian 2000: *The Little Ice Age,* Basic Books

Fagan, Brian 2008: *The Great Warming,* Bloomsbury Press

Humlum, Ole 2023: www.climate4you.com

Parmentola, John A 2023: *Celestial Mechanics and Estimating the Termination of the Holocene Warm Period,* Science of Climate Change, https://doi.org/10.53234/SCC202301/11

Petit, J. R. (and 18 others) 1999: *Climate and atmospheric history of the past 420 000 years from the Vostok ice core*, Antarctica. Nature 399, 429–436.

Lamb, Hubert 1977: *Climate Present, Past and Future, Vol 1 and Vol 2,* Routledge

Monnin, E., Indermuhle, A., Dallenbach, A., Fluckiger, J., Stauffer, B., Stocker, T. F., Raynaud, D. & Barnola, J. M. 2001: *Atmospheric CO_2 concentrations over the last glacial termination.* Science 291, 112–114.

Montford, A. W. 2010: *The Hockey Stick Illusion*, Stacey International, ISBN: 978 1 906768355

Schaller, Nahtalie 2009: *Climate effects of the Krakatoa eruption,* ETH Zurich 2009

Yndestad, Harald 2022: *Jovian Planets and Lunar nodal Cycles in the Earth's Climate Variability,* Frontiers in Astronomy and Space Sciences, May 10, https://doi.org/10.3389/fspas.2022.839794

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
janesol@online.no

Vol. 3.4 (2023)

pp. 402-407

Weaker Gulf Stream and Weather Extremes

Forced by the Planets

Jan-Erik Solheim

Independent Scientist, Bærum, Norway

Abstract

During the summer of 2023 media announced that the Gulf Stream should disappear already in 2025. A colder climate was expected in Northern Europe. This was based on a paper by two Danish researchers who had discovered that the sea surface temperature south of Greenland did not increase as on the rest of the globe. Cooling is also observed at the opening of the Barents Sea south of Svalbard. There the column temperature of the sea has decreased one degree since its peak in 2006, and the salinity has decreased. This means that less warm saltwater is entering the Barents Sea, and the outflow along the east cost of Greenland is cooling. We interpreted this as a sign of weakening of the Northern Branch (NB) of the Gulf Stream (GS). This may evolve into a Gulf Stream Beat (GSB), where heat is diverted from the NB to the southern branch (SB) of the GS. A GSB takes place during deep and prolonged minima of solar activity. Such minima occur in periods when the Jovian planets force the Sun to move in a chaotic orbit around the solar system barycenter. A deep solar minimum is expected during this century, but our analysis of the minimum position of the ice edge in the Barents Sea indicates that the ice edge will not move as far south as in previous complete GSBs. During the chaotic solar orbit periods the Jovian planets experience double (2x2) and triple conjunctions. During these conjunctions there is historical evidence of extreme rain and flooding. A double conjunction in 2024 may explain the flooding experienced in Europe, Asia and North Africa in 2023.

Keywords: Gulf Stream Weakening; Earth rotation and Gulf Stream beat; Planets forcing Sun and climate; Jovian planets conjunction and flooding.

Submitted 2023-10-14, Accepted 2023-10-27. https://doi.org/10.53234/scc202310/18

1. Introduction

In the summer of 2023, we could read scary news: *The Gulf Stream should disappear already in 2025*, according to an article by two Danish scientists. The reason was increasing greenhouse gases in the atmosphere. This was based on an article in Nature Communication by Peter and Susanne Ditlevsen. with the title *Warning of a forthcoming collapse of the Atlantic meridional overturning circulation* (AMOC) (Ditlevsen & Ditlevsen 2023).

They had analyzed observations of sea surface temperature in an area south of Iceland and Greenland (Danskestredet) and found that this area did not warm as much as the rest of the surface of the Earth. They interpreted this as a weakening of the North Atlantic Circulation. They did not write that it should happen in 2025, but sometime between 2025 and 2090, most likely around 2055. They also wrote that this was different from what IPCC had concluded based on the CMIP models, which indicated that overturning was not likely this century. Ditlevsens claimed that observations showed signals (fingerprints) of a collapse during the last part of this century.

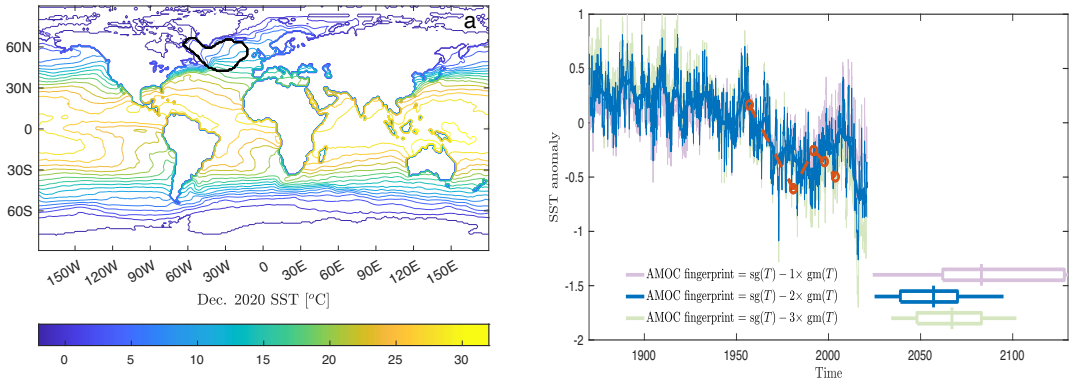


Figure 1: The left panel shows the Sea Surface Temperatures, and the black line defines the area where the SST index is decreasing as shown in the right panel. When the index reaches -1.5 the overturning circulation may stop, and this is indicated in the right panel with fingerprints for collapse marked around 2055.

2. The Gulf Stream Beat

The report of a forthcoming collapse of AMOC, is in line with a talk presented by the late paleontologist Nils-Axel (Niklas) Mörner at the previous Nordic climate conference in Oslo in October 2019. The talk was titled *The Gulf Stream beat* and Mörner showed how the strength of the Gulf Stream changed between a strong northern branch (NB) and a strong southern branch (SB) (Mörner 2022). His theory was *that the ocean circulation is controlled by the planetary beat of the Sun. The ocean circulation can be simplified in 8 dominant systems which are supersensitive to changes in the Earth's rate of rotation in a feedback coupling and interchange of angular momentum. The most dominant (ocean circulation) system is the equatorial system which moves from East to West, opposite Earth's rotation. If Earth's rotation changes - this has an immediate response on the current system.*

When the Earth rotates slower, the day gets longer. We have defined a day of 86 400 seconds. If the rotation of the Earth slows, we must add leap seconds, to be sure the clock-midnight comes at the true Earth-midnight. The Earth slowed its rotation from 1870 to 1910, then it increased until 1940 and slowed again until 1975. Now the rotation is slowly increasing. Figure 2 shows that the day was 3 milliseconds too long in 1975. This is reduced to zero from about 2020, and if this increase in rotation speed continues, we may have to subtract leap seconds instead of adding.

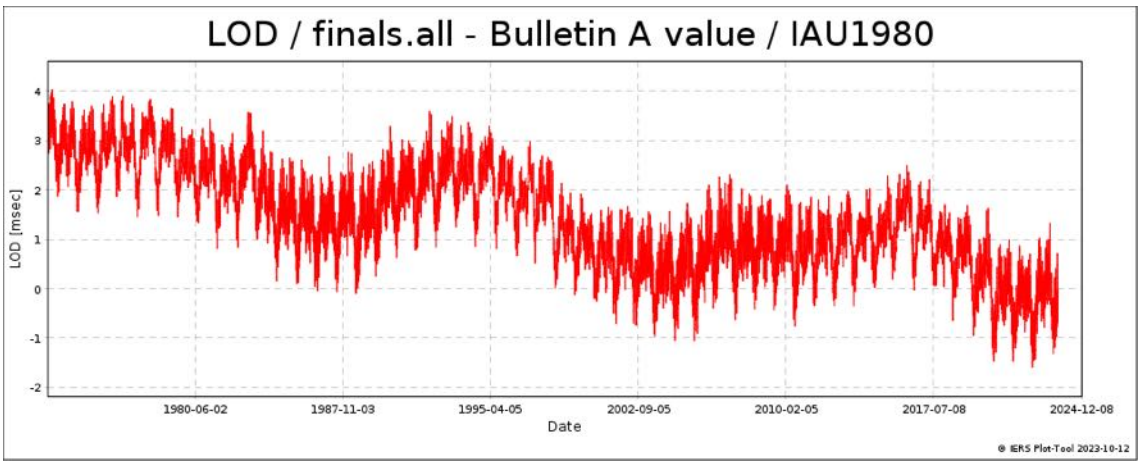


Figure 2: Length of Day (LOD) variations 1973-2023.
(https://datacenter.iers.org/singlePlot.php?plotname=FinalsAllIAU1980-LOD-BULA&id=7)

According to Mörner (2010) a slower rotation will make the Northern Branch of the Gulf stream stronger. More heat will be transported North and more Arctic ice will melt. This is observed in the position of the late August ice edge in the Barents Sea, which has moved slowly north since maximum ice around 1895. This was reported at the previous conference (Solheim 2022). Analysis of the ice edge position for 440 years, also reported at the 2019 climate conference (Solheim 2022 Figure 3) showed periodic variations, all related to planetary periods (Solheim et al. 2021). The periods found in the Ice edge variations were 3,3/2, 4/5 of the Jose Period of 178.8 years - a period where the position of the four giant (Jovian) planets repeats. In addition, we found the period of Uranus and two periods related to Jupiter and Saturn. In the same conference professor Harald Yndestad reported that the sea temperature in the Barents Sea and the Barents ecosystem was forced by the lunar nodal period (Yndestad 2022).

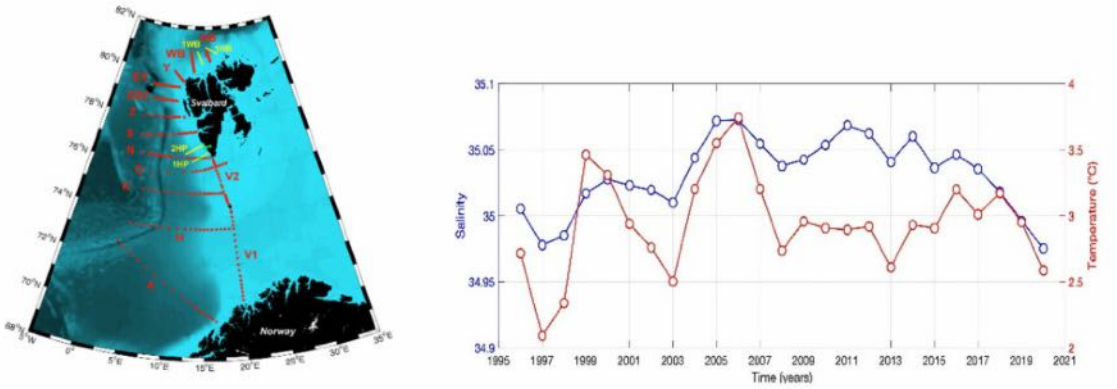


Figure 3. The map at the left shows the route of a research ship which each year in August has sampled the sea at various latitudinal stretches since 1995. The right panel shows the temperature in a column from the surface to the bottom of the sea at 76ºN, just south of the Svalbard islands. (Svalbardposten 2023, Aug)

Since the Earth now is speeding up, we can expect less heat transported in the Northern Branch of the Gulf Stream. That is what Ditlevsen & Ditlevsen (2023) have observed shown in Figure 1. This is confirmed in Figure 3, which show results of yearly sampling along latitude 76ºN just south of Svalbard. The temperature in the water column was about 3.5 ºC in 2006, but reduced to 2.5 ºC in 2021. In addition, the salinity (blue graph) is reduced. This means that there is a reduction of warm saltwater flowing into the Barents Sea since the maximum in 2006. This supports the observation of cooling in the outflow from the Barents Sea as observed by Ditlevsen & Ditlevsen (2023).

Our conclusion is that cooling of the GS in the NB has started. This is due to a faster rotating Earth due to reduced solar wind as explained in the next sections. Our conclusion differs from Ditlevsen & Ditlevsen (2023), who blame CO_2 emissions for the reduced AMOC.

3. GSB and solar activity since 1400

Figure 4 shows periods with high solar activity and strong NB, which leads to higher temperatures in NW Europe about 1570, 1730, 1780, 1940 and 1995, compared with NB weak during the Spörer minimum 1390-1550, the Maunder Minimum 1640.1720, Dalton Minimum 1790-1830 and expected next minimum around 2050 (Mörner 2010).

4. Planets and solar activity

The four Jovian planets have most of the mass in the solar system, except for the Sun. Because of their variable distance from the Sun, they force the Sun to move in a very complicated orbit around the solar system mass center, also called the barycenter. The planets move according to the Kepler laws: slow when they are far from the Sun and fast when they are at perihelium. This means that

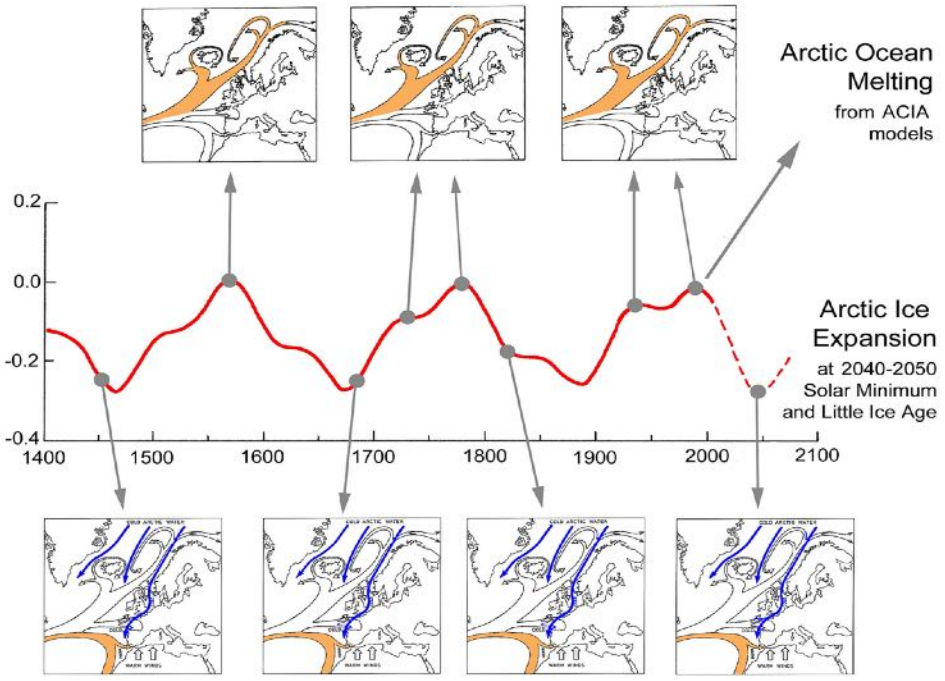


Figure 4: The Gulf Stream beat between a warm NB when solar activity (the red curve) is high and a cold NB when the solar activity is low. (Mörner 2010-fig 14)

they are near perihelium at the same time and in the same direction from the Sun and they will force the Sun to move close to the barycenter with a rapidly changing orbital speed. This will create shocks in the solar interior, increased nuclear burning and increased solar activity (Scafetta 2012).

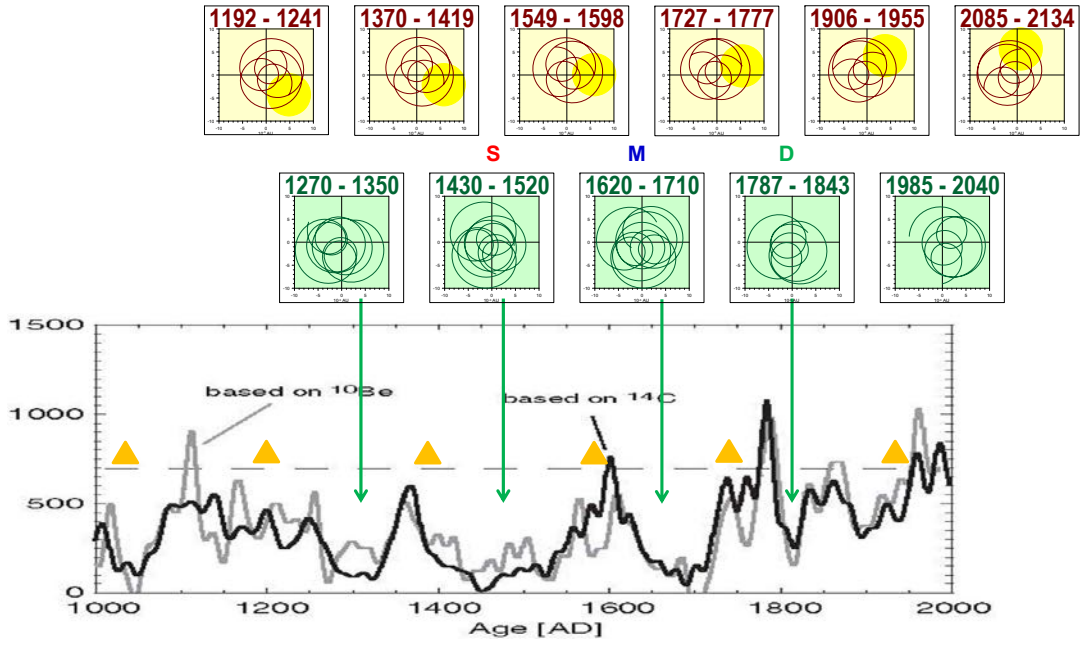


Figure 5: The solar orbit is divided into two basic types, the one ordered (trefoils - yellow) and one disordered (chaotic - green). The Sun is returning to the trefoil orbit every 178.7 year (The Jose period). The Sun moves in an orbit that is 4.3 solar radii. The black graph below is solar activity determined from ^{14}C and ^{10}Be. Long term maxima tend to coincide with the trefoil intervals (yellow triangles marking their centre). Grand (long) minima coincide with disordered solar obits (green) (Charvátová & Hejeda 2014)

Ivanka Charvátová has analyzed the orbits of the sun around the solar system barycenter and

classified some orbits to be orderly with a trefoil pattern in periods of 50 about year length. They are shown as the yellow trefoil patterns in Figure 5. During all these periods there are solar maxima marked with yellow triangles in the lower graph, which shows solar activity based on cosmic rays. Increased activity gives better magnetic shielding and less cosmic rays. In periods with disorderly patterns, we find the Spörer (S), the Maunder (M) and Dalton (D) solar minima. The last disorderly period started in 1985 and will last until 2040. It is expected that this will lead to another deep solar minimum starting before 2040. The trefoil intervals are about 50 years long, and the Sun always returns to the trefoil pattern after 178.7 years on average, which is the Jose period (Charvátová & Hejeda 2014).

The average period of a loop is 19.82 years, which is the Jupiter/Saturn synodic period - the time between when they meet in the sky. The Sun returns to the trefoil orbits after 9 cycles of Jupiter-Saturn conjunctions (the Jose period)

4. Planetary conjunctions during disordered states

During the disordered states there are double or triple conjunctions between the 4 large planets. Figure 6 shows the large planets in October 2023 on their way to a double conjunction in April 2024. Jupiter will then be in near conjunction with Uranus and Saturn with Neptune.

Figure 6: The large planets in October 2023.They move counterclockwise with longer periods away from the Sun.

Examination of historical records show that during such double conjunctions there are periods of extreme rain, flooding of rivers, earthquakes and volcanic eruptions, within 2-3 years of the closest conjunctions. It may be that the floods in Europe, North Africa, and Asia in 2023 are forced by the planetary conjunctions, and that we may expect more extreme weather in the next 2-3 years. Another doble conduction takes place in 2035, but from then on, the planets will cause little havoc until the end of the next orderly period as shown in Figure 5.

H. Hüne (2011) has analyzed historical records and shows that floods in German rivers are correlated with double and triple conjunctions of the great planets. Triple conjunctions took place in 1995 and 2010. and we have double conjunctions in 1984, 2024 and 2035. They repeat with the Jose Period of 178.7 year.

6. Discussion and conclusion

The Jovian planets play an important role in forcing the climate. Their forcing on the solar orbit modulates the solar magnetic field and the solar wind which interact with the Earth's magnetic field and rotation, which forces changes in the Gulf Stream and the climate in North Europe. Since the orbits of the Jovian planets can be predicted with high precision, we can predict with some confidence what the forcing on the sun and the Ice cover in the Barents Sea will be in the future. Our conclusion is that the ice cover in the Barents Sea will increase, but not as much as seen during previous GSBs. We can therefore not support the Detlevsen & Detlevsen (2023) conclusion of an AMOC breakdown this century. Planetary conjunctions seem to be related to extreme rain and flooding as experienced in 2023.

Guest-Editor: Stein Storlie Bergsmark; Reviewers: anonymous.

References

Charvátová I & Hejeda P 2014, *Responses of the basic cycles of 178,7 and 2402 yr in solar-terrestrial phenomena during the Holocene*, Pattern Recogn. Phys.,2, 21-26. http://doi.org/10.5194/prp-2-21-2014j

Ditlevsen P & Ditlevsen S 2023, *Warning of a forthcoming collapse of the Atlantic meridional overturning circulation*, Nature Communications,14:4254. https://doi.org/10.1038/s41467-023-39810-w

Hüne H 2011, *Korrelierungen von Kaltzeiten mit den einseitigen Stellungen der vier Groß-Planeten über 21 Jahrhunderte*, in AAS-Bestätigung 26.KW 2011, Abkühlung bis nach 2041

Mörner N-A 2010, *Solar Minima, Earth's rotation and Little Ice ages in the past and in the future The North-European case*, Global and Planetary Change 72, 282-293. http://dx.doi.org/10.1016/j.gloplacha.2010.01.004

Mörner N-A 2022, *The Gulf Stream Beat,* Science of Climate Change, Vol. 2.1, 48-53. https://doi.org/10.53234/scc202203/14

Scafetta N 2012, *Does the Sun work as a nuclear fusion amplifier of planetary tidal forcint? A Proposal for a physical mechanism based on the mass-luminosity relation,* Journal of Atmospheric and Solar-Terrestrial Physics, 81-82, 27-40. https://dx.doi.org/10.1016/j.jastp.2012.04.002

Solheim J-E, Falk-Pedersen, S, Humlum, O, and Mörner, N-A 2021, *Changes in Barents Sea Ice Edge Positions in the Last 442 Years. Part 2: Sun, Moon and Planet*s, International Journal of Astronomy and Astrophysics, 11, 279-341. https://doi.org/10.4236/ijaa.2021.112015

Solheim J-E 2022, *The Barents Sea Edge During the Last Centuries*, Science of Climate Change, Vol 2.1, 69-73. https://doi.org/10.53234/scc202203/18

Yndestad H 2022, *Lunar-driven Control of Climate and Barents Sea Ecosystems*, Science of Climate Change, Vol 2.1, 74-77. https://doi.org/10.53234/scc202203/19

.

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
haraldyn-
destad@mac.com

Vol. 3.4 (2023)

p. 408

Little Ice Age 1330 to 2150 A.D.

Harald Yndestad

Prof. em. NTNU

Keywords: Wavelet analysis; TSI data; Little ice age; Solar minimum; Planet forcing

Submitted 2023-10-14, Accepted 2023-10-18. https://doi.org/10.53234/scc202310/20

Summary of Conference Speech

A wavelet spectrum analysis of TSI data series from 1000 AD and 1700A D computed a Maunder-Dalton type next deep sola minimum at the year 2049 (Yndestad and Solheim 2017). New investigations have revealed that The Little Age is controlled by interference between TSI variations from the sun, solar forced accumulation of heat in oceans and lunar forced distribution of heat in oceans (Yndesstad 2022). Coincidences between the planets Saturn, Uranus, and Neptune, are controlling TSI periods up to 4450 years. Lunar forced climate has periods up to 445 years.

During the last 4450-year period, there has been two Little Ice ages. The first has a coincidence to the end of Bronze Age civilizations close to 1200 BC. The last Little Ice Age covers a total period eight solar minima from 1330 to 2150 A.D. The upcoming solar minima is a computed Spörer-type minimum in 2050 and a deep minimum in 2211. Analysis of Solar forced accumulation of heat in oceans has resulted in a further deep temperature minimum in the year 2071 AD, the deepest computed climate minimum since 1200 BC.

References:

Yndestad, H., & Solheim, J. 2017. *The influence of solar system oscillation on the variability of the total solar irradiance.* New Astronomy, 51, 135-152. doi.org/10.1016/j.newast.2016.08.020. https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2473902

Yndestad H. 2022. *Jovian Planets and Lunar Nodal Cycles in the Earth's Climate Variability* Frontiers in Astronomy and Space Sciences. May 10. 2022. https://doi.org/10.3389/fspas.2022.839794

OPEN ACCESS

IR Absorption and Back Radiation from CO_2 in a Simulated Earth/Atmosphere Experiment

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway

ISSN: 2703-9072

Correspondence to:
borgar.torre.olsen@gmail.com

Vol. 3.4 (2023)
pp. 409-415

Thorstein O. Seim[1,2] and Borgar T. Olsen[3,4,5]

Former affiliations, now retired:

[1]Amanuensis at the Institute of Physics, University of Oslo

[2]Senior Research Scientist at Nycomed Pharma, Oslo, Norway.

[3]Research assistant at the Institute of Physics, University of Oslo

[4]Research Fellow at Max-Planck-Institute for Physiological and Clinical Research, Munich, Germany.

[5]Research Scientist at Telenor (Televerkets) Research Department, Fornebu, Norway.

Abstract

The Greenhouse Effect was simulated in a laboratory setup, consisting of a heated ground area and two chambers, one filled with air and one filled with air or CO_2. While heating the gas, the temperature and IR radiation in both chambers were measured. IR radiation was produced by warming a metal plate, painted with heat-resistant, matt black paint, mounted on the rear wall. Reduced IR radiation through the front window was observed when the air in the foremost chamber was exchanged with CO_2. In the rear chamber, we observed increased IR radiation due to backscatter from the front chamber. Based on Stefan Boltzmann's law, this should noticeably increase the temperature of the air in the rear chamber, but no such increase was found. A thermopile, made to increase the sensitivity and accuracy of the temperature measurements, showed that the temperature with CO_2 increased slightly, just within the uncertainty range.

Keywords: Greenhouse effect; radiative forcing; CO_2; Backscatter; IR radiation

Submitted 2023-09-20, Accepted 2023-12-04. https://doi.org/10.53234/scc202310/21

1. Introduction

In 1859 John Tyndall [1] published his famous experiments, showing how infrared (IR) radiation was absorbed in "greenhouse" gases like water vapor, carbon dioxide (CO_2) and methane (CH_4), laying the foundation for the theory that increased CO_2 in the air leads to a warmer climate. This Greenhouse effect, illustrated in Figure 1, can be described as follows.

1) The atmosphere is transparent to short-wave solar radiation that warms the surface of the Earth.

2) The heated soil and water emit long-wave radiation (IR radiation).
3) The IR radiation is captured by greenhouse gases and then sent out (emitted) in all directions.
4) Part of the emitted radiation (back radiation or backscatter) from greenhouse gases returns to the Earth's surface and contributes to increased surface temperature; the rest is leaving the atmosphere. Humans' increased emissions of greenhouse gases lead to an enhanced Greenhouse Effect.

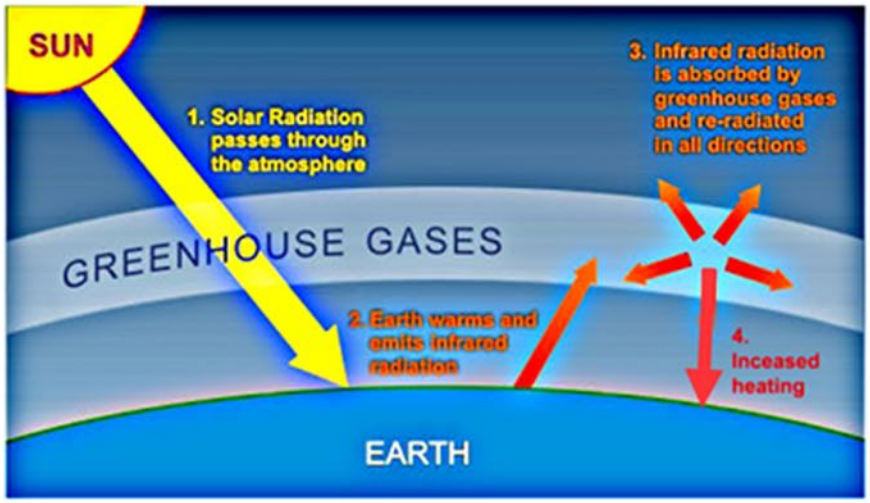


***Figure 1**. Illustration of the Greenhouse Effect due to greenhouse gases, mainly CO_2 and water vapor [2].*

This explanation is used by IPCC (the Intergovernmental Panel on Climate Change) and others [3] [4] [5]. The IR backscatter from the greenhouse gases in the atmosphere has been identified by several types of measurements, both by satellites and at ground level [6] [7] [8] [9]. However, no direct measurement was made of the resulting heating of the ground. IPCC admits that the amount of heating is still discussed and that the enhanced greenhouse effect from CO_2 has only been confirmed by empirical evidence [10]. To our knowledge, no carefully performed experimental measurement of the temperature effect of CO_2 absorption of IR and the resulting backscatter on the IR radiating surface has been presented in the literature.

The illustration in Figure 1 gave us the idea of how to perform an experiment to study the Greenhouse Effect. By separating the air above the ground from the CO_2 greenhouse gas we could study how the air was warmed from an increasing amount of IR backscatter. This could be done as indicated in Figure 2.

In this simulated atmosphere/ground situation the ground, heated by the sun, is replaced by a warm black painted metal plate. The atmosphere above the "ground" is divided into two chambers, one above the "ground", filled with air (the rear chamber in the experiment), and one on the top that can contain air or CO_2 (the front chamber). The heated metal plate emits IR-radiation that either leaves the container through the window on top, or is partly absorbed when CO_2 is filled in the top compartment. The absorbed IR radiation is emitted in all directions, including backscatter radiation that is returned to the air-filled bottom chamber. A thin window of LDPE (low-density polyethylene) plastic foil, which transmits nearly all of the IR radiation was applied between the chambers and at the window out of the box.

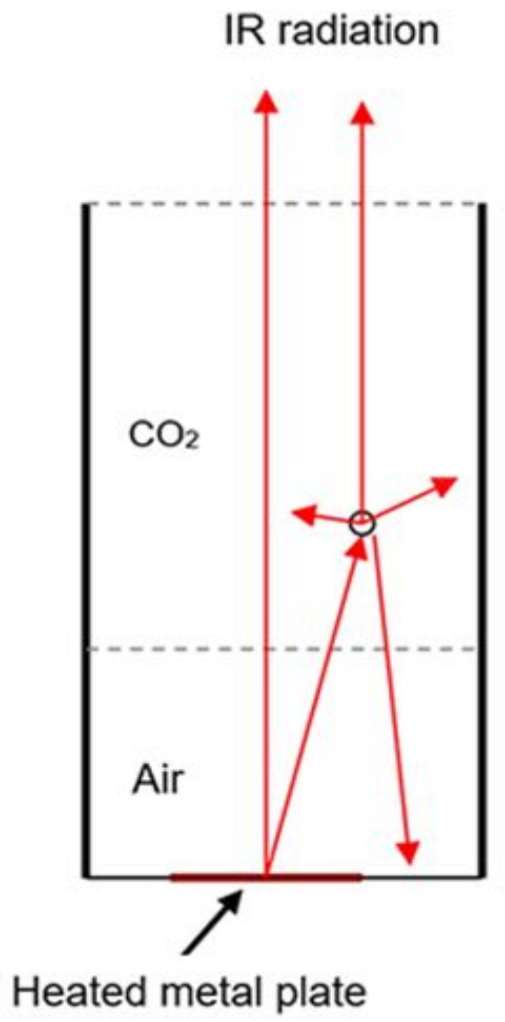


Figure 2. Simulation of the greenhouse effect for use in a laboratory experiment, top view. The front chamber on top, the rear chamber at the bottom.

2. The experiment

2.1. Experimental Setup

For practical reasons the setup, shown in Figure 2, was placed horizontally, not vertically. Figure 3 shows the experimental arrangement. The top and the bottom chamber in Figure 2 represent the front and rear chamber in Figure 3.

The one-meter-long box, with a volume of 150 liters, is made of insulating 5 cm thick Styrofoam plates. The two chambers are separated by a thin LDPE plastic film that transmits more than 90 % of visual light and IR radiation. The window in the front of the foremost chamber was also made of LDPE. The Styrofoam walls of the chambers (except the rear wall) are covered by thin Al-foil. The Al-foil reflects most of the IR radiation and thereby reduces the heat loss through the walls. The length of the rear and front chamber is 30 and 70 cm, respectively. IR radiation was produced by warming a metal plate, painted with heat-resistant, mat black paint, and mounted on the rear wall of the rear chamber. The rear wall, with an area of 0.15 m^2, is made from Styrofoam.

The area of the metal plate is 0.036 m^2. An increase in backscatter IR intensity with CO_2 in the front chamber should then give us measurable changes in temperature of the rear wall and in the

air in the rear chamber.

A thermometer, measuring the gas temperature, was placed close to the roof in each chamber and screened from radiation from the metal plate. (The temperature sensor is encapsulated in polished metal that reflects IR radiation).

Figure 3 shows the experimental setup. A black-painted Al-plate (or a black-painted Al-foil) is heated by a 500 W halogen lamp. The distance to the lamp was adjusted to warm the plate to about 100 ˚C. An IR radiation detector is located in front of the window on the box (IR1). Another detector is placed behind the box (IR2) and measures IR backscatter radiation via a 6 × 6 cm window in the rear wall, covered with LDPE film. The IR2 detector is shielded from the heating lamp with a wall of Styrofoam (not shown in the figure). In order to reduce the heating by the lamp of the outside rear Styrofoam wall (surrounding the black metal plate), the wall was covered with reflecting Al-foil. Small holes were made in the top of the two chambers to obtain constant pressure during heating.

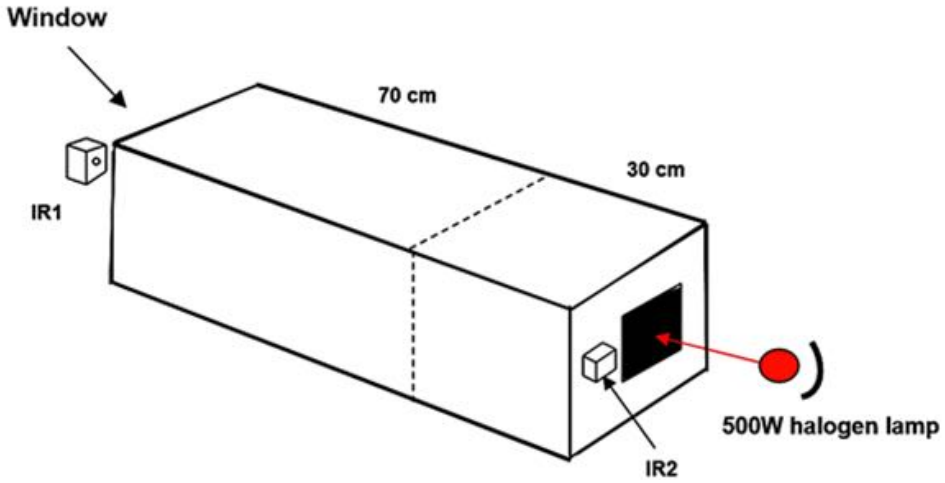


Figure 3. The experimental setup.

The one-meter-long box, with a volume of 150 liters, is made of insulating 5 cm thick Styrofoam plates. The Styrofoam walls of the chambers (except the rear wall) are covered by thin Al-foil. The Al-foil reflects most of the IR radiation and thereby reduces the heat loss through the walls. The rear wall, with an area of 0.15 m^2, is made from Styrofoam. The area of the metal plate is 0.036 m^2. An increase in back radiation IR intensity with CO_2 in the front chamber should then give us measurable changes in temperature of the rear wall and in the air in the rear chamber.

A thermometer, measuring the gas temperature, was placed close to the roof in each chamber and screened from radiation from the metal plate. (The temperature sensor is encapsulated in polished metal that reflects IR radiation).

3. Measurements and results

3.1 The temperature curves

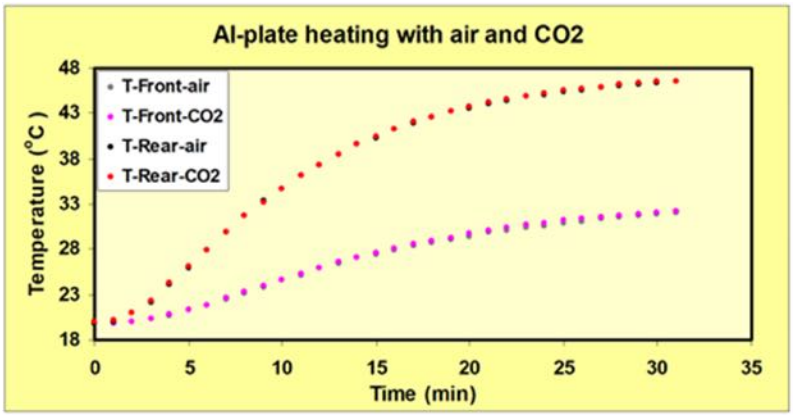


***Figure 4**. The heating curves with air and with near 100 % CO_2. The rear chamber is filled with air, the front chamber with air or CO_2.*

The heating curves for the two chambers are nearly identical, with the front chamber filled with close to 100 % CO_2 or air (with ca. 400 ppm CO_2). This is opposed to the current greenhouse theory which assumes back radiation heating of the rear chamber. Average values from five measurement series are shown.

3.2 The IR curves

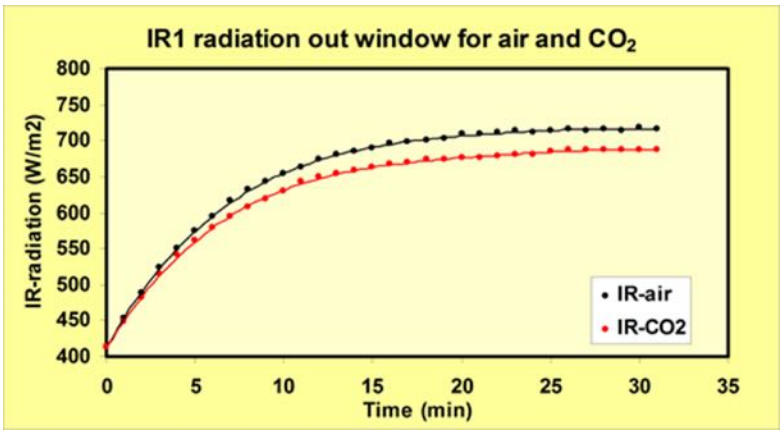


***Figure 5**. Absorption of IR radiation. with CO_2, Detector range: 2.5 - 20 µm. The same situation as in Figure 4, two experiments, the rear chamber is filled with air, the front chamber with air or CO_2.*

This result contradicts the current greenhouse theory, which assumes a constant IR out independent of the concentration of the CO_2.

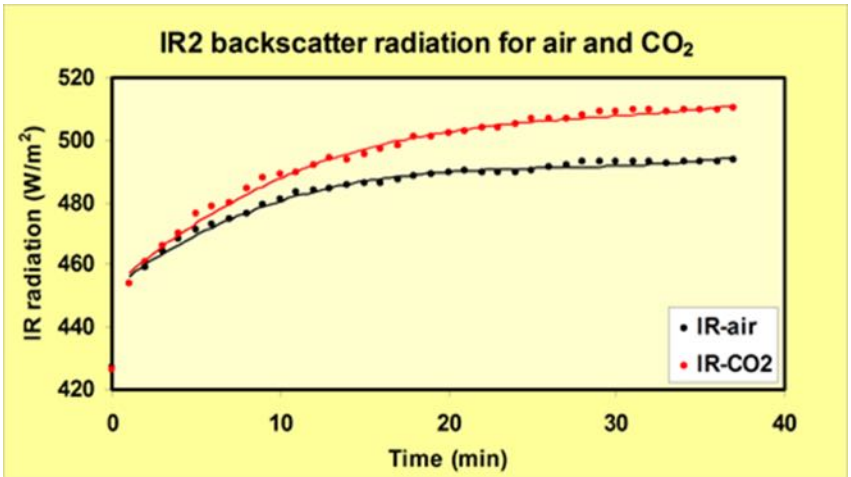


***Figure 6**. Backscatter change with CO_2, from the rear chamber, Detector range: 2.5 - 20 µm.*

Figure 6 shows two experiments, (i) air in both chambers and (ii) CO_2 in the front chamber and air in the rear chamber. The increase in back radiation power density with CO_2 in the front chamber and air in the rear chamber should give a noticeable temperature increase in the rear chamber. No such increase in temperature was found, see Figure 4.

4. Conclusion

The results of our study show near-identical heating curves when we change from air to 100 % CO_2 or to Argon gas, with low CO_2 concentration in the front chamber. We observe reduced IR radiation out of the front chamber with CO_2 gas, which contradicts the Climate models. (We simply measure the absorption of IR in the CO_2 gas). We also observe an increased radiation density into the rear chamber due to the back radiation from CO_2. The increase in observed back radiation should give us a measurable temperature increase in the rear chamber. Such increase is not observed in the experiment.

The heating, due to IR backscatter from CO_2, is almost nothing and much less than what is assumed from the Stefan Boltzmann law.

The near-identical heating curves for all the three gases indicate that the idea of back radiation as an important heating factor should be reconsidered.

Funding
No funding was received.

Acknowledgements

We thank the Norwegian Climate Realists for publication of this paper.

References

1. Tyndall, J. (1859) On the Transmission of Heat of Different Qualities through Gases of Different Kinds. Proceedings of the Royal Institution, 3, 155-158.
2. Figure 1 Is Modified from Figure in https://skepticalscience.com/empirical-evidence-for-co2-enhanced-greenhouse-effect-intermediate.htm
3. Houghton, J.T., Meira Filho, L.G., Griggs, D.J. and Maskell, K. (1997) An Introduction to Simple Climate Models Used in the IPCC Second Assessment Report. IPCC Technical Paper II—February IPCC, Geneva, 51. https://zlibrary-asia.se/book/1063708/8682e3?dsource=recommend

4. Benestad, R.E. (2006) Solar Activity and Earth's Climate. Springer, Berlin. https://link.springer.com/book/10.1007/3-540-30621-8
5. Pierrehumbert, R.T. (2011) Infrared Radiation and Planetary Temperature. Physics Today, 64, 33-38.https://geosci.uchicago.edu/~rtp1/papers/PhysTodayRT2011.pdf, https://doi.org/10.1063/1.3541943
6. Harde, H. (2017) Radiation Transfer Calculations and Assessment of Global Warming by CO2. International Journal of Atmospheric Sciences, 2017, Article ID: 9251034., https://doi.org/10.1155/2017/9251034
7. Philipona, R., Dürr, B., Marty, C., Ohmura, A. and Wild, M. (2004) Radiative Forcing—Measured at Earth's Surface—Corroborate the Increasing Greenhouse Effect. Geophysical Research Letter, 31, L03202. https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2003GL018765
8. Feldman, R., et al. (2015) Observational Determination of Surface Radiative Forcing by CO2 from 2000 to 2010. Nature, 519, 339-343. http://www.nature.com, https://doi.org/10.1038/nature14240,
9. https://phys.org/news/2015-02-carbon-dioxide-greenhouse-effect.html
10. IPCC Assessment Report 4. https://www.ipcc.ch/site/assets/uploads/2018/03/ar4-wg1-chapter1.pdf

OPEN ACCESS

Klimarealistene
P.O. Box 33,
3901 Porsgrunn
Norway
ISSN: 2703-9072

Correspondence:
tege.tornvall@gmail.com

Vol. 3.4 (2023)

pp. 416-420

The Frozen Climate Views of the IPCC

An Analysis of AR6

Book Review

Tege Tornvall

Independent Analyst, Sweden

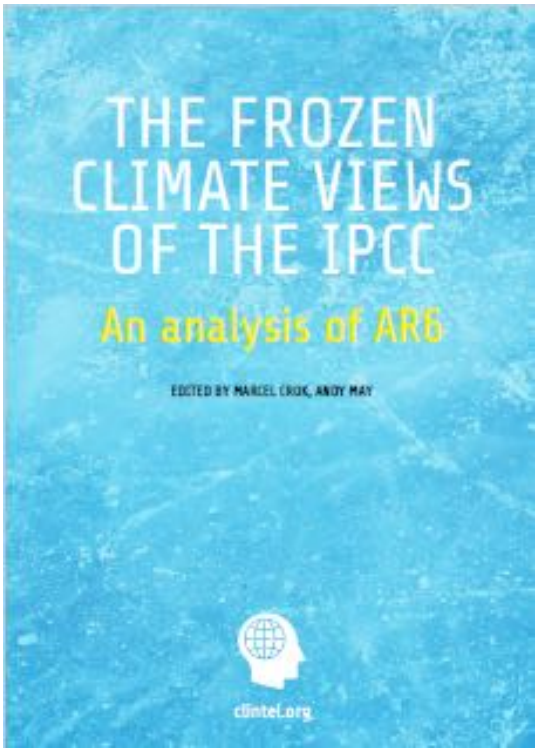
Marcel Krok and Andy May: The Frozen Views of the IPCC – An Analysis of AR6

*Published by the Clintel Foundation, 1014 BV, Amsterdam. ISBN 979-8-89074-862-*1

Submitted 2023-11-24, Accepted 2023-11-26. https://doi.org/10.53234/scc202310/28

1. Climate alarm is based on computer models

In its book ”The frozen climate views of the IPCC”, the global network Clintel (Climate Intelligence) scrutinizes the sixth report (AR6) from the UN climate panel IPCC. Editors are science writers Marcel Crok and Andy May. Contributing scientific writers are: Science writer Kip Hansen, experienced sea captain and expert on sea levels, prof. Dr. Ole Humlum, geophysicist, prof. Dr. Ross McKitrick, mathematician and economist, prof. Dr. Nicola Scafetta, solar physicist, prof. Dr. Fritz Vahrenholt, chemist and energy expert, and finally Dr. Javier Vinós, science historian.



AR6 is based on reports from the IPCC working groups 1-3. WG 1 treats the scientific foundation. WG 2 treats climate effects. WG 3 treats adaption to these effects.

Clintel's examination reveals substantial exaggerations, omitted or biased facts, missing contexts, misleading images, lack of historical background, and a clear tendency to make Man responsible for all climate changes.

Against the claim that present days should be the warmest in 120,000 years, the book points out that:

(i) 110.000 of these years were a glaciation,

(ii) The Holocene climate optimum 9 800-5 700 years ago was clearly warmer than today.

(iii) Also warmer were the bronze age, the Roman period and the Middle Ages, as shown by natural observations and historical documents.

The book points out that both glaciers and tree lines have varied for millions of years, following the natural climate changes.

An IPCC attempt to picture today as the warmest period over the previous 1000 years, is the so-called hockey stick graph by Michael Mann (Mann et al. 1999). Omitting both the medieval warm period and the cold Little Ice Age, it pictured 1000-1900 temperatures as quite even – but with a sudden rise in the 20th century.

This graph has been statistically and historically debunked, but now reappears in AR6 in a very similar form, together with the IPCC claim that all of today's warming is clearly caused by human activities - despite IPCC's own statement shortly before, that natural climate variation accounts for half of the warming.

Climate scenarios and temperature graphs are created by computer models, depending on what data and contexts they are fed with. The book repeatedly states that models are not reality and that known natural variations still prevail.

2. Self-interest behind alarms

Clintel shows how the IPCC consciously rewrites history to prove threatening warming. The driving force behind this is not its scientific working group WG1, but the WG 2 group, which studies consequences of a warmer climate and which has a self-interest in painting threats to justify its own existence.

These threats are written into IPCC's Summary for Policy Makers to justify drastic and expensive "climate politics", bribing countries in need with enormous amounts of money to make them replace coal, oil and gas (which they have) with wind and solar (which they don't have and which only generate energy when there is enough wind or sunshine).

The book criticizes how global temperatures are measured. Three institutes follow these from land, and two per satellite.

Most land measurements are from wealthy nations in the northern hemisphere, where 90 per cent of humanity lives. Remote stations have been closed, while growing cities and more human activities surround stations who once were alone, out in the green.

This gives higher recorded temperatures without any actual, adjacent warming. Despite some adjustments, a growing number of reports show that cities are warmer than their surroundings. This explains many "record temperatures", reported by uncritical media. Satellite temperatures are generally lower and less alarmistic.

Since Earth experiences life threatening Antarctic cold as well as dangerous heat in deserts, it is not very meaningful to speak of any global mean temperature.

3. Underestimating history

Temperatures can only be measured accurately with modern technology. Lacking reliable earlier data, the IPCC underestimates older temperature readings and exaggerates today's. This implies showing a threatening warming which justifies IPCC's existence.

Climate is related to the lower troposphere temperature over longer time spans. Over shorter time, it is weather, but it is still considered climate if it suits intentions. A hot summer is called climate. But a really cold winter is not cold climate but cold weather - if you want to warn of threatening global warming.

Longer time spans often mean various measurement scales. A new scale can give an impression of smaller - or larger - variations, depending on wishes and starting points.

After cooling 1850-1910 came warming 1910-1945. Then it got colder 1945-76, when media warned of a new ice age. Choice of period decides how variations can be seen - mostly natural. Despite more industrial activity, the British HadCRUT series registered slight cooling 1945-76.

Also natural are cyclical ocean currents (ENSO) across the Pacific. The warm El Niño can warm large parts of Earth, and the cooler La Niña can cool them. Right now, we have a strong El Niño with a warming weather effect.

Clintel's book shows how global mean temperatures vary with El Niño and La Niña.

It also shows how the oceans have warmed 0.08 degrees C at 100-2.000 m depth since 2002, in continuous warming since the Little Ice Age. This makes 0.4 degrees per century, hardly worrying. Alarmists forget or don't mention that this is rather a welcome recovery from the periodically chilling Little ice Age.

The AR6 misses the great mass of the oceans as the world's heat regulator with effects on clouds and precipitation. More water vapor from warmer seas gives not only rain but also snow. The book shows an even snow cover on the north hemisphere since 1972.

Global warming since the deepest Little ice age 300 years ago makes sea levels rise from expanding sea volumes and melting glaciers. But sea ices are already in water and don't raise sea levels. It all takes time with the great mass of oceans.

Antarctic and Greenland land glaciers can't melt. On their vast ice surfaces, the annual mean temperature is below minus 50 degrees in the Antarctic and minus 20-30 degrees on Greenland. The glaciers grow from snowing. Returning scientists find their camps covered with snow and ice.

Clintel states that the oceans are not one single mass of water in one single basin but divided. If there was one single basin, the sea level may rise by 3 mm per year, according to the IPCC. But coasts are not vertical but mostly sloping to make rising oceans wider rather than higher.

According to the US weather service NOAA, New York's water level rose less than 0.5 m from 1850 to 2015, steadily 3 mm per year. According to Australian CSIRO, ocean levels rose by 200 mm from 1870 to 2000, or 1.54 mm per year.

4. Little regard for the Sun

AR6 disregards solar influence on Earth's climate despite ample evidence of cyclical varying solar magnetism and cosmic radiation into the atmosphere. AR6 admits only marginal solar influence on Earth's warming, which is about one degree since 1900.

But the book shows how temperatures and solar activity have closely followed each other in England during the 20th century, and that an 11-year solar cycle is registered globally as well as on other planets in the solar system, without any human presence.

The Swedish climate historian Fredrik Ljungquist Charpentier and others show a marked covariance between solar activity and warm and cold periods during the past 2.000 years, with warmth in the Roman period, medieval times and present times as well as cold during the Wolf, Spörer, Maunder and Dalton minima of the Little Ice Age. These variations indicate one 115-year and one thousand-year cycle. The AR6 misses or neglects many cyclical and natural climate processes.

One example is the covariation between cyclic solar wind and cosmic radiation into the atmosphere, clearly shown by Danish scientists Henrik Svensmark and Eigil Friis-Christensen and others. The AR6 finds these variations too small to play a significant role, but this covariation can be found millions of years back.

Alarmists have their own vocabulary for alleged alarming global warming from human activities. One key concept is" climate sensitivity", a number which is assumed to tell us how much a doubling of the CO_2 concentration can warm the atmosphere. This is calculated in computer models, based on assumptions, and the likely range is narrowed from 1.5 – 4.5 degrees in AR5 to be between 2.5 and 4.0 degrees Celsius in AR6.

5. Models against reality

Climate models differ more and more from real observations. Still, media and opinion take model results as reality without realizing the difference. Reality always trumps models and maps.

For modelling, the IPCC uses five scenarios from 1.5 to 5 degrees global warming, allegedly caused by doubled CO_2 concentration from 420 to 840 ppm (parts per million). Even though 2.5-4 degrees are considered probable, the debate often includes 5 degrees - without any protests from the IPCC.

Still, nothing but a slow and steady temperature growth has happened in reality. A regression model based on the HadCRUT4 surface temperature series, covering the period from 1850 until today, gives a trend of only 0,005 degrees per year, which may give a temperature rise of 0,4 degrees until year 2100. A regression model over the UAH satellite temperature series from 1980 until today, gives a trend of 0,013 degrees per year, which may result in a 1 degree increase in

year 2100. This is little to worry about. Almost all climate alarms of future high temperatures come from models, as Clintel clearly shows.

Clintel shows that extreme weather is not caused by global warming but by cooling. Warming means lower temperature differences and less winds. Cooling brings higher temperature differences and more and stronger winds.

This is what we now experience. Computer models increasingly differ from reality, also shown by Clintel in clear images.

We may get more and worse extreme weather with worse effects. We are becoming more numerous, live and work too close to water and have more and more expensive houses and more possessions and equipment that can be damaged.

6. The cart before the horse

The ”climate sensitivity” tells us how much a doubling of the CO_2 concentration can warm the atmosphere. But since oceans gas out more carbon dioxide as they warm, the oceans must first be further warmed before they can gas out more.

Nobody denies that shortwave solar radiation warms Earth’s land and oceans. As oceans are warmed by the Sun they are gassing out more carbon dioxide. Warming of land and oceans is warming the atmosphere through sensible and latent heat. Not the other way round. That would be putting the cart before the horse.

To double the atmosphere’s CO_2 concentration from 420 to 840 ppm (parts per million), the oceans must be continuously warmed for a very long time. Human contributions are far from enough. No 4 to 5 degrees warming can be expected within a foreseeable time.

The Earth had an 840 ppm CO_2 concentration some 30 million years ago. From where would the heat come at that time, to warm the oceans enough to gas out so much carbon dioxide? Rather, a new Little Ice Age or even proper glaciation is likely to occur within the next 500 years (Parmentola 2023). Nothing to look forward to.

Guest-Editor: Stein Storlie Bergsmark; Reviewers:anonymous.

References

Mann ME, Bradley RS, Hughes MK 1999*, "Northern hemisphere temperatures during the past millennium: Inferences, uncertainties, and limitations", Geophysical Research Letters,* ***26*** *(6): 759–762. Bibcode:1999GeoRL..26..759M, doi:10.1029/1999GL900070*

Parmentola JA 2023, *Celestial Mechanics and Estimating the Termination of the Holocene Warm Period,* Science of Climate Change V3.1, 9-32. https://doi.org/10.53234/SCC202310/19

.