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Proceedings of the
5th Nordic Climate Conference
"Climate Science versus Politics"

Mölndal, Sweden

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Preface

This is a special issue of Science of Climate Change (SCC) which covers 5th Nordic Climate Conference held in Mölndal, Sweden, October 26 and 27, 2024. The conference with the main theme "Climate Science versus Politics" was arranged by the Association of Climate Realists in Sweden

In this Volume 4.4, the first part contains the programme, listing the speakers, the titles of the speeches including a very brief summary of the speeches as well as links to speakers' video presentations on YouTube. The second part gives extended summaries of six of the conference speeches.

The complete video presentation program can be found on https://www.youtube.com/@klimatupplysningen-co2 .

SCC has also published proceedings from other Nordic conferences. The first one was in Oslo October 18 – 19, 2019. The proceedings were published in SCC Vol 2.1 (2022). Next was the Copenhagen conference on September 14 and 15 2023, with proceedings published in SCC Vol 3.4 2023.

20. December 2024,

Hermann Harde
Chief Editor

Stein Storlie Bergsmark
Guest Editor

A digital version of this Volume can be fond here: https://doi.org/scc202412/03

Mölndal, a small town south of Gothenburg

The Scandic Mölndal Hotel

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“Climate Science versus Politics“

Conference Program

26 and 27 October 2024

Mölndal, Sweden

The conference is organized by the Association of Climate Realists in Sweden

Day one 26 October

13.00 – 13.30 Ingemar Nordin (SE) ***The role of science in politics***.

The philosophical formulation is that "Is does not imply ought" (Hume). No politics including values can be inferred from scientific facts alone. Therefore the scientific contribution to politics is only critical. However, scientific statements are often used as the sole basis for ideology and politics. Climate politics is a typical example.
https://youtu.be/ujnB9ZqFqzs

13.30 – 14.15 Eva Marie Brekkestö (NO) ***The rise and fall of civilizations in a climate perspective.***

During the last 6,000 years, various civilizations have arisen and disappeared around the world, under the clear influence of climatic variations. Abrupt changes in the climatic conditions have often triggered. migrations and the development of new cultures. The prevailing picture, however, is that civilizations have flourished during the warm periods and declined when the climate has cooled.
https://youtu.be/ZgfTsg2dghY

14.15 – 15.00 Sören Hansen (DK) ***The Danish Energy Transition.***

Denmark has set ambitious goals for CO_2-emission reductions and wishes to play the role of front-runner in the World. However, in reality the results are not so impressive and the transition is running into serious difficulties.
https://youtu.be/zdX62zP3Sic

15.00 – 15.30 Coffee break

15.00 -16.15 Benny Peiser (UK) ***Political realism: A pragmatic alternative to Net Zero dogmatism***

As the rising cost of Europe's unilateral climate and renewable energy policies are hitting households and businesses ever harder, most countries' social fabric and economic competitiveness faces severe risks. Across Europe, policy makers are beginning to consider how to slow down, revise and roll back some of the damaging and most unpopular Net Zero plans. In this talk, I will consider what alternative policy options governments have in order to ensure a level playing field and that climate policies are economically, socially and politically sustainable in the long run.
https://youtu.be/g9nRmRpzfao

16.15 – 17.00 Karl Iver Dahl-Madsen (DK) ***Climate Change and Global Food Production: A Minimal Impact Perspective.***

This presentation explores the relationship between climate change and global food production, arguing that the influence of climate change on food production is minimal compared to other factors. The primary driver of food production is the increasing demand for food as populations grow and wealth increases. A secondary yet crucial factor is the ongoing technological advancement in the agricultural industry, which continually enhances yield per unit of land. Climate change may marginally affect production costs, but its impact is likely positive due to increased warmth, rainfall, and higher CO2 levels, which boost agricultural productivity. The global food supply faces no significant risk from climate change, with many more critical factors influencing food production.
https://youtu.be/DvUeViLbK4g

Day two 27 October

09-00 – 09.45 Jan Erik Solheim (NO) ***The Journal of Science of Climate change (SCC) – the three first years.***

SCC was initiated by the Climate Realists in Norway in the summer of 2020. The first issue appeared in August 2021 and has now existed in 3 years and produced 11 issues. The objective of this journal was and is, to publish – different to many other journals – also peer reviewed scientific contributions, which contradict the often very unilateral climate hypotheses of the IPCC and thus, to open the view to alternative interpretations of climate change. I will tell about the ideas behind the journal, the startup difficulties, and how we managed to publish more than 100 papers, consisting of origiginal articles, review papers, essays, conference abstracts, obituaries, comments and discussions. I will also mention some important papers from the 3 first years, related to the scientific method, properties of the Earth's atmosphere, the carbon cycle, the dynamic Earth and the greening of our planet thanks to increasing CO2. Our horizon is full international recognition in 10 years.
https://youtu.be/bH3ZOa7oDPU

09.45 – 10.30 Olav Martin Kvalheim (NO) ***A strategy for winning the climate war***

The only way to rip the Climate suicide cult for their destructive power is to develop a strategy to influence the voters in elections. And since most voters do not have a strong understanding of scientific models and discussions, we have to turn our focus to the destructive outcome of the climate policy inferred by the Climate church and get the message out to the people. This will be the focus of this talk.
https://youtu.be/xhaqZ_-waWo

10.30 – 11.00 Coffee break

11.00 – 11.45 Anders Bolling (SE) ***Alarmism bias in the media.***

The media constantly gets the climate science facts wrong, and almost always leans towards alarm. Why? A few clues:

- Mainstream media is a part of the establishment
- There is a journalistic addiction to drama (negativity bias)
- Climate is complex, and citing secondary sources is easier than digging into papers
- Many journalists feel that questioning the alarmists is morally wrong

https://youtu.be/CRNrBefE4v4

11.45 – 12.45 Lunch

12.45 – 13.30 Geir Aaslid (NO) ***Climate Science versus Politics***

"Climate Science versus Politics" takes a closer look at the IPCC science, from the excellent First Assessment Report in 1990 and downhill to the latest Sixth Report with it's claim that we've had no natural climate change since the pre-industrial era. We take a closer look at the 2010 IAC critical evaluation of IPCC, as well as some of the pseudo-science supporting the climate crisis narrative.
https://youtu.be/x2JGn52QcO4

13.30 – 14.15 Marcel Crok (NL) ***Do we have to win the climate debate in court?***

In The Netherlands, the birthplace of activist climate litigation, a novel counter-response has emerged. Clintel is leading the efforts. Clintel's director, Marcel Crok will explain what is happening.
After the Dutch Supreme Court's ruling in the famous Urgenda climate case, climate litigation mushroomed and currently more than 2000 climate lawsuits are pending worldwide. Crok will discuss the climate movement's strategy in mitigation cases and expose the weaknesses of the arguments most commonly used in these climate lawsuits.

14.15 – 15.00. Magnus Cederlöf (SE) ***What we can learn from Uppsala long temperature record.***

This session will cover how bad placements of measurement stations in Uppsala creates a warming trend which does not represent the surrounding countryside. When instead using a better placed station, all (or almost all) warming can be explained by natural factors.
https://youtu.be/1EzNIvZpskI

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The Role of Science in Climate Politics

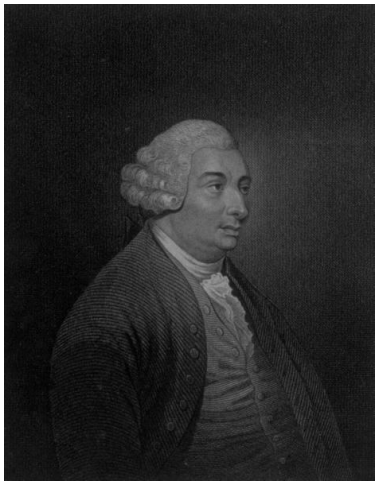
Ingemar Nordin

Emeritus professor of philosophy, Sweden

Keywords: Science; climate politics; philosophy; Brundtland; Hume; Kant Submitted 2024-11-01, Accepted 2024-12-20. https://doi.org/10.53234/scc202412/35

1. Introduction

I gave a short introduction to the climate conference in Mölndal 26-27 October 2024. The theme of the conference was “Science and Politics” so I picked up a couple of basic philosophical words of wisdom for this occasion.



David Hume (Wikipedia)

The first sentence comes from the 18th century philosopher David Hume with the following logic statement:

$$\neg (\text{Is} \rightarrow \text{Ought})^{1}$$

Or in words: "it is not the case that is-statements imply ought-statements", i.e. it is not possible to deduce what we ought to do from a description of what is the case. After all, the task of science is to describe how different things in the world look and function. But it says nothing about how we ought to act. In order to arrive at how we should act, we have to insert an ethical ought-premise

[1] The symbol ¬ is the logic symbol for NOT, the symbol → means implication.

into the reasoning.

2. A common logical mistake

It is a common logical mistake in the climate debate to interpret what is described as purely scientific as a request to do this or that. You thus confuse is with ought.

A clear example of that was a statement by Gro Harlem Brundtland in 2007. It was actually her statement before a group of journalists that made me wake up and wonder what on earth UN climate research is doing; is it science or is it politics?

Gro Harlem Brundtland

In May 2007 Gro Harlem Brundtland proclaimed from the UN Headquarters:

> *This discussion is behind us. It's over. The diagnosis is clear, the science is unequivocal – it's completely immoral, even, to question now, on the basis of what we know, the reports that are out, to question the issue and to question whether we need to move forward at a much stronger pace as humankind to address the issues.*

The science is thus unequivocal and it is even morally reprehensible to question it, according to Brundtland. When I came across the above quote for the first time, I thought: "This person has no idea what she is talking about".

The history of science shows something completely different than that it would be unreasonable to question the established truth in science.

Science distinguishes itself precisely by questioning and by critically examining various theories and hypotheses. This is how science moves forward, by showing that some of our accepted beliefs are wrong and by developing better theories that avoid the things that have been shown to be wrong. However, we never have any guarantees that we will not find faults even in the new theories. Only the omniscient gods of the United Nations think they know the absolute truth. But our human knowledge of the world is growing. In this way, one can consider the scientific process as a dynamic flux of criticism and new ideas. If the process is stopped by e.g. political decisions, scientific development also ceases.

That is the one flaw with Brundtland's statement. The second error is that she believes that it follows a definite political action plan from what, for example, the IPCC, WGI, have arrived at. We shouldn't…" question whether we need to move forward at a much stronger pace as humanity to address the issues." And she is certainly not alone in making this thought error. Time and again we are told that "science has now shown that we must reduce carbon dioxide emissions, stop driving fossil cars, build renewable electricity production ... etc." But the IPCC WGI actually says

nothing about that. They just pick out different models for how carbon dioxide affects global warming. But whether one or the other political action is desirable, and morally defensible, is another thing that can, and should, be questioned and discussed.

3. The role of science in politics

To return to the original question of what role science can have in politics, it can be said that all political ideologies or programs contain two different things: 1. A factual description of how you believe that the state of the world (or the part that you focus on) is and works. 2. Ethical principles - or a "value base" as it is now called - for which goals are worth pursuing and which methods should be used.

The role of science in the whole structure concerns only (1). The factual picture may be incorrect and should therefore be criticized. Science can be helpful here. However, science cannot tell us how we should act.

So therefore, I argue, the scientific contribution to politics is limited to essentially making critical reviews; to demonstrate inaccuracies in the background understanding which is made when formulating one's problems, goals and solutions.

However, not everything is science in this basic sense. In addition, simple fact-gathering of all sorts of other things than what lies on the research front is needed. For example, how much wood does it take to heat a house? How much electricity does an electric car draw? How much electricity does a wind turbine generate? Etc. To find out that kind of facts, much more empirical studies are needed than what concerns basic science. It is technicians, doctors, economists, social scientists and other experts who work with such fact-finding and who are very important in everyday political work. This is usually reported in what we call "expert reports".

Immanuel Kant (Wikipedia)

Do philosophers have anything interesting to say about this? Yes, actually. And then thoughts go to yet another 18th-century philosopher, namely Immanuel Kant.

He formulated the following wisdom:

"Ought implies can" (ought → can), or if you transform it according to the rules of logic: "If you

can't do x, there is no moral duty to do x." (¬can → ¬ought). Yes, you can even spice it up a bit and say that "if you can't do x then you shouldn't strive to do the impossible".

Applied to the climate policy debate: If the goals of the Paris Agreement are not feasible, then we have no obligation to pursue those goals. If Net Zero is not achievable, then we should not try to achieve it. If Agenda 2030 is not achievable, then this is not a morally necessary goal, and so on.

A large part of the climate debate is about things like this; what can be done economically, technically, environmentally and politically. And it follows inexorably from Kant's sentence that we have no moral obligations whatsoever to strive for impossible goals. Objections of the type: "Yes, but we should still strive to do it" are illogical. But those who despite this, persistently repeat it over and over again, almost automatically get a stamp of goodness on their forehead. "They really want to do good".

These sentences, or words of wisdom, are, as you may understand, quite "pregnant" or rich in content, with far-reaching consequences. Consequently, they have also been discussed and sometimes questioned at numerous philosophical seminars throughout the ages.

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The Rise and Fall of Civilizations in a Climate Perspective

Eva Marie Brekkestø

Bærum, Norway

Abstract

Civilizations flourished during the warm periods, such as the Bronze Age, the Roman era, and the medieval times, when weather conditions were relatively stable with more precipitation in the tropic and subtropical areas. Civilizations experienced decline or succumbed during the cold periods, such as 1 200 to 500 BC, 300 to 700 AD and the Little Ice Age, when weather conditions were more unstable with less precipitation in the tropical and subtropical areas.

Keywords: Climate history; civilizations; disasters Submitted

2024-11-01, Accepted 2024-12-20. https://doi.org/10.53234/scc202412/36

1. Introduction

It's finally acknowledged by most historians that climate conditions affect the rise and fall of civilizations. This extended abstract is based on a book on climate history which is available in Norwegian (Brekkestø 2022) and Swedish (Brekkestø 2024). Based on this book also a talk at the 2023 Climate Conference in Copenhagen is available as an extend abstract (Brekkestø and Bergsmark 2023).

In this summary it is shown how a very dry period from 4 400 to 2 000 BC affected the subtropical and tropical areas of the globe lead to migrations of people towards rivers where several civilizations started (section 2), and how favourable conditions led to rise of civilizations (section 3,5 and 7), and finally how the cultures deteriorated during the cold periods (section 4.6 and 8).

2. A long period of drought caused migrations

After the Holocene climate optimum approx. 8 000 to 7 000 BC, a 2 400 year long period of cooler and dryer conditions followed. The temperatures dropped significantly, and it became much dryer. Ice cores from glaciers on Kilimanjaro and in the Himalayas, as well as lake sediments from Egypt clearly show this very dry period. It also became considerably colder in large areas, including in the eastern Mediterranean area.

This period, often referred to as a 'mega drought', led to migrations in several parts around the world. People left areas that dried up and moved towards places where they could still find water, most often large rivers. This for instance happened in Northern Africa. A large part of Northern Africa area had since the end of the last Ice Age, been a savannah with several lakes and river systems, now dried up and gradually turned into the Sahara Desert. The peoples who had lived in this area mostly migrated towards the east and the Nile Valley. The same development took place in the Middle East where people migrated towards the rivers Tigris and Eufratus, and in the areas around the Indus River.

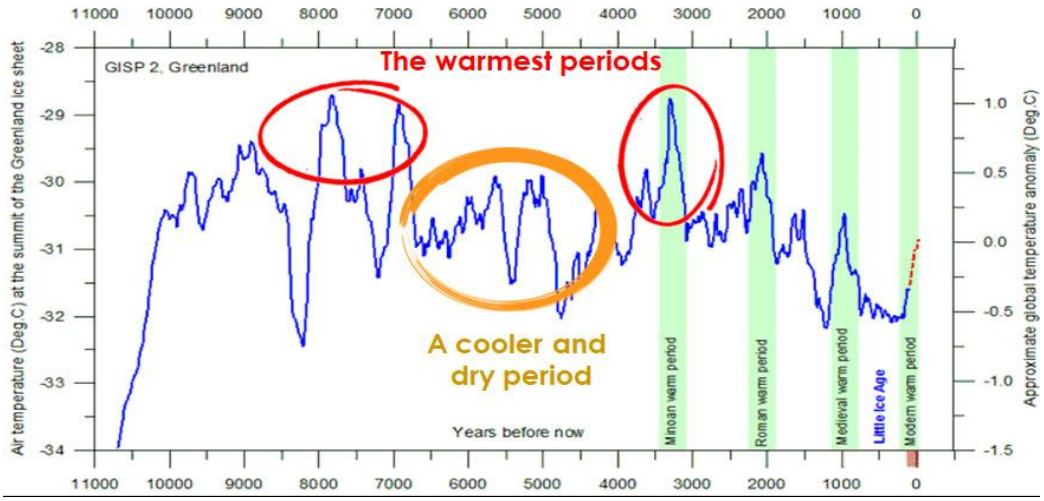

Figure 1. Estimated Holocene temperatures. Left: Temperatures from Greenland ice cores (Alley 2004). Right: Estimated global temperatures based on other proxy data (Box et al. 2009).

3. Favourable climatic conditions enabled the rise of civilizations

3.1 The first Civilizations

How is a civilization defined? Most historians agree that three factors must be present:
1) An urban development with division of labour and social classes.
2) Some form of monumental architecture
3) The use of a written language

The first civilizations that developed were Sumer / Mesopotamia from 4 000 BC, The Old Egyptian Kingdom from 3 500 BC, The Indus Valley from 3 000 BC and finally the Chinese empire from 1 600 BC. The three first ones arose during the dry period 4 400 – 2 000 BC and were founded on access to water (rivers). All four of them developed and consolidated during the Bronze Age period from 2 500 to 1 200 BC.

3.2 The climate during The Bronze Age 2 500 to 1 200 BC

Favourable climatic conditions around the world gave good times in most of the world. The Bronze Age enjoyed temperatures up to 2 - 3 °C higher than today in Northern hemisphere and 1 to 2 °C globally (Ljungqvist 2017). Asia and the Middle East had abundant precipitation, which enabled the emergence of large agricultural communities. The first Chinese civilization emerged and expanded during this period from approx. 1600 BC. (Xia-dynasty). In Northern Europe enjoys a warm climate with mild winters which provides good conditions for the development of agriculture. Millet is cultivated in Denmark during this period, which requires an average temperature 2 °C higher than today (Myhre 2021). In Norway the tree limit is approx. 300 meters higher than today, and high mountain ranges like the Hardanger and Dovre plateaus were wooded most of this period (Brox 2914). By 2 000 BC all the glaciers in Norway and in the Alps had melted away, and there were hardly any glaciers in Iceland and at Svalbard (Johannessen 2007; Carstens 2014).

3.3 European integration during the Bronze Age

Several regions in Europe had flourishing cultures during the Bronze Age. The civilizations in the southeast were communicating with the cultures in the western and northern regions. There was an extensive north-south trade with for instance weapons, jewelry, and glass. There was also an exchange of technology regarding for instance boat building, and long-distance travelling (Cline 2021).

3.4 Mediterranean civilizations during the Bronze Age

Cultures and civilizations around the eastern and central parts of the Mediterranean such as the Minoans, the Hittites, the Mycenaeans, Mesopotamia (later Assyria), Cyprus, and Egypt all had an extensive trade amongst themselves: They traded with tin, copper, grain, timbers etc. They had extensive diplomatic connection letters and envoys, and the ruling classer often practiced inter-marriage between the various kingdoms (Cline 2021).

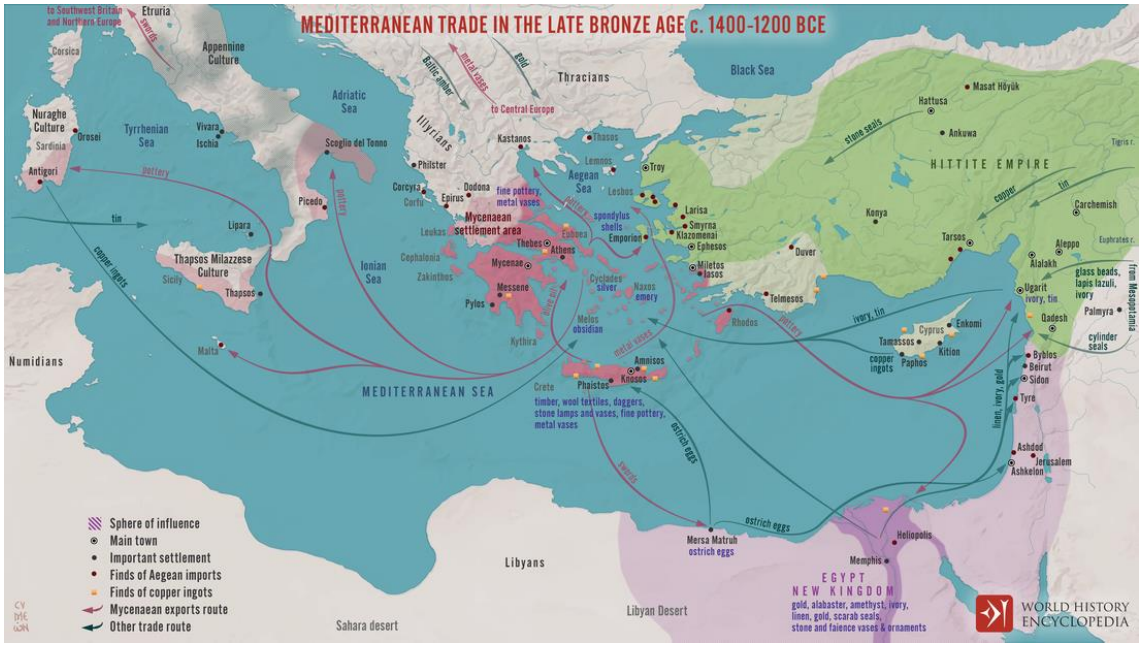

Figure 2. Mediterranean trade routes in the late Bronze age 1400 – 1200 BC (Cline 2021).

4. The collapse of the Mediterranean civilizations

Around 1 200 BC a dramatic climatic deterioration took place that led to the collapse of several of the Mediterranean civilizations. Recent research (analyses of pollen, sediments, ice cores etc.) shows, among other things, a sudden global cooling with more ice in North-Atlantic, a 200 year long, severe drought in subtropical areas, a sudden drop in the sea temperatures in the eastern Mediterranean of 2-3 °C and a failing monsoon in Asia and eastern Africa (Cline 2021).

This climatic deterioration led to crop failure, hunger, collapse in the trade, revolts, migrations (invasions by the «The Sea People») and war, which in turn led to the collapse in several of the civilizations. Due to the existence of i.e. Egyptian written sources it has been possible to pinpoint tis collapse to the year 1 177 BC.

The only surviving civilization on the Mediterranean was the Egyptian, but in decline, with reduced amount of water in The Nile. The old Kingdom came to an end and was replaced by The New Kingdom. It also led to the decline in Mesopotamia / Assyria and the Indus Valley civilization completely disappeared (Cline 2021).

5. Improved climatic conditions allow cultural growth

5.1 Improved climate from 500 BC and the emergence of new civilizations

From approx. 500 BC temperatures were rising again globally and there was an increase in rainfall in the Mediterranean, the Middle East and in the East (Frankopan 2023) A similar improvement also took place in Central America, which saw the emergence of The Mayan culture emerges

from 300 BC. Parallel with the improved climatic conditions in the Mediterranean the development new civilizations emerged. During the great era of Greek antiquity from 480 to 30 BC (from 146 BC under Roman rule) democracy developed in Athens (from the early 400s) and the construction of the Parthenon started (the mid 400s).The Roman republic developed from approx. 500 BC with the expansion of its borders beyond today's Italy from around 400 BC. In China the construction of the Great Wall started during the 300s BC and the greater Chinese Empire was established from 221 BC.

5.2 A short period of instability in the 40 BC replaced by new favorable conditions

In the 40 BC volcanic eruptions (Okmok in Alaska and others) a short period of climatic instability with cold and wet conditions in Europe led to unrest and attacks against the Roman Empire. However, the climate quickly stabilized again, and during the two first centuries AD with favorable climatic conditions, the period known as Pax Romana from 27 BC to 180 AD was a particularly peaceful and stable period in the Roman Empire. Whereas the drop in temperature during the 40 BC meant several years of drought in East Africa and a reduced water flow in the Nile which resulted in crop failures and hunger in Egypt and may have been a contributing factor to the end of Egypt's independence, the two first centuries AD represented a good period with stable Nile floods and ample crops (Frankopan 2023).

6. The Migration period and the climate catastrophe 550 AD

With the increasingly colder, drier and more unstable climate from the 200s, and waves of attacking migrants from the north and the east, the Roman Empire disintegrated, and Rome fell in year 410. Then, from 536 a virtual climate catastrophe started caused by several massive volcanic eruptions (probably in Iceland, North America and Southeast Asia): An abrupt and significant global cooling caused crop failures over large parts of the world, followed by 100 years of extreme weather and hunger (Johannssen 2007). A sudden drop of 2 - 3 °C in the Northern hemisphere and 3 - 4 °C in the Nordic countries (Ljungqvist 2017) where large areas were completely depopulated (Iversen m. fl. 2017). Reports of several years of severe drought in China, Peru the Middle East and Persia, and snowfalls in China in midsummer. (Ljungqvist 2017; Hoffmann & Ochoa 2005).

7. The warm Middle Ages

From the mid700s temperature had finally recovered and a 400 year long period with higher temperatures and stable conditions started that enabled cultural and economic growth around the globe. The 900s, the warmest century enjoyed a global 1 - 2 °C higher than today (Ljungqvist 2017). In Europe the forest lines and agriculture several hundred meters higher that today. In Svalbard glaciers were significantly smaller than today, the limit of summer pack ice 100 km farther north of Iceland than today (Lamb 1982) and the Norse cultivated barley in Greenland allowed by a temperature 1,5 °C warmer than today (Lamb 1972; Steen Henriksen 2012).

Europe experienced a heyday of craftsmanship and architecture (e.g. Byzantine churches, Gothic cathedrals). Abundant monsoon rains gave a rise in Chinese and Indian culture and architecture and allowed the building of Anchor Wat. In South America the Chimú culture flourished from the 800s and the Inca Empire from the 1 100s (Fagan 2008).

8. The Little Ice Age

8.1 Dramatic climatic deterioration and cultural decline

The cold, wet and unstable climate from the early 1 300s with floods, failing crops and hunger

reduced the European population by 1,5 million before the Black Death killed 50 to 80 million more in the late 1340s (Fagan 2000). The climate did not improve during the late 1300s and the 1400s, and the Inquisition laid its grips on Europe. The coldest period, the 1600s, saw freezing conditions in Europe, Asia and South America, accompanied by severe droughts in the East, the Middle East, the Sahel region and South America (Fagan 2000). China and Japan suffered widespread hunger and rebellions, while witch hunts took place in Europe with a typical conviction: with magical powers having produced bad weather (Blix Hagen 2019). In South America children were sacrificed on a large scale, in the hope of propitiating the gods.

8.2 The Little Ice Age culminates, and the western, modern civilization is founded

The early 1700s saw a rapid rise in temperatures, and a culmination of the Little Ice Age and rising temperatures, although with several setbacks until the early 1900s. Also in the 1700s, the foundations of the modern, western civilization were laid:

1) The Age of Enlightenment with science, reason, freedom and tolerance,
2) the end of Feudalism and
3) the start of the Industrialization.

Guest-Editor: Jan-Erik Solheim

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The Danish Energy Transition

Summary of presentation given at the Climate Conference, October 2024

Søren Hansen

Klimarealisme.dk

Abstract

Denmark has set ambitious goals for CO_2-emission reductions and wishes to play the role of front-runner in the World. However, in reality the results are not so impressive and the transition is running into serious difficulties.

Keywords: Solar and wind energy; Energy transition; Balancing problems; Cost of green energy solutions

Submitted 2024-10-22, Accepted 2024-12-20, https://doi.org/10.53234/scc202412/37

1. Introduction

Denmark has set ambitious climate goals, deviating from those of the EU. Denmark wishes to have reduced CO_2-emissions by 70 % in 2030 and 100 % in 2045 or 2050. The means are basically a transition of the energy supply to wind and solar-based electricity, combined with an extensive use of biomass. At present, the country boasts that some 46 % of the total energy consumption is covered by renewable energy sources, see Fig. 1, however, two thirds derive from the use of biomass, of which a large share is imported – as wooden pellets or chips.

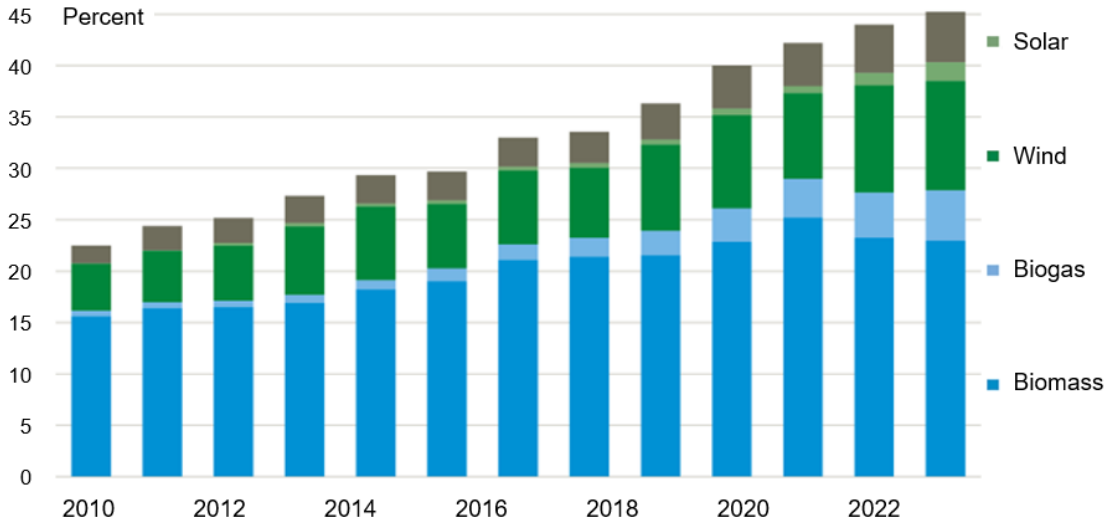

Figure 1. Share of renewable energy sources of total consumption in Denmark, 2010-2024. Source: [1]

2. Wind and solar

Denmark has by 2024 installed a total of 7,000 megawatts (MW) wind turbines and 3,500 MW solar cells. The average electricity consumption is around 4,000 MW, so the installed capacity already constitutes 2.5 times the need.

This of course leads to the usual problems, where the fluctuating power supply from solar and wind sometimes exceeds the need but during most of the time delivers much less than required, see Fig. 2.

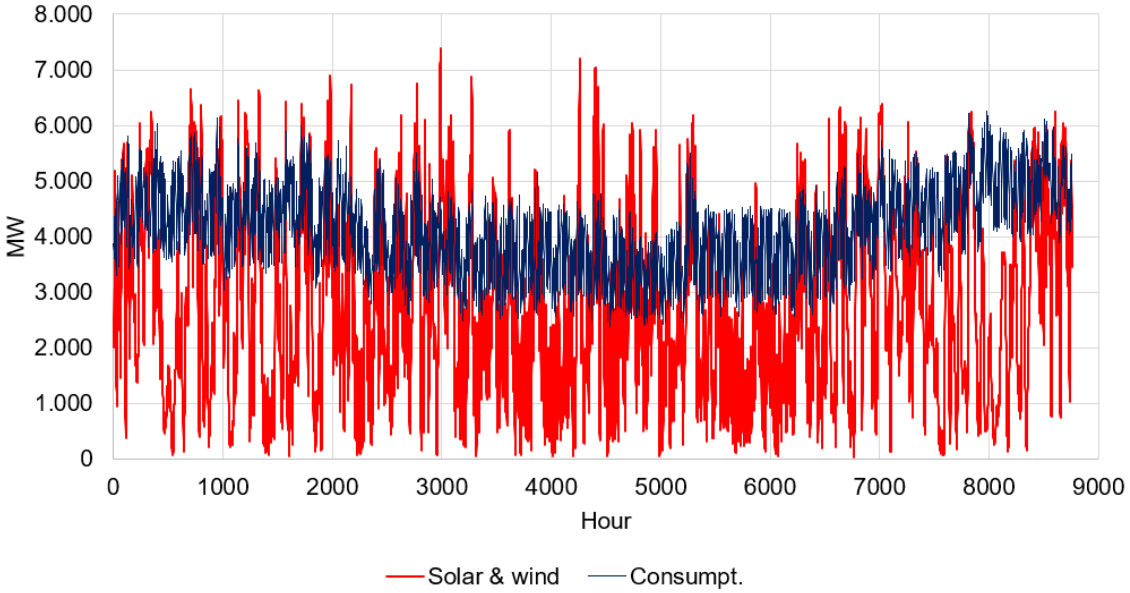

Figure 2: Hourly figures for the production of electricity from solar cells and wind turbines in Denmark in 2023 (red curve), with the consumption shown (blue curve). Data from [2]

The shortfalls are made up by the remaining dispatchable power plants, mainly fired with biomass (wooden pellets & chips), waste incineration and a few gas- and coal-fired boilers. Very often in practice these sources are not utilised to any great extent. Instead, Denmark relies on imports and exports of power.

3. The power trade

In Northern Europa an elaborate cooperation has been established, whereby electricity is traded across the borders. One part of the system is known as EPEX, comprising countries in Europe like Germany, France, the Netherlands, Belgium etc., and the other part is the Nord Pool, covering Scandinavia and the Baltic States.

Every day volumes and prices are settled, hour by hour for the following 24 hours. The producers will submit their estimates for the amount of power they expect to be able to supply, for solar and wind the figures are mainly based on weather forecasts.

Denmark accordingly has widely fluctuating imports and exports, almost every day. Fig. 3 shows the situation during a week in June-July 2023. It is apparent, that the export or import at certain intervals reach 3,000 MW or 75-80 % of the consumption.

Fig. 3 also clearly shows how the periods of heavy exports coincide with a large output from solar and wind (e.g. on Tuesday), whereas imports are needed when both these sources fail (Thursday).

Denmark is a small country with a limited electricity consumption, and the country is fortunate in having neighbours like Norway and Sweden with large capacities of hydroelectric power. These facilities are very flexible, they can adjust the output very quickly, and by pumping water they can also receive and store large quantities of electricity. Besides, Sweden has its nuclear power plants, which can supply power in times of need.

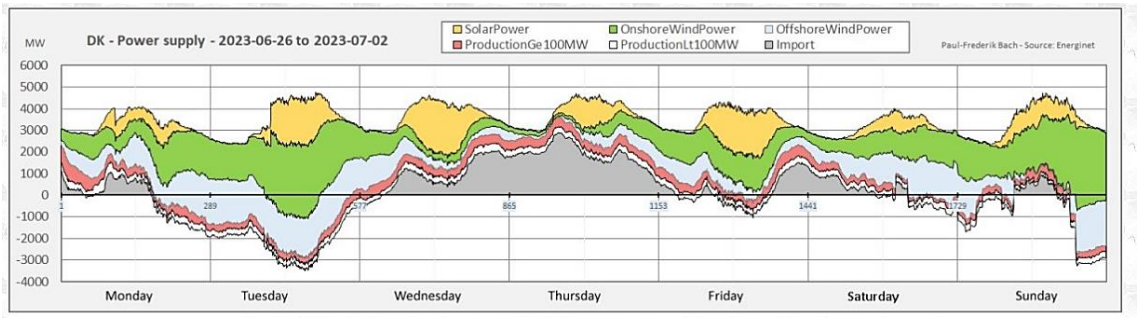

Figure 3. A week of the Danish power production, import and export. The import is marked with grey, while exports are indicated by the curve below zero. The consumption is at the line above wind and solar, respectively. Source: [3]

Germany is in a similar situation, with a large excessive capacity of solar cells and wind turbines, and the Germans experience similar needs for large imports and exports. Here the situation is much more complicated, because these demands may reach 14,000 MW or more, which is above what the neighbouring countries can handle [4].

The so-called "geographic cooperation" with exchanges of power across borders rest on the assumption that if one country is low in production from the renewable sources, the neighbours can supply what is missing. This assumption, however, is basically a fallacy. The Sun sets at roughly the same time all over Europe, and the wind is very often uniform over most of Northern Europe. In other words, whenever Denmark has a surplus of wind and solar, e.g. Germany will find itself in the same situation.

4. The future, hydrogen

The green transition entails a vast expansion of the capacities of solar and wind power. The Danish government has expressed wishes for a tripling or quadrupling of power production from these two sources, already by 2030. Fig. 4 shows the planning, as expressed by the Danish Energy Board.

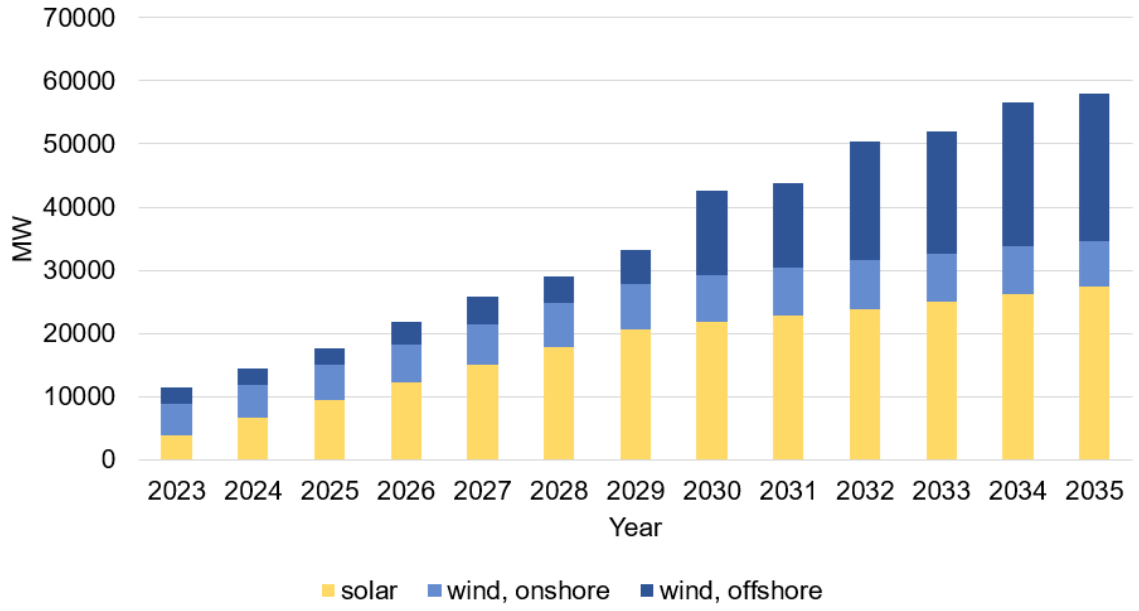

Figure 4. The visions for the future by the Danish Energy Board (Energistyrelsen) total capacities of solar and onshore & offshore wind, 2023-2035. Data from [5]

It is obvious that with these large amounts of fluctuating power it will no longer be possible to turn them into a steady supply based on e.g. imports and exports. In 2035 the average Danish consumption is expected to be around 5,000-7,000 MW. Hence there will be times, where imports of 4,000-5,000 MW are required, but what is much worse: sometimes there will be a surplus of up to 50,000 MW – which is close to Germany's total consumption. It is of course totally unrealistic that exports will solve this problem.

The Energy Board is aware of the problem and envisages that the surplus power shall be used for producing hydrogen, and the derived "clean" fuels, also known as Power to X. The hydrogen is to be produced by electrolysis, where by the electricity water is split into hydrogen and oxygen. The hydrogen can be used as a fuel, and is also a valuable raw material for parts of the chemical industry. Plans have been set up for a hydrogen pipeline going down through Jutland to the German border, where the German industry is foreseen to have a vast need for this "clean" source of energy. Also, it is expected that German power plants will run on hydrogen in the future, replacing natural gas as fuel for the backup production when wind and solar fail.

Hydrogen is a very light gas, highly explosive in mixtures with air and somewhat difficult to handle and store. However, the biggest drawback is the cost. There is no way around the fact that around 50 MW of power is required to produce one ton of hydrogen. Currently the average spot price of power in Denmark is around 65 €/MWh, which translates into a power cost of 3,250 € per ton of hydrogen. The power cost is expected to be in the order of two thirds of the total expenses, leaving us with a hydrogen cost of some 5,000 €/ton.

This figure probably will be on the low side of reality in the future, the latest auctions in the UK for offshore wind indicate that power prices will approach 100 €/MWh [6], due to the sharp cost increases in connection with establishing offshore wind farms. Then we end up with a hydrogen price of 8,000 €/ton.

Today, hydrogen in Europe is mainly produced from natural gas, and the price is in the order of 1,000-1,500 €/ton.

This will be a serious problem for the future purchasers of the hydrogen, seeing their fuel and raw material costs increase by a factor of 4-6. Already, high energy prices are driving parts of the German chemical industry out of business, either the production lines are closed down or moved to countries outside the EU, e.g. the U.S., where energy prices are much lower [7].

For the Danish visions of a hydrogen future, mainly based on the exports to Germany, there will be a further complication. Today the source of energy for high-temperature processes like steelmaking, cement, ceramics etc., would be coal or, preferably, natural gas. This means that the hydrogen has to be compared with natural gas regarding the cost per energy unit.

With a hydrogen price of 8,000 €/ton the cost per energy unit will be 240 €/MWh. The similar cost for natural gas in Europe is at present 40 €/MWh. In competing countries, like e.g. the U.S., the cost is even lower, maybe only half.

Accordingly, a switch to hydrogen would entail a sharp increase in the European industry energy costs, and almost certainly drive it out of business. The situation seems to be dawning on the financial players involved in the green transition, they are hesitating and hydrogen projects are now being cancelled or postponed. This applies to the hydrogen pipeline in Jutland as well.

In turn, the projects for more wind turbines and solar cells are now in jeopardy. The investors can see that without a large-scale hydrogen production there will be no need for all the additional power. Already one large solar project has been cancelled by the investors. At the end of the year there will be a huge auction for offshore wind farms in Denmark, with a total of 6,000 MW. The bidders are to submit the rates they will commit to pay in concession fees. But with high prices for the equipment, higher interest rates and the uncertainty regarding sales of the power, there can be some doubt regarding the outcome of this auction.

5. Conclusion

Basically, the green transition in Denmark (and the neighbouring countries) is rapidly reaching a moment of truth. The politicians have until now believed that more solar and wind installed always is better, but the stark realities of relying on unreliable and fluctuating energy sources are by now becoming painfully apparent.

With further increases in the capacities of solar and wind the practical obstacles will become insurmountable and the visions of hydrogen as the saviour have turned out to be prohibitively costly.

It is only a matter of time before the realities will dawn on the politicians in Europe, especially the EU. The sooner it happens, the more beneficial it will be for our common future.

Guest-Editor: Stein Storlie Bergsmark

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SCC – the three first years

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Abstract

The scientific journal Science of Climate Change was initiated by the Climate Realists in Norway in the summer of 2020. The first issue appeared in August 2021 and the journal has now existed in 3 years and produced 11 issues. The objective of this journal was and is, to publish – different to many other journals – also peer reviewed scientific contributions, which contradict the often very unilateral climate hypotheses of the IPCC and thus, to open the view to alternative interpretations of climate change. I will tell about the ideas behind the journal, the startup difficulties, and how we managed to publish more than 100 papers, consisting of original articles, review papers, essays, conference abstracts, obituaries, comments and discussions. Our horizon is full international recognition in 10 years.

Keywords: Scientific publishing; history of journal; climate gate keepers.

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1. Introduction

This presentation is dedicated to Nils-Axel (Niklas) Mörner (1938-2020). He held a personal associate professorship at the Swedish National Research Council (1978–2005) and was head of the Department of Paleogeophysics & Geodynamics at Stockholm University (1991–2005). He published more than 700 papers in many scientific fields.

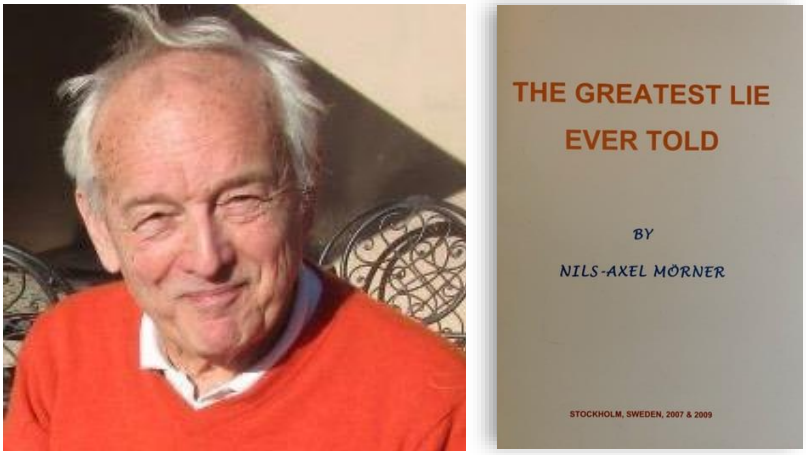

Figure 1. Niklas Mörner in Maroc during COP22 (2016) and his booklet (2006).

His booklet *The Greatest Lie Ever Told* showed no dangerous sea level rise. This was repeated in the book *Naturen styrer klima* (Solheim et al. 2017) where he described global and Scandiavian sea level changes as small or negative – nothing to worry about.

In 2013 Niklas became editor in the new scientific journal Pattern Recognition in Physics (PRP). Inspired by a session at a conference in Space Climate in Oulu, Finland, he organized a Special issue of the journal with title *Pattern in solar variability, their planetary origin and terrestrial impacts.* This contained 12 articles, including a conclusion that: *The coming Grand Solar Minimum sheds serious doubts on the issue of continued, even accelerated warming as claimed by the IPCC.* The 12 papers were published before mid-January 2014. It took only a couple of days before the whole journal was terminated by its publishers Copernicus Publications.

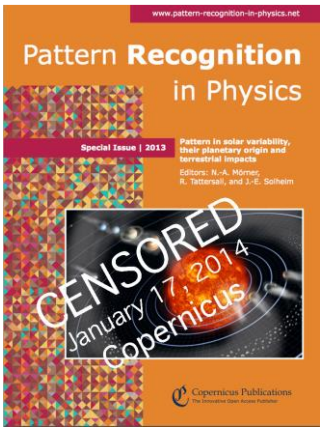

Figure 2. The front page of the Special issue of Pattern Recognition in Physics

The journal terminated without warning, no discussion, and no possibility to appeal. Niklas called it A *Modern Book-Burning* and published a book with that name as a protest (Mörner et al. 2015).

2. Birth of a new journal

In March 2020, Geir Hasnes became member of the board of the Norwegian Climate Realists (KR). In order to increase the organization's public image, he proposed that KR should create a scientific journal. This should be based on the experience from its Scientific Council (KVR), which had many members familiar with scientific publishing. A meeting was planned to get KVR's approval at the end of September. This was not so easy due to Covid restrictions.

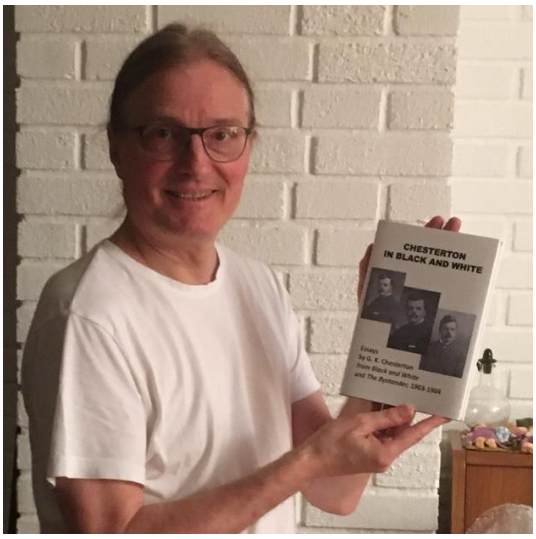

Figure 3. Geir Hasnes proposed a journal and became its first editor

In the meantime, Niklas Mörner was asked if he would accept to be Chief Editor if the Council decided. He immediately said *Yes – with joy*. And he quickly started to contact many of his excellent scientific colleagues and invited them unofficially to write articles for the first issues. When the board had its meeting Sept 26-27, Geir Hasnes and Niklas Mörner presented plans for the journal. The Scientific Board supported the plans for a journal that should be free from the gatekeepers. Due to Covid travel restrictions and a health problem, Niklas was not present, but was informed the same night and sounded very happy.

3. The first issue

However, the health issue of Niklas was serious, and he died in October 2020. It was decided that Geir Hasnes should take over as editor with the help of the editorial board from KVR consisting of Ole Henrik Ellestad (chairman), Stein Bergsmark, Martin Hovland, Ole Humlum, Mrten Jødal and Jan-Erik Solhiem. In addition to the articles already planned by Niklas, we also collected memorials for him

To start a scientific journal, many questions had to be solved: How to publish, free or paid access, salary for the editor, mission statement, cover and banner, text layout, rules for referees and possible advertisements. It was decided that the referee process should be with open reviewer, if the reviewer agreed. It was further decided that when a paper was accepted, it should be published on the internet as soon as possible after a technical editing, and later collected into an issue which should consist of 100 – 150 pages. It should be free for the authors to publish, but with a fee of $10 to read or download a paper or $50 for a printed issue or an annual subscription. The start up cost was covered by KR.

The first issue was published in August 2021 and was an impressive book of 178 pages including greetings from the Nobel Prize Laureate Ivar Giæver. It contained 7 articles from distinguished scientists as Christopher Monckton of Brenchley, Hermann Harde, Murry Salby, François Gervais, Nicola Scafetta, Fritz Vahrenholt and Martin Hovland. It also had 6 memorials of Nils-Axel Mörner in addition to two book reviews and essays presenting the journal. The mission statement is written in Vol 1.1, page 2.

4. The gatekeepers strike back

To make the journal more visible an official launching event was scheduled on October 12 at the University of Stavanger, where the administrative officer Hans Borge of K worked. Professor Henrik Svensmark from Denmark was invited as a guest speaker, and the Rector of the University, Klaus Mohn was invited to give a welcome address.

DEBATT • KLAUS MOHN, REKTOR VED UiS

Konspirasjon mot klimaforskinga

— Klimarealistene stikk kjeppar i hjula og stiller seg på tvers av det meste av det me står for her ved Universitetet i Stavanger.

— Om vin ikkje når gjennom med arbeida sine i tradisjonelle vitskapleg forskingstidsskrift, så er dem med sunnsynlege forklaringa at forskinga ikkje held mål, sa rektor ved Universitetet i Stavanger, Klaus Mohn på Klimarealistenes lansering av dens eige tidsskrift. Foto: Ivar Hystad

Figure 4. Rector Klaus Mohn at the Stavanger University recommends cancelling the journal

The University Rector called the journal a *Conspiracy against climate research* and told us to stop the journal or turn it into a membership journal for the KR. He showed no intention of welcoming a free and independent scientific journal. The press followed up, as seen from the regional newspaper in figure 4 and echoed on national television. There were no greetings or support from IPCC friendly climate researchers.

Luckily, the journal was not owned by a publishing house, so we continued, but of cause with a negative reputation in our country. Rector Mohn was awarded with several official positions. The editor and the editorial board continued to receive articles and did the evaluations and acceptances. Some were published on the web, but no new issues were produced. The last paper was published on the web March 22, 2022. Maybe the journal project was too big for the limited resources of the *Climate Realists of Norway*?

5. A new deal – and rebirth of the journal

Figure 5. A seminar on the ferry Oslo-Kiel-Oslo on how to continue with the journal.

Another meeting took place between the editorial board, KRV and KR officials. This time a seminar on the ferry Oslo-Kiel, where Professor Hermann Harde gave a brilliant lecture on the CO_2 growth problem when the ferry stayed in port in Kiel. The conclusion was that the journal should continue, but with a much simpler production. We should accept only papers written in a Word template. The review process should continue as before, but with members of the Editorial Board as guest-editors, and the journal should be free to read on the web. No printed versions should be sold. There should be a small fee for the authors and no salary for the editors. The goal should be a highly respected international scientific journal in 10 years. Exact timing (quarterly) should have priority before length.

No new editor was selected, but after some hesitation I took the task of publishing the backlog before the end of 2022, while the KRV was searching for an editor. A new editor was not found by the end of the year, so I was talked into continuation one more year while the search went on. My intention was to publish what we had received by the end of 2023 and then terminate the journal. Stein Bergsmark helped me as a Co-Editor, and I selected my own Editorial Board who took care of guest-editing. A new web site run by Word Press was purchased, and a new cover design was created by an AI-illustrator by Arild E. Johnsen. Some donations kick-started the revised journal and the fees kept it going.

Figure 6. Chief-Editors of SCC: Jan-Erik Solheim from Oct 2022 and Hermann Harde from 2024.

At the end of 2023 no new Chief-Editor was found, and the last issue Volume 3.5 was published. But in January 2024 the most active user of SCC, Professor Hermann Harde from Hamburg took over as a temporary Chief-Editor till a more permanent one can be found. The result can be seen on our website: https://scienceofclimatechange.org

Figure 7. Front covers of 2023-issues of SCC designed by Arild E. Johansen by use of AI drawing tool

The front and back covers of a compete volume is designed by an AI-drawing tool where we specified the most important issues in the discussion of climate change today: The atmosphere, clouds, some forests and mountains and the ocean. We made a big window to peek into the journal to look at an interesting graph found in one of the articles.

Unfortunately, due to technical error or hacking, user statistics for 2023 is lost. For the last month Sept/Oct 2024 we have this picture:

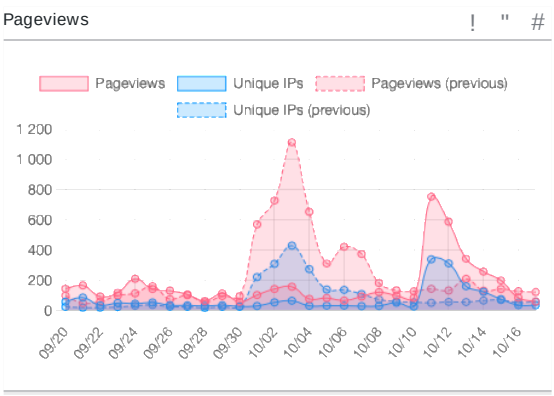

Figure 8. User statistics for the period 240920-1020

The situation in October 2024 is that 7 papers and one complete volume (4.1) have been published so far this year, and Vol 4.2 is under construction. The number of daily pagewiews are 100-200, but on special days it has increased to more than 1200. A special day is when an article is mentioned on WUWT or other climate science blogs. The number of unique wiewers vary between 30 and 60 with a peak up to 450 on special days.

If we sort the viewers per country, we find United States 37.5%, Norway 13.5%, United Kingdom 8.6%, Germany 7%, Canada 5%, Denmark 3.2% and Sweden 2.2%. We can only conclude that there is little interest in the jounal in the other Nordic countries.

6. Conclusions

The aim of the journal – different from many other journals – is to publish peer-reviewed scientific contributions which contradict the often-unilateral climate hypothesis of the IPCC, and thus to open the view to alternative interpretations of climate change. On the one hand this requires to motivate and find people with these different approaches, but also to have some co-editors and reviewers, who are supporting our journal. This is the prerequisite for survival of the journal.

Concerning the patronage of Climate Realists of Norway, the support was vital in the starting phase, but the difficulty of finding a Chief-Editor within the KVR, and the accusations of being climate deniers, suggest that it is now time for an independent ownership of the journal. A publishing association has been founded, with the aim to become publishers of SCC. The transfer may take place in 2025. People who wants to participate in the publishing association may contact me (janesol@online.no).

To acquire higher international publishing status more visibility is needed. Readars and authors may help. Also, first class scientists may continue to support us with their articles – as they have until now. A more permanent, preferably younger Chief-Editor has to be found.

Guest Editor: Stein Storlie Bergsmark

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Climate Science versus Politics

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Independent author, economist and serial entrepreneur, Norway

Keywords: Climate science; politics; IPCC; Climategate; IAC report

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1. Introduction

Starting with a critical look at the IPCC science, from the excellent First Assessment Report in 1990 and downhill to the latest Sixth Assessment Report with its claim that we have had no natural climate change since the pre-industrial era, we also take a closer look at the 2010 IAC critical evaluation of IPCC, as well as some of the pseudo-science supporting the climate crisis narrative.

2. 35 years with the IPCC

We now have 35 years of IPCC procedures and processes, and already in 2010 with the 700- page IAC (Inter-Academy Council) report, it was established that most of the IPCC processes and procedures were flawed, dominated by the needs of the politicians.

The Climate science is summed up in the IPCC First Assessment Report from 1990 «...the enhanced greenhouse effect has not yet been detected unequivocally in the observational record. » (8.1.1./page 243)[1] and «The fact that we have not yet detected the enhanced greenhouse effect leads to the question when is this likely to occur? » (section 8.4/page 253)

Interestingly, the latter section answered the question as follows: This effect is likely to occur in the 2040ies, if the strong warming continues. Observers at the time noticed that the politicians were not satisfied with this, and accordingly wanted some conclusions changed.

Later reports from other sources made it clear that the 1995 deception (described by Frederick Seitz in Wall Street Journal, in his article "A Major Deception On Global Warming")[2], was not the only one to show the problems with the IPCC: among the other sources we find the NIPCC reports, publications from GWPF and Clintels «World Climate Declaration». In 2020 and 2023 Dagsvik et al concluded:

«Using theoretical arguments and statistical tests we find", as in Dagsvik et al. (2020), "that the effect of man-made CO_2 emissions does not appear to be strong enough to cause

[1] https://www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_I_full_report.pdf
[2] https://www.wsj.com/articles/SB834512411338954000

systematic changes in the temperature fluctuations during the last 200 years»[3].

From this we can conclude that Dagsvik in 2023 with 35 more years of data, agrees with the 1990 IPCC statement that the effect on temperature from our emissions « ...has not yet been detected unequivocally in the observational record. »

3. The Alarmist narrative

This narrative was in place in media well before 1990, and it is still with us today, with warnings of impending doom. Taking a closer look at the Scientific method, we note that the narrative is not science-based, because in science the following processes rule:

- Analysis of all relevant data, not just those that fit the fixed idea you have.
- The conclusion appears at the end – not the beginning, and is based on all the data.
- A hypothesis that must be formulated so that it is falsifiable.
- The CO_2 hypothesis has never been scientifically formulated.

4. The IPCC mandate

Interestingly, the IPCC mandate from 1990 was quietly changed in 2023 when the 6th Assessment Report had established that all climate change since the pre-industrial era was human-induced: «IPCC provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.»

The 1990 mandate was more interesting, but was cleverly hidden from sceptical politicians: «The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.»

This author has been unable to find any official document or government webpage in Norwegian language where the phrase «human-induced» is included. Instead, the reader is led to believe that the IPCC is assessing all climate change.

5. IPCC processes and procedures

Every 5 – 7 years there is a new set of Assessment Reports. The first one from Working Group 1 (WG1) covers the scientific basics. The WG1 report is followed by largely political reports a year later.

The content of the WG1, WG2 and WG3 reports are communicated to media in Summaries for Policy Makers (SPM), where the SPM text is negotiated paragraph by paragraph in a plenary session, by the governmental delegations, and where every country has to agree. Since the end result of these negotiations often deviates from the underlying assessment report which the SPM is supposed to summarize, the scientists are quietly told to change the assessment report so nothing there disagrees with the SPM. Those involved pretend they are only doing normal proof

[3] https://www.ssb.no/natur-og-miljo/forurensning-og-klima/artikler/i-hvilken-grad-endrer-temperaturni-vaet-seg-pa-grunn-av-klimagassutslipp/_/attachment/inline/5a3f4a9b-3bc3-4988-9579-9fea82944264:f63064594b9225f9d7dc458b0b70a646baec3339/DP1007.pdf

reading and editing. This is not science, it is politics.

The SPM texts which are more alarming than the underlaying Assessment reports are again condensed into even more alarming press releases, which are invariably reproduced in the mainstream media, with language like «Code Red», «Highway to hell» and "Global boiling".

IPCC's Farewell to the Science in 1995 was the first major scandal, followed by The Hockey Stick Controversy. These scandals made it clear to many that the IPCC should be subjected to an independent evaluation, but nothing was done at the time. However, the third major scandal appearing in 2009 made an evaluation unavoidable.

6. The Climategate Scandal

An anonymous leaker, likely from the IPCC camp, released thousands of emails, discussing or describing what the leading IPCC climate scientists did in:

- how to reduce the major temperature increase in SSTs around 1940
- hide the knowledge of their own useless climate models
- how to sensor critics, while they among themselves agreed with the criticism
- how to prevent their critics from obtaining data or methods used in their own research.
- showing they were well aware of the strong solar-induced warming after 1970 on several planets and moons

7. The IAC evaluation of IPCC

Ban Ki-Moon in march 2010 asked the InterAcademy Counsel (IAC) to evaluate the IPCC. Note that the IAC was not allowed to assess the climate science. By October 2010 IAC had published their report[4], where they found:

- Missing scientific processes
- Missing uncertainty
- Mixing of external and internal roles
- Mixing science and politics
- No quality control

Moreover, the IAC report pointed out that:

- some lead authors «are obviously not qualified» (page 16)
- Half of lead authors «were not competent» but were «politically correct appointments» from developing countries (page 138)
- «All (climate panel personnel's) decisions are political rather than scientific» (page 554)

8. «Die Kalte Sonne»

Prof. Fritz Vahrenholt (SPD-Hamburg) was Germany's greenest politician for a long time. His bestselling book *«Die Kalte Sonne»* exposed the IPCC in Germany. In an interview with Der Spiegel in the spring of 2012, he said:

«Of the 34 supposedly independent members who write the political report, 1/3 of the editorial staff are from Greenpeace and WWF.»

[4] https://archive.ipcc.ch/pdf/IAC_report/IAC%20Report.pdf

«Of the alleged 18,000 peer-reviewed publications, 5,000 of them are «grey» - completely without peer review.»

«In my own field, the IPCC's conclusions rested on a lacking scientific basis» (Chemistry).

9. Moving the goalposts

In 2013, the IPCC concluded that our emissions caused at least 50 % of global warming since 1950. In 2021, the IPCC concluded that our emissions caused close to 100 % of post-industrial global warming (1.1 degrees C).

Incidentally, none of these conclusions nor the Paris Agreement have support in credible natural science. Especially the 2021 conclusion was based on climate models and creative use of urban temperatures affected by urban heat islands.

10. Neglecting inconvenient science

The IPCC lead authors from AR2 in 1995 and onwards removed most of the inconvenient sections found in their first assessment report. When more inconvenient science appeared, it would be ignored and left out of their reports. In a few rare cases when scientists warned the IPCC of legal action, the inconvenient text would be hidden in a footnote or tucked away in some appendix.

Newer research from Humlum, Solheim and Stordahl[5] in 2013 showed that changes in global atmospheric CO_2 occur 9–12 months after changes in global SST, in global air temperature, and in global temperature in the lower troposphere.

This was one of many studies concluding that temperature change is the cause and later CO_2 changes can therefore not have caused the temperature change. But all these studies have been ignored by the IPCC.

Guest Editor: Stein Storlie Bergsmark

[5] https://www.researchgate.net/publication/257343053_The_phase_relation_between_atmospheric_carbon_dioxide_and_global_temperature

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The Temperature Fluctuations in Uppsala has Natural Causes

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1. The Uppsala temperature record

The temperature record from Uppsala in Sweden starts already in 1722. This is one of the world's longest temperature series available. A great job has been made to adjust and homogenize this data to be consistent over time, measurement locations and changed equipment. However, during the 20th and 21th century this temperature series has diverged substantially from surrounding rural stations. This is probably due to urbanization effects from the growing city of Uppsala, which has more than doubled its inhabitants from the 1950-ies to now. The location of the measurements has also been moved, not further away from the city, but instead into the city. This gives the incorrect impression that the temperature lately has increased much more than it actually has.

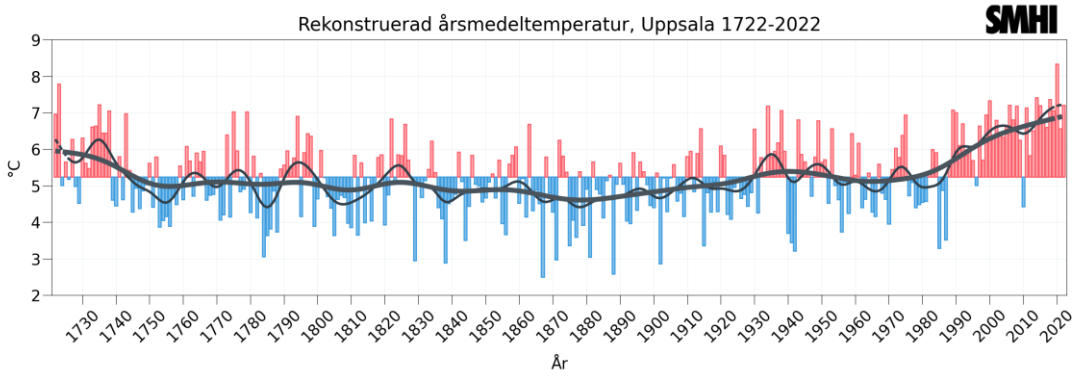

Figure 1. The long temperature record from Uppsala according to Uppsala university.

There is however a well-maintained reference measurement station, located some 5 km north of the citjerker.soderlind@stadslivab.sey center, at the Uppsala airport. This is a former military airbase which has records of temperature 8 times per day from mid-1952 and every hour from 1962.

2. The Cederlöf Uppsala series

To make the Uppsala series better reflect rural conditions, I have created a new series, called **Cederlöf Uppsala series**, which uses the station at Uppsala airport to adjust the Uppsala University series from 1953 and onwards. The result is shown below.

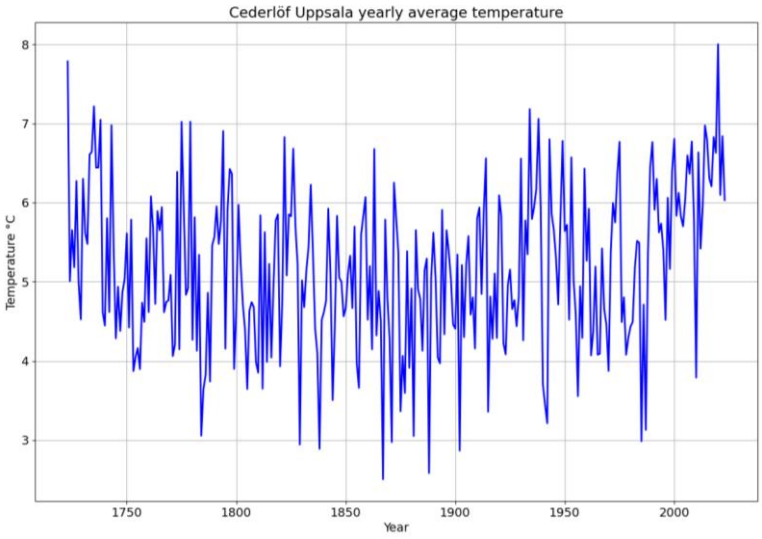

Figure 2. A better Uppsala series which has not been affected by Urbanization effects in the same magnitude as the Uppsala university series.

The Cederlöf Uppsala series has a much better correlation with nearby rural stations, compared to the Uppsala University series. But this temperature series still shows huge fluctuations in temperature over time. These fluctuations must have a cause and I have therefore investigated which other weather statistics that correlate to the temperature fluctuations for different seasons.

The following weather statistics is used in the analysis:

- Uppsala wind on 10m height from ERA5 (starting 1940)
- Uppsala total cloud cover from ERA5 (starting 1940)
- Stockholm solar irradiance measurements (starting 1983)
- North Atlantic Oscillation Index from Hurrell (starting 1865)

Please note that there are dependencies between Solar irradiance and Total cloud cover. Less clouds give more solar radiation (irradiance is radiation power per unit area).

The NAO index represents the air pressure difference between Portugal and Iceland. A high NAO index means a low-pressure area around Iceland. This implies in most cases an increased wind from south and west to Uppsala.

Table 1 overleaf shows the statistical correlations between the Cederlöf Uppsala temperature series and the above-mentioned weather statistics. Winter is defined as the months dec-jan-feb, spring as mar-apr-may, summer as jun-jul-aug and autumn as sep-oct-nov.

The P value is the null-hypothesis test. A small P value means that there is a correlation between the two data sets. The R value is the Pearson correlation coefficient. It describes how well the two data sets correlate as a straight (linear) line.

In this analysis a P value below 0.05 together with an R value higher than 0.4 or lower than -0.4 is considered a significant correlation. These are in bold.

Table 1. Statistical correlations between the Cederlöf Uppsala temperatur series and the NAO index

Winter **Wind from south: P = 0,00 R = 0,79** **Wind from west: P = 0,00 R = 0,55** Total cloud cover: P = 0,54 R = -0,07 Irradiance: P = 0,02 R = -0,37 **NAO index: P = 0,00 R = 0,65**	Summer Wind from south: P = 0,20 R = 0,14 Wind from west: P = 0,03 R = -0,24 **Total cloud cover: P = 0,00 R = -0,62** **Irradiance: P = 0,00 R = 0,83** NAO index: P = 0,00 R = 0,33
Spring **Wind from south: P = 0,00 R = 0,48** **Wind from west: P = 0,00 R = 0,51** Total cloud cover: P = 0,07 R = -0,20 Irradiance: P = 0,04 R = 0,32 **NAO index: P = 0,00 R = 0,52**	Autumn **Wind from south: P = 0,00 R = 0,69** Wind from west: P = 0,98 R = 0,00 Total cloud cover: P = 0,37 R = 0,10 Irradiance: P = 0,27 R = 0,18 **NAO index: P = 0,00 R = 0,60**

3. Winter

The winter season temperature has a very good correlation with the wind from south and the NAO index. A high NAO index gives strong wind from south. The correlation between NAO index and the temperature is shown in Figure 3 below.

Basically, all the winter warming that has occurred since the 1960s can be explained by low pressure areas around Iceland.

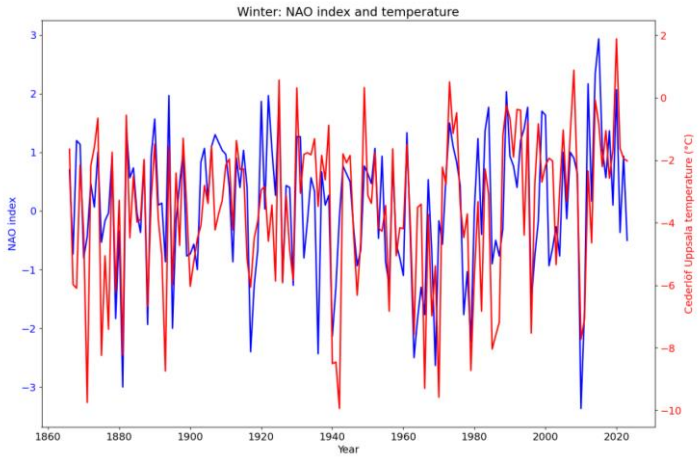

Figure 3. NAO index and winter temperature in Uppsala.

4. Summer

The summer temperature has a very good correlation with the incoming solar radiation, see Figure 4 overleaf.

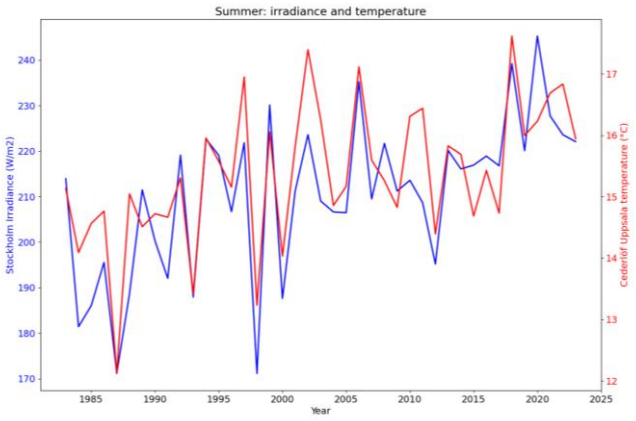

Figure 4. Solar irradiance and summer temperature in Uppsala.

The decreasing cloud cover during the summer also shows a good correlation, but not as good as with irradiance. Especially after ~1995 there is a larger discrepancy. The reason why the correlation is not as good for cloud cover compared to irradiance is not clear. Reasons might be different cloud cover during night and day or cloud cover on different altitudes gives different shielding of the sun. There might also be uncertainties in the ERA5 cloud cover data.

5. Spring and autumn

The situation for the spring is not as clear as for the winter and the summer. It seems to be a pretty good correlation with the wind from west and south. There are probably many factors that affect the spring temperature, not only the wind. Since the spring is a transition from winter to summer, parts of the wind and parts of the irradiance might affect the temperature.

For autumn, the situation is similar to winter. The temperature is very much dependent on the wind from south which in turn is dependent on NAO index.

6. Conclusions

The major driver for the winter Uppsala temperature is the wind from south/west which in turn is dependent on the position of low/high pressure areas in the Atlantic. When a low-pressure area is positioned near Iceland, warm winds from south/west will increase the temperature. Also, the autumn has a similar behaviour as the winter.

For the summer, the incoming solar radiation drives the temperature. The correlation between solar irradiance and temperature is very strong. But for the spring the situation is not as clear. Probably many factors affect the temperature

Since most (or maybe all) of the warming seen since the 1960s can be explained by natural factors, it is hard to see that carbon dioxide emissions could have any large impact on the temperature. Furthermore, since the temperature has natural causes, it may therefore be warmer or cooler in the future.

Guest Editor: Stein Storlie Bergsmark

References

All data and all references can be found on https://mcederlof.se