



**Antarctic (Dome C) temperature and Earth orbital parameters (1 kyr = 1000 years).**

## Sophie’s Planet and Terminations

30 May 2024

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Writing of *Sophie’s Planet* is now proceeding at the pace (4 chapters per month) needed to finish it in 2024; I am into the second half of the book. The style is different than the version started years ago – most chapters now more compact and easier for the nonscientist to read. Nevertheless, it will contain a few chapters that are technical and challenging. Chapter 25 ([Paleoclimate and “Slow” Feedbacks](#)) is one of those, so I invite feedback on that chapter.

The time scale of “slow” feedbacks, including ice sheet disintegration, is a crucial issue that must be understood better to assess the climate threat. “Terminations,” the relatively rapid transitions from glacial to interglacial conditions, are an important source of knowledge about the physics of “slow” feedbacks. Human-made forcing driving the present transition from an interglacial to a super-interglacial – assuming we stay with our present ineffectual emissions reduction strategy – is more than an order of magnitude faster than the natural forcing that drove terminations, so the ongoing transition will be much faster than past terminations.

There is another reason to get into technical stuff on glacial-interglacial climate oscillations, besides the need to understand the physics of “slow” feedbacks. There are well-educated people<sup>1</sup> who do not recognize how much is known from Earth’s climate history. Paleoclimate data show how sensitive climate is to forcings and the magnitude of the consequences, if the forcings are left in force long enough to bring “slow” feedbacks strongly into play. My aim is to describe the paleoclimate evidence well enough in just a few paleoclimate chapters that interested, objective, people will be able to appreciate the implications.

**Why write a book** that mixes climate science with a recounting of energy and climate policy travails? If mistakes of the past are not appreciated, it will be difficult to achieve a stable, beneficial, climate for future generations. The audience I hope to reach is especially young people. I am enthusiastic about the ability of student leaders to understand the climate situation and support the sort of policies that are needed, as I have mentioned in prior posts.<sup>2</sup>

Global fossil fuel emissions will not begin to decline rapidly until there is a rising fee on carbon emissions enforced on a near-global basis via border duties on products made from fossil fuels. Here, however, I want to focus on two related matters – one old and one new: (1) nuclear power, and (2) the increasingly likely possibility that young people will need to take purposeful actions to cool off the planet faster than is possible with even the most aggressive phasedown of emissions and removal of greenhouse gases.

I had no strong opinion about nuclear power when I began to be interested in energy policies about 25 years ago. But as I began to travel with and give talks with environmentalists, some things they said about nuclear power clearly did not have a scientific basis. The strategy to kill nuclear power by making it so expensive that nobody wants it (based on material costs of a nuclear power plant and fuel costs of the fuel, nuclear power should be our cheapest energy) and count on 100% renewables is unfair to young people. Do we have the right to make the decision for them that they must use 100% renewables? What if they do not want German electricity prices? De facto, we made a decision for young people and future generations via the hidden, unlimited, subsidy of “renewable portfolio standards” (as opposed to “clean energy portfolio standards”) and many other actions that denied equal opportunity to drive down costs of nuclear power. On the contrary, disinformation about the danger of low-level radiation served to drive up the cost of nuclear power – there is a long, sordid, story to tell about that, but this is not the time for it.

Instead, I want to point out the analogy with a new story: geoengineering. Old people are geoengineering the dickins out of the planet. Never in the history of planet Earth has there been a drive for global warming at even one-tenth of the rate of the present human-made geoengineering of the planet. Yet there are some people (of the generation responsible for the geoengineering) who believe they have the right to prevent investigation of the options to phase down the massive geoengineering that the old geezers imposed on young people and future generations. Potential consequences are related to and analogous to the consequences of the past lack of the support needed to drive down the cost of modern nuclear power. Just as young people today have been denied the option of ready, low-cost, modern nuclear power to complement intermittent renewable energies, so young people tomorrow may be denied the option of a life-jacket in the event that accelerating climate change drives the climate system toward the point-of-no-return.

Recently Kathleen McCroskey wrote an article<sup>3</sup> in Medium aimed at my organization, CSAS (Climate Science, Awareness and Solutions), in response to our Global warming in the pipeline paper<sup>4</sup> and an update on our research.<sup>5</sup> It “worked,” in the sense that public contributions to CSAS dropped to a fraction, but “fortunately” those have not been our main source of support recently. CSAS was once rescued via a public appeal,<sup>6</sup> but such a support level of the general public was not sustainable or expected. Instead, CSAS has survived for a decade mainly from the support of a few philanthropists or their organizations, as delineated at the end of section 5 of our research update.<sup>5</sup>

This coming fiscal year, beginning 1 July 2024, is a special case. Makiko Sato will retire at the end of December this year. It is impossible to replace her, as she contributes across our program in data set compilations, climate analysis, graphics, and keeping our group together. The essential need is for someone who can maintain, expand, and work with climate data sets. We aim to find someone at an entry level position who is eager to learn – in our view, working with data is at least as interesting and important as climate modeling. If we can afford it, we would like to start someone before the end of the year to have a period of overlap with Makiko. A few months ago, I received an email from someone asking if I would serve as an adviser to an organization that supports climate research. I declined, as I must finish SP this year. He hinted that CSAS might be eligible for support – now I can’t find that correspondence – if you were that person, please contact me!

BTW, my friend Bengt Sundquist has translated the Pipeline paper and the Hopium email to Swedish language; they are available [here](#) and [here](#).

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<sup>1</sup> I could point out a NASA Administrator who said, in effect: why worry about climate change – who are we to say that the present climate is the best one for humanity. But let's not open old wounds.

<sup>2</sup> Hansen J. [A realistic path to a bright future](#). 20 December 2021; [Can young people save democracy and the planet?](#) 8 October 2021

<sup>3</sup> McCroskey K. [Help get geo-engineering stopped before it starts!](#) 22 February 2024

<sup>4</sup> Hansen J, Sato M, Simons L *et al.* [Global warming in the pipeline](#). *Oxford Open Clim Chan* **3(1)**, doi.org/10.1093/oxfclm/kgad008, 2023

<sup>5</sup> Hansen J, Sato M, Kharecha P [Global warming acceleration: hope vs hopium](#). 29 March 2024

<sup>6</sup> Hansen J. [It's a wonderful life](#). 19 December 2019