
Turning Deserts into Paradises: Geoengineering in Science, Practice, and Fiction in the 19th and Early 20th Centuries

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ABSTRACT

This article studies the history of geoengineering in the West in the 19th and early 20th centuries in science, practice, and fiction. Visions of geoengineering at the time, it is argued, were shaped by the birth of climatology, colonial practices and ideals, and widespread techno-optimism. The mutual entanglement of humans and climate was recognised, inspiring speculation over utopian possibilities but also existential threats posed by geoengineering. In light of this history, it is suggested that there is a need to discard framings of geoengineering as a new approach to tackling climate change, rethink simplistic conceptions of Western modernity, and recognise the inherently political nature of technological visions.

I. Introduction

Geoengineering is a contested term without a formal dictionary definition, combining the Greek word *ge*, meaning earth, and *engineering*.¹ The word was first used by the physicist Cesare Marchetti in 1977 in an article that suggested tackling the “CO₂ problem” by injecting CO₂ into the deep ocean.² It gained wider prominence after a 1992 US National Academy of Sciences assessment, which defined geoengineering as “large-scale engineering of our environment in order to combat or counteract the effects of changes in

atmospheric chemistry.”³ At present, geoengineering is commonly understood as a set of speculative technologies aimed at counteracting climate change. A distinction between two forms of geoengineering—carbon capture and solar radiation management (SRM)—is often made.⁴ Proposed SRM methods include brightening sea clouds, deploying mirrors in space, and injecting particles into the atmosphere—which is known as Stratospheric Aerosol Injection (SAI)—to cool the Earth by deflecting sunlight.⁵ SAI, in particular, has been widely

¹ Keith, D. “Geoengineering the Climate: History and Prospect.” *Annual Review of Energy and the Environment*, vol. 25, no. 1, 2000, pp. 245–284.

² Marchetti, C. “On Geoengineering and the CO₂ Problem.” *Climatic Change*, vol. 1, no. 1, 1977, pp. 59–68.

³ *Policy Implications of Greenhouse Warming: Mitigation, Adaptation, and the Science Base*. National Academies of Sciences, Engineering, and Medicine, 1992.

⁴ Shepherd, J. “Geoengineering the Climate: Science, Governance and Uncertainty.” *The Royal Society*, 2009.

⁵ Augustine, G, et al. “Constructing a Distant Future: Imaginaries in Geoengineering.” *Academy of Management Journal*, vol 62, no. 6, 2019, pp. 1930–1960.

discussed after Nobel laureate Paul Crutzen argued that it should be given “serious consideration.”⁶

Attention to geoengineering as a potential tool to address climate change has grown in recent years, with an increasing number of academics, scientists, and policymakers engaging with the subject. A 2023 review by the United Nations Environment Programme (UNEP) concluded that “SRM is the only option that could cool the planet within years.”⁷ SRM is highly controversial, however. Many academics have called for an international non-use agreement.⁸ Concerns have been raised regarding potential negative environmental, climatic, and political effects, among others.⁹ Reflecting the controversial nature of geoengineering, a planned outdoor SAI experiment led by Harvard researchers funded by Bill Gates was cancelled in 2021 after protests from the Saami Council in Sweden.¹⁰

I will use the term geoengineering in this article to refer to intentional climate manipulation. This definition allows for an analysis of the long history of geoengineering.¹¹ Visions of geoengineering, in fact, far predate the current climate crisis. As the climate historian James Fleming emphasises, there is a “perennial story” of

weather and climate modification in Western science and culture, dating back thousands of years.¹² Indeed, weather control can be found in the *Odyssey*, where various gods disrupt Odysseus’ return to Ithaca by conjuring storms.¹³ I draw on Fleming and other scholars tracing the long history of geoengineering in the article.¹⁴ I focus on the 19th and early 20th centuries, a period marked by lively discussions about geoengineering and climate change in the West.¹⁵ Moreover, the vast majority of existing historical research on geoengineering focuses on the post-1945 era, rendering this period particularly rewarding to study.

My aim is to help redress the scarcity of historical perspectives on geoengineering. As with many other technologies, geoengineering is typically conceived of in a “historical vacuum” in contemporary debates that fails to recognise similar technological visions in the past.¹⁶ When history does get mentioned, geoengineering is often portrayed as a new idea, emerging in response to growing concerns with climate change.¹⁷ Geoengineering was previously a ‘taboo’ subject, the story goes, but it is now taken seriously for the first time. A recent article in the *Wall Street Journal* sums this portrayal up well: “[s]cientists are resorting to *once unthinkable techniques* [emphasis added] to

⁶ Crutzen, P. “Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?” *Climatic Change*, vol. 77, no. 3, 2006, p. 216.

⁷ “One Atmosphere: An Independent Expert Review on Solar Radiation Modification Research and Deployment.” United Nations Environment Programme, 2023.

⁸ *Solar Geoengineering Non-Use Agreement*, 2022.

⁹ Robock, A. “20 Reasons Why Geoengineering May Be a Bad Idea.” *Bulletin of the Atomic Scientists*, vol. 64, no. 2, 2008, pp. 14–18.

¹⁰ Temple, J. “Harvard Has Halted Its Long-Planned Atmospheric Geoengineering Experiment.” *MIT Technology Review*, 18 Mar. 2024.

¹¹ Fleming, J. *Fixing the Sky: The Checkered History of Weather and Climate Control*. Columbia University Press, 2010.

¹² *ibid* at p. 2.

¹³ Schneider, S. “Geoengineering: Could—or Should—We Do It?” *Climatic Change*, vol. 33, no. 3, 1996, pp. 291–302.

¹⁴ *see, e.g.,* Bonnheim, N. “History of Climate Engineering.” *WIREs Climate Change*, vol. 1, no. 6, 2010, pp. 891–897; Fleming (n 11) *supra*; Masco, J. “The Age of

Fallout.” *History of the Present*, vol. 5, no. 2, 2015, pp. 137–168; Baskin, J. *Geoengineering, the Anthropocene and the End of Nature*. Palgrave Macmillan, 2019; Scheffran, J. “The Entwined Cold War Roots of Missile Defense and Climate Geoengineering.” *Bulletin of the Atomic Scientists*, vol. 75, no. 5, 2019, pp. 222–228; Oomen, J. *Imagining Climate Engineering: Dreaming of the Designer Climate*. Routledge, 2021; Schubert, J. *Engineering the Climate: Science, Politics, and Visions of Control*. Mattering Press, 2021.

¹⁵ Stehr, N, et al. “The 19th Century Discussion of Climate Variability and Climate Change: Analogies for the Present Debate?” *World Research Review*, vol. 7, no. 4, 1995; von Storch, H, and N Stehr. “Anthropogenic Climate Change: A Reason for Concern Since the 18th Century and Earlier.” *Geografiska Annaler: Series A, Physical Geography*, vol. 88, no. 2, 2006, pp. 107–113; Lehmann, P. *Desert Edens: Colonial Climate Engineering in the Age of Anxiety*. Princeton University Press, 2022.

¹⁶ Bell, D. “Les Tecnòpolis.” *Barcelona Centre For International Affairs*. Nov. 2023, pp. 174–187.

¹⁷ Fleming (n 11) *supra*.

cool the planet because global efforts to check greenhouse gas emissions are failing.”¹⁸ This historical portrayal is not limited to the media but can be found in academic papers as well. For instance, a widely cited paper by Augustine et al. suggests that geoengineering emerged as a response to the climate crisis in the 1970s and 80s.¹⁹

My argument in the article proceeds in three Sections. The following Section surveys the history of geoengineering in science and practice, tracing its links to climatology, colonialism, and techno-optimism. The subsequent Section analyses visions of geoengineering in science fiction, showing how authors imagined both utopian and apocalyptic consequences of geoengineering. The final Section discusses the implications of recognising the long history of geoengineering in the West, arguing for the need to reject framing geoengineering as a new approach, rethink simplistic conceptions of Western modernity, and recognise the politics of technological visions.

II. Geoengineering in Science and Practice

For centuries, thinking about geoengineering has gone hand in hand with thinking about the climate. To understand how geoengineering was envisioned in the 19th century, it is therefore necessary to survey contemporary thinking about the climate. Notably, the climate was becoming a topic of increasing scientific scrutiny in the West in the 19th century. Efforts to collect data and infer general laws about nature gave rise to climate science, or climatology, which from its very inception sought to predict and, ultimately, control.²⁰ As Fleming has argued, the “quest to control nature, including the sky, is deeply rooted in the history of Western science.”²¹

The aim of climate control included presumed societal benefits and political control. Indeed, 19th-century geoengineers “tended to not distinguish between the “natural” and the “social” spheres.”²² Social and climatic improvements were understood as intertwined. In particular, ‘European’ climates were seen as superior and assumed to boost health and productivity. Geoengineering non-European climates thus became an aim of Western scientists and policymakers.²³

Western colonialism played an important role in the emergence of early climate science and visions of geoengineering. Colonial officials sought to “develop more formal, scientific knowledge of colonial atmospheres.”²⁴ This knowledge was important to governments when making decisions on risks and opportunities in colonies. As the environmental historian Lehmann notes, “modern climatology emerged as imperial climatology.”²⁵ Western colonies, particularly in North Africa, were seen as “living laboratories” for experimentation with nature, including the climate.²⁶ The goal was the “Europeanisation” of “indigenous landscapes” to make them suitable for European agriculture and settlement.²⁷ As Mahony and Endfield argue, “ideas of climatic improvement became central to the colonial enterprise” based on beliefs that “Europeans had a right, even a duty, to “civilize” both barbarous peoples and wild nature.”²⁸

A wide range of geoengineering methods were envisioned in the 19th and early 20th centuries. In the US, there were sustained rainmaking efforts. For instance, in the 1890s, in response to sustained droughts, the US government sponsored efforts by the self-proclaimed rain-maker R G Dyrenforth to

¹⁸ Niiler, E. “Scientists Resort to Once-Unthinkable Solutions to Cool the Planet.” *Wall Street Journal*, 14 Feb. 2024.

¹⁹ Augustine et al. (n 5) *supra*.

²⁰ Fleming (n 11) *supra*.

²¹ Fleming (n 11) *supra* at p. 49.

²² Lehmann, P. *Desert Edens: Colonial Climate Engineering in the Age of Anxiety*. Princeton University Press, 2022, p. 8.

²³ *ibid.*

²⁴ Mahony, M, and G Endfield. “Climate and Colonialism.” *WIREs Climate Change*, vol. 9, no. 2, 2018, p. 2.

²⁵ Lehmann (n 22) *supra* at p. 26.

²⁶ Tilley, H. *Africa As a Living Laboratory*. University of Chicago Press, 2011.

²⁷ Lehmann (n 22) *supra* at p. 51.

²⁸ Mahony and Enfield (n 24) *supra* at p. 10.

produce rain through loud explosions.²⁹ In colonial settings, geoengineering efforts were driven by ideas about the inferiority of particular climates. The most common geoengineering scheme introduced was large-scale forest planting and conservation in North Africa, aiming to increase rainfall and reverse desiccation. More radical proposals were debated but never implemented. Many of these projects included flooding deserts in Africa, including the Kalahari and the Sahara.³⁰ For instance, the French engineer François Roudaire envisioned the ‘Sahara Sea’ project in the 1870 and 1880s, which aimed to flood large parts of the Sahara to achieve a more temperate climate in the region.³¹ It ended up unrealised, but was discussed at length among French politicians and was widely publicised at the time. The Arctic was also seen as an undesirable region, inspiring ideas to melt the ice sheets. For instance, Nathaniel Shaler, an American geologist at Harvard University, suggested melting the Arctic in the 1870s by diverting warm ocean currents.³²

The climate science underlying geoengineering visions was enabled by the spread of instruments recording meteorological data in Western colonies.³³ Colonialism allowed climate data from across the world to be collected and analysed by Western scientists. In the early 19th century, climate observations were often made by individual European explorers.³⁴ Over time, however, the collection of climate data became more systematised, contributing to the rise of climatology. In 1836, the German geographer Alexander von Humboldt suggested that the Royal Society use Britain’s

imperial reach to improve the recording of global weather patterns.³⁵ Indeed, toward the end of the 19th century, state-sponsored meteorological stations recorded climate data on a global scale. This data was analysed in Western academic journals and spread during international conferences, culminating in the creation of the International Meteorological Organization in 1873.³⁶

At the end of the 19th century, the climate began to be understood as global in scale and capable of radical change, influencing how geoengineering was conceived. A transnational network of Western scientists argued that local and regional weather patterns were part of a global climate system.³⁷ These ideas were fuelled by the eruption of the Indonesian volcano Krakatoa in 1883.³⁸ The eruption was studied by meteorologists in Dutch-controlled Indonesia and globally. Global effects included disturbances in barometric pressures, cooling, and unusual optical phenomena, lasting several years.³⁹ A scientific report on the eruption by the Royal Society described the “startling character of the worldwide effects to which it gave rise.”⁴⁰ This understanding, the report states, was achieved through “extensive correspondence with all parts of the globe.”⁴¹ The eruption suggested not only that the climate was an interconnected whole but also that it could be transformed, fuelling speculation about global climate change.⁴²

The 19th century also saw the emergence of large-scale climate change theories in the West. Observed data suggested that the climate had radically changed in the past. For instance, in Africa, fossils and cave paintings revealed that the Sahara had previously been

²⁹ Fleming (n 11) *supra*.

³⁰ Lehmann (n 22) *supra*.

³¹ *ibid*.

³² Fleming (n 11) *supra*.

³³ Fleming, J. *Historical Perspectives on Climate Change*. Oxford University Press, 1998.

³⁴ Brännimann, S. “Picturing Climate Change.” *Climate Research*, vol. 22, no. 1, 2002, pp. 87–95.

³⁵ Mahony and Enfield (n 24) *supra*.

³⁶ Lehmann (n 22) *supra*.

³⁷ *ibid*.

³⁸ Asselin, S. “A Climate of Competition: Climate Change as Political Economy in Speculative Fiction, 1889–1915.” *Science Fiction Studies*, vol. 45, no. 3, 2018, pp. 440–453.

³⁹ *ibid*.

⁴⁰ Judd, J. “On the Volcanic Phenomena of the Eruption, and on the Nature and Distribution of the Ejected Materials.” *The Eruption of Krakatoa, and Subsequent Phenomenon: Report of the Krakatoa Committee of the Royal Society*, edited by G Symons et al., Harrison, 1888, p. 1.

⁴¹ *ibid* at p. vi.

⁴² Asselin (n 38) *supra*.

home to forests and large animals. As Bonneuil and Fressoz write, “colonial expansion played a key role in the emergence of reflection on anthropic climate change.”⁴³ The idea that Earth had gone through one or more ice ages also became popularised during the 19th century. The Swiss-American geologist Louis Agassiz put forward the idea of a past glacial epoch in the 1840s, but ice age theories were only widely accepted by scientists towards the end of the century. As a result of glacial theories, Lehmann points out, “Westerners reimagined the earth as a dynamic and changing place.”⁴⁴ Ice age theories suggested that the Earth had a dynamic history involving radical climatic changes. This, in turn, fuelled speculation over the causes of climate change, including the role of humans in producing climate change.⁴⁵

A wide range of climate change theories were presented in the 19th century, predicting both future warming and cooling. Factors such as changes in the Earth’s orbit, ocean currents, volcanic activity, and solar storms were all suggested as potential drivers of climate change.⁴⁶ Cooling due to the gradual heat loss of the sun and Earth was a particular worry of physicists at the time, leading to concerns about future glaciation.⁴⁷ A different theory was presented in 1896 by the Swedish physicist Svante Arrhenius, arguing that variation in the levels of atmospheric carbon dioxide had caused past ice ages, drawing on earlier research by Joseph Fourier and John Tyndall on the greenhouse effect. Arrhenius’ colleague, Nils Ekholm, suggested that humanity could raise the Earth’s temperature by burning fossil fuels, thereby preventing future ice ages. In 1899, Ekholm wrote that “it seems possible that Man will be able

efficaciously to regulate the future climate of the earth and consequently prevent the arrival of a new Ice Age.” This grand possibility, Ekholm continued, could “afford to Mankind hitherto unforeseen means of evolution.”⁴⁸

Visions of geoengineering in the 19th and early 20th centuries reflected the strong techno-optimism prevalent at the time. There was a growing belief in calculability, the idea that the effects of engineering interventions could be accurately predicted if enough data was available.⁴⁹ As a result, large-scale climate interventions were considered feasible; if not in practice, then in theory. It was widely believed that science and technology would over time allow humans to overcome all obstacles.⁵⁰ Since the dawn of the Industrial Revolution, science and technology had radically transformed the natural world. Large-scale engineering projects had been planned and successfully implemented, for example the opening of the Suez Canal in 1869.⁵¹ Hence, the idea that control over the climate was the next step in human evolution, as Ekholm suggested, seemed like a natural conclusion.⁵²

Debates about climate change and geoengineering declined in vitality by the time the First World War broke out and subsequently entered a quiet period in the 1920s and 30s.⁵³ The war ruptured transnational exchanges on climate research which took decades to recover. There was also a problem with an absence of data necessary to validate or refute different climate change theories, meaning scientific debates hit a dead end.⁵⁴ Nonetheless, geoengineering continued to occupy the imagination of scientists and policymakers. Geoengineering was proposed

⁴³ Bonneuil, C, and J Fressoz. *The Shock of the Anthropocene*. Verso, 2015, p. 176.

⁴⁴ Lehmann (n 22) *supra* p. 19.

⁴⁵ Locher, F, and J Fressoz. “Modernity’s Frail Climate: A Climate History of Environmental Reflexivity.” *Critical Inquiry*, vol. 38, no. 3, 2012, pp. 579–598.

⁴⁶ Fleming (n 11) *supra*.

⁴⁷ Lehmann (n 22) *supra*.

⁴⁸ Ekholm, N. “On the Variations of the Climate of the Geological and Historical Past and Their Causes.”

Quarterly Journal of the Royal Meteorological Society, vol. 27, no. 117, 1901 [1899], p. 61.

⁴⁹ Lehmann (n 22) *supra*.

⁵⁰ Asselin (n 38) *supra*.

⁵¹ Lehmann (n 22) *supra*.

⁵² Asselin, S. “Apocalypse, Inc.: Incorporating the Environment into the Boom/Bust Cycle in Fin-de-Siècle Science Fiction.” *New Centennial Review*, vol. 19, no. 1, 2019, pp. 181–204.

⁵³ Stehr et al. (n 15) *supra*.

⁵⁴ Lehmann (n 22) *supra* at p. 35.

in the first US government report mentioning global warming in 1965. The report did not mention limiting fossil fuel emissions but suggested cooling the Earth by dispersing reflective particles in the ocean to deflect sunlight.⁵⁵

III. Geoengineering in Science Fiction

In the 19th and early 20th centuries, geoengineering featured in the new genre of science fiction. The emergence of science fiction in the 19th century was facilitated by a rapid expansion in literacy and scientific knowledge among the Western middle class and a proliferation of cheap printing.⁵⁶ Science fiction emerged in France and England around the peak of Western colonial domination, which is often evident in early works.⁵⁷ Climate science sparked the imagination of authors who envisioned transformative new technologies capable of transforming the climate on both a regional and global scale. These visions of geoengineering in science fiction did not distinguish between nature and society but imagined climate-change technologies radically reordering the world, producing both utopian and apocalyptic effects.⁵⁸

Utopian writing frequently featured weather control, both on a local and global scale. As Meyer has argued, “[v]isions of a perfect earthly future have routinely incorporated a reconstructed earth.”⁵⁹ For example, Feddei Bulgarin speculated in the 1824 novel *Plausible Fantasies* about a future where the Russian Empire has used science to warm its Arctic coast, creating a seaside paradise. Late 19th-century fiction such as *Earth Revisited*

(1893) by Byron Brooks and *Breaking Up* (1896) by Lysander Salmon Richards imagined the Sahara transformed into a fertile landscape.⁶⁰ George Griffith’s *The Great Weather Syndicate* (1906) went even further, imagining a geoengineered utopia on a global scale.⁶¹ In the novel, an English engineer invents a way to control the global climate by establishing weather stations worldwide equipped with “atmospheric disintegrators.” Together with a US businessman, the engineer uses geoengineering to bring a permanent end to war by threatening to unleash extreme weather events and to “increase the fertility of the world by turning deserts into paradises.”⁶² The Sahara is turned into a blossoming landscape and Arctic regions melted. As Griffith writes, “wherever there were waste lands which could be reclaimed through change of climate the same wonders were happening.”⁶³ The techno-optimism at the dawn of the 20th century is starkly on display, as is the colonial idea that the global climate should be adapted to suit Western desires. In all these novels, the idea that climatic and social improvements go hand in hand is taken as a given.

Visions of geoengineering were not solely positive, however. Optimism about rapid technological advancement was not shared by everyone in the West.⁶⁴ Perhaps the most famous science fiction novel featuring geoengineering from the 19th century imagined its catastrophic effects.⁶⁵ In Jules Verne’s *The Purchase of the North Pole* (1889), often referred to as the first-ever work of climate fiction (cli-fi), an American company aims to make a profit by melting the North Pole to access valuable resources presumed to

⁵⁵ “Restoring the Quality of Our Environment.” United States President’s Science Advisory Committee, Nov. 1965.

⁵⁶ Luckhurst, R. *Science Fiction*. Polity Press, 2005.

⁵⁷ Rieder, J. *Colonialism and the Emergence of Science Fiction*. Wesleyan University Press, 2008.

⁵⁸ Williams, R. “Inventing New Worlds: The Age of Manifestos and Utopias.” *The Cambridge History of Science Fiction*, edited by E C Link and G Canavan, Cambridge University Press, 2019, pp. 69–85.

⁵⁹ Meyer, W. “The Perfectionists and the Weather: The Oneida Community’s Quest for Meteorological Utopia,

1848–1879.” *Environmental History*, vol. 7, no. 4, 2002, p. 589.

⁶⁰ Asselin (n 38) *supra*.

⁶¹ Griffith, G. *The Great Weather Syndicate*. F V White and Company, 1906.

⁶² *ibid* at p. 73.

⁶³ *ibid* at p. 312.

⁶⁴ Harpold, T. “European Science Fiction in the Nineteenth Century.” *The Cambridge History of Science Fiction* (n 58) *supra* at pp. 50–68.

⁶⁵ Milner, A, and J Burgmann. “A Short Pre-History of Climate Fiction.” *Extrapolation*, vol. 59, no. 1, 2018, pp. 1–23.

lie underneath.⁶⁶ Their scheme involves shifting the planet's axis by detonating a huge gun to cause global climate change. The catastrophic consequences of the plan are quickly calculated and described in colourful terms: "what a dreadful state of affairs there would be in the world! What cities thrown down, what mountains shaken, what people destroyed by millions, what waters hurled from their beds, what fearful terrors!"⁶⁷ The attempt to melt the North Pole would "menace fourteen hundred millions of people, upset their habits and customs, and disturb their very existence by provoking a general catastrophe."⁶⁸

Similarly, in *The Aerial Brickfield* (1897) by John Mills, geoengineering on a global scale has catastrophic effects.⁶⁹ In this short story, a businessman launches a geoengineering scheme that involves transforming air into bricks to sell people access to any climate from anywhere in the world.⁷⁰ The plan has unintended consequences, however, causing increased rainfall that ruins crops worldwide. It also drains the atmosphere of oxygen, putting everyone at risk. The businessman is thus forced to stop the geoengineering scheme. Had it continued, Mills writes, "the air would have become so thin or attenuated that no one could have breathed with comfort, and thus the human race would have been slowly exterminated."⁷¹ The science fiction of Mills and Verne imagines existential threats from geoengineering, highlighting how humans are united by their shared condition as earthly beings, or as Verne called them, "Terrestrials."⁷² Humans, they show, are vulnerable to geoengineering due to their

fundamental dependency on the stability of the Earth's climate.

IV. Discussion

Examining the history of geoengineering helps fill the historical vacuum characterising present discussions. Visions of geoengineering are much older than often presumed, in turn undermining claims that geoengineering is a new solution to climate change. For instance, Augustine et al. suggest that geoengineering proposals are utopian because they offer "a break from present understandings."⁷³ The history of geoengineering challenges this view. At the same time, studying history undermines attempts to refute geoengineering by referring to it as mere 'science fiction'.⁷⁴ Although geoengineering has featured in science fiction, there is a long history of attempts to implement geoengineering in practice.

Recognising the history of geoengineering also highlights the need to rethink simplistic conceptions of modernity. Visions of geoengineering in the 19th and early 20th centuries, both in practice and in fiction, understood human societies as closely entangled with the climate. This contrasts with the common understanding that Western modernist thinking relied on a sharp distinction between humans and nature and did not fathom any planetary limits to political and technological progress.⁷⁵ Locher and Fressoz call it a popular "myth" about "modern man, oblivious of the impact of his actions and blinded by his faith in progress."⁷⁶ As the history of geoengineering shows, thinking about the intersections between the Earth's climate and human action is not new.

⁶⁶ Verne, J. *The Purchase of the North Pole*. Sampson Low, Marston and Company, 1891 [1889].

⁶⁷ *ibid* at p. 100.

⁶⁸ *ibid* at p. 93.

⁶⁹ Mills, J. "The Aerial Brickfield." *Windsor Magazine*, vol. 6, 1897.

⁷⁰ *ibid* at p. 66.

⁷¹ *ibid* at p. 70.

⁷² Verne (n 66) *supra* at p. 72.

⁷³ Augustine et al. (n 5) *supra* at p. 1934.

⁷⁴ *see, e.g.*, Andersen, G. "Desperate Science Fiction: On How Musk, Bezos, Gates and Google Plan to Escape

Socio-Ecological Collapse." *Culture, Theory and Critique*, vol. 63, no. 4, 2022, pp. 281–295.

⁷⁵ *see, e.g.*, Hamilton, C. *Earthmasters: The Dawn of the Age of Climate Engineering*. Yale University Press, 2013; Burke, A, et al. "Planet Politics: A Manifesto from the End of IR." *Millennium: Journal of International Studies*, vol. 44, no. 3, 2016, pp. 499–523; Lövbrand, E, et al. "The Anthropocene and the Geo-Political Imagination: Re-Writing Earth as Political Space." *Earth System Governance*, vol. 4, 2020, p. 100051.

⁷⁶ Locher and Fressoz (n 45) *supra*.

Rather, as Locher and Fressoz write, “we entered the Anthropocene Age not in a blind modernist geist but saturated with multifaceted reflections and profound worries over human impacts on the climate.”⁷⁷

Finally, studying the history of geoengineering prompts deeper reflection on how and why particular technological visions emerge. Rather than arising as a purely technical solution to the growing threat of climate change, visions of geoengineering are a long-standing feature in the West and always a product of their time. They offer a window into the historical period they emerged in, illuminating particular scientific, social, and political assumptions. For instance, colonial ideals influenced how the purpose of geoengineering was conceived of in the 19th and early 20th centuries, producing schemes aimed at removing deserts and Arctic landscapes. As scholars studying the history of technology have long recognised, technologies are always shaped by the society they emerged in and entrench particular power relations.⁷⁸ Indeed, as many scholars have shown, current visions of geoengineering are not insulated from their social, political, or economic context.⁷⁹

V. Conclusion

Proposals to use geoengineering to tackle climate change are rising on policy agendas

worldwide. However, discussions of climate intervention often lack historical perspective. In response, I sought to invoke deeper historical reflection on the topic in this article by studying how geoengineering was conceived in the West in the 19th and early 20th centuries. I showed how climatology, colonialism, and techno-optimism shaped geoengineering plans and visions. I also highlighted how science fiction imagined geoengineering both as a means of utopian transformation and as a potential existential threat. These visions recognised the intertwined relationships between humans and the climate, I argued, challenging common conceptions of Western modernist thinking. Last but not least, I aimed to encourage thinking about the politics of geoengineering, a topic that will only grow in importance as geoengineering proposals gain traction.

⁷⁷ *ibid* at p. 581.

⁷⁸ *see, e.g.,* Allen, M, and G Hecht. “Authority, Political Machines, and Technology’s History.” *Technologies of Power: Essays in Honour of Thomas Parke Hughes and Agatha Chipley Hughes*, edited by M Allen and G Hecht, MIT Press, 2001, pp. 1–23; *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, edited by W Bijker et al., MIT Press, 1987; Winner, L. “Do Artifacts have Politics?” *Daedalus*, vol. 109, no. 1, 1980, pp. 121–136; Jasanoff, S. “Future Imperfect: Science, Technology and the Imaginations of Modernity.” *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, edited by S Jasanoff and S Kim, University of Chicago Press, 2015, pp. 1–33.

⁷⁹ *see, e.g.,* Yusoff, K. “The Geoengine: Geoengineering and the Geopolitics of Planetary Modification.” *Environment and Planning A: Economy and Space*, vol. 45, no. 12, 2013, pp. 2799–2808; Horton, J, and J Reynolds. “The International Politics of Climate Engineering: A Review and Prospectus for International Relations.” *International Studies Review*, vol. 18, no. 3, 2016, pp. 438–461; Szerszynski, B. “Coloring Climates: Imagining a Geoengineered World.” *The Routledge Companion to the Environmental Humanities*, edited by U Heise et al., Routledge, 2017; Corry, O, and N Kornbech. “Geoengineering: A New Arena of International Politics.” *International Relations in the Anthropocene*, edited by D Chandler et al., Palgrave Macmillan, 2021.