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Book Review of *Geoengineering, Persuasion and the Climate Crisis A Geologic Rhetoric*: Ehren H. Pflugfelder, University of Alabama Press, 2022.

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***Geoengineering, Persuasion and the Climate Crisis: A Geologic Rhetoric*.**
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The 2022 book *Geoengineering, Persuasion & the Climate Crisis: A Geologic Rhetoric* by Ehren Helmut Pflugfelder investigates an element of climate change that has received little consideration: geologic rhetoric. I began reading this book with an environmental and geological perspective in my mindset, but the book quickly became a synthesis of rhetoric, geology, environment, climate science, and risk communication, all of which prompted me to embrace its complexity. The book is technical and freely uses chemical names and geoengineering jargon, yet it is an enlightening rhetorical account from a scientific perspective on the global climate catastrophe. According to Pflugfelder, geoengineering denotes "the complex scientific and engineering strategies that intend to change some aspect of the earth on a large scale, with the end goal of altering the earth's entire climate system" (p. 3). This technique could be an interesting approach to combating the existing climate change crisis. Pflugfelder's focus of his research on environmental risk and communication makes this book a valuable resource in graduate courses focused on technical and professional communication (TPC), environmental communication, environmental rhetoric, science communication, rhetorics of science and technology, and social justice.

The book has six chapters, excluding the Introduction and Conclusion. Introduction subtopics include "Tipping Point Exigence," "A State of Exception," "Geoengineering Kairos," and "A Geologic Rhetoric." These subtopics provide a complete summary of the book and emphasize its relevance to TPC, beginning with 65 million years of geological history and the presence, evolution, and extinction of various animal and plant species.

Pflugfelder introduces geologic rhetoric in Chapter 1, "A Geologic Rhetoric." He argues in the introduction that, "because of recent climatic stability and the dominance of what Bruno Latour calls the 'modern constitution,' it has taken the threat of climatic collapse in Western countries for a renewed attention to geologic and climatic issues to emerge" (p. 23). Modern constitution here signifies a system of law that maintains a distinction between political and scientific power, as well as between nature and culture. He defines geologic rhetoric as "a collection of ideas about how persuasion sediments, and we can observe this emerging rhetorical work in recent environmental and material rhetorics" (p. 23). The chapter clarifies several myths about research in Western humanities and assumptions about geology. It then implies that science rhetoric may not solve these issues (p. 30). By saying that geologic rhetoric does not assume these linkages based merely on logic or reasoning (a priori), the author implies that these ties have always been deep in the Earth's primordial epoch. The chapter first challenges geologic rhetoric and then explores the role of geoengineering in tackling climate crisis.

The second chapter, "CO_2 and Stasis," provides a theoretical foundation for studying CO_2's persuasive ability in varied power networks. Pflugfelder claims that "because CO_2 functions as matter whose discursive-material relations have resulted in starkly contrasting versions" (p. 64), geoengineering requires a rhetorical study of CO_2. Pflugfelder's work challenges traditional human-centered agency by examining how non-human entities like CO_2 shape rhetorical

ecologies, a trend in environmental rhetoric and science studies that questions material forces' contribution to meaning and action construction and emphasizes the interconnectedness between humans and the environment. In this theoretical chapter, Pflugfelder examines how ontological enactments have created different versions of CO_2 and potential overlap sites where ontologies could agree more. He also discusses CO_2's many climate models and how CO_2 was assumed to be self-regulating as water vapor since an increase in CO_2 would raise the Earth's temperature and increase sky water vapor. Pflugfelder grounds his alternative CO_2ontology in years of economic experience and feels that economic CO_2 is indispensable. Environmental economic ontology defines CO_2 by its location in commercial and industrial assemblages, yet too many individuals see declining CO_2 emissions as an economic loss. Thus, this chapter examines the dispute between advocates of the climate model of CO_2, who say that CO_2 causes global warming, and advocates of the economic model of global warming, who deny the climate model and blame natural causes.

The third chapter, "Geoengineering Risk," discusses literal geoengineering risks, including environmental and ecosystem damage, disrupted global rainfall, species redistribution, decreased enthusiasm for CO_2 mitigation efforts, amplified political discord, and catastrophic technology failure. Pflugfelder, citing Robock, implies that Solar Radiation Modification (SRM) alone may not be sufficient to prevent a disruptive precipitation pattern that would cause harmful algal blooms due to atmospheric CO_2 accumulation and ocean fertilization. In this chapter, Pflugfelder emphasizes danger. The threats of greenhouse gas (GHG) emissions to the climate have forced policymakers to give geoengineering some consideration for hundreds of years. Ulrich Beck's theory of a risk society helps one understand how Western industrial fossil fuel extraction practices spanning hundreds of years distribute and generate risk. Pflugfelder applies Beck’s theory in subsections like "Rhetoric of Risk," "Geologic Rhetoric in a Risk Society," "Sub-political Actors," and "Persuasive Geosocial Risk" (p. 110). The chapter extensively discusses climate change risk factors and geoengineering as a remedy.

In the fourth chapter, "Rogue Engineering," Pflugfelder discusses one strain of geoengineering research in which its theoretical frameworks, lab-based studies, real-world examples, and modern entrepreneurial geoengineering are superficially related. The author uses the terms techne$_1$ and techne$_2$, where techne$_1$ refers to the knowledge and abilities that are based on traditional craft, and techne$_2$ comprises the complex technological systems and processes that are indicative of modern industry and digital innovation. He claims that techne$_1$ is based on a stable notion of nature, whereas techne$_2$ is not. Through such distinctions, readers can better comprehend rhetoric as an art and a skill which improves their persuasive communication. Several for-profit organizations are testing potential future geoengineering approaches while misinterpreting scientific data and claiming to comprehend natural forces. They are developing new start-up enterprises, which, if we consider the risk, could result in losses of both employment and capital.

The fifth chapter, "Homo Faber," examines how cybernetics theory shaped the Anthropocene and geoengineering. The term "noosphere" is defined in the chapter as "the world of thought," and it is used "to mark the growing role played by mankind's brainpower and technological talents in shaping its own future and environment" (p. 139). Pflugfelder observes how cybernetics utilizes the term noosphere to describe a layer of human mind around Earth.

Pflugfelder looks at how Homo Faber, the Anthropocene, cybernetics, and other concepts connect with the noosphere. Though seemingly opposing concepts, he argues that both cybernetics and noosphere are related and required for understanding the challenging concerns of geoengineering and climate change (p. 141). Understanding the concept of the "noosphere" will help one handle the moral and pragmatic issues that arise when one considers how people influence the planet overall. He also believes that vitalism, geology, and cybernetics theory inspired the noosphere.

The Anthropocene has seen fossil fuel overuse, CO_2 emissions, population growth, industrial agriculture, nitrogen fertilizer misapplication, species extinction, extreme forest fires, deforestation, toxic pollution, and ozone hole expansion. Increased greenhouse gas emissions from these activities worsen climate change. In this chapter, Homo sapiens are blamed for the world's climate problems, and geoengineering is proposed as a remedy. According to the chapter, Homo Faber—tool-makers—is the next type. The Roman statesman and writer Appius Claudius Caecus, who built the first major road and aqueduct in ancient Rome, said, "Every human is the architect of his or her own destiny" (Lynas, quoted on p. 145), making geoengineering a natural development of human capability and one of the few significant methods to mitigate global warming. In many different ways, such as Solar Radiation Management (SRM), Carbon Dioxide Removal (CDR), geoengineering could be helpful in mitigating climate change effects.
To further demonstrate the concept of geoengineering resilience, Pflugfelder uses simplified Keeling Curve graphics, the most famous visual representation of global warming (p. 154). The Keeling Curve image has become a symbol for the relationship between human activity, CO_2 emissions, and serious climate change (p. 155). Direct Air Capture (DAC) and Stratospheric Aerosol Injection (SAI) increase the Stratospheric Precipitation Index (SPI), which can quickly return the global temperature to normal. The efforts of Homo Faber, the toolmaker, and the tool user resulted in these strategies.

The sixth chapter, "Geologic Violence," delves into the Anthropocene's latent assumptions about human capacity. Eco-modern arguments that promote the utilization of technology and human creativity to tackle environmental concerns might overpower Western brutality while creating a new climatic system. Here, Pflugfelder begins with several thought-provoking questions, such as "What would the ideal geoengineering look like?" "Is it virtually energy-neutral?" "Would it be cost-effective, or at the very least show the possibility for future cost savings?" Other practical methods for mitigating climate impacts include atmospheric Carbon Dioxide Removal (CDR), afforestation (which may take longer but which may be the sole answer to calamities faced by people and species worldwide), and saving species on Earth (pp. 161–162). While technologies have many advantages, they can also contribute to environmental damage. Pflugfelder divides geologic violence into two categories: the first considers the results of a rhetorical communication problem, in which more information about geoengineering increases the likelihood that it will be accepted as a deliberative strategy; the second, however, is much larger in scope than the moral hazard issue. Pflugfelder argues that geoengineering will increase moral hazards because of its ability to conceal both slow and spectacular histories of violence.

In the final chapter, Pflugfelder details how alternative deliberative rhetorics can be developed to limit the expansion of discursive-material forces. He emphasizes his dissatisfaction with the emergence of geoengineering and his unease with ecomodernism's theoretical assertions,

whether read as "green" environmentalism, a romantic sense of 20th-century environmental activism, or the audience of sentimental "wildlife lovers." He adds, "With a more geologically attuned approach to deliberation, we could finally believe in our unstable earth and work alongside it, within it, in all the complexities of our being, to create a future that is livable, sustainable, and more just" (p. 186). A strong awareness of Earth systems improves environmental technical communication by providing the fundamental understanding needed to evaluate impacts, support cooperation, and advance sustainable practices, thereby allowing effective communication. This knowledge is fundamental for a thorough and well-informed treatment of environmental problems.

To conclude, this book is a revelation for TPC, geoengineering, and environmental rhetoric academics who aspire to imagine a more just, less exploited world that provides a more sustainable habitat for future generations. Geoengineering strategies, while not ideal, may be one of the most effective ways to accomplish this goal. Pflugfelder's book is excellent in terms of substance and research. Environmental justice is a concern being increasingly explored in rhetoric and technical communication teaching and scholarship, and such work inevitably requires understanding and working across most, if not all, technical and scientific disciplines while equally exploring those studies' intersections with rhetorical and communication scholarship.