

James Rodger Fleming. *Fixing the Sky: The Checkered History of Weather and Climate Control.* Columbia Studies in International and Global History Series. New York: Columbia University Press, 2010. Illustrations. xiv + 325 pp. \$27.95, cloth, ISBN 978-0-231-14412-4.



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In *Fixing the Sky*, James Rodger Fleming traces human efforts to control weather and climate from ancient rain dances to contemporary high-tech, big-budget geoengineering. This often bizarre and sometimes fascinating story proves to be, in the author's words, "a tragicomedy of overreaching, hubris, and self-delusion" (p. 2). Fleming argues consistently and persuasively that plans to tinker with the atmosphere have been ineffective at best and dangerous at worst. This interesting and original work, building off of Fleming's previous studies of meteorology and climate science history, provides valuable perspective on what may soon become serious policy debates over how to respond to global warming.

The book begins in chapter 1 with an account of atmospheric control schemes in myth and fiction. The best known of these stories--and perhaps the most appropriate metaphor for geoengineering--remains the ancient Greek legend of Phaeton crashing the sun god's chariot and scorching the earth. However, as the author argues, most weather control stories have tended more toward

the farcical than the tragic, much like early weather control efforts themselves. In chapters 2 and 3, *Fixing the Sky* catalogues such schemes up through the early twentieth century, which ranged from deliberate forest fires to "hurricane cannons," and follows the typically unedifying careers of their inventors.

The plot thickens with the history of fog dispersal in chapter 4. In this case, fantastic nineteenth-century designs involving aerial sprays of electrified sand gradually evolved into more serious and even modestly successful WWII-era projects to clear runway visibility for Royal Air Force (RAF) fighters, employing giant bursts of burning gasoline. Projects like these, along with tremendous wartime investments in meteorology and climate science, launched an enduring and at times disturbing collaboration between would-be climate engineers and the military, explored in chapters 5 and 6. In a pattern familiar from Edmund Russell's history of insecticides (*War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* [2001]),

Fleming finds that war provided both a justification and an uncontrolled testing ground for potentially disastrous experiments with nature. Among other examples, the book recounts American attempts to flood the Ho Chi Minh Trail through cloud seeding and Soviet efforts to make clouds over the Chernobyl nuclear disaster rain out their radioactive particles on Ukraine before reaching Russia.

The final chapters examine the origins and prospects of modern climate modification proposals proffered to counteract anthropogenic greenhouse emissions. Time and again, *Fixing the Sky* emphasizes the plans' vast overconfidence in simplified computer models and their tremendous engineering hubris with scant consideration of possible side effects and unintended consequences. Fleming also demonstrates that many current suggestions--from flooding the Sahara to spraying the stratosphere with sulfates--have been circulating for decades, their scientific credentials still uncertain and their drawbacks long apparent. Emphasizing the considerable expense, impracticality, and unpredictability of even the least far-fetched geoengineering schemes, the book ends with a plea for a "middle course" of mitigation and adaptation: "amenable to all, reasonable, practical, equitable, and effective" (p. 268).

Fixing the Sky is oriented primarily toward historians, albeit with a policy agenda that can occasionally stray into polemics. On occasion, the reader could use more specific criticism of the climate engineers' proposals and less caricature of their personalities. More basic scientific background on such subjects as planetary albedo and cloud formation would also help readers better follow the logic and illogic of various weather control schemes. Furthermore, the book offers only passing explanations of current anthropogenic impacts on atmosphere and climate, sometimes rendering it more difficult to place deliberate geoengineering plans in context. For in-

stance, recent meteorological investigations indicate that current emissions of sulfates and particulates already have extremely complex and often counterintuitive effects on cloud formation and rainfall.[1] While studies such as these only emphasize the dangerous uncertainties of tinkering with the sky, they also illustrate the degree of anthropogenic interference already in place. Likewise, Fleming makes only passing reference to William F. Ruddiman's thesis (in *Plows, Plagues, and Petroleum: How Humans Took Control of Climate* [2005]) that human deforestation and agriculture have been altering climate for millennia. The inherent fascination of the topic and Fleming's strong, critical presentation deserve to attract scholarly attention and will be sure to invite discussion and debate. While certainly of interest to environmental historians studying weather and climate or war and nature, the book engages as much or more with history of technology and envirotech literatures. In terms of use in class, the technical nature of some of the subject matter and the length make it less suitable for an undergraduate audience and probably more appropriate for upper-level seminars. That said, it remains refreshingly readable and free of jargon throughout.

Fleming has provided another valuable contribution to the still tiny but emerging historiography of global warming. The story of weather and climate and control schemes sheds light both on the cultural history of weather and climate and on the more specific challenges of climate change policy, especially in America: the obsession with technological fixes, the shortage of sound science, the illusion of mastery over nature, and the impulse to do always something more when often we may need to do something less.

Note

[1]. For an overview of such research, see, for instance, the recent review article Urs Baltensperger, "Aerosols in Clearer Focus," *Science* 329 (2010): 1474-1475.

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[1] Edmund Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (New York: Cambridge University Press, 2001).

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[3] William F. Ruddiman, *Plows, Plagues, and Petroleum: How Humans Took Control of Climate* (Princeton, NJ: Princeton University Press, 2005).

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