

On geoengineering questions made architectural

Book review: *The Planet After Geoengineering* by Rania Ghosn, El Hadi Jazairy, with contributions from Benjamin Bratton, Holly Jean Buck, and Kathryn Yusoff. (New York: Actar, 2021)

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The Planet After Geoengineering is a serious graphic novel that exploits interdisciplinarity and critical visuality to raise awareness of systems for climate modification. The novel is the latest iteration of a series of research projects produced by Design Earth: a collaborative design practice co-founded by Rania Ghosn and El Hadi Jazairy of the MIT Architecture faculty. Design Earth employs speculative architectural projects to bring geographic imagination to the climate crisis. In this book, Design Earth embrace the creative processes, tools and outcomes associated with architectural design research to conduct a critical inquiry into geoengineering: technologies aimed at counteracting the effects of the carbon damage that humans have been doing to the earth's systems. The novel is grounded in deep research into the science and technologies of geoengineering as well as studies of the wider political and geographical impacts associated with such planetary interventions.

Much of this book's significance lies in its ability to place equal importance on both the medium and the message of its argument. It employs the particularity of the graphic novel genre and modes of design fiction – or what can be called 'thinking through fiction' – to reframe questions of geoengineering, providing a visual, spatial and geopolitical dimension to those questions. Design Earth have translated and compressed their research outcomes into a set of poetically choreographed *tableaux*: a compilation of meticulous collages combining composite drawings, axonometric projections, perspective, and section views. These *tableaux* become the backdrop of a series of hypothetical 'what if?' scenarios that explore geoengineering practices as an 'emergency medicine' for global warming or a risky gamble that can bring irreversible harm on a planet-wide scale.

The graphic novel consists of five stories: 'Petrified Carbon'; 'Arctic Albedo'; 'Sky River'; 'Sulfur Storm'; and 'Dust Cloud'. Each story explores and provokes questions concerning possible near-future scenarios following the deployment of a specific planetary geoengineering solution, respectively: carbon capture and sequestration; albedo modification; cloud seeding; sulfur aerosol injection; and solar mirrors. The stories follow the traditions of dystopian worlds common in certain strands of graphic novel, setting out pessimistic speculations about the earth which are extrapolated from the current geopolitical *status quo* and outcomes of the past application of similar climate technologies. The book concludes with three framing essays by Kathryn Yusoff, Benjamin Bratton and Holly Jean Buck which situate the graphic novel back

into its broader academic context from three different disciplinary angles: geography; visual arts; and environmental science. The essays reflect upon the future of the earth under the climate crisis, and the hope and worry associated with the geoengineering ‘gamble’.

The novel evokes glimpses of Jules Verne’s *The Purchase of the North Pole*¹ which induced an early vision of geoengineering. In Verne’s novel, a plan to level climate by eliminating the tilt from the earth’s axis was envisioned as a celebration of the possibilities brought by science and technology. By contrast, this book offers a less optimistic perspective of science and technology, built on a legacy of mistrust accumulated through previous misuses in the twentieth century and a history of the broken promises of ‘fix-it-all’ technologies. While the book takes a precautionary interest in climate modification practices, attempting to present both pros and cons, it nevertheless seems to lean against geoengineering intervention. The different stories imply a sense of distrust towards the political and economic actors involved in geoengineering, who have allegedly profited from contributing to global warming and are, seemingly, also to benefit from fixing it. This is emphasised in the tone of the text, the dark colour palette, and rough strokes in the illustrations which together create an atmosphere of imminent danger. The book asks the reader to pause and reflect on the fate of the threatened earth, humanity and civilisation if the climate *status quo* is not tackled or is tackled incorrectly.

The first two stories in the novel in particular raise questions of motive and trust. ‘Petrified Carbon’ imagines the repurposing of oil extraction infrastructure into carbon warehouses, whilst cities are transformed into machines that capture carbon and release fresh air. Here, carbon becomes the new ‘cool’: the source of clean air, and wealth! ‘Arctic Albedo’, on the other hand, depicts the implementation of albedo modification technologies by the deployment of floating dome structures to act as artificial glaciers: a substitute for the melting sea-ice which simulate its ability to reflect solar radiation. As in ‘Petrified Carbon’, this story points-out the enormous economic opportunities arising from decreased sea ice: uninterrupted ship traffic, increased potential for exploiting under-ice oil and gas reserves, the domestication of greenhouse gases into technological applications, as well as a prospering timber industry that benefits from replacing natural forests by targeted tree plantation programmes. In both stories, global economic beneficiaries seem to be winning either way: once by polluting the planet, and then again by recovering it: ‘It is all upside down.’²

Subsequent stories in the book illuminate another side of the concerns surrounding climate modification. They visualise possible horrors of toxicity to air and living organisms, as well as the social and political division caused by water – and possibly air – conflicts between highlands and lowlands, nations that control geoengineering technologies and those who helplessly sit at the receiving end. The story of ‘Sky River’ illustrates the potential of cloud seeding technologies to alleviate drought and irrigate the desert. This glimmer of hope, though, brings to mind the controversial history of cloud seeding systems in terms of ‘weather as weapon’ campaigns promoted in the second half of the twentieth century and applied in the Vietnam war. The story concludes with a *tableau* of a split sky between rain and drought, setting out the new structure of power and a further divide between richer and poorer nations. ‘Sulfur Storm’ and ‘Dust Cloud’ revolve around Solar Radiation Management (SRM)

schemes designed to deflect sunlight away from the earth. The first story involves the release of sulfate aerosols into the stratosphere to replicate the cooling effect which naturally occurs in volcanic eruptions. The second concerns the creation of an artificial shield of asteroid dust near the sun-earth Lagrange L1 to reflect sunlight into space. Each of the two stories opens with an optimistic technological fix for the warming planet but concludes with a dystopian ending. The outcomes of the two geoengineering systems are climate-engineering weapons used in warfare, a stark division where the elite winners of the climate crisis live in crystal air utopias, while climate outcasts suffocate under accumulated dust and smoke that dull the ozone-depleted sky.

This book can be seen from two angles: as a speculative graphic novel and also as an example of creative processes of design research in architecture. While a few comic books and graphic novels have occasionally addressed the climate crisis, *The Planet After Geoengineering* is unique in this genre in its focus on climate modification technologies. Examples of such representations include a story in the *Super Sons* graphic novel, in which Superman was asked to help with finding an artificial way to block the sun's rays in order to tackle the rapidly warming earth, featuring some inspiration from Solar Radiation Management (SRM) approaches.³ In a more direct – albeit brief – manner, Grady Klien and Yorum Bauman's *The Cartoon Introduction to Climate Change*⁴ visually reviewed the option of geoengineering to tackle climate emergency, adding an economic dimension to the question of 'Is it the life-saving medicine?'. In this context, the book stands out as a dedicated research-informed graphic novel that is thorough and sophisticated in its handling of the geoengineering dilemma.

The book is also unique as an example of the unconventional outcomes of a design research process in architecture. As research, the book relies on a series of methodological devices to build its argument and convey its message. These devices include the visual criticality brought about by its atmospheric illustrations, and the speculative perspectives afforded by employing design fiction, in addition to the accessibility granted by using the graphic novel genre as a platform for demonstrating and communicating the research argument. Rather than serving as simple diagrams or data visualisations, the book's visual and textual narrative forms the basis for both the research outcome and its means of inquiry and communication. Through illustrations and text, the book strikes a delicate balance between a strong graphic and visual approach, which needs to be exaggerated and pithy, and an academic writing style, which prefers understatement and deliberation.

The book employs various aspects of what Simon Grand (2011) describes as the toolbox of design fiction. These include 'projection', 'experimental systems', and 'multitude'.⁵ By interpreting their research through the medium of a graphic novel, the authors have blurred the line between reality and fiction and offered a space for projection: the possibility for the creation of other worlds in reference to the actual one. The imaginary setting brought by the 'what if?' scenarios in the novel serves as an experimental system that allows exploring hypotheses and opening up a space for a multitude of possible perspectives on geoengineering that extend beyond one-sided views over-relying on scientific and technological premises. By deliberately entering the metaphorical realm through speculative fiction and graphic novel genre, the book

has been able to exaggerate reality and push it to the extremity of fantasy, granting the authors temporary authority to examine other logics about geoengineering that could not be fully explored through other mediums.

Nevertheless, while the book seems to fall somewhere between a graphic novel and the outcome of a research project, it does not entirely fit either category. In its current format, the book is much closer to an illustrated book than to a graphic novel. This is evident in the clear separation of the text from the visual and also from abandoning the commonly used technical elements of graphic novels such as panels, gutters, and speech balloons. To fit the graphic novel formula, the authors have divided the large-scale atmospheric illustrations they previously produced for a Venice Biennale installation into a series of zoomed-in sections to form the novel's storyboards. The close-ups, though, sometimes fail to convey the holistic picture offered by the full *tableaux* (which are only present in the book's cover and table of contents). This raises questions regarding whether the book in its current form is the most effective medium for conveying its message, particularly when compared to the Venice animation which featured the same *tableaux* and narrative.

Moreover, the book does not share the intensive research process that the authors have evidently gone through to produce the sophisticated graphical illustrations. It touches upon parts of the 'what' and the 'why' questions surrounding the background research but does not shed much light on the 'how' element. In addition, while its textual narrative is crisp and carefully written, it might be too complex and compact for the general reader. The novel's intended audience needs to have some prior knowledge of the subject. On the other hand, although the visual atmosphere that the illustrations create is intriguing to both specialists and non-specialists, those illustrations may need further contextualisation in their wider frame of reference for an academic reader to allow the process of research inquiry to be widely accessible and transferable for other scholars. This has not, however, decreased the quality of the book as a product of design research but rather affects its ability to engage a wider audience.

The Planet After Geoengineering makes the reader curious to know more. The illustrations are full of clues and mystical objects that ask the reader to unpick (the inclusion of a series of Khufu pyramids, and Burj Khalifa to name a few examples). The book could, therefore, form a basis for an extended edition in which the storyboards are dismantled into a dialogue-based narrative that, in turn, could provide an opportunity to present a side of the research process and unravel the cypher of the hidden clues left in the *tableaux*.

The book presents architecture as a discipline well-equipped to speak about, and visualise, the climate crisis. It demonstrates how architectural skills and knowledge can contribute differently to the broader effort to address climate change. Using the power of interdisciplinarity afforded by the openness of the architectural field to deploy tools and methods from other disciplines, the book brings a spatialised geographical imagination to its narrative. This, in turn, allows the geoengineering question to move beyond conventional patterns of thinking tethered within specialised disciplinary knowledge. The book is also a statement on design research in architecture. It shows how a mastery of visual methodologies can present strong critical tools

for examining and communicating a research narrative, allowing the inclusion of space and time in an argument. The book represents an example of a newly-forming generation in architectural design research: one that has long left behind the first challenges of ‘is design considered research?’ and exploits broader possibilities identified by a second generation through visual tools of inquiry matured in the last ten years or so. By doing so, the book presents a confident move towards conceptualising a third generation of architectural design research that should seek further social and political emancipation, employing the skillset of architectural knowledge, the critical use of visual media, and interdisciplinarity to achieve a broader impact of this type of research in architecture on a planetary scale.

Notes

1. Jules Verne, *The Purchase of The North Pole* (Altenmünster: Jazzybee Verlag, 2014).
2. Rania Ghosn and El Hadi Jazairy, *The Planet After Geoengineering* (New York: Actar, 2021) p. 6.
3. Ridley Pearson and Gonzalez Ile, *DC Comics Super Sons: A Graphic Novel: The Polarshield Project, April 2019* (Milwaukee: Penworthy Company, LLC, 2019).
4. Yoram Bauman, Grady Klein, *The Cartoon Introduction to Economics, Volume I: Microeconomics* (New York: Farrar, Straus and Giroux, 2010), pp. 145–58.
5. Simon Grand, ‘Research as Design: Promising Strategies and Possible Futures’, in *Mapping Design Research: Positions and Perspectives*, ed. by Simon Grand and Wolfgang Jonas (Basel: Birkhäuser, 2011), pp. 155–75, (p. 168).