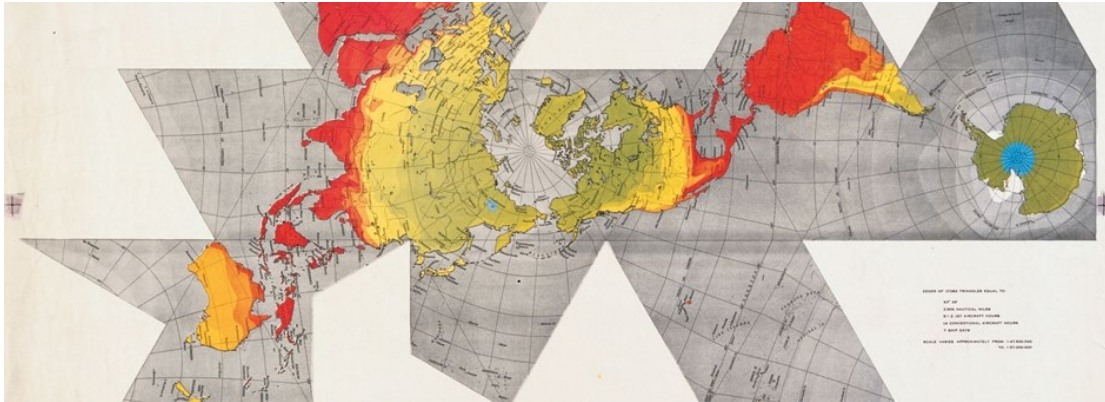


Histories of World-making through Science, Technology and Design



The Dymaxion Map – Buckminster Fuller

Academic Units: 4
Pre-requisites: None
Instructor: Dr May Ee Wong
Email: myewong@ucdavis.edu

Seminar time and day: Fridays, 1.30 – 5.30pm
Location: LHS-TR+29

Class description

‘The Anthropocene’ was announced by geologists and scientists as the most recent period in Earth’s history. It is named for anthropogenic activity, which is characterised by the human species’ use of science and technology in altering the earth. While the temporal designations and meaningful boundaries of this classification are up for debate, the planetary dimension of ‘the Anthropocene’ has brought up the question of scale in the construction of history and the future. It has also brought up the impact of constructions of scale enacted through science, technology and design, that have made Earth a legible object.

This class explores the making of the world as planet through the critical notion of worlding, as expressed by feminist philosopher Donna Haraway, that looks at the world as material-semiotic worlds in which “natures, cultures, subjects and objects do not pre-exist their intertwined worldings” (2016). It explores histories of how some forms, ideas and practices of science, technology and design – as seen in the development of the ecological and colonial botanical sciences, industrial technology and infrastructure, modernist architectural, urban planning and media environment design, the post-World War II

military-industrial complex, and planetary science – have projected, shaped and produced the world/planet as systems of knowledge, sociotechnical imaginaries and controllable environments from the 19th century onwards. We will also look at how worlds are reimagined or reconstructed in analysing visual texts, a climate change speculative fiction novel, and in engaging with readings from Science, Technology and Society studies.

Class format:

This is a seminar class. Class time will be devoted to lecture, seminar discussions based on the readings of the week, group presentations, preparation for assignments and to addressing questions.

Learning Objectives:

In this class, students will learn

- various arguments and critiques pertaining to the categorisation and interpretation of ‘the Anthropocene’
- ways in which forms, ideas and practices of science, technology and design have historically shaped the world/planet as systems of knowledge, sociotechnical imaginaries and controllable environments, and the histories behind them
- how to analyse and contextualise visual/literary texts and material objects and practices as cultural objects of study and as cultural history
- how to use various disciplinary methods and perspectives to construct a historical argument and a ‘global’ history
- how to theorise and critique the relationship between the past, present and the future with respect to various ideologies and applications of science, technology and design

Assessments and Expectations:

- Museum Review – 15%
- Group presentation – 20%
- Reading responses – 20%
- Final essay – 45%

Museum Review – 15%

Students will publish a blogpost/web entry that reviews the Lee Kong Chian Natural History Museum. The blogpost/entry should be of approximately 300 – 500 words and should feature at least one image. The review should reflect your overall impression of the curation and design of the Museum in relation to its context, and an analysis of one or two exhibits or features of the site. The review should be published online by the **4th of February 2021, Thursday, 11.59pm.**

Group Presentation – 20%

In groups, students will provide a 15 – 20 minute presentation on the history of a chosen object/ image/ entity (living, inanimate, etc.) as part of a curated exhibition or an atlas on the ‘Anthropocene.’ The presentation will take place during the seminar.

The presentation should include an introduction to the broader thematic framing of their proposed exhibition/atlas that explains what their conceptualisation of the ‘Anthropocene’ is. It should also involve a visual and/or material component (either presentation slides or webpage or other visual presentation forms) to communicate the history of the object/image/entity within the exhibition/atlas. This history should be based on primary and secondary sources.

Here are some readings/examples that you can refer to for initial inspiration:

- *A History of the World in Seven Cheap Things* by Raj Patel and Jason W. Moore
- *Reset Modernity!* Edited by Bruno Latour and Christopher Leclerc - <https://zkm.de/en/exhibition/2016/04/globale-reset-modernity/>
- *Feral Atlas* (featured in Week 13’s reading list)
- “Introduction: Lexicon for an Anthropocene Yet Unseen” - <https://culanth.org/fieldsights/introduction-lexicon-for-an-anthropocene-yet-unseen>
- “An Anthropogenic Table of Elements” - <https://culanth.org/fieldsights/series/an-anthropogenic-table-of-elements-1>
- “Welcome to the Anthropocene: The Age of Humans” - <https://www.esri.com/en-us/maps-we-love/gallery/anthropocene>
- *A History of the World in 100 objects* (podcast) - <https://www.bbc.co.uk/programmes/b00nrtd2/episodes/downloads>
- *Object Lessons* - <http://objectsobjectsobjects.com/books/>
- “Writing the Implosion: Teaching the World One Thing at a Time” – Joseph Dumit <https://journal.culanth.org/index.php/ca/article/view/ca29.2.09/301>
- “Surfacing” by Nicole Starosielski, Erik Loyer, and Shane Brennan <http://surfacing.in/>
- “Making Coal Historical (a Road Trip)” – James Graham <https://averyreview.com/issues/35/making-coal-historical>

Reading response papers (20%)

Students will submit 2 reading response papers in the course of the semester of about 500 words each. Each paper should be a critical response to one or two readings assigned for the week and it should be submitted on the day of class in hard copy.

Final paper (45%)

Students will submit a 4000-word research paper at the end of the semester that focuses on the historical analysis of an entity or object of their choice. The paper should engage with both primary and secondary sources. It should also either engage with other

disciplinary methods/research, and/or engage with a topic area or theme of the class. Paper topics should be discussed and confirmed with me by the **9th of April 2021**. The final paper is due by **16th April 2021, 11.59 pm**.

Seminar policies

Seminar Attendance

The success of our collective learning in the class depends on your attendance and participation in the seminar. You should come prepared for each class having done the assigned reading, and you are expected to contribute to discussion. If you are unable to attend seminar, you should have a medical certificate to account for your absence. I will also require that you complete specific tasks to make up for the seminar absence.

Assignment Submission Policy

Late submissions will be subjected to a deduction of 10% of the full number of points for every 24 hours block or part thereof (i.e. submitted any time within 24 hours after deadline: - 10%; within 48 hours after deadline: -20%; within 72 hours: -30%, etc.). Late submissions will not be accepted for grading after a week. Extensions will only be considered with respect to extraordinary circumstances, and they will not be considered within a week of the assignment deadline.

Academic Integrity & Plagiarism

This class follows NTU's Academic Integrity Policy, and academic misconduct and plagiarism will not be tolerated in this class. If you are unsure of what plagiarism entails, please approach me.

Readings for the course:

The assigned readings for the class will mostly be available for download either on the class site, or from the NTU library. Readings that are available on the Internet should be accessible through the urls stated in this syllabus. You will be required to obtain the following book on your own:

Kim Stanley Robinson, *Ministry of the Future* (2020)

This book should be available on various formats (e.g. paperback, Kindle) through Amazon, Book Depository and other booksellers.

The readings for this class are thematically organised and I have included some references for further reading. Please discuss with me if you would like recommendations for further reading about certain topics.

There might be changes to the reading schedule in the course of the semester. I will inform you beforehand of any changes to the reading schedule.

Reading schedule:

Week 1 (15th January 2021) - History and/in 'The Anthropocene'

Paul Crutzen, "Geology of Mankind," *Nature* 415(23) (2002)

Will Steffen et al, "The Anthropocene: Conceptual and Historical Perspectives," *Philosophical Transactions of the Royal Society A* 369 (2011): 842 - 867

Julia Adeney Thomas, "History and Biology in the Anthropocene: Problems of Scale, Problems of Value," *The American Historical Review* 119(5) (December 2014): 1587-1607.

Dipesh Chakrabarty, "Climate and Capital: On Conjoined Histories," *Critical Enquiry* 41(1) (2014): 1-23

Donna Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin," *Environmental Humanities* 6 (2015): 159-165.

Further reading:

Paul J. Crutzen and Eugene F. Stoermer, "The 'Anthropocene'" *IGBP Newsletter* 41 (May 2000): 17

Kregg Hetherington, "Introduction: Key words of the Anthropocene" in *Infrastructure, Environment and Life in the Anthropocene*, ed. Kregg Hetherington (Duke University Press, 2019), p 1-14

Natasha Myers, "From Edenic Apocalypse to Gardens against Eden: Plants and People in and after the Anthropocene" in *Infrastructure, Environment and Life in the Anthropocene*, 115-148

Andreas Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (Verso, 2016)

Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35(2) (Winter 2009): 197 - 222.

Week 2 (22nd January 2021) - A Global World (Seminar hours will be rescheduled)

Lee Kong Chian Natural History Museum (<https://lkcnhm.nus.edu.sg/>)

Anna Lowenhaupt Tsing, *Friction: An Ethnography of Global Connection* (Duke University Press, 2004) - "Natural Universals and the Global Scale," 88 - 112.

Anna Lowenhaupt Tsing, "On Non-Scalability: The Living World Is Not Amenable to Precision-Nested Scales," *Common Knowledge* (2012) 18(3): 505-524

Further reading:

Paul Edwards, *A Vast Machine* (MIT Press, 2010) - "Thinking Globally", p 1- 26

Week 3 (29th January 2021) – Knowing and Constructing the World in the 19th Century through Science

Paul Edwards, *A Vast Machine* - "Global Space, Universal Time: Seeing the Planetary Atmosphere," 27 - 48

Alexander von Humboldt, *Cosmos* (1845) - Introduction – "Reflection on the different degrees of enjoyment presented to us by the aspect of nature and the study of her laws" <http://www.gutenberg.org/cache/epub/14565/pg14565-images.html>

Lorraine Daston and Peter Galison, *Objectivity* (Princeton University Press, 2007) – "Truth-to-Nature," 55 - 113

Museum review due online by 4th February 2021, 11.59pm

Week 4 (5th February 2021) – Colonial Knowledge in the 19th century and its legacies

Lucille Brockway, "Science and colonial expansion: the role of the British Royal Botanic Gardens" in *The Postcolonial Science and Technology Studies Reader*, ed. Sandra Harding (Duke University Press, 2011), 128 - 138

Stuart McCook, "'Squares of Tropic Summer': The Wardian Case, Victorian Horticulture, and the Logistics of Global Plant Transfers, 1770 – 1910," in *Global Scientific Practice in an age of revolutions, 1750 – 1850*, eds. Patrick Manning and Daniel Rood (University of Pittsburg Press, 2016), 199 – 215

Xan Sarah Chacko, "Digging up colonial roots: The less-known origins of the Millennium Seed Bank Partnership," *Catalyst: Feminism, Theory, Technoscience* 5(2) (2019): 1 - 9

David Wade Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge," *Osiris* 15 (2000): 221 - 240

Further reading:

Londa Schiebinger, "Prospecting for Drugs: European Naturalists in the West Indies," *The Postcolonial Science and Technology Studies Reader* (2011), 110 – 126

Xan Sarah Chacko, "When life gives you lemons: Frank Meyer, authority, and credit in early twentieth-century plant hunting," *History of Science* 56 (4) (2018-12): 432-469

Lynn Hollen Lees, *Planting Empire, Cultivating Subjects: British Malaya, 1786 – 1941* (Cambridge University Press, 2017)

H.S. Barlow, "Natural History Drawings: The Complete William Farquhar Collection, Malay Peninsula 1803 – 1818 (review)," *Journal of the Malaysian Branch of the Royal Asiatic Society*, 84 (300) (Part 1) (June 2010): 107 - 109

Nicholas Radburn and David Eltis, "Visualizing the Middle Passage: The *Brooks* and the Reality of Ship Crowding in the Transatlantic Slave Trade," *Journal of Interdisciplinary History* XLIX:4 (Spring 2019), 533-565.

Kathryn Yusoff, *A Billion Black Anthropocenes or none* (2018) -
<https://manifold.umn.edu/projects/a-billion-black-anthropocenes-or-none>

Week 5 (12th February 2021) – No seminar (Chinese New Year)

Week 6 (19th February 2021) – Infrastructure and the built environment in the 19th to 20th century

Devyani Gupta, "Stamping Empire: Postal Standardization in Nineteenth-Century India" in *Global Scientific Practice in an Age of Revolutions, 1750 – 1850* (2016), 216-234

Paul Edwards, *A Vast Machine* - "Standards and Networks: International Meteorology and the Réseau Mondial," 49 – 60

Richard L. Hindle, "The Levees that Might Have Been," *Places Journal* (2015) -
<https://placesjournal.org/article/levees-that-might-have-been/>

Iain Jackson, "Tropical Architecture and the West Indies: from military advances and tropical medicine, to Robert Gardner-Medwin and the networks of tropical modernism" *The Journal of Architecture* 18 (2) (2013): 167 - 195

Further reading:

Jennifer S. Light, *The Nature of Cities: Ecological Visions and the American Urban Professions, 1920 – 1960* (Johns Hopkins University Press, 2009) - "The City is an Ecological Community," "The City is a National Resource," 6 - 68

Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895-1945* (Harvard University Press, 2001)

Jiat-Hwee Chang, *A Genealogy of Tropical Architecture: Colonial networks, Nature and Technoscience* (Routledge, 2016).

Jiat-Hwee Chang, "Thermal comfort and climatic design in the tropics: an historical critique" *The Journal of Architecture* 21(8) (2016): 1171-1202

Ashley Carse, *Beyond the Big Ditch: Politics, Ecology and Infrastructure at the Panama Canal* (MIT Press, 2014)

Keller Easterling, *Extrastatecraft: The Power of Infrastructural Space* (Verso, 2014)

Week 7 (26th February 2021) The Global Order of the Cold War

Peder Anker, "Buckminster Fuller As Captain for Spaceship Earth," *Minerva* 45 (2007): 417-434

Buckminster Fuller, *Operating Manual for Spaceship Earth* (1969) - selections

The World Game (<https://worldgameworkshop.org/brief-history>)

Whole Earth Catalog (1968)

"Access to Tools: Publications from the Whole Earth Catalog, 1968 – 1974":
<https://www.moma.org/interactives/exhibitions/2011/AccessToTools/>

Fred Turner, "The Whole Earth Catalog as Information Technology," *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (University of Chicago Press, 2006), 69 - 102

C.A. Doxiadis (1964) "Ekistics, the science of human settlements"

Stephen Phillips, "Plastics," *Cold war hothouses inventing Postwar culture, from cockpit to playboy*, eds. Beatriz Colomina, Annmarie Brennan and Jeannie Kim (Princeton Architectural Press, 2004), 91 - 123

Gastón Gordillo, "The Metropolis: The Infrastructure of the Anthropocene," in *Infrastructure, Environment and Life in the Anthropocene* (2019), 66 - 94

Further reading:

Andrew Kirk, "Appropriating Technology: The Whole Earth Catalog and Counterculture Environmental Politics," *Environmental History* 6 (3) (2001): 374-394

Powers of 10 and the Relative Size of Things in the Universe (1977) - Charles and Ray Eames

Ryan Bishop, "The Eames Office, the Cold War and the Avant-Garde: Making the Lab of Tomorrow," *Theory, Culture and Society*, October 13, 2020

Ginger Nolan, *The Neocolonialism of the Global Village* -
<https://manifold.umn.edu/projects/the-neocolonialism-of-the-global-village>

Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (MIT Press, 2011)

Yuri Furuhashi, "Architecture as Atmospheric Media: Tange Lab and Cybernetics" *Media Theory in Japan*, ed. Marc Steinberg (Duke University Press, 2017), 52 - 79

Alexander Klose, Charles Marcumil, Geoffrey Bowker, and Paul Edwards, *The Container Principle: How a Box Changes the Way We Think* (MIT Press, 2015).

Mid-Semester Break (5th March 2021)

Week 8 (12th March 2021) Militarisation and the Environment: Simulation and Securitization

Paul Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1997) - "Why Build Computers? The Military Role in Computer Research" (43 - 73); "From Operations Research to the Electronic Battlefield," (113 - 145)

Peter Galison, "War Against the Center" *Grey Room* 4 (Summer 2001): 6 - 33

Felicity D Scott, *Outlaw Territories: Environments of Security/Architectures of Counterinsurgency* (Princeton University Press, 2016) - "Discourse. Seek. Interact," 339 - 382

Further Reading:

Peder Anker, *From Bauhaus to Ecohouse: A History of Ecological Design* (LSU Press, 2010) - "Taking Ground Control of Spaceship Earth" (96 - 113)

James Rodger Fleming, "The pathological history of weather and climate modification: Three cycles of promise and hype," *Historical Studies in the Physical and Biological Sciences* 37(1) (September 2006), 3 - 25.

Nicholas Mirzoeff, "The Clash of Visualizations: Counterinsurgency and Climate Change" (<https://archive.nyu.edu/bitstream/2451/40718/4/Mirzoeff%20Social%20Research%20published.pdf>)

Week 9 (19th March 2021) Planetary Design (I) – Visualizing Futures

Reinhold Martin (2016), “Visualizing Change: The Line of the Anthropocene” in *Energy Accounts: Architectural Representations of Energy, Climate and the Future*, eds. Dan Willis, William W. Braham, Katsuhiko Muramoto, Daniel A. Barber (Routledge, 2016), 42- 47

Sheila Jasanoff, “Future Imperfect: Science, Technology, and the Imaginations of Modernity” in *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, eds. Sheila Jasanoff and Sang-Hyun Kim (University of Chicago Press, 2015), 1 – 33.

Daniel Rosenberg, “The Trouble with Timelines” (Interlude IV) in *Histories of the Future*, eds. Daniel Rosenberg and Sandra Harding (Duke University Press, 2005), 4 - 17

Paul Edwards, “Control Earth,” *Places Journal*, <https://placesjournal.org/article/control-earth/>

Jussi Parikka, *A Geology of Media* (University of Minnesota Press, 2015) - “Fossil Futures,” 109 - 136

Further reading:

Containment (2019) (documentary)

Paul Edwards (2016) “Knowledge infrastructures in the Anthropocene” *The Anthropocene Review* 4(1): p.34 - 43

Jussi Parikka and Abelardo Gil-Fournier, “ ‘Visual hallucination of probable events,’ or, on environments and machine learning,” <https://jussiparikka.net/2018/09/06/machine-learned-futures/>

Week 10 (26th March 2021) Planetary Design (II) – Space and Speculation

Peder Anker, “The Ecological Colonization of Space,” *Environmental History* 10 (2005): 239 - 265

Michael P. Oman-Reagan, “The Resonance of Earth, Other Worlds, and Exoplanets” <https://savageminds.org/2017/02/23/the-resonance-of-earth-other-worlds-and-exoplanets/>

Lisa Messeri, “Earth as Analog: The Disciplinary Debate and Astronaut Training that Took Geology to the Moon” *Astropolitics* 12 (2014): 196 - 209

Elizabeth Leane and Graeme Miles, "The poles as planetary spaces" *The Polar Journal* 7 (2) (2017): 270 – 28

Further reading:

Spaceship Earth (documentary)

Making New Worlds podcast (<https://makingnewworlds.com/>)

Felicity D Scott, "Securing Adjustable Climate," *Climates: Architecture and the Planetary Imaginary*, eds. Caitlin Blanchfield and James Graham, Alissa Anderson, Jordan Carver, Jacob Moore (Columbia Books on Architecture and the City and Lars Mueller Publishers, 2016), 90 - 105

Nicholas de Monchaux, *Spacesuit: Fashioning Apollo* (MIT Press, 2011)

"Earth-like: Design Your Planet" (<http://www.earthlike.world/>)

Week 11 (To be rescheduled) – 'Smart' environments

Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (University of Minnesota Press 2015) – Introduction (1 – 23), Urban Sensing (185 – 205)

Gökçe Günel, *Spaceship in the Desert: Energy, Climate Change, and Urban Design in Abu Dhabi* (Duke University Press, 2019) – "Inhabiting the Spaceship" (37 – 64); "Ergos: A New Energy Currency" (101 – 126)

Further reading:

Shannon Mattern, "A City is Not a Computer," *Places Journal*, February 2017 - <https://placesjournal.org/article/a-city-is-not-a-computer/?cn-reloaded=1>

Final paper topics to be discussed and confirmed by the 9th of April.

Week 12 (9th April 2021) Climate Change Near-Futures

Kim Stanley Robinson, *Ministry of the Future*

Further reading:

Sheila Jasanoff, "Imagined Worlds: The Politics of Future-Making in the 21st Century," *Probing and Governing the Future: The Politics and Science of Prevision*, eds. Andreas Wenger, Ursula Jasper, Myriam Dunn Cavelty (Routledge, 2020), 27-44.

Week 13 (16th April 2021) Reimagining the Present and Future

Jennifer Gabrys and Kathryn Yusoff (2012) "Art, Sciences and Climate Change: Practices and Politics at the Threshold," *Science as Culture*, 21:1, 1 – 24.

Donna Haraway, *Staying with the Trouble* (Duke University Press, 2016) - "Tentacular Thinking: Anthropocene, Capitalocene, Cthulucene," 30 – 57.

Mario Blaser and Marisol de la Cadeña, eds. *A World of Many Worlds* (Duke University Press, 2018) - "Pluriverse: Proposals for a World of Many Worlds" (Introduction), 1 -22.

Michelle Murphy, "Some Keywords Towards Decolonial Methods: Studying Settler Colonial Histories and Environmental Violence from Tkaronto," *History and Theory* 59 (3) (September 2020), 369-375.

Feral Atlas <https://feralatlas.org/>

Final paper due 16th April 2021, 11.59pm