
The Digital Anthropocene: A Syllabus*

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Rationale

We make the digital from the natural world, crafting metals and plastics into sleek handheld forms. We observe and make our understandings of environments through digital devices, spreadsheet accounting and carbon calculations. We have brought epochal shifts into being through rhetoric, disciplines, and geological measures. The Anthropocene is a digitally mediated and produced time. Yet the 'we' of these statements is an unevenly distributed set of actors, and the politics of producing (knowledge of) the Digital Anthropocene are pressing. From planetary observation and oceanic measurement to marine tailings, the appropriation of precious metals and labors of pollution, anthropogenic knowledge is deeply woven in with computation, tools, media and devices. It is also constituted through histories of colonialism, political economy, and ways of being in and knowing the world. Teaching the Digital Anthropocene is necessarily an interdisciplinary endeavor. This syllabus is offered as a resource for bringing together materials for teaching

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Overview

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ETHOSLab at the IT University of Copenhagen

1 Background

How are data and environment becoming mutually constitutive? James Maguire and Astrid O. Andersen put this question to participants in the 2018 Data Ecologies of the Anthropocene, a slow seminar workshop at Aarhus University, Denmark.

This Syllabus is based on a follow up workshop organized by Rachel Douglas-Jones at the ETHOSLab, IT University of Copenhagen, on the occasion of Hannah Knox's visit from University College London.

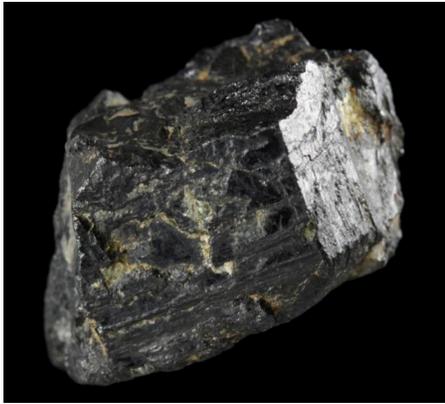
Our starting point was to ask how a syllabus on *The Digital Anthropocene* could reflect this co-constitution of digital data and environment. By syllabus, we meant a frame for learning in university settings, comprising readings and materials for collective engagement around cases and themes.

Drawing together interdisciplinary thinking on the natural and the digital, the environmental and the managerial, the material and the sensor-ial, we sought to make a syllabus that would be open access, free to download, and citable, modifiable to different teaching situations, programs and class sizes.

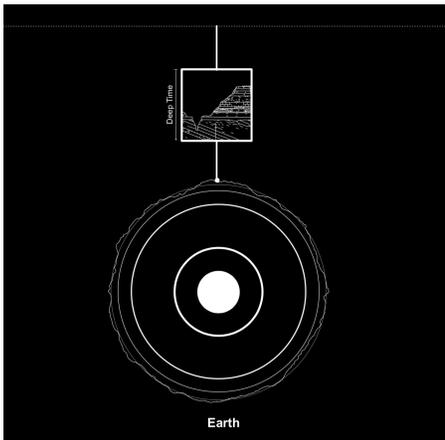
In preparing the syllabus workshop, we decided that a syllabus would be *a way of thinking through the Digital Anthropocene as an emergent space of research*. We also agreed that making a syllabus should be an interdisciplinary challenge. Scholars with background in history, anthropology, science and technology studies, and those currently working in policy settings as well as universities, were invited to join the event. Our common objective was to define the scope of, and draw out some themes from, the workshop. Some of the initial questions motivating the event were:

- What is this emergent field and how do we map it?
- What concerns do students have? What materials might they want to work with?
- What texts might be considered foundational, and why?
- How might we equip students to ask questions of their own?

Since ETHOS is an experimental techno-humanities space, primarily consisting of anthropologists and STS scholars interested in method, we took the syllabus workshop as a 'method' through which to explore *The Digital Anthropocene*. It drew from and built on existing resources created through The Anthropocene Campus events, such as the Anthropocene Curriculum. The objective was to think through the *digital* Anthropocene.



Coltan. Source: Wikipedia



Excerpt of a visualisation of deep time. Source: Kate Crawford and Vladan Joler. <https://anatomyof.ai/>

2 Pedagogical Principles

In the workshop that led to this document, we asked each other how we could use classroom spaces to find our way between the #FridaysforFuture, or Extinction Rebellion movements, and literature that introduces students to concepts that deal critically with the histories and resources through which the digital Anthropocene is known and mediated? One recurring question was if it would be possible for others to co-create a syllabus from within their own setting?

This syllabus design begins with principles of student-led learning. We argue that building a syllabus from within the interests of our classrooms is one way to develop more engaged conversations. Students oftentimes enter the classroom engaged (digitally or otherwise) in activist movements, or highly aware of ongoing developments at the intersection of the digital and the environmental. We encourage teachers to acknowledge this at the beginning of a semester, and invite student contributions to shaping the syllabus.

Our Syllabus is open to the input of students in the classrooms where it was put to use. Yet in designing it, this commitment left us— would-be syllabus builders— with a dilemma: how to bring the experience and expertise of our workshop collective together with a commitment to openness in the classroom? We hope we have resolved this dilemma by making the syllabus re-mixable. Directions on how to use it follow a little later in this document.

3 Open Access Syllabus

In his 2008 ethnography of the open source movement *Two Bits* the anthropologist Chris Kelty used the “Attribution-NonCommercial-Share Alike License” which borrows from the knowledge sharing that the people he worked with use. He argues that Free Software is “good to think with”, offering a “template and a kind of inspiration for people to experiment with new modes of reuse, remixing, modulating and transducing collaboratively created objects’ (Kelty 2008).

We think that the topic and the teaching task demands this kind of approach. Using the Creative Commons framework, this syllabus is licensed for remix, which Collins and Durrington suggest is an ‘ethic and aesthetic for a digital age where culture and media are infinitely reproducible and



Source: Still from Matt Parker's "The Cloud is More than Air and Water. Earthkeptwarm.com



Carbon and container ships: mapping data visualisation. <https://www.shipmap.org/>

malleable' (2015:69). Remix of a syllabus is almost inevitable: research and teaching institutions vary, semester lengths, class sizes, degree programs and level of study. We would, in short, welcome syllabus forks from any setting where this document is put to use, hosting them digitally on the ETHOS website.

4 Using the Syllabus

Given the variety of institutional set-ups and affordances that teachers may find themselves working with, the syllabus is designed to be used in one of two ways. Each approach involves the use of clusters and cases. Clusters are subsets of literature that our collective generated as a starting point for thematically and conceptually engaging with the digital anthropocene. Cases are possible sites of study that can empirically enrich our forms of analysis.

Method 1 Cluster first: Order the clusters to suit your course preferences and afterwards slot in student-led cases

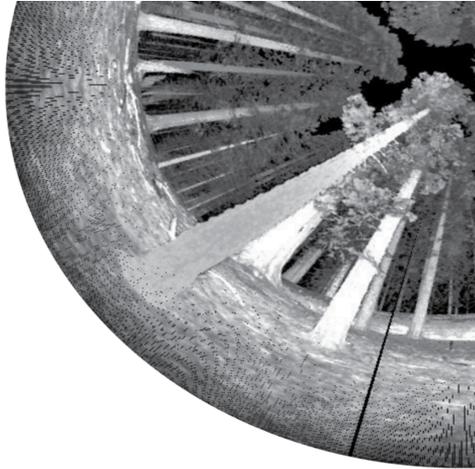
This method works for settings where a syllabus must be finalized and made official before the start of the semester.

Method 2 Case first: Order student-led cases, and then attach existing literature clusters to each case

This method works for settings where a syllabus can be co-created with students during the semester, and finalized ahead of an exam period. The feasibility of Method 2 will vary by institution. Some institutions will require a syllabus posted beforehand, not allowing teachers to begin with cases students bring to class.

For both methods, we suggest that an introductory, case-based session is conducted with students, in the first weeks of the semester.

This will give all involved a sense of the scope of *The Digital Anthropocene*, but also draw out the concerns and priorities of those taking the class. Working in Method 1, teachers then slot in cases brought by students after the first week into their pre-ordered cluster framework. Working in Method 2, the clusters are a resource for the teacher who is at liberty to start with student led cases on Day 1 of class. *The main difference between these methods is how much of the course is finalized before the first meeting with students.*



Xiaoyuan Yan, Alan Strahler and Erik Brisson *Mean image of hemispherical projected LIDAR data 2015, extract.* From Gabrys 2017, *Becoming Planetary*

Class size

The course structure and size are closely connected. The larger a class, the less tailored to individual interests the resulting syllabus is likely to be. However, large classes afford the opportunity for grouping students together and encouraging research based group work. Resource depending, one teacher could handle the class if 15 students were to take it, but at 50 two would be ideal. With larger classes, working from a workshop design might be more challenging, and exercises would need to be combined with full class lectures.

Examination Options

While this will again vary between institutions and may largely be out of the teacher's hands, creative formants lend themselves well to this topic. Submissions of Digital Anthropocene journal entries, inspired by readings could be made mandatory at anchor points in the semester, or at the end of each theme. Contributions of photos with analytical commentary could be uploaded to class online systems, creating a class exhibition at the end. In mixed level classes, undergraduates could submit a written essay responding to a prompt from the course readings while MSc students could submit a hypothetical research design for a future project. At the postgraduate level, the course could run as a PhD specialization, examined by the student framing their existing empirical work through two or more themes from the course.

5 Method 1: Introducing Clusters

To plan the syllabus with clusters is to work thematically. We have created seven thematic clusters, under the headings of *Technological Planetaryity*, *Power in the Digital Anthropocene*, *Materiality and Geology*, *Life in the Digital Anthropocene*, *Knowing in the Digital Anthropocene*, *Participation* and *Temporalities*. The readings are suggestive; they point in particular directions rather than lay out definitive spaces. Arising from workshop discussion, these seven thematic clusters set out key areas that our collective agreed would be important to cover a course addressing the Digital Anthropocene. Literature is drawn from a range of disciplines, to reflect our conviction that the topic requires the skill to work with readings across traditional boundaries.

6 Method 2: Introducing Cases

To plan the syllabus through *cases* is to take the lead from the kinds of things students might be inspired by, or bring to class themselves. The cases we have proposed here are indicative only, and

9 References

- Anderson, A.O. and James Maguire. 2018. Organizers of: "Data Ecologies of the Anthropocene" Slow Seminar no. 47, October 9 2018. AURA: Aarhus University Research on the Anthropocene.
<http://anthropocene.au.dk/currently/events/show/artikel/slow-seminar-no-47/>
- Douglas-Jones, R. 2019. Organizer of: "The Digital Anthropocene: Syllabus Workshop" ETHOSLab, IT University of Copenhagen.
<https://ethos.itu.dk/the-digital-anthropocene/>
- Collins. Samuel Gerald and Matthew Slover Durington. 2015. Networked Anthropology: A Primer for Ethnographers. London and NY: Routledge.
- Kelty, Chris. 2008. *Two Bits: The Cultural Significance of Free Software* Durham, NC: Duke University Press.

are to be used as tools to help students think the digital anthropocene empirically. Said otherwise, our case list is a 'mock-up' designed to inspire students to generate their own empirical issues and sites that they imagine form part of the Digital Anthropocene's remit.

Each case is elaborated with a 'box' of materials – spanning a range of sources: from the journalistic to the artistic. A "project box" is something students will draw on and contribute to whether for workshops or for writing up a final report.

There are two modes of working with Method 2.

Mode 1: In the opening session, take one of the cases we have listed and ask students to return with ideas for their own "case box" the following week.

Mode 2:, In the opening session, introduce students to our cases and associated 'project box' material as exemplars of the kinds of materials they will need to assemble for studying the Digital Anthropocene empirically

7 Additional Resources

The Anthropocene Curriculum was 'developed from diverse endeavors to envision the forms and roles that knowledge takes in the age of humankind'. While not focused on the *digital* it is exemplary in its curation of examples and cases, and is regularly updated.

<https://anthropocene-curriculum.org/>

8 Acknowledgements

This syllabus was made possible through the support of the ETHOSLab at the IT University of Copenhagen.

Technological Planetary

The capacity to think on a planetary scale has been the subject of academic discussion since the Whole Earth Catalogue and the “Blue Marble” images, produced in 1972 by the Apollo 17 spacecraft. Since then, digital technologies have been deployed to generate images and a sense of planetary totality. These readings introduce students to the significance of seeing a whole earth, technologically mediated.

Boes, Tobias. 2014. Beyond Whole Earth: Planetary Mediation and the Anthropocene. *Environmental Humanities* 5, 155-170.

Chakrabarty, Dipesh. 2019. The Planet: An Emergent Humanist Category. *Critical Inquiry* 46(1): 1-31 <https://www.journals.uchicago.edu/doi/abs/10.1086/705298>

Diederichsen, Diedrich, and Anselm Franke. 2013. *The Whole Earth: California and the Disappearance of the Outside*. Sternberg Press, Berlin.

Edwards, Paul N. 2010. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. MIT Press, 2010.

Gabrys, Jennifer. Becoming Planetary. E-flux <https://www.e-flux.com/architecture/accumulation/217051/becoming-planetary/>

Goodchild, Michael F. 2000. “Cartographic Futures on a Digital Earth” *cartographic perspectives* 36: 3-11.

Houser, Heather. 2014. *The Aesthetics of Environmental Visualizations: More Than Information Ecstasy?* *Public Culture* (2014) 26 (2 (73)): 319-337.

Jasanoff, Sheila. 2001. "Image and Imagination: The Formation of Global Environmental Consciousness." *Changing the Atmosphere: Expert Knowledge and Environmental Governance*. Ed. P. Edwards and C. Miller. MIT Press, 2001, 309-337.

Latour, Bruno. 2018. *Down to Earth: Politics in the New Climatic Regime*. London, Polity Press.

Power in the Anthropocene

In addition to the power of definition (the naming of an era) this cluster concerns questions of power and political geography at various scales, as well their intersection with new digital affordances. Amongst a host of concerns, it raises specific questions about territory, digital labour, and capital. These readings draw attention to questions of colonialism, governance and sovereignty that extend existing power legacies into digital environments.

Ahmed, Sara and David Scott. 2018. "Colonial Repercussions. Planetary Utopias – Hope, Desire, Imaginaries in a Post Colonial World" <https://www.youtube.com/watch?v=OlzDe2rgfzs>

Amoore, Louise. 2018. Cloud geographies: Computing, data, sovereignty. *Progress in Human Geography*:Vol 42, Issue 1: 4-24.

Bratton, Benjamin. 2016. *The Stack: On Software and Sovereignty*. Cambridge, MA: MIT University Press.

Chandler, David. 2019. Digital Governance in the Anthropocene: The Rise of the Correlational Machine. In David Chandler and Christian Fuchs (eds) *Digital Objects, Digital Subjects: Interdisciplinary Perspectives on Capitalism, Labour and Politics the Age of Big Data*. University of Westminster Press.

Cowen, Deborah. 2014. *The Deadly Life of Logistics: Mapping Violence in Global Trade*. University of Minnesota Press.

Davis, Heather and Zoe Todd. 2017. "On the Importance of a Date, or, Decolonizing the Anthropocene" *ACME* 16(4): 761-80.

Joler, Vladan and Kate Crawford. 2018 "Anatomy of an AI system" <https://anatomyof.ai>

Materiality and Geology

The Digital Anthropocene is built from resources and materials of the earth. This cluster explores social, political and technical questions on the material origins and processes that give rise to digital technologies—such as our phones and laptops. It introduces a temporal lens, to look ‘up stream’ to sites of extraction and ‘down stream’ to sites of recycling and the afterlives of digital objects (“e-waste”). In dialogue with the previous cluster, these readings show that extraction processes are inseparable from questions of labour, toxicity, bodies and conflict over valuable minerals.

Bell, Joshua A., Briel Kobak, Joel Kuipers, and Amanda Kemble. ‘Unseen Connections: The Materiality of Cell Phones’. *Anthropological Quarterly* 91, no. 2 (24 August 2018): 465–84. <https://doi.org/10.1353/anq.2018.0023>.

Gabrys, Jennifer. *Digital Rubbish: A Natural History of Electronics*. University of Michigan Press, 2011. <https://doi.org/10.2307/j.ctv65swcp.1>.

Halpern, Orit. 2018. *Golden Futures* <https://limn.it/articles/golden-futures/>

Maguire, James and Brit Ross Winthereik. 2019. Digitalizing the State: Data Centers and the Power of Exchange. *Ethnos*, online first <https://doi.org/10.1080/00141844.2019.1660391>

Mantz, Jeffrey W. ‘From Digital Divides to Creative Destruction: Epistemological Encounters in the Regulation of the “Blood Mineral” Trade in the Congo’. *Anthropological Quarterly* 91, no. 2 (24 August 2018): 525–49. <https://doi.org/10.1353/anq.2018.0025>.

Palsson, Gisli and Heather Anne Swanson. 2016. Down to Earth: Geosocialities and Geopolitics. *Environmental Humanities* 8(2): 149-171. <https://doi:10.1215/22011919-3664202>

Starosielski, Nicole. 2018. Strangling the Internet. *Limn* 10. *Chokepoints*. <https://limn.it/articles/strangling-the-internet/>

Starosielski, Nicole. 2016. Thermocultures of Geological Media. *Cultural Politics* 12(3): 293-309. <https://doi.org/10.1215/17432197-3648858>

Taffel, Sy. 2016. Technofossils of the Anthropocene: Media, Geology and Plastics. *Cultural Politics* 12(3): 355-375. <https://doi.org/10.1215/17432197-3648906>

Life in the Digital Anthropocene

How human and nonhuman life are lived in the digital Anthropocene is the focus of research across the biosciences. This cluster explores the digital contributions to studies of, and interventions on, 'life', ranging from human health to pollinators. Prefiguring themes in the next cluster of "how we know", this section foregrounds calls to think about the status of life in the Anthropocene. These readings draw attention to the expanding horizons of digital health, fast throughput DNA sequencing, database logics, evidence regimes, and calculative practices around the value of all forms of life.

Bronson, Kelly, and Irena Knezevic. 'Big Data in Food and Agriculture'. *Big Data & Society* 3, no. 1 (1 June 2016): 2053951716648174. <https://doi.org/10.1177/2053951716648174>.

Butler, CD. 2018. "Planetary Epidemiology: Towards First Principles" *Curr Environ Health Rep* 5(4): 418-429.

Carolan, Michael. 'Publicising Food: Big Data, Precision Agriculture, and Co-Experimental Techniques of Addition'. *Sociologia Ruralis* 57, no. 2 (2017): 135-54. <https://doi.org/10.1111/soru.12120>.

Horton, Richard., Robert Beaglehole, Ruth Bonita, John Raeburn, Martin McKee, Stig Wall. 2014. "From Public to Planetary Health: a manifesto. *The Lancet* 383, Issue 9920 p. 847. [https://doi.org/10.1016/S0140-6736\(14\)60409-8](https://doi.org/10.1016/S0140-6736(14)60409-8)

Haff, P. K. 'Technology as a Geological Phenomenon: Implications for Human Well-Being'. *Geological Society, London, Special Publications* 395, no. 1 (1 January 2014): 301-9. <https://doi.org/10.1144/SP395.4>.

Parikka, Jussi. 2015. *A Geology of Media*. University of Minnesota Press.

Pritchard, Helen. 2017. *Critter Compiler* in DATA browser 06 EXECUTING PRACTICES ed. Helen Pritchard, .Eric Snodgrass Open Humanities Press. http://www.data-browser.net/pdf/DB06_Executing_Practices.pdf

Vonderau, Asta. 2019. 'Scaling the Cloud: Making State and Infrastructure in Sweden' *Ethnos: Journal of Anthropology* 84(4): 698-718.

Knowing (in) the Digital Anthropocene

How we know the digital anthropocene is tied into digital technologies. Sensors produce data, tracking devices mediate our knowledge, and the digital harvesting and management of data is increasingly political. When how we know changes what we do, as in the case of environmental policy and the datafied biome, being able to take a critical perspective on how knowledge about the Anthropocene is generated is a central skill. These readings show different modes of knowledgemaking.

Seddon, Nathalie, Georgina M. Mace, Shahid Naeem, Joseph A. Tobias, Alex L. Pugo, Rachel Cavanagh, David Mouillot, James Vause and Matt Walpole. 2016. "Biodiversity in the Anthropocene: prospects and policy" *Proceedings of the Royal Society B: Biological Sciences* 283 (1844)

Harris A. Lewin, Gene E. Robinson, W. John Kress et al. 2018. Earth BioGenome Project: Sequencing life for the future of life *Proceedings of the National Academy of Sciences* Apr 2018, 115 (17) 4325-4333; DOI: 10.1073/pnas.1720115115

Keck, Frédéric. 2018. 'Livestock Revolution and Ghostly Apparitions: South China as a Sentinel Territory for Influenza Pandemics' *Current Anthropology* 60(S20): S251-S259.
<https://doi.org/10.1086/702857>

Carruth, Allison and Robert P. Marzec. 2014. "Environmental Visualization in the Anthropocene: Technologies, Aesthetics, Ethics" *Public Culture* 26(2 (73)): 205-211.
<https://doi.org/10.1215/08992363-2392030>

Hind, Sam, and Sybille Lammes. 'Digital Mapping as Double-Tap: Cartographic Modes, Calculations and Failures'. *Global Discourse* 6, no. 1-2 (2 January 2016): 79-97.
<https://doi.org/10.1080/23269995.2015.1019732>.

Graham, S. 'The End of Geography or the Explosion of Place? Conceptualizing Space, Place and Information Technology'. *Progress in Human Geography* 22, no. 2 (June 1998): 165-85.
<https://doi.org/10.1191/030913298671334137>.

Warren, M. S., S. P. Brumby, S. W. Skillman, T. Kelton, B. Wohlberg, M. Mathis, R. Chartrand, R. Keisler, and M. Johnson. 'Seeing the Earth in the Cloud: Processing One Petabyte of Satellite Imagery in One Day'. In 2015 IEEE Applied Imagery Pattern Recognition Workshop (AIPR), 1-12, 2015. <https://doi.org/10.1109/AIPR.2015.7444536>

Lippert, Ingmar. 2015. 'Environment as Datascape: Enacting Emission Realities in Corporate Carbon Accounting'. *Geoforum* (66): 126-135. doi: 10/wx8

Participation

Digital technologies afford participation in the making of the Anthropocene. They both contribute to the phenomena, through the consumption of digital technologies, and allow for the democratization of knowledge production. This cluster takes up questions of affective attachment and detachment, participatory knowledge production, as well as the belonging and cultivation generated through digital means. These readings demonstrate the degree of digital engagements varies from producing your own data to arguments for how digital technologies can produce new forms of environmental awareness.

Buck, Holly Jean. 2015. On the Possibilities of a Charming Anthropocene, *Annals of the Association of American Geographers*, 105:2, 369-377, DOI: [10.1080/00045608.2014.973005](https://doi.org/10.1080/00045608.2014.973005)

Gabrys, Jennifer. 'Sensing Lichens. From Ecological Microcosms to Environmental Subjects'. *Third Text* 32, no. 2-3 (4 May 2018): 350-67. <https://doi.org/10.1080/09528822.2018.1483884>.

Kim, John. 2019. "Data Sensing" *Anthropocene Curriculum* <https://anthropocene-curriculum.org/project/mississippi/anthropocene-river-journey/data-sensing/>

Knox, Hannah. 2014. Footprints in the City: Models, Materiality and the Cultural Politics of Climate Change. *Anthropological Quarterly* 87(2): 405-429.

Knox, Hannah. 2015. "Thinking Like a Climate" *Distinktion: Journal of Social Theory* 16(1): 81-109. <https://doi.org/10.1080/1600910X.2015.1022565>

Gibson-Graham. J.K. 2011. "A feminist project of belonging for the Anthropocene" *Gender, Place and Culture* 18(1): 1-21. <https://doi.org/10.1080/0966369X.2011.535295>

Gabrys, Jennifer. 2017. 'Citizen Sensing, Air Pollution and Fracking: From "Caring about Your Air" to Speculative Practices of Evidencing Harm'. *The Sociological Review* 65(2): 172-92. <https://doi.org/10.1177/0081176917710421>.

Styhre, Alexander. 2010. 'Organizing Technologies of Vision: Making the Invisible Visible in Media-Laden Observations'. *Information and Organization* 20(1): 64-78. <https://doi.org/10.1016/j.infoandorg.2010.01.002>.

Paterson, Matthew and Stripple, Johannes. 2010. 'My Space: governing individuals' carbon emissions'. *Environment and planning D: Society and Space*, 28, 341-362. doi: 10.1068/d4109

Temporalities

This theme explores the different times of the digital Anthropocene. From geologic time to the time of computer modelling, we broaden our horizons to the ways that time gets made and told, as well as the devices (narrative and technical) that we have at our disposal to do so. The readings range from storytelling analyses to meditations on speed.

Bastian, Michelle. 2012. Fatally Confused: Telling the Time in the Midst of Ecological Crises. *Journal of Environmental Philosophy* 9(1): 23-48.

Heise, Ursula K. 2019. Science Fiction and the Time Scales of the Anthropocene. *ELH* 86(2): 275–304. <https://doi.org/10.1353/elh.2019.0015>

Nowviskie, Bethany. 2015. Digital Humanities in the Anthropocene. *Digital Scholarship in the Humanities* 30 (1) i4-i15. <https://doi.org/10.1093/lc/fqv015>

Parikka, Jussi. 2016. *The Contemporary Condition: A Slow, Contemporary Violence: Damaged Environments of Technological Culture*. Cambridge, MA: MIT Press.

Neimaris, Astrida., Cecilia Åsberg, Johan Hedren. Four Problems, Four Directions for Environmental Humanities: Toward A Critical Post-humanities for the Anthropocene. *Ethics and the Environment* 20(1): 67-97. <https://www.jstor.org/stable/10.2979/ethicsenviro.20.1.67>

Rose, Deborah Bird. 2017. “Shimmer: When All You Love is Being Trashed” in *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene* Minnesota

Rosol, Christoph., Benjamin Steininger, Jürgen Renn & Robert Schlögl. 20xx. On the age of computation in the epoch of humankind. *Nature Magazine*. <https://www.nature.com/articles/d42473-018-00286-8>

Smith, James H. ‘Tantalus in the Digital Age: Coltan Ore, Temporal Dispossession, and “Movement” in the Eastern Democratic Republic of the Congo’. *American Ethnologist* 38, no. 1 (2011): 17–35. <https://doi.org/10.1111/j.1548-1425.2010.01289.x>.

Project Boxes

If invited, students will bring a wide variety of cases. The examples we have gathered here – from our own research interests, demonstrate the range of reading that might be used to construct a project box from these cases.

A “project box” is envisaged as a set of resources students will draw on and contribute to whether for workshops or for writing up a final report. In advanced classes, they might have to build their own “project box” to act as the research archive for project work. In earlier levels, students might offer a theme, and Teaching Assistants might, in collaboration with teachers, compile a box from which students could work.

Each case is elaborated with a ‘box’ of materials – in practice a folder of digital resources- spanning a range of sources: journalistic, artistic, corporate, academic.

The range of sources can help in class discussions on critical relationships to material, and considerations of its origins.

Example Project Box: Coltan

Coltan is short for *columbite-tantalites* and is a mineral used in electronic capacitors. Coltan has a central role in the material making of many digital devices, and the materials in this project box draw out the material, political, and planetary dimensions of devices that depend on mining it. The digital and the extractive are closely linked. Workshops can be based on these articles

Journalistic Content

National Geographic: *The Price Of Precious - 'The minerals in our electronic devices have bankrolled unspeakable violence in the Congo.'*

ngm.nationalgeographic.com/2013/10/conflict-minerals/gettleman-text

BBC: 2009 'People are now beginning to ask: what is the human cost of a mobile phone?'

news.bbc.co.uk/1/hi/8234583

Joseph-Gabriel, Daphne. 2015. Your Phone, Coltan and the Business case for Innovative and Sustainable Alternatives. *Humanity in Action*

https://www.humanityinaction.org/knowledge_detail/your-phone-coltan-and-the-business-case-for-innovative-sustainable-alternatives/

Lublinski., Jan, Monika Griebeler and Cyrus Farivar. 2010. *Coltan Mines to be Fingerprinted.*

<https://www.dw.com/en/coltan-mines-to-be-fingerprinted-german-scientists-say/a-5907446>

Amnesty International: *Is your phone powered by child labour?*

www.amnesty.org/en/latest/campaigns/2016/06/drc-cobalt-child-labour/

Artistic Content

- Mosse, Richard. 2011. *Infra* <https://aperture.org/shop/infra-2698>
- Crawford, K and Vladan Joler. *Anatomy of an AI* <https://anatomyof.ai/>
- Ejiofor, Chiwetel. 2013. *Columbite Tantalite*, short film.

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Example Project Box: Data Centres

Data Centres are material footprints of our digital lives. The materials in this project box draw out the way data captures our imagination, our territories and our energy systems. How might students work with these ideas to respond to and analyse the way narratives of the cloud make the materials of the digital Anthropocene difficult to see?

Journalistic Content

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Besnihan, Patrick and Patrick Brodie. 2019. High-energy data centres not quite as clean and green as they seem. *The Irish Times* <https://www.irishtimes.com/opinion/high-energy-data-centres-not-quite-as-clean-and-green-as-they-seem-1.4013992>

Artistic Content

Data Centre Murals <https://datacentermurals.withgoogle.com/>

Ikeda, Royoji. "A [continuum] and Code-Verse. (2018), Centre Pompidou, Paris. <https://hyperallergic.com/453442/ryoji-ikeda-continuum-centre-pompidou/>

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The Peoples' Cloud <http://www.thepeoplescloud.org/>

Corporate Content

Energy Positive Data Centre <https://ecodatacenter.uk/>

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Hofstee, Eltjo. 2019. The Future of Data Centres is Green <https://www.datacenterdynamics.com/opinions/future-data-centers-green/>

Example Project Box: Computing Carbon

Carbon is not only treated as a threat, but also as technology of governance. The materials in this project box link how we live – in a world of references to carbon – to the technologies and troubles of enacting carbon as computable. How might students use the stories of carbon to make out the situated political economies figured in managing the Anthropocene through carbon?

Journalistic content

Darby, Megan. 2019. 'New guidelines, old loopholes as world's carbon accounting is overhauled'. (13/5/2019) <https://www.climatechangenews.com/2019/05/13/new-guidelines-old-loopholes-worlds-carbon-accounting-overhauled/>

Intell, Art. 2019. 'How to respond to climate change, if you are an algorithm'. (1/10/2019) <https://www.economist.com/open-future/2019/10/01/how-to-respond-to-climate-change-if-you-are-an-algorithm>

The Economist, 'Computing climate change: How much carbon dioxide do computers emit?' (24/8/2009) <https://www.economist.com/international/2009/08/24/computing-climate-change>

Vidal, John. 2019. 'Offsetting carbon emissions: "It has proved a minefield"' (2/8/2019) <https://www.theguardian.com/travel/2019/aug/02/offsetting-carbon-emissions-how-to-travel-options>

Artistic content

'Artists and Climate Change'. <https://artistsandclimatechange.com/>

Chameides, Bill. 2019. 'Art Makes Environmental Change Real'. (24/1/2014) <https://www.conservationmagazine.org/2014/01/art-makes-environmental-change-real/>

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