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MEMOS ON DIGITAL WORLD-IN-FORMATION

Thesis Research Spring 23

ABSTRACT

If cultural criticism in the 1970s targeted machine productivity and the rise of consumerism, then its 21st century parallel should be rendered in digital lights.

At the core of digital computation is optimization; in order to possess the great capacity of comprehension we desire, the algorithm must be able to identify patterns from a great pool of samples, then produce and assess variations; in efforts to resolve in an optimal outcome.

Behind this complex operation for human-machine communication embeds a message that urges us to examine closely the medium it employs, which is manifested in the shaping of urban forms.

ABSTRACT

Through sensing, collecting, and processing information on a planetary scale, our understandings of human behavior, urban functionality, and global energy exchange have been shaped by data collected by digital apparatuses. Every aspect of life embodies datafication.

This series of annotated montage of thoughts aims to capture moments where datafication manifests.

These transformations can be physical or philosophical; at a personal, urban, or global scale.

Cover of Hyperobject (2013) by Timothy Morton.

“Every interface between one data process and another - collecting, recording, transmitting, receiving, correcting, storing - has a cost in time, effort, and potential error: data friction. Computing, too, is always material; there are always moving parts in the overall system. Every calculation costs time, energy, and human labor. Computing and automation can reduce those costs, yet no matter how smooth and inexpensive calculation may become, there will always be some scale of activity at which computational friction can slow things to a crawl. These forms of friction helped maintain the separation of forecasting from climatology, and the separation of “weather data” from “climate data,” well into the computer age.”

— Paul N. Edwards, A Vast Machine. 2010

Abstractions explain nothing, they themselves have to be explained: there are no such things as universals, there's nothing transcendent, no Unity, subject (or object), Reason; there are only processes, sometimes unifying, subjectifying, rationalizing, but just processes all the same.

— Gilles Deleuze, Negotiations: 1972—1990. 1995

The desire to understand environmental conditions on a global scale motivates scientific advancement; yet the sublime vastness and the process of abraction determine that the outcomes will be alienating to human sensorium. If climate change anxiety stems from sensorial experience of strange weathers, then climate change policy is founded on very different grounds. While data only attempts to capture conditions within its limited scope, the construction and use of data models is never neutral.

Data favors the quantifiable, to which human conditions do not translate.

Data favors seamlessness, while the translation from data to information or knowledge always involves physicality that causes friction.

BELIEF (ATTENTION)

The election of Trump in 2016 was a brutal awakening for data believers. Contrary to almost all major forecasts, Trump's victory undermines the reliance on data analysis to accurately predict outcomes. The lesson here is perhaps to re-examine the ambiguity within human nature that data fails to capture.

Whether it's political, economic, or meteorological, the rudimentary principle of forecasting through data involves algorithmic calculations following a defined model, which is based on patterns from previous data. Data abstracts empirical human conditions and translate them into arithmetic or non-arithmetic components for calculation; and the magnitude of data necessitates the shift from human computers to machines. There will always be dynamic factors that are unprecedented, hence unforeseeable; and these conditions call for attention: yet attention involves the matter of belief.

BELIEF (ATTENTION)

Attention, taken to its highest degree, is the same thing as prayer. It presupposes faith and love.

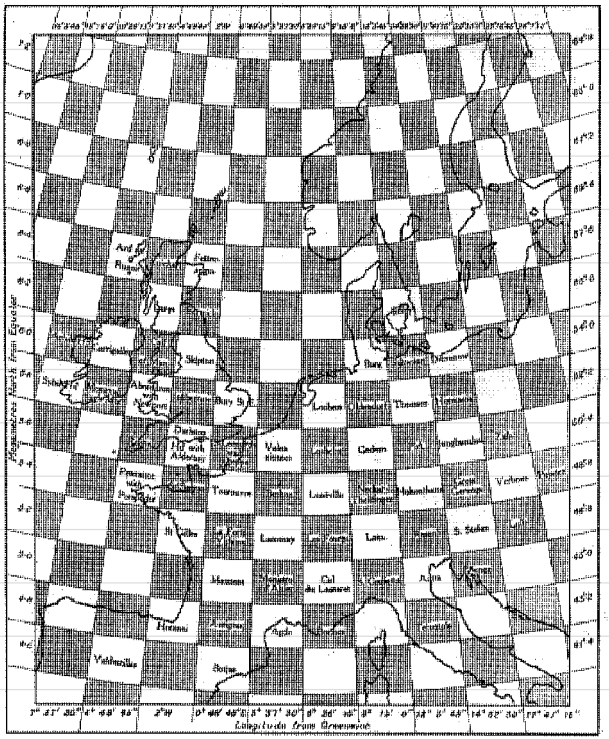
— Simone Weil, Gravity and Grace. 1947

BLIND SPOT (DISTRACTION)

There would always be mistakes, however, because models are, by their very nature, simplifications. No model can include all of the real world's complexity or the nuance of human communication. Inevitably, some important information gets left out. I might have neglected to inform my model that junk-food rules are relaxed on birthdays, or that raw carrots are more popular than the cooked variety. Sometimes these blind spots don't matter. When we ask Google Maps for directions, it models the world as a series of roads, tunnels, and bridges. It ignores the buildings, because they aren't relevant to the task. [...] A model's blind spots reflect the judgments and priorities of its creators.

— Cathy O'Neil, Weapons of Math Destruction. 2016

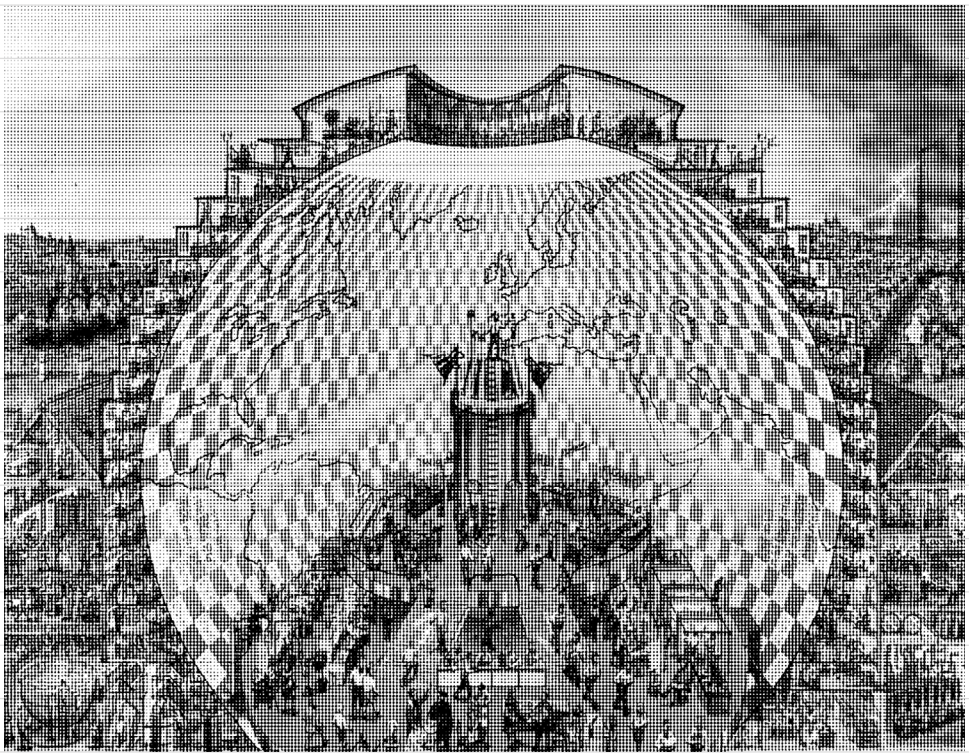
In 1922, English mathematician Lewis Fry Richardson published Weather Prediction by Numerical Process, in which he "devised a method of solving the mathematical equations that describe atmospheric flow". Richardson began with an experiment to calculate for a retrospective forecast. Starting by gathering atmospheric variables at a 6-hour interval, Richardson proceeded to derive a series of equations that would correctly produce outputs inherent to the data collected. His method employed a "finite-difference grid", dividing the area into cells along latitude/longitude lines, and specifying the dynamical variables at the center of each cell. The grid also extended from ground to aerial, up to about 12 km, with a total of 5 layers. While Richardson's model was based on a grid, the actual locations of data collection did not conform to it; it revels one of the shortcomings of data models.



Richardson’s forecast system employed a finite-difference grid; each rectangle with sides around 200 km long (2° latitude by 3° longitude)

Due to the vast amount of data, Richardson developed methods to simplify calculations into a series of arithmetical operations. The result was that they arrived at the retrospective six-hour forecast after six weeks of calculation.

The burden of labor led Richardson to envision what he called the "forecast-factory".



“Weather Forecasting Factory”(1986) by Stephen Conlin

"There are striking similarities between Richardson's forecast factory and a modern massively parallel processor (MPP). Richardson envisaged a large number of processors — his estimate was 64,000 — working in synchronous fashion on different sub-tasks. The forecasting job was sub-divided, or parallelized, using domain decomposition, a technique often used in MPPs today."

— Peter Lynch, Richardson's Fantastic Forecast Factory. 2015

"Richardson's striking metaphors of calculation as factory, theater, church, and orchestra reach to the heart of computing as a coordinated human activity that harmonizes machines, equations, people, data, and communication systems in a frenetic ballet of numerical transformation. At the same time, they stand in stark contrast to today's dominant metaphors of computation, which are mostly individual: the brain, memory, neurons, intelligence. Richardson's forecast factory remains a better description of the practical reality of computing. The limits of computer power, even today, stem from these human and material dimensions."

— Paul N. Edwards, A Vast Machine. 2010

Still from Blow-Up (1962) by Michelangelo Antonioni.

“BLOW-UP“ EFFECT

In the 1962 movie Blow-Up by Antonioni, a photographer takes a picture at the park on his film camera; later at his studio, he processes the photo and notices a suspicious object in shadow as he blows up a detail in the image; suspecting it to be a murder weapon, the photographer goes on to investigate a possible murder mystery; a series of absurd events unravel from there. The premise of this film brings attention to the power of image, down to its very unit of a grain, or nowadays with digital technology, a pixel.

Today, this “Blow-Up” effect persists. To see, to photograph, or to “blow-up”, are all acts that carry deliberate messages; whether it is to see further, to see more, or to see more clearly. Behind the literal deliverance of an image, there is a process of blowing up, crafting, and presenting; which may reveal some reasons or misreasons in our society.

In The Conflict Shoreline: Colonialism as Climate Change in the Negev Desert, Sheikh and Weizman elaborate on the concept “threshold of detectability” by investigating land conditions in an area of conflict, employing and examining different methods of sensing and extracting information.

A series of 1945 aerial film photography was presented as part of the evidence for agricultural cultivation in al-‘Araqib. With a resolution of 35 lp/mm (“line-pairs a millimeter”), the size of one grain would correspond to 214 mm (8.43 in) on the ground. The objective was to demonstrate the presence of agricultural activity, which was challenging because any traceable structures built are represented by less than a few grains on the film, hence falling below what Weizman refers to as the “threshold of detectability”, where “the object and the grain match”.

Weizman also calls attention to the fact that “the image has a distinct material topography”, they are rather a relation between the surface of the film and the terrain, “mediated by the climate between them”.

A detail enlarged from the original 9-inch negative shows a scene area of roughly 530 ft by 380 ft; the inquiry focuses the black dot at the center. The subject is then verified to be a well by a photo taken at ground level by Sheikh in 2014. The case was presented as evidence of human settlement.

From the surface of film to the surface of terrain, the investigation examines the friction between representation and abstraction, further complicating the relations between resolution, detectability and fidelity.

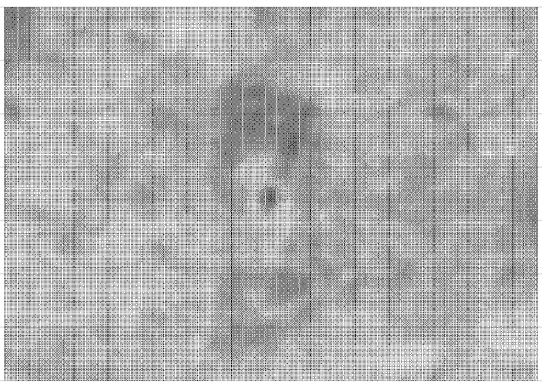
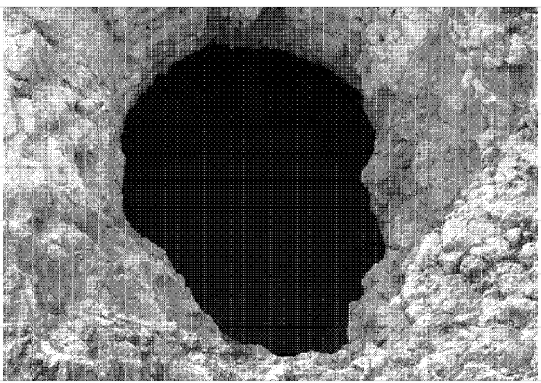
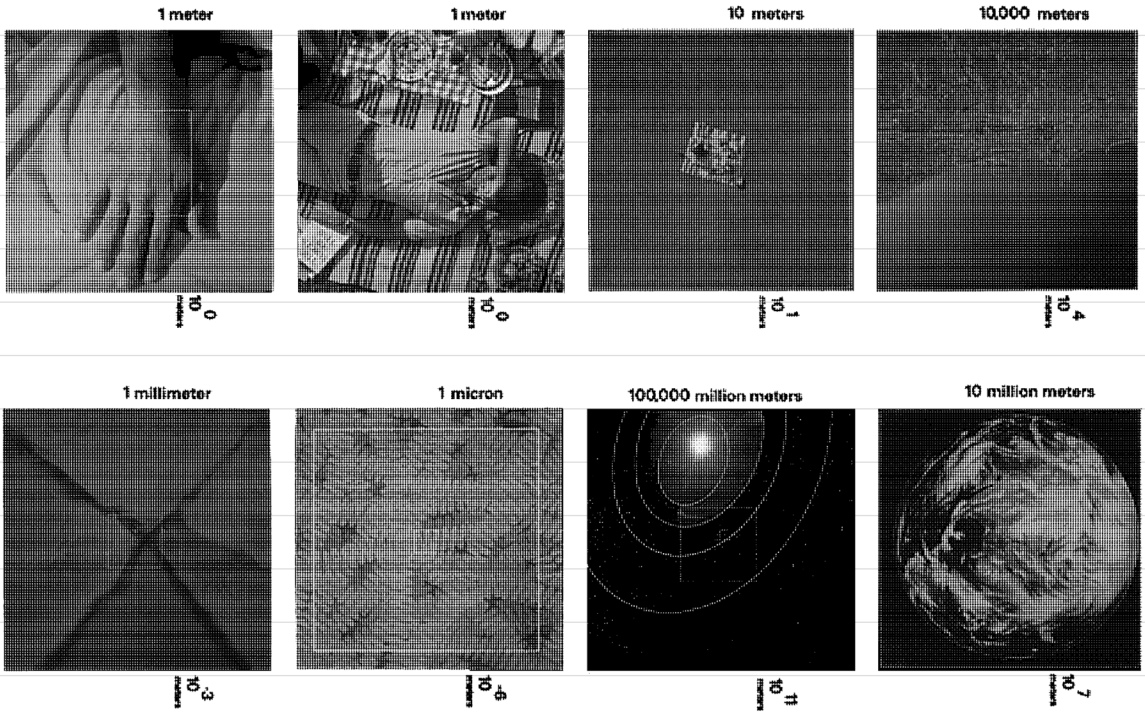


image 5033, RAF PS series, January 5, 1945



Fazal Sheikh, April 14, 2014

“Husein Salem Abu Mdeghem family well, al-‘Araqib.”



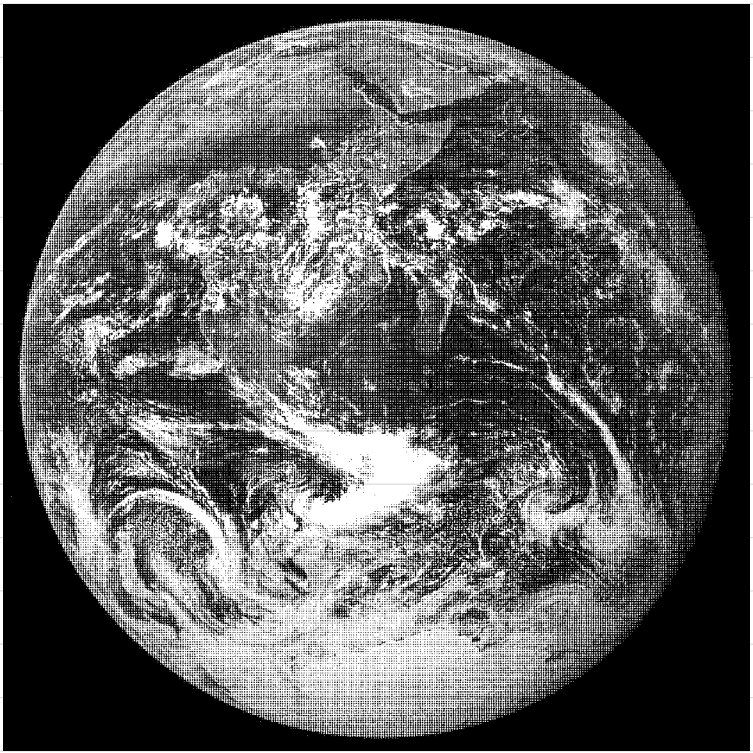
Stills from Powers of Ten (1977) by Charles and Ray Eames.

ZOOM IN, ZOOM OUT

The first frame in Powers of Ten was anchored at a tangible scale of a human; it then increases and decreases incrementally by the powers of 10 into both the microscopic and macroscopic realms. Perception of scale shifts exponentially with scale, revealing, quite literally the POWER of translation between space and scale by numerical orders.

The film is an exploration in representation and visualization of an abstract idea; the film itself is a method of ideation. The format of film as moving images allows them to create the seemingly smooth transition between frames, conceptually similar to the operations of zooming in and out in modern computer graphics.

The process of stitching the frames involves extensive manipulations of graphic information; as the scale shifts into alien territories, the spaces are no longer captured with optical apparatuses, but instead represented by invention. The exponential transitions are also compressed or expanded into equal intervals; a process of visual crafting that involves filtering and inventing information.



The Blue Marble (1972) taken by the crew of Apollo 17

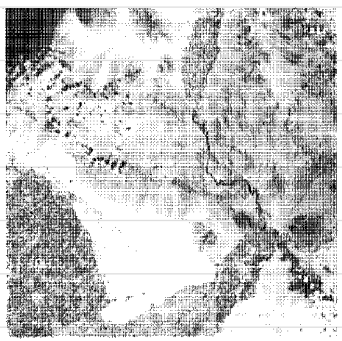
“In 1957, an earth-born object made by man was launched into the universe... But, curiously enough, this joy was not triumphal; it was not pride or awe at the tremendousness of human power and mastery which rilled the hearts of men... The immediate reaction, expressed on the spur of the moment, was relief about the first “step toward escape from men’s imprisonment to the earth.”

— Hannah Arendt, The Human Condition. 1958

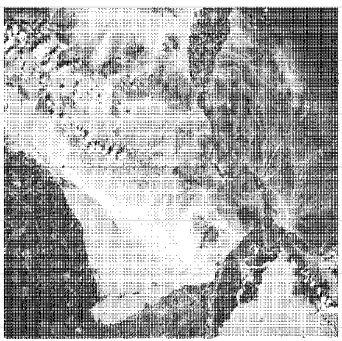
In 1972, the crew of Apollo 17 captured one of the most famous photos of the Earth, titled the Blue Marble, which captures the planet as a unified whole, illuminated against the immense backdrop of darkness. The wide dissemination of this image in the 1970s granted it significance beyond its pictorial depiction; released amidst a surge of environmental activism, it became a symbol for environmental movements1. The unified appearance of the Earth, absent of borders or regional differences, renders environmental activism a global undertaking. Fundamentally different from how we otherwise perceive land, such as cartographic representation, space or satellite images attempt to capture land conditions instead of enforcing some sort of hierarchical orders upon it. The act of “seeing” from space signifies a sense of relief from the confinement of the human body; furthermore, “from men’s imprisonment to the earth”.

To see is a specific and deliberate act towards the subject; in the Human Condition, Hannah Arendt writes about the launching of Sputnik in 1957 and the boomerang effect it created. Satellite images introduce to the human condition a significant factor of artificiality; driven by the same desire that set afoot the Apollo missions, satellite imaging technology is connoted with the same ideology as artifices like Sputnik; an ideology that endeavors to extend the human condition beyond earth-bound, to transform it with artificiality.

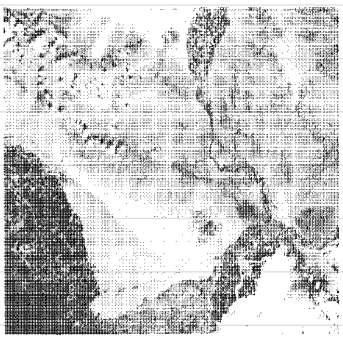
Satellite image is no doubt a space technology, yet it's worth noting that it was also a direct legacy of the Apollo missions, particularly Apollo 9's multi-band photography experiment S065. Experiment S065 produced geographic photographs that not only established the premise, but also provided a "proof of concept" for Landsat.



(a) Photograph NASA AS9-26A-3699A taken with Ektachrome type SO-180 infrared aerial film (color) with a Photar 15 orange filter.

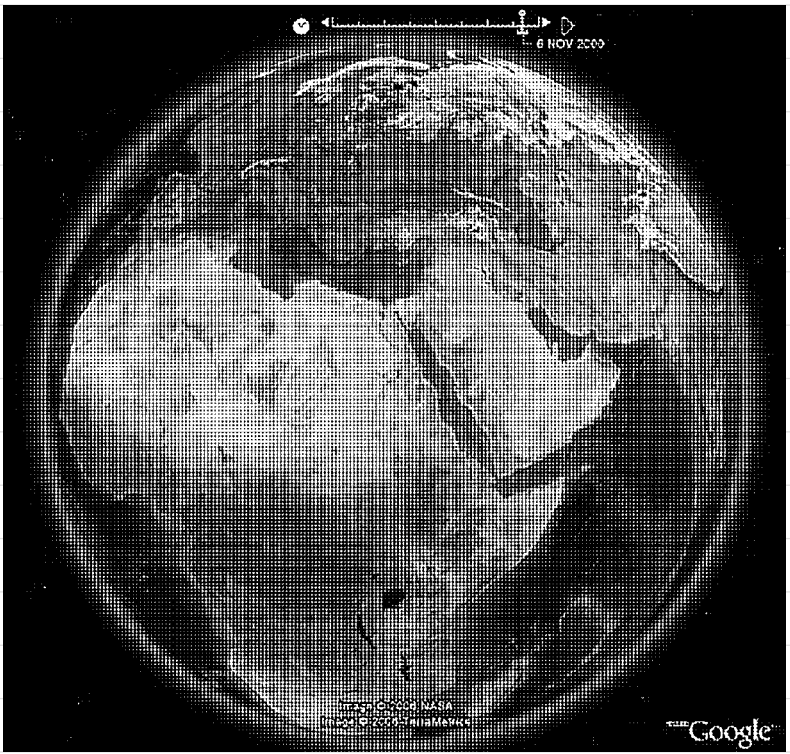


(b) Photograph NASA AS9-26B-3699B taken with Panatomic-X type 3400 aerial film (black and white) with a Photar 58 green filter.



(c) Photograph NASA AS9-26D-3699D taken with Panatomic-X type 3400 aerial film (black and white) with a Photar 25A red filter.

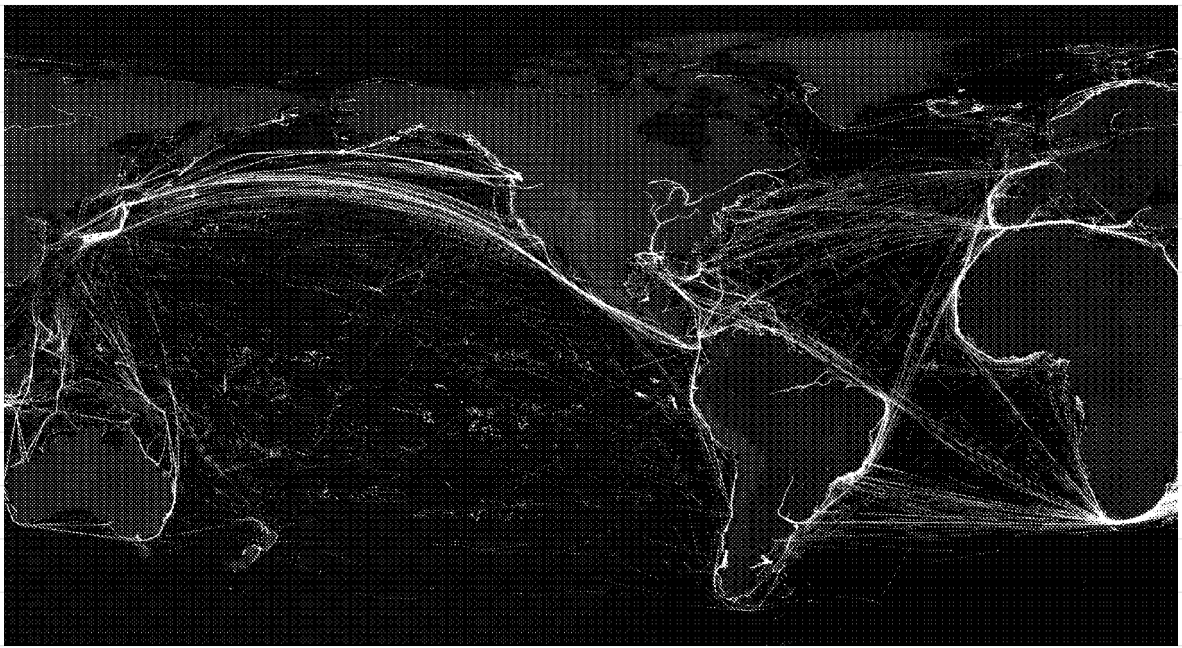
"Examples for the NASA Experiment S065 Multispectral Photography on Apollo 9."



"This Blue Marble Version 2.0 Google add-on overlays a beautiful image of the Earth created by NASA, called the Blue Marble Next Generation, when viewing Google Earth from space."

“Every view from a satellite is an experiment with the technology of looking close up at a distance, remotely examining and representing something as small as fifty centimeters of the ground from a height of four hundred miles in the sky. In the ease of the Google Earth interface, as in the simplifications of a map, the political, military, and economic stakes that underwrite the creation and expansion of the database can often disappear. All that’s left are the minimal data: the image has a date, a time stamp, and a series of coordinates in which it has been registered and made available for purchase by others, including Google Earth.”

— Laura Kurgan, Close Up At a Distance. 2013



“Spire tracks more than 75,000 ships per day now, and continues to build out its satellite and analytics infrastructure”

“The amount of activity that occurs outside the color spectrum is far greater than what occurs within it. It’s like a parallel universe, except we don’t have to travel beyond the stars to reach it. It is accessible right here, and we can call it data.

“Just as the eye captures data within the color spectrum, other devices capture data in the radio frequency spectrum. Radio signals that encode readable data like aircraft and sea vessel tracking, or signals that reflect off of surfaces, like ocean wave height and soil moisture, or still, others that bend from the density of the atmosphere to greatly improve weather forecasting and big weather events.”

— Spire Global. What Spire Does.
https://www.youtube.com/watch?v=xjpP5Fe-VPE

CONTROL SYNTAX RIO

[CASE STUDY]

https://www.e-flux.com/architecture/structural-instability/208702/unstable-control/

GHOST CITY CHINA

[CASE STUDY]

https://civicdatadesignlab.mit.edu/Ghost-Cities-of-China

DIGITAL BACK-UP TUVALU

— Lindsay Bremner et al., Monsoon as Method. 2022