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CLOSE UP AT A DISTANCE MAPPING, TECHNOLOGY, AND POLITICS

Laura Kurgan

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INTRODUCTION



Astronaut photograph AS8-14-2383, December 24, 1968. NASA's original caption reads: "This view of the rising Earth greeted the Apollo 8 astronauts as they came from behind the Moon after the lunar orbit insertion burn. Earth is about five degrees above the horizon in the photo. The unnamed surface features in the foreground are near the eastern limb of the Moon as viewed from Earth. The lunar horizon is approximately 780 kilometers from the spacecraft. Width of the photographed area at the horizon is about 175 kilometers. On the Earth 240,000 miles away, the sunset terminator bisects Africa." This image has come to be known as *Earthrise*. PHOTO: NASA



Astronaut photograph AS17-148-22727, December 7, 1972. NASA's original caption reads: "View of the Earth as seen by the Apollo 7 crew traveling toward the moon. This translunar coast photograph extends from the Mediterranean Sea area to the Antarctica south polar ice cap. This is the first time the Apollo trajectory made it possible to photograph the south polar ice cap. Note the heavy cloud cover in the Southern Hemisphere. Almost the entire coastline of Africa is clearly visible. The Arabian Peninsula can be seen at the northeastern edge of Africa. The large island off the coast of Africa is the Malagasy Republic. The Asian mainland is on the horizon toward the northeast." This image has come to be known as *The Blue Marble*. PHOTO: NASA

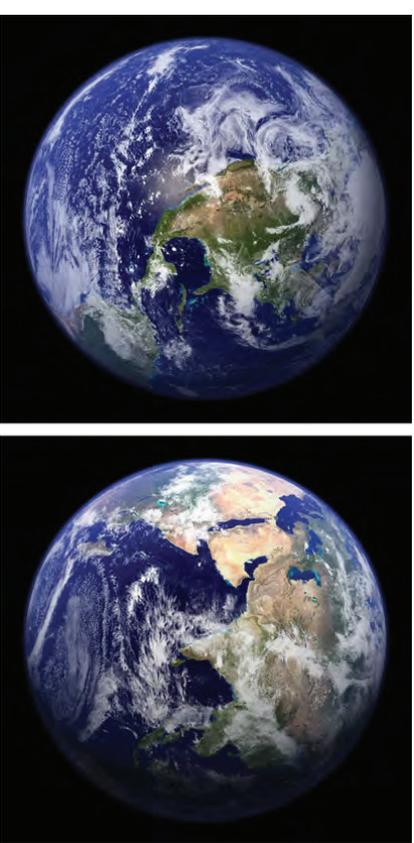
Mapping Considered as a Problem of Theory and Practice

Consider two similar images that have transcended mere publicity to become iconic. *Earthrise*, or image AS8-14-2383, is a color photograph taken by Apollo 8 astronaut William Anders in December 1968, showing the Earth in half shadow against the foreground of a lunar landscape. The second picture comes from the Apollo 17 astronauts in December 1972, a circular image of a shadowless globe. NASA labeled it image number AS17-148-22727, but it has come to be called *The Blue Marble*.

Earthrise is a photo of the Earth taken while orbiting the Moon. It is a perspectival view—the foreground offers a sort of ground and seems to suggest the position of a viewer, so that you can almost imagine being there, looking across the lunar surface. *The Blue Marble* is perhaps more unsettling, because it is without perspective, a floating globe, an abstracted sphere, something like a map.

Denis Cosgrove, in *Apollo's Eye*, calls our attention to these two images and to the role they played in producing “an altered image of the Earth.”¹ Each in its own way is credited with representing or even catalyzing a notion of global or planetary unity, whether in universalist terms, humanist ones, or precisely non-humanist environmental or natural ones. The view across the Moon’s surface, it seems, provoked thoughts of an Earth without borders. Cosgrove quotes Apollo 8 mission commander Frank Borman’s reading of the *Earthrise* image: “When you’re finally up at the moon looking back at the earth, all those differences and nationalistic traits are pretty well going to blend and you’re going to get a concept that maybe this is really one world and why the hell can’t we learn to live together like decent people?”² This “concept” of “one world” can be evaluated in many ways: as “the universal brotherhood of a common humanity” (Cosgrove paraphrasing Archbishop Macl eisih), as a gesture of imperial domination, as an abstract and artificially totalizing erasure of very real differences, as the basis of new global political

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The Blue Marble 2002 is a composite image stitching together quarterly observations, at a spatial resolution of 1 square kilometer per pixel, from the Moderate Resolution Imaging Spectroradiometer (MODIS) onboard NASA’s Terra satellite. NASA. MADE BY RETO STÖCKLI WITH ENHANCEMENTS BY ROBERT SIMMON; ADDITIONAL DATA FROM USGS EROS DATA CENTER, USGS TERRESTRIAL REMOTE SENSING FLAGSTAFF FIELD CENTER (AMTANCTCA), AND DEFENSE METEOROLOGICAL SATELLITE PROGRAM

movements for human rights or planetary responsibility, or as what Martin Heidegger called “the uprooting of man”—“I was shocked when a short time ago I saw the pictures of the earth taken from the moon. We do not need atomic bombs at all—the uprooting of man is already here. . . . It is no longer upon an earth that man lives today,” he told an interviewer in 1966, just a month after an even earlier *Earthrise* image, taken from the Lunar Orbiter 1, had been released.³ Whatever the evaluation, as Cosgrove underlines, these photographs “have become the image of the globe, simultaneously ‘true’ representations and virtual spaces.”⁴ The 1972 photograph, no doubt because it both offered the viewer the whole Earth and seemed to remove any viewer from the picture, became perhaps even more of an icon, not only of totality and unity but likewise singularity and freestanding vulnerability.

But these two images are not the only examples of their type, and their afterlife is indicative of an important shift in the way we represent the planet—and the political stakes of those representations. The iconic status of the images, particularly the second one, is perhaps attested to by the fact that most people will not be able to notice a difference between the 1972 *Blue Marble* and a number of new ones. In 2002, NASA produced a pair of new images, together called once again

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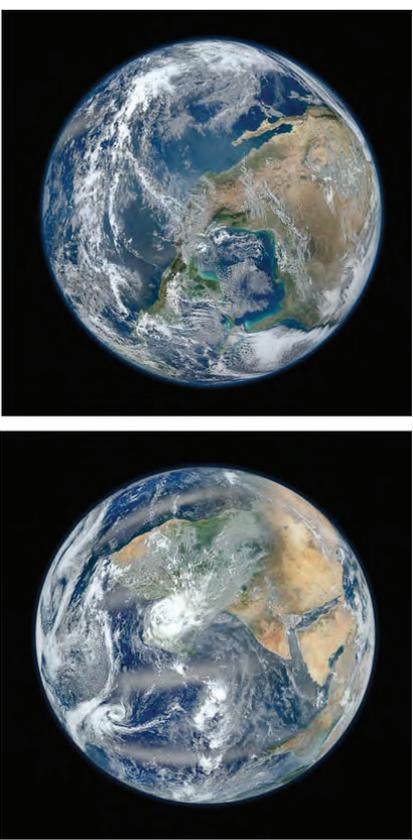


The Blue Marble: The Next Generation, 2005, is a composite image using twelve monthly, cloud-free observations in 2004, at a spatial resolution of 500 square meters per pixel, from the MODIS onboard NASA's Terra satellite. IMAGE: RETO STÖCKLI, NASA EARTH OBSERVATORY

The Blue Marble (one of the Western Hemisphere, and one of the Eastern) put together out of four months' worth of satellite images assembled into what the space agency called a "seamless, photo-like mosaic of every square kilometer of our planet." The resolution of the images, collected by the Moderate Resolution Imaging Spectroradiometer, was one kilometer per pixel. Three years later, they did it again, at twice the resolution and based on twelve months' worth of remote sensing, and called the images *The Blue Marble: The Next Generation 5*. And in 2012, there were two more, again one of the Western Hemisphere and the other of the Eastern, called *Blue Marble Next Generation 2012*, assembled from data collected by the Visible/Infrared Imager Radiometer Suite (VIIRS) on the Suomi NPP satellite in six orbits over eight hours.⁶ These versions are not simply photographs taken by a person traveling in space with a camera. They are composites of massive quantities of remotely sensed data collected by satellite-borne sensors.⁷

The difference between the generations of *Blue Marbles* sums up a shift in ways of thinking about images, what they represent, and how we are to interpret them.

The new blue marbles now appear everywhere: in advertisements and as the ubiquitous default screen of the iPhone.⁸ So where you might think you're looking at image number AS17-148-22727, handcrafted witness to earthly totality, in fact what you're seeing is a patchwork of satellite data, artificially assembled—albeit



Blue Marble Next Generation, 2012, is a composite image using a number of swaths of the Earth's surface taken on January 4, 2012, by the VIIRS instrument aboard NASA's Suomi NPP satellite. IMAGE: NASA/NOAA/GSFC/SUOMI NPP/VIIRS/NORMAN KURNIG

with great skill and an enormous amount of labor. This is not the integrating vision of a particular person standing in a particular place or even floating in space. It's an image of something no human could see with his or her own eye, not only because it's cloudless, but because it's a full 360-degree composite, made of data collected and assembled over time, wrapped around a wireframe sphere to produce a view of the Earth at a resolution of at least half a kilometer per pixel—and any content can be chosen to be in the center of the image. As the story of the versions suggests, it can always be updated with new data. It bears with it a history that mixes, unstably, both precision and ambiguity and that raises a series of fundamental questions about the intersection between physical space and its representation, virtual space and its realization.

Cosgrove described the astronauts' photographs as "simultaneously 'true' representations and 'virtual spaces,'" and we can now begin to appreciate just how precise that description is for the sequence of satellite-generated images to which they gave rise. The photographs were true, at least in the trivial mechanical sense, and then provided a platform for something more abstract or virtual, the "concept" of "one world." Now it is the virtuality of the data-based constructions that seems self-evident. And their basis in remotely sensed data helps us understand what has become of truth in the era of the digital data stream: it is intimately related to

resolution, to measurability, to the construction of a reliable algorithm for translating between representation and reality. The fact that they are virtual images does not make them any less true, but it should make us pause and consider what we mean today by truth.

It is the intersection between the true and the virtual that is the subject of what follows. In it, I offer an account of the technologies that produce global imagery and that both necessitate and facilitate the interpretation of images at once measurable and digital, uncentered and ambiguous, yet comprehensive and authoritative. My account rests on and results from research conducted through practice, working with maps and images I have created, data I have acquired or generated, installations and projects I have undertaken.

RESEARCH CONDUCTED THROUGH PRACTICE

Since the early 1990s—since the first Gulf War, to be precise—I have been thinking about and working with new technologies of location, remote sensing, and mapping. I understand this work as a form of research conducted through practice. The propositions and claims I offer here, however theoretical they are, only emerged for me through the process of experimenting with the technologies themselves, working with and through them to create images. That research has not simply been aimed at developing a theoretical framework for better understanding these new sorts of spatial representations, but has taken the form of a series of projects utilizing the technologies that have produced these images in order to investigate them. That work is presented here in terms of a series of projects that have formed the basis of my inquiry. They both exemplify the approach to understanding digital images articulated here and, I hope, suggest further lines of exploration.

The technologies of global positioning, imaging, and interpretation made available by the development of satellites tasked with surveillance and mapping first emerged to serve the needs of governments and their military and intelligence establishments. Subsequently, these technologies have been made available to the public for commercial and other ends. In the projects documented here, my aims were neither military nor commercial, but while many began as exhibitions in art galleries or museums and then were extended in print and online, they have been no less political than those of the governments and militaries that underwrote the technologies in the first place. This book gathers and reframes a number of these projects in order to make claims and arguments about what the technologies of spatial representation have to do with the spaces they represent, beyond simply representing them.

It offers a series of images created as the once-classified government and military digital technologies of mapping became publicly available, and with them the data on which they rely. In a certain sense, these images are nothing but maps, although not in the ordinary sense. Maps construct space—physical, propositional, discursive, political, archival, and memorial spaces. For many of us, maps now are as omnipresent as the more obvious utilities (such as electricity, water, gas, telephone, television, the Internet), functioning somehow like “extensions” of ourselves, to co-opt Marshall McLuhan’s famous definition of media. They have become infrastructures and systems, and we are located, however insecurely, within them. Drawn with satellites, assembled with pixels radioed from outer space, and constructed out of statistics joined to specific geographies, the maps presented here record situations of intense conflict and struggle, on the one hand, and fundamental transformations in our ways of seeing and of experiencing space, on the other.

Central to the ways these projects unfolded and to the fact that they do not simply analyze, but in fact employ, these technologies, is this claim: we do not stand at a distance from these technologies, but are addressed by and embedded within them. These projects explicitly reject the ideology, the stance, and the security of “critical distance” and reflect a basic operational commitment to a practice that explores spatial data and its processing from within. Only through a certain intimacy with these technologies—an encounter with their opacities, their assumptions, their intended aims—can we begin to assess their full ethical and political stakes.⁹

These projects were made possible by and unfolded in reaction to a series of events over the last two decades that amount to a cataclysmic shift in our ability to navigate, inhabit, and define the spatial realm. They were brought on by: the operationalizing of Global Positioning System (GPS) satellites for both military and civilian uses in 1991; the democratization and distribution of data and imagery on the World Wide Web in 1992; the proliferation of desktop computing and the use of geographic information systems for the management of data; the privatization of commercial high-resolution satellites later in the 1990s; and widespread mapping made possible by Google Earth in 2005. They are also conditioned by and explore a series of political, military, and social conflicts that have defined what is loosely called the “post-Cold War” period, a time in which war fighting became ever more deeply invested in image and information technologies and in which the borders between the civilian and the military, the domestic and the international, became more and more blurred. Each project captures a moment in time politically and, with the technical means possible at that moment, zooms in and expands that moment in space and time, with all the complexities entailed in the repurposing of any image from its intended functions to new ones.

A THEORY MACHINE

Toward the end of *Einstein's Clocks, Poincaré's Maps*, Peter Galison insists on the ways in which, in the twentieth century, "machines tied clocks and maps ever closer together." He focuses on the systems constructed by "American defense planners" that "turned satellites into radio stations that would beam timed signals to earth." In that transmission, an extremely precise accounting of time can translate into an extremely accurate recording of location: "50 billionths of a second per day provide[s] a resolution on the earth's surface of fifty feet."¹⁰

But the accuracy is, Galison argues, *relative*—indeed, the entire operation is for him a sort of concrete, real-world exploration and realization of Einstein's theory of relativity. The desired accuracy comes, rather precisely, at the cost of fixed or absolute understandings of space and time.

Galison is of course talking about the Global Positioning System, the network of twenty-four military satellites that today helps everything from missiles to mobile phones know more or less exactly where they are on the face of the Earth: "The late twentieth-century GPS satellites provided precision timing (and therefore positioning) for both civilian and military users. Built into this orbiting machine were the software and hardware adjustments required by Einstein's theories of relativity. The result is a planet-encompassing, \$10 billion theory machine."¹¹

GPS, Galison says, unhinges our sense of stable and fixed location: "so accurate had the system become that even 'fixed' parts of the earth's landmass revealed themselves to be in motion, an unending shuffle of continents drifting over the surface of the planet on backs of tectonic plates." This "relativization" is not only a result of the unprecedented accuracy of the new measuring technology, however: It is also embedded in the very way in which it works. The system functions only because it takes this relativity into account in its timekeeping: "According to relativity, satellites that were orbiting the earth at 12,500 miles per hour ran their clocks slow (relative to the earth) by 7 millionths of a second per day," and "eleven thousand miles in space, where the satellites orbited, general relativity predicted that the weaker gravitational field would leave the satellite clocks running fast (relative to the earth's surface) by 45 millionths of a second per day." When corrections for these relativistic errors were built into the system, it worked: "relativity—or rather relativities (special and general)—had joined an apparatus laying an invisible grid over the planet. Theory had become a machine."¹²

But what kind of theory? Galison limits his claims to Einstein's theory of relativity, but he draws radical conclusions nonetheless. Einstein's theory, he argues, "designed a machine that upended the very category of metaphysical centrality. Absolute time was dead. With time coordination now defined only by the exchange

of electromagnetic signals, Einstein could finish his description of the electromagnetic theory of moving bodies without spatial or temporal reference to any specially picked-out rest frame, whether in the ether or on earth. No center remained."¹³ In fact, GPS and a whole new set of technologies linked to it have introduced, or hyperbolized, a profound decentring or disorientation, and it is that loss of absolute reference points—and the political engagements and commitments that can be *enabled* by that loss—that are explored in the projects chronicled here.

FROM THEORY TO PRACTICE

We constantly read maps. In print and on computers, mobile phones, PowerPoint presentations, and blogs, maps visualize everything from the movement of hurricanes and refugees to the patterns of traffic and shifting electoral landscapes. Maps and the sophisticated technologies that create them are not limited, of course, to the public domain—we can only imagine the complex maps housed in the nose cone of a cruise missile or those that detail the location of every phone call and email intercepted by the Department of Homeland Security. But we tend generally to reduce maps to the diagrams we hold in our hands. They show us where we are and how to get somewhere else, and in doing so, they can contribute to a sense of security and self-possession. The solidity and certainty of the phrase "You are here" would be the motto of that identity-reinforcing—and maybe even identity-constitutive—function of maps.

The more they become our everyday means of navigating simple and complex situations alike, the more we take maps for granted. Rather than the interpretations of information that they are, we too often see them simply as representations and descriptions of space. This makes the task of analyzing them even more critical.

Maps locate. We can read them because they come laden with conventions, ranging from their legend, scale, and codes of graphic representation to what counts as the information they represent. They depend on a system of notation or of coordinates that places things in relation to one another.

This holds for maps that claim to represent physical spaces as well as those that diagram or chart the relative location of nonphysical entities: maps of a family or kinship structure, for instance, or the flows of data through a network. The spaces that maps try to describe can be ideal, psychological, virtual, immaterial, or imaginary—and they are never *just* physical.

This drive to locate, to coordinate, however revelatory and even emancipatory it can be, also has its price. It seems as though in the end, maps—the successful ones, the ones that show us where we are and get us from here to there—risk offering only two alternatives. They let us see too much, and hence blind us to

what we cannot see, imposing a quiet tyranny of orientation that erases the possibility of disoriented discovery, or they lose sight of all the other things that we ought to see. They omit, according to their conventions, those invisible lines of people, places, and networks that create the most common spaces we live in today.

It is this comfortable sense of orientation, of there being a fixed point, a center from which we can determine with certainty where we are, who we are, or where we are going, that the projects in this book challenge. They put the project of orientation—visibility, location, use, action, and exploration—into question, and they do so without dispensing with maps.

The maps here are built with GPS, satellite images, databases, and geographic information systems (GIS) software: digital spatial technologies originally designed for military and governmental purposes such as reconnaissance, monitoring, ballistics, the census, and national security. Rather than shying away from the politics and complexities of their intended uses, these maps attempt to understand them. Poised at the intersection of art, architecture, activism, and geography, they intend to uncover the implicit biases of the new views, the means of recording information that they present, and the new spaces they have opened up. These projects expose the materials they work with in order to reclaim, repurpose, and discover their inadvertent, sometimes critical, often propositional, uses. They can be used to document, memorialize, preserve, interpret, and politicize, or simply as aesthetic devices, but as with all maps, the ones here—as well as the data sets and the technologies used to chart them—are not neutral.

**“WHAT IS CALLED REALITY IS CONSTITUTED
IN A COMPLEX OF REPRESENTATIONS”**

Every spot on earth can be located, calculated, and represented in multiple descriptive systems. The digitization of the globe was prefigured by the ancient Greek system of latitudinal and longitudinal lines, translating the surface of the Earth into an abstract and universal grid. Irrespective of politics, place names, borders, or changing environments, places were fixed within the mathematical descriptions of their location.

A network of atomic clocks, cameras, and computers has built a virtual globe on which any point of physical space is easily coordinated with digital space. With this change comes the potential to move digital information very quickly from one place to another. We are familiar with the idea that new spaces are today being constructed—spaces different from the ones in which our bodies normally move—but we don't quite know what to think about them. They are the netherland spaces of electronic money, information warfare, and dataveillance, but they

are also the spaces of the everyday, such as mobile phone calls, radio stations, navigation systems, and online social networks.

To call this the “coordination” of physical space with digital space, as I just found ways, constitutes in effect a question about which globe has the priority. In these days when virtual coordinates direct missiles to their targets and social networks have allowed phone companies and other collectors of our data trails to predict our next move in physical space, the shift has resulted in a radical transformation—we can never be sure which coordinate system takes priority in terms of representing our identity or our spatial movements.

Some years ago, Rosalyn Deutsche noted that “what is called reality—social meaning, relations, values, identities—is constituted in a complex of representations.” This book experiments with that claim, tests its bearing on our new digital spatial realm, and ends up confirming it in its most radical formulations:

Reality and representation mutually imply each other. This does not mean, as it is frequently held, that no reality exists or that it is unknowable, but only that no founding presence, no objective source, or privileged ground of meaning, ensures a truth lurking behind representations and independent of subjects. Nor is the stress on representation a desertion of the field of politics; rather, it expands and recasts our conception of the political to include the forms of discourse. We might even say that it is thanks to the deconstruction of a privileged ground and the recognized impossibility of exterior standpoints that politics becomes a necessity. For in the absence of given or nonrelational meanings, any claim to know directly a truth outside representation emerges as an authoritarian form of representation employed in battles to name reality. There can never be an unproblematic—simply given—“representation of politics,” but there is always a politics of representation.¹⁴