

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 did, perhaps understates things. The digital and the physical globes interact in profound ways, constituting 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

Representation and the Necessity of Interpretation

In 1977, the Eames Office, founded by Charles and Ray Eames, made a film called *Powers of Ten*. They aimed to explain “the relative size of things in the universe” by way of a sequence of images, zooming out in a series of frames from the aerial view of an unremarkable event, a couple having a picnic on a lawn, to the Milky Way and then back to a microscopic view of DNA.¹⁵

Citing the architect Eliel Saarinen, the Eameses argued for “the importance of always looking for the next larger thing—and the next smaller.” This profoundly relativistic view animates their film about scale and the aesthetics of sliding along a scale; it is subtitled *About the Relative Size of Things in the Universe*. *Powers of Ten* constructs a seamless zoom into outer space, moving farther and farther away from the ground until the Earth becomes a tiny point in a much larger universe. Beginning with what we might call the human scale—the man and woman lying on a picnic blanket—the sequence of images reduces them (and their scale) to invisible insignificance, then reverses direction, returns to the surface of the Earth and its inhabitants, and then proceeds farther, all the way to the symbolic double helix of a DNA strand. “With a constant time unit for each power of ten,” Ray Eames writes, “an unchanging center point, and a steady photographic move, we could show ‘the effect of adding another zero’ to any number.” This steady move was what filmmakers Philip and Phyllis Morrison called “a disciplined smooth flow,” “a long and uninterrupted straight line.”¹⁶

The film intends to demonstrate that the universe is constructed as a set of transparent pictures, homogenous and continuous, telling more and more about its relational scale. In fact, however, the film tells us about the techniques of taking pictures of the Earth, its features and its context, at different scales. The zoom is *simulated* in the Eames movie, using more than a hundred separate images, many obtained from scientists and from NASA, others made in the studio, some even drawn and painted by hand.¹⁷

In a way, the apparently uninterrupted flow of the film, its seamless transition from one scale to another, might be seen as an attempt to compensate for its radically disorienting premise: There is no absolute scale, just as there is no natural or logical starting or stopping point for the zoom. It is not anchored anywhere—least of all in the human scale. Every scale is relativized by its proximity to and distance from the next, and there is no base or ground for the process of zooming itself. In the zoom we can see reaffirmed, even literalized, what Galison called the “upending” of “the very category of metaphysical centrality.” The Eames’s use of powers of ten as “an unchanging center point” was actually an exercise in radical decentering.

It took the Eames Office a long time and a lot of work to construct their zooms. Today, a nearly real-time zoom from the whole Earth to a picnic blanket is available on our desktops. And with a very easy interface, almost anyone can look at almost anything—not just a sentimental summer scene. The upending of the category of metaphysical centrality now is an everyday experience.

Today, “Google Earth” barely even names an application and its associated database; it is more of a nickname for our access to images of anyplace on the globe. Although it appears as a smooth zoom, the overhead view in Google Earth is just as much a composite, in its own way, as the “steady photographic move” of *Powers of Ten*. Instead of a comprehensive blanket of uniform-resolution (or real-time) images, it is a patchwork of archived aerial and satellite images of varying origins, sources, motivations, and resolutions. In fact, Google generates no overhead images of its own, but rather accesses them indirectly through the commercial enterprises that operate imaging satellites and via the people and governments who have tasked the satellites to collect data about specific locations at particular times. Google then assembles a composite map of these images, regardless of origin or resolution. For some places on the globe, Google Earth even has its own “archeological” record of the history of images of the spot, if and when those are available in the satellite company’s database, and so it becomes possible to move backward and forward in time, as well as almost everywhere on Earth in space. Since 2008, by virtue of pressure from satellite image providers, Google also includes the name of the satellite company that has taken the picture.

How has this come about? The ease with which we can conduct these experiments often hides the reasons for the existence of the images in the first place. Why are they in the database, anyway? How did they get to be freely viewable online from 2005 on? The consumers of generally available satellite imagery, or even the ones who download images for a price from a commercial satellite database, will never know who has tasked a satellite to take a picture (unless they did it themselves) in order to see something close up, but from far away. And 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.¹⁸

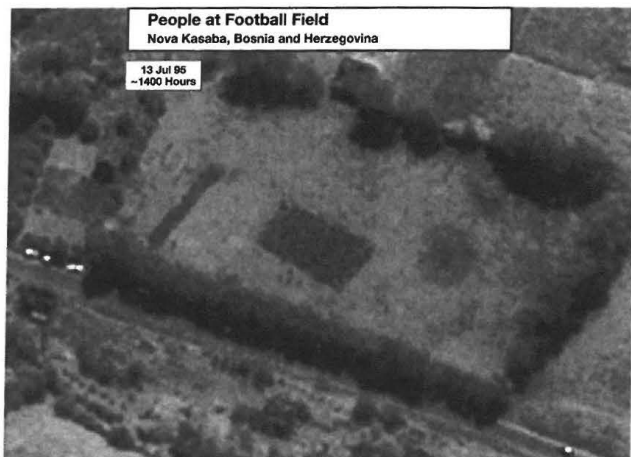
Thus, when we use the ubiquitous zoom of Google Earth to look at our houses or neighborhoods, how many of us stop to consider that the image of our backyard was almost impossible to see—either because the image did not exist or its technology of the zoom was a military secret—only a short time ago? Moreover, how many people know what it is that they are looking at—a high-resolution commercial satellite image, a low-resolution one, or an aerial photograph?

The transition of satellite images from state secrets to commonplace everyday instruments that can be used for indulging idle curiosity, not just for implementing drone strikes on suspected terrorists, has been gradual, but accelerating. Only a few years separate the first Corona satellite mission (1964), tasked on high-resolution and top-secret image collection flights that were not declassified until thirty years later, and the launch of the first Landsat satellite (1972), a low-resolution environmental mission generating a potentially complete and publicly available world picture every three days. Some significant events mark the transition of satellite imagery from top secret to the taken-for-granted public availability that characterizes them now.

In August 1995, as a debate about mass killings the previous month at Srebrenica, in Bosnia, unfolded, Barbara Crosette reported in the *New York Times* that the Clinton administration had shown classified satellite and aerial photographs of mass graves and execution sites to the United Nations Security Council, but had made a distinction between them for the press.

The administration made public three of the photographs, which showed disturbed soil, taken from a U-2 spy plane. It declined, however, to let reporters see the satellite photographs taken several days earlier, which were said to include pictures of people crowded into a soccer field. American officials said the satellite photographs were classified, although Secretary of State Madeleine Albright showed them to the other fourteen members of the Security Council.¹⁹

Thus, a residue of reticence and secrecy remained, for some images, just weeks after Vice President Al Gore had inaugurated one of the most ambitious declassification efforts in U.S. history with the unveiling of the CIA’s Cold War-era Corona project and its extraordinary visual archive.²⁰ The example of the Srebrenica images, though, was the significant one: since then, we have lived in a geopolitical

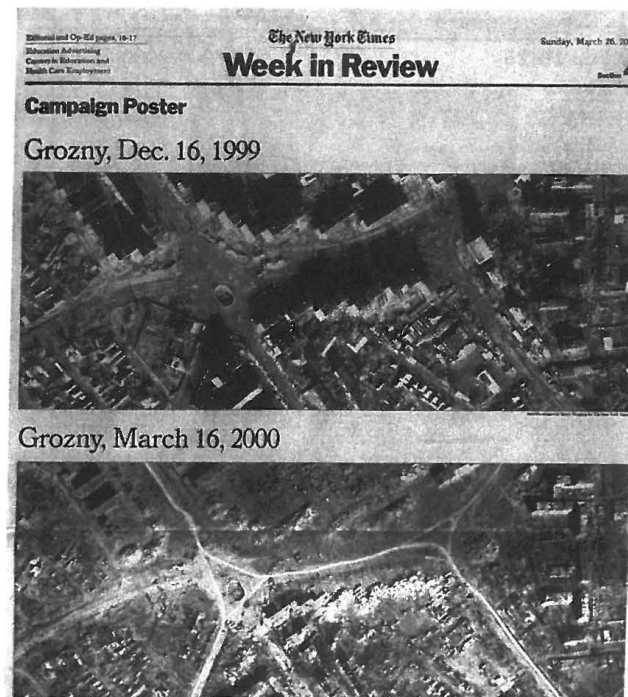


U.S. satellite image taken on July 13, 1995, showing about six hundred people gathered in a soccer field at Nova Kasaba, Bosnia-Herzegovina, near Srebrenica. It was one of several classified images shown to members of the UN Security Council on August 10, 1995, as evidence of mass killings by the Bosnian Serb Army.

IMAGE: INTERNATIONAL CRIMINAL TRIBUNAL FOR THE FORMER YUGOSLAVIA, VIA U.S. HOLOCAUST MEMORIAL MUSEUM

world in which it was not only a reasonable working assumption that major events could be monitored from outer space, but that the traces of that surveillance would appear in the public sphere.

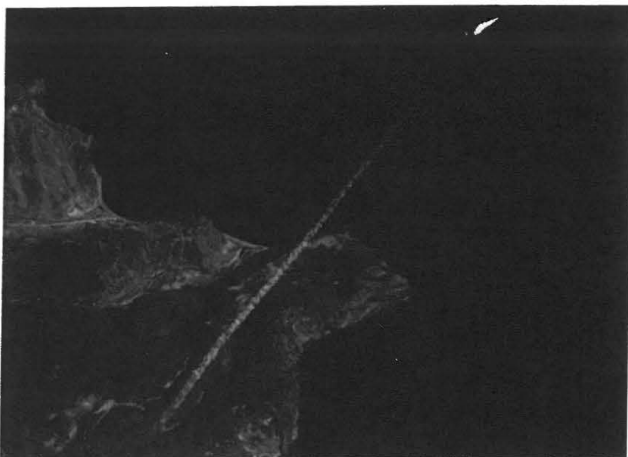
In 2000, the *New York Times* for the first time used the newly available Ikonos satellite as a sort of alternative investigative journalist in Chechnya. On the front page of the Sunday "Week in Review" section, two comparable satellite images of the Chechen capital city of Grozny were published, bearing the title "Campaign Poster." The first image was dated December 16, 1999, and the second March 16, 2000, just ten days prior to their publication in the newspaper. The accompanying text remarked on the likely electoral victory that day of Russian President Vladimir Putin and explained: "The images above, commissioned by the New York Times and taken by a commercial satellite, hint at the cost of that victory, in the destruction of a residential area near Minutka Square in the Chechen capital, Grozny."²¹ As Lara Nettelfield has pointed out, "unlike other images of destruction in the post-Communist world, the Grozny pictures failed to arouse public sympathy or outrage for the plight of civilians in Chechnya."²² But since then, this genre



The *New York Times* first used before-and-after satellite imagery, directly obtained from a commercial provider, in an analysis of the role of the Chechen war in the Russian presidential campaign of March 2000.

of before-and-after images has become commonplace in much news gathering and reporting from zones of conflict and mass destruction.

Fast forward almost another decade. In April 2009, *The Lede* blog at the *New York Times* reported on what might be considered a satellite photo opportunity. "In what was either a remarkable coincidence or a bit of precision timing," wrote Robert Mackey, the North Korean government had launched a rocket "just as a commercial satellite, owned by a company which provides images of the earth to the Pentagon, DigitalGlobe, was passing over North Korea."²³ The *Guardian's* science correspondent, Ian Sample, reported that at least one British defense analyst



"A satellite image showing what is believed to be the exhaust trail and part of a North Korean rocket launched on April 5. The company that took the photograph, DigitalGlobe, describes it as 'a panchromatic, 50 centimeter (1.6 foot) high-resolution WorldView-1 satellite image showing the rocket launch from the Musudan Ri launch facility, formerly known as Taepo-dong.'" CAPTION: NEW YORK TIMES; IMAGE: DIGITALGLOBE

"suspects Pyongyang had timed the controversial launch to coincide with the satellite's arrival, in the hope of maximizing publicity of the launch."²⁴

Google Earth is only the latest step in the public availability or democratization of high-resolution satellite imagery. Many military technologies have gone from classified to omnipresent, from expensive to free, and from centralized to distributed, downloadable on our desktops anywhere on Earth with access to the Internet.²⁵ That much seems certain. Policy analysts have dubbed this a "growing global transparency."²⁶ However, because what is involved is the appearance in the public sphere of a way of viewing things close up at a distance in which there is no absolute scale, no anchor, no center, evaluating this new visibility and negotiating its reality is a lot less obvious.

THE OPACITY OF TRANSPARENCY

In September 1999, Space Imaging successfully launched Ikonos, the first satellite to make high-resolution image data publicly available. John Pike, who pioneered

the civilian use of aerial and satellite imagery at the Federation of American Scientists and today directs GlobalSecurity.org, called it "one of the most significant events in the history of the space age."²⁷ Earlier, Pike had suggested that a new kind of deterrence was enabled when news organizations and civilians could test, with meaningful certainty, the authority of official claims about, for example, the presence or absence of nuclear facilities in other states. And likewise, "it provides an independent check," he said, "on what the government is saying, for example about mass graves and other wartime atrocities in the Balkans."²⁸ Ann Florini, of the Carnegie Endowment for International Peace, argued that "on the plus side, governments and nongovernmental organizations may find it easier to respond quickly to sudden refugee movements, to document and publicize large-scale humanitarian atrocities, to monitor environmental degradation, or to manage international disputes before they escalate.... But, there is no way to guarantee benevolent uses."²⁹

When U.S. Secretary of State Colin Powell made his infamous February 2003 presentation to the United Nations Security Council claiming to demonstrate that the government of Iraq was in possession of weapons of mass destruction, he presented a PowerPoint slide show that included a lot of satellite images, annotated to support his claims. "The facts speak for themselves," he said. "My colleagues, every statement I make today is backed up by sources, solid sources. These are not assertions. What we are giving you are facts and conclusions based on solid intelligence." And later he repeated, "Ladies and gentlemen, these are not assertions. These are facts corroborated by many sources, some of them sources of the intelligence services of other countries."

Later, he clarified his epistemology. He explained that the images, in fact, did *not* speak for themselves and were indeed hard to understand, but insisted that he was confident in his own ability, backed by the work of experts, to say what they meant:

Let me say a word about satellite images before I show a couple. The photos that I am about to show you are sometimes hard for the average person to interpret, hard for me. The painstaking work of photo analysis takes experts with years and years of experience, poring for hours and hours over light tables. But as I show you these images, I will try to capture and explain what they mean, what they indicate, to our imagery specialists.³⁰

The images he presented had been artfully interpreted, which is not to say that they were fake or forged or even that the images distorted the truth. Simply and more importantly, they were not objective photographs, but were presented as such. They were interpretations presented as facts and in a way that prevented

anyone else from examining the uninterpreted data. The presentation and its catastrophic results remind us that we need to be alert to what is being highlighted and pointed toward, to the ways in which satellite evidence is used in making assertions and arguments. We need to learn how to agree and disagree with those arguments, to challenge the interpretations made of images that are anything but objective or self-evident. For every image, we should be able to inquire about its technology, its location data, its ownership, its legibility, and its source. To facilitate that inquiry, an image and its associated data should remain closely linked. But we are seldom given access to the data or the tools with which to interpret it, because the satellite images have been stripped of their data and presented to us as pictures already interpreted by experts.

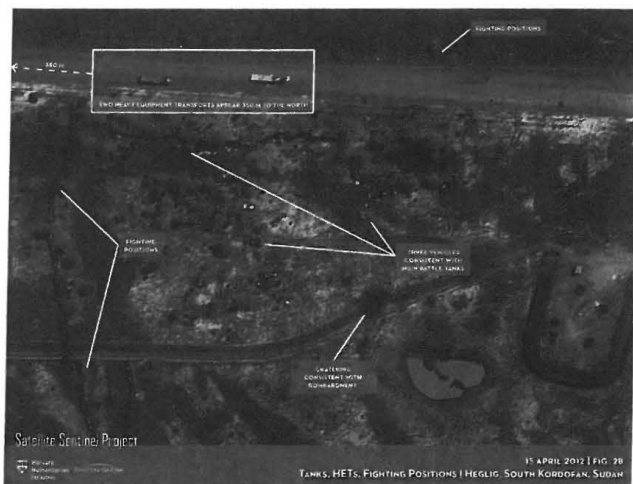
We know now that there were no weapons of mass destruction found in Iraq. We also know that there was a videotape made by a jihadist militia, the Islamic Army in Iraq, that showed the group using satellite images from Google Earth to plan an attack.³¹ And we have witnessed the “benevolent” stand taken by the Satellite Sentinel Project at Harvard, which makes use of DigitalGlobe satellite imagery to “identify chilling warning signs [of mass atrocities]—elevated roads for moving heavy armor, lengthened airstrips for landing attack aircraft, build-ups of troops, tanks, and artillery preparing for invasion—and sound the alarm.”³² Michael Van Rooyen, director of the Harvard Humanitarian Initiative, which houses the project, says that it’s “a clear example of how technology transforms the way we think about and prepare for crises. In the hands of well-trained and experienced analysts guided by humanitarian principles, satellite technology provides a potent new way of ensuring that the world witnesses threats to civilians.”³³

Is the globe transparent? Yes, sort of. High-resolution satellites seem to signify global transparency, to realize effectively the dream that pretty much anyone could be able to see pretty much anything, anywhere. Because a visual regime that is inherently decentering, that disorients under the banner of orientation, can be used for all sorts of purposes, understanding how the images thus generated are produced and used is a civic responsibility and a political obligation. And the ways in which these satellite views are for the most part presented to the public—which is to say, in the news or in the public announcements of private companies, NGOs, or government agencies—are as misleading as they are revelatory: they come to us as already interpreted images, and in a way that obscures the data that has built them. As apparently self-evident images, pictures stripped of their data, they generally lack, omit, or erase the fact, quite simply, that they have been interpreted.

In such a situation, Lisa Parks worries that any satellite image, even on Google Earth, implies a military view, which is to say, “knowledge practices of intelligence gathering and Earth observation...satellites...encircling the Earth on planetary



Four slides from U.S. Secretary of State Colin Powell's PowerPoint presentation on Iraq to the United Nations Security Council, February 5, 2003. These are some of the many annotated satellite images displayed that day, without access to the original satellite data. IMAGES: U.S. DEPARTMENT OF STATE



"The Satellite Sentinel Project (SSP) has published new imagery indicating that as Sudan and South Sudan clashed over an oil field near the disputed border town of Heglig, a key part of the pipeline infrastructure was destroyed. The damage appears to be so severe, and in such a critical part of the oil infrastructure, that it would likely stop oil flow in the area, according to SSP."

FROM PRESS RELEASE, [HTTP://WWW.SATSENTINEL.ORG](http://www.satsentinel.org); SATELLITE IMAGERY FROM DIGITALGLOBE

patrols" and "treat[ing] the surface of the Earth as a domain of unobstructed Western vision, knowledge, and control." She says, "I define remote sensing as a television practice that has been articulated with military and scientific use of satellites to monitor, historicize and visualize events on Earth."³⁴

Parks spends a long time analyzing the same images of Srebrenica mentioned above, the ones Madeline Albright showed to the Security Council. Some of her analysis may seem apologetic now, for instance, her protests against the ways "the Western media tended to demonize the Serbs" and her suggestion that the Bosnian Army "must take partial responsibility for conditions leading to the massacre" at Srebrenica.³⁵ Her response is complicated by her almost automatic suspicion whenever agencies of the U.S. government appear to be the main interpreters of events by way of a satellite image. However, she is right that we were simply given images and interpretations by Albright, and more importantly, that we were also and unexpectedly seeing high-resolution intelligence imagery used for the first time as evidence of genocide. But today it is clear that Albright's imagery was in fact essential evidence of a crime and its cover-up.

Parks devotes a good part of her analysis to the "passive-aggressive voyeurism" of the U.S. government, "idly recording" the attack on Srebrenica while failing to do anything to stop it. She concludes that because of its "remoteness and abstraction," the satellite view functioned merely as an "overview of the war, draw[ing] on the discursive authority of meteorology, photography, cartography and state intelligence to produce its reality and truth effects."³⁶ The combination of passivity (just watching) and aggressivity (the militarized view) is most troubling to her. The problem is not just that the image comes from the state, though, and bears its codes; she seems troubled by its ontology, as well.

Since it is digital, however, the satellite image is only an *approximation* of the event, not a mechanical reproduction of it or live immersion in it.... Because it is digital, its ontological status differs from that of the electronic image. The satellite image is encoded with time coordinates that index the moment of its acquisition, but since most satellite image data is simply archived in huge supercomputers, *its tense is one of latency*.... The satellite image is not really produced, then, until it is sorted, rendered, and put into circulation.³⁷

This latency or approximation, for Parks, leaves the satellite image open to all sorts of exploitation, most notably that operated by a military-diplomatic machine promoting its own omniscience and objectivity. Critical of that, she endorses the engagement of journalist David Rohde, who traveled to the scene in the immediate aftermath of Albright's revelations to see whether he could confirm what the images seemed to show. She admires his success in "witness[ing] the minutiae that

the satellite could not pick up," his eyewitness account of the body parts, clothes, shell casings, and documents left behind in the mass murders. She is tempted by the notion that, because the eye sees at a higher resolution than the satellite, it sees more, and more clearly. Parks praises Rohde's "refusal to accept the satellite image as evident"—"instead of accepting the state's attempt to anchor the meaning of the satellite image, [he] seizes its emptiness and abstraction as impetus to infuse it with partiality, situated knowledge, and local tales."³⁸

She leaves unstated the fact that Rohde in fact did confirm the interpretation that Albright had offered, but that is less important than her commitment to what is called "ground truthing." The ultimate test of the image, it seems, is what can be found, seen, heard, and sensed on the ground itself. In fact, she makes the trip herself some years later, but confesses to not really being able to see very much. Srebrenica was still largely populated by those who had killed and expelled its Muslim population and neighbors: "at Cafe Kum I encountered a former Serbian military officer who, I was told, had recently been indicted by the War Crimes Tribunal." So it was hard to learn much. "There is a code of silence in Srebrenica that is difficult to penetrate, especially for an outsider like me," she says. She concludes from this persistence of unreality—"the site was as abstract to me up close as when I first saw it on television"—that "witnessing became a *fantasy of proximity*."³⁹

This conclusion seems more reliable than the premise that generated it. The view up close can be just as blurred as the one from overhead, and the difference between the image as a "site of activity" and a "memorial" more difficult to tell than it might at first seem.⁴⁰ What is most valuable here is the caution she invites: no satellite image presents a simple, unambiguous picture of the Earth, and a visit to the site itself can often raise more questions than it answers, reaffirming rather than reducing the openness of the image to interpretation. In the end, it seems, embedded in the very structure of the techno-scientific, militarized, "objective" image is something more disorienting, an "emptiness and abstraction" that resists sovereign control and opens itself to other sorts of interpretation.

INTERPRETATION AND "THE VIEW FROM NOWHERE"

What does the "emptiness and abstraction" of digital satellite images reveal? Although how such images are to be read and who is able to read them are of central importance, widespread understanding of satellite imagery and how to interpret it lags considerably behind its rate of production. We are often presented with images bereft of any data associated with them and subordinated to the interpretations that guard that data behind a shield of security and expertise. The projects in this book aim to challenge that.

What digital satellite images can show is certainly derived from a military or logistical worldview and deeply indebted to the institutions committed to seeing the world in military or logistical terms. The publicly available images in Google Earth come largely from DigitalGlobe and GeoEye, both major contractors for the U.S. government in the development and deployment of high-resolution satellites. By allowing transparency and openness—or rather, by funneling these images to the public via Google Earth—the United States has remained, thus far, in the forefront of viewing at high resolution across borders. And because what is at issue here is interpretation, other interpretations are possible.

What is largely missing from Parks's argument is the positive reading of what "image interpretation" implies. It is both an art and a science, especially with satellite image data, and the relation between the two is not an easy one to negotiate, even for "experts" whose expertise is at the service of governments and commercial institutions. John Pike, interviewed on National Public Radio about satellite imagery of destroyed villages in Darfur, responded to his host's claim that "the interpretation of these images is an art as well as a science" this way:

Well, it's a discipline that the military intelligence community has spent a long time training people to do. One of the big challenges with this type of imagery is in finding things that it's readily understandable what you're looking at, and doesn't require any great leap of imagination, you're not dependent on somebody else captioning it. In the case of the Chinese nuclear submarine, well, that was pretty straightforward. In the case of Darfur, frankly, I've been very frustrated that the satellite imagery has not had the sort of impact on the public imagination that we had hoped it would in the past.⁴¹

Pike is telling us about the leaps of imagination that image interpreters must take when they look at an image, and longing for images that require fewer and shorter leaps. We continue, though, to defer to experts and to privilege the view that designates itself as scientific and objective.

But because the interpretation of such images is an art, as well as a science—because it inherently involves imaginative leaps—the putatively scientific and objective interpretations at the service of governments and commercial institutions tell only a story, not the story, of what is going on in these images. Views of the globe, which is to say, maps, have always combined the science of spatial description and documentation with a certain art, as well. J.B. Harley argued famously that maps should be understood as multidisciplinary artifacts, ones that reveal social and political forces, as well as representations of power. He worried, in 1989, about the ways in which "the scientific rhetoric of map makers [was] becoming more strident." "Many may find it surprising," he wrote, "that 'art'

no longer exists in 'professional' cartography." He asks that we question the by now naturalized conventions through which maps have in fact standardized our images and knowledge of the world. He also asks us "to search for the social forces that have structured cartography and to locate the presence of power—and its effects—in all map knowledge." Although Harley's article was aimed at historians, *against* "what cartographers tell us maps are supposed to be," his questions are equally important for professional cartographers and the users of maps.⁴²

He asks about the legends and frames of ancient maps, whose creators could only imagine what the globe looked like, as well as the symbols and legends in contemporary maps, which claim the status of objective description of reality. He treats both as texts that need to be read closely so we can start to understand the bias in any map projection. He reminds us that even something as simple and innocent as the mathematical translation of a sphere projected as a so-called undistorted flat plane has a "politics." "In our cartographic workshops we standardize our images of the world," he writes, and the process is complex: "the way maps are compiled and the categories of information selected; the way they are generalized, a set of rules for the abstraction of the landscape; the way the elements in the landscape are formed into hierarchies; and the way various rhetorical styles that also reproduce power are employed to represent the landscape." The standardized cartographic images to which we have grown so accustomed that most of us don't know them as a particular interpretive decision—the Mercator projection—are distinguished from others because they project the spherical globe as a series of apparently undistorted square shapes. This formal, but not only formal, gesture, he points out, "helped to confirm a new myth of Europe's ideological centrality."⁴³

Svetlana Alpers attributes these standardized images of the world, or the flattening of the Earth into the mathematical uniformity of longitude and latitude, to a certain disappearance of the subject, or what, following Thomas Nagel, she calls "the view from nowhere."⁴⁴ As an art historian, she opposes this flat surface to the equally mathematical formula of the perspectival grid, which is viewed from somewhere—the point of view of the subject who both constructs and is constructed by that view. Perspective, it is well known, freezes a subject in a particular place and time.

Maps do not employ perspective. Although the grid that the Mercator and other such projections impose on the sphere of the Earth may share with perspectival paintings the mathematical uniformity of the frame and the definition of the picture as a window through which an external viewer looks, they do not share the positioning of the viewer. The cartographic projection is, in that sense, viewed from nowhere.⁴⁵

Maps construct a spatial interpretation through their techniques of representation, the "normalized" views that Harley decries.⁴⁶ A cartographic projection transforms, mathematically, a sphere into plane.

Yve-Alain Bois arrives at maps, although he does not quite specify that this is where his argument leads, from another type of constructed, measured, and projected view: the "axonometric" projection. An axonometric drawing shows an object in ways that cannot be seen simply by looking at it. To do so, it rotates the object along one or more of its axes such that the surfaces of the top and two sides are in view simultaneously. The horizontal and vertical dimensions are projected to scale, so that their planes are parallel to each other. Unlike in a perspectival drawing, there is no single fixed position from which the object is viewed.

Axonometric drawing originated, argues Bois, in techniques developed by engineers in 1822 to draw carefully the joints of a new material, iron. What distinguishes this technique is that the top and the side views are both drawn to scale, as if one were flying over the joint, but no perspective is generated to distort the scale. The engineers, Bois writes in "Metamorphosis of Axonometry," derived their drawings from French military artists a century and a half earlier, who had used the technique to simulate the trajectory of a cannonball making its way over the walls of a medieval city, in order to compensate for the blindness imposed on them by the walls.⁴⁷

Modern architects reinvented this drawing technique another hundred years later, in 1923, showing an object from the top and the side view in equal measures in order deliberately to generate a decentered modernist aesthetic of ambiguity. "All treatises which precede this event...regardless of their concern with architecture, military art, technical drawing or geometry, emphasize the convenience and accuracy of axonometry, whereas modern artists celebrated its perceptive ambiguity.... The axonometric image is reversible; it tears free of the ground (Malevich's term), facilitating aerial views." After chronicling the various ways in which more and more architects, from Herbert Bayer to the New York Five, used the axonometric view to focus on ambiguous spaces, rather than to reproduce the scientific or factual vision of the engineer, Bois pushes the argument further to propose that the "history of axonometry should include a chapter on aerial views and photogrammetry." And there is no reason to stop there: the history should extend to remote sensing in all its forms...a history precisely, as Bois insists, not only of the logistically and pragmatically military, but also at the same time of instability, abstraction, "ambiguities," and the "vertiginously ambivalent."⁴⁸

"The axonometric drawing hovers or flies above its object," concludes Bois.⁴⁹ Denis Cosgrove has written some of the history of this flying image, focusing on Oskar Messter's 1915 invention of the airborne automatic camera, which "allowed

pilots to film a 60-by-2.4 kilometer strip of land surface in a sequence of frames at the scale of conventional topographic maps." With it, he says, "a new mode of geographical representation was created: 'a flattened and cubist map of the earth,' which demanded new skills to relate the image to the ground": "Composite photographic images demanded a different way of looking than the still photograph did. The eye moves over the virtual space of the image as across a map, parodying in some measure the kinetic vision of the flyer.... Over time the aerial photograph and, more recently, remote-sensed images have become codependent with the map."⁵⁰

Although high-resolution satellite images are by now naturalized as authoritative and maplike, the rigor (and we could even say the truth) of their embeddedness into the coordinates of longitude and latitude, the digital grid of navigational lines, should not be allowed to efface their military-political origins, or the technologies that have produced them, or the "relativity" and "ambivalence" that can render them so profoundly opaque and disorienting—and demanding of interpretation.⁵¹

PARA-EMPIRICISM

Not only is the physical surface of the Earth being mapped—we are also part of the transformation effected by digital mapping technologies. Anything that is listed, counted, and linked to a physical or digital address can potentially become spatial data and be mapped as well. Mounds of social, financial, and mobile data are collected on a daily basis by private and public entities, and we are being counted and translated into data each time we interact with electronic networks. Maps are being generated and updated constantly with this data. All of us—crossing a border, talking to a census taker, swiping a credit card, riding the London Underground, entering a luxury building in Dubai or a public housing project in Seattle, withdrawing cash at an ATM, driving through a highway toll booth—can become, and are regularly becoming, points on all sorts of maps. The social city is inscribed repeatedly onto the physical city.

The projects in this book use advanced digital technology and data. I have each time taken a leap and not left the data to speak for itself, but have tried instead to offer a reflection on what can be done with it. When working with data, things are not as obvious as they might seem. So while others call working with data "quantitative," "empirical," or "objective" analysis, I prefer the somewhat more modest notion of "para-empiricism."

The English prefix "para" comes from the Greek word meaning "by the side of, beside," hence "alongside of, by, past, or beyond." It has come to denote, in words

such as "paramedic" and "paramilitary," the sense of auxiliary, almost, not quite, functional but not really a substitute. It is with this double sense of alongsideness and incompleteness that I employ this neologism.

Usually when we appeal to *data*, we mean by this nothing less than reality itself, the concrete facts of the world, the real things. We ask for data points, we collect them in data sets and databases, and we treat them as indexical traces of the very phenomena we wish to understand or manipulate. Data are, in their etymological sense, the givens with which we can operate on the world. When empirical social scientists want to explore the hard facts of a situation, it is to data in this sense that they turn.

Instead, the word "data," in this book, means nothing more or less than representations, delegates or emissaries of reality, to be sure, but only that: not presentations of the things themselves, but representations, figures, mediations—subject, then, to all the conventions and aesthetics and rhetorics that we have come to expect of our images and narratives. All data, then, are not empirical, not irreducible facts about the world, but exist as not quite or almost, alongside the world: they are para-empirical.

To put it another way, there is no such thing as raw data. Data are always translated such that they might be presented. The images, lists, graphs, and maps that represent those data are all interpretations. And there is no such thing as neutral data. Data are always collected for a specific purpose, by a combination of people, technology, money, commerce, and government. The phrase "data visualization," in that sense, is a bit redundant: data are already a visualization.

My claim is not that this plunges us into some abyss of uncertainty, though, or makes it impossible to function in the real world. On the contrary, it is only on the condition of accepting this condition of data, in *para*-empirical condition, that we have any chance of operating responsibly in or on the world. It is because we admit that our data are not the same as reality, that there are disputes about data and that they can be decided only in debates with others, that the realms of politics and ethics open up for us.

Here I share the position of Bruno Latour, who argued in his introduction to the catalog of his ZKM show, *Making Things Public*, that the time has come for a thorough reevaluation of the so-called "crisis of representation." It might be, he says, and he means that this is in fact the case, that

half of such a crisis is due to what has been sold to the general public under the name of a faithful, transparent and accurate representation. We are asking from representation something it cannot possibly give, namely representation without any re-presentation, without any provisional assertions, without any imperfect

proof, without any opaque layers of translations, transmissions, betrayals, without any complicated machinery of assembly, delegation, proof, argumentation, negotiation and conclusion.⁵²

"Para-empiricism" names for me this effort at once to reclaim a sense of reality, and not to imagine that this requires doing away with representations, narratives, and images.

The projects included here don't only talk *about* maps, images, data. They seek to talk *with* them—to put them to use in ways that are critical of or that enlarge our conceptions of where we are and might be in the world. From the facts on the ground to the exhilaration of disorientation, the projects and writing, the images and data, collected here all aim to open spaces for discussion and action. They affirm the necessity of critique, and they reject the idea that critique requires "critical distance," at least in the ordinary sense. That is, they aim to make more space in the public sphere for the participation of everyone, not just governments, their militaries, and the experts tasked with making interpretations of global imagery to serve those constituencies. They aim to make it possible for everyone at least to understand how to participate actively, and by necessity politically, within the new territories constituted by these technologies of representation.

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