After taking one-hundred micrograms of LSD one fateful evening in 1966, Stewart Brand stood on his San Francisco rooftop and had a revelation that launched what would become an obsessive quest. He suddenly realized that a color photograph of the Earth from outer space had never before been made. Brand felt such an image might have the capacity to transform the way everyone thought about the planet, and could bolster support for one of his beloved causes, the environmental movement. When he woke up the next day, Brand ordered hundreds of buttons and posters bearing the slogan, “Why haven’t we seen a photograph of the Whole Earth yet?” (Fig. 1) He mailed them to the National Aeronautics and Space Administration, to members of Congress, diplomats, officials from the United Nations, and to Soviet scientists. Brand also sold buttons at the University of California at Berkeley for twenty-five cents each. He was thrown off campus, but managed to sell out of buttons at Stanford University, Columbia University, Harvard University, and at the Massachusetts Institute of Technology. One man’s revelation, born on a rooftop of a San Francisco, soon sparked a campaign of international proportions.

But it would be six years until Brand’s demand for a color photograph of the entire Earth, made by a human being, was fulfilled. One of three astronauts aboard the Apollo 17 spaceship, during its coast toward the moon, shot a sequence of eleven color photographs of the Earth with a hand-held Hasselblad camera (which later broke, damaging most of the other photographs). At precisely 5:33 a.m., Eastern Standard Time, on December 7, 1972, the astronaut captured image AS17-148-22727, at a distance of about 21,750 nautical miles from the Earth’s surface (Fig. 2). In this photograph, the Earth appears, center-frame, basking in full sunlight, and in perfect clarity. The only “imperfection,” as some saw it, was the fact that Africa and Antarctica, not the United States of America, were the points of focus. The Sahara Desert appears cloud-free, while swirls of clouds covering Antarctica give the impression of rotational dynamism and of frozen time and motion. The official caption for this photograph reads as follows:

View of Earth as seen by the Apollo 17 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.
TIME IMPLOSION

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 east coast of Africa is the Republic of Madagascar. The Asian mainland is on the horizon.7

According to N.A.S.A., the image was taken at precisely five hours and six minutes after launch, and about one hour and forty-eight minutes after the spacecraft left its parking orbit around the Earth to begin its trajectory to the moon.8 This image, assumed to be a snapshot of a fraction of time, is labeled with temporal precision—but not too much precision. It was taken sometime within the thirty-third minute after five o’clock in the morning, Eastern Standard Time. However, light, as we see it in the photograph, accumulated on light-sensitive film over just a fraction of a second, not a full minute. Big Blue Marble, as the picture would come to be titled, exemplifies an enduring normative perception that photography’s relationship to time is that of instantaneity. Arguments that the photographic medium has a finite, instantaneous relationship to time have been the mainstay in photo-history discourse until the 1990s. The early motion studies of Eadward Muybridge and Étienne-Jules Marey, the snapshots of Jacques-Henri Lartigue, the “decisive moments” of Henri Cartier-Bresson, the stroboscopic images of Dr. Harold Edgerton, and the 1960s snapshot aesthetic reflect and maintain this perception that the photograph captures the appearance of its subject in the fraction of a moment.

But instantaneous-time photographs such as Big Blue Marble also have a complicated, sometimes convoluted, relationship to time. In Camera Lucida, Roland Barthes maintains that the photograph has a peculiar capacity to represent the past in the present, and thus to imply the passing of time in general.9 As a consequence, Barthes argues, all photographs speak of the inevitability of our own death in the future. Moreover, he suggests that photography’s most important attribute is its ability to fracture the linearity of “lived time,” or the “logico-temporal order,” to cause a collision of past, present and future in the viewer.10

Big Blue Marble is an example of just such a convolution of time in instantaneous photographs. The image depicts a planet very much in the throes of motion, as Marta Braun suggests:

…whereas the other photographs depict movements that occur in instants of time too fast to ever be seen by the naked eye, this photograph is a picture of movements—the diurnal rotation of the earth and the much longer rotation of the moon—that are too slow. The invisibility of the earth’s motion is echoed by the invisibility of all human presence.11

Thus, in this photograph, time is extended. What we see is a duration of time. Yet the image was snapped in an instantaneous fraction of a second. These apparently conflicting attributes of time—that is, time as it appears in instantaneous photography—were explained by Charles Sanders Peirce: “Even what is called an ‘instantaneous photograph,’ taken with a camera, is a composite of the effects of intervals of exposure more numerous by far than the sands of the sea.”12

But the temporal attributes of Big Blue Marble are yet more complicated. Light collected on film was actually reflected from the Earth’s surface in a split second in the past that took time to travel through space and collect on film.13 Not only does the image reveal the conventional appearance of things in the past—as is conventionally assumed of instantaneous photographs—it also presents the appearance of the Earth in a time previous to the past-time assumed by the viewer. N.A.S.A.’s Big Blue Marble then represents an image with an instantaneous relationship to time (thanks to the camera’s quick shutter operations), but which actually depicts a duration of time and movement that transpired in the past. The photograph exemplifies Geoffrey Batchen’s suggestion that photography is “in time but not of time.”14

Big Blue Marble’s Re-Generation

Apollo 17, the spacecraft from which Big Blue Marble was photographed in 1972, was the only manned spacecraft ever to orbit far enough away from the Earth that it could view the entire planet
in full sunlight. Later missions have flown too close to the Earth to observe the entire globe. For this reason, according to William Stefanov of N.A.S.A.’s Image Science and Analysis Laboratory, any image showing the surface of the entire Earth which was made after 1972 is a composite digital photograph. These images are made with the aid of computer software, which blends photographs from dozens of satellite images to produce an image of what the Earth might look like if the planet were cloud-free or, as in one example I will analyze, illuminated all at once.

Although digital whole-Earth montages are difficult to distinguish from single-exposure photographs from space, the composite images are the result of the seamless digital combination of separate photographs, each of which relate to a different moment in time, into a composite picture presenting what appears to be a single, instantaneous moment in time.

Whole-Earth digital images are made by a computer program that collects satellite data about the appearance of the surface of the Earth and combines that information to make a composite image. ARC Science Simulations, whose clients include N.A.S.A., is among the companies that make this software. According to ARC’s website, the goal of their programs is, admittedly, to produce “photo-realistic,” “accurate, high quality earth imagery...[that] can compare remarkably well to photographs from space.”

Whole-Earth-composite-generating computer programs produce images based on the mathematical “probability of appearance” of the subject. Clouds, for instance, do not appear haphazardly. Mathematical calculations performed by the computer program determine the likelihood of cloud positioning, based on the information about cloud location collected from satellites over a span of time. The duration of time required to collect data is variable and subjective, and is determined by the time it takes for every square mile of the Earth to have its image captured by the satellites. The image from 1996 (Fig. 3) was made from four months of data. The image from the year 2000 (Fig. 4), in comparison, was made from one week of data in late March. If clouds covered most of America during the period of data collection, the country likely will be obscured by clouds in the resulting image. Operators, however, can choose to override the computer-generated “average-appearance” cloud cover produced by the data set and mathematical figures (also called the computer’s “decision trees”). They can opt instead to make a thinly clouded, or even cloud-free, picture of the Earth.

The digital whole-Earth photograph titled _The New World: GOES (Geostationary-Orbiting Environmental Satellite) Clouds Over the Face of the Earth, Aug. 2, 1996_ (Fig. 3) is a composite image that is very similar in coloration, cloud covering and in the degree of surface detail to the original 1972 _Big Blue Marble_ single-exposure photograph. However, although the digital image could be mistaken as a single-exposure image, the 1996 composite photograph has a different relationship to time. It was made from four months of cumulative data, in order to assure that every part of the Earth’s surface was eventually visible below the cloud cover. In this photograph, North and South America, not Africa, are the central focus. Swirls of dynamic clouds avoid obscuring the western half of the United States, but are not omitted altogether—presumably because a
cloudless country might not be believable. 

The New World is a photograph of the Americas, as they would have appeared in “average” appearance, over four months (with some possible aesthetic modifications of this data). The planet Earth that appears in this photograph never existed exactly as we see it. The New World, like all digital composite whole-Earth images, is an abstraction. Stephen Talbott suggests that this phenomenon is the result of the way that computer technology processes data: “What can be mapped from the human being to a machine is always and only an abstraction.” In The New World, abstraction occurs at several levels of the production process. First, reflected light that left the Earth’s surface several split-seconds in the past is collected as an instantaneous photograph—which has an innate assumed relationship to the past. Although photographs have a unique capacity to represent the past in the present, as Barthes notes, photographic representations of time are always much more complicated than that. Because a photograph presents an image of the past which is beheld in the present, every photograph implies the passing of time in general—and by extension, it reminds us of the inevitability of our own deaths. Whole-Earth photographs take this convolution of tenses one step further. All of the Earth’s motions and surface activities, which are so slight that they cannot be detected by the human eye or camera—are nevertheless present in the image. Thus, these instantaneous-time images of imprinted light from the past also embody duration.

The piecing-together of a tapestry of satellite data from different times and locations, and the conversion of this data into mathematical figures for the purpose of producing a product based on an average appearance, is all a function of producing an image of an hypothetical, abstract Earth. Thus, the temporality depicted in a digital composite N.A.S.A. whole-Earth photograph is a simulated time. The New World and other whole-Earth composites represent a complex synthesis of time, enabled by technological advance. These time abstractions can be seen as the products of a culture of “informediation” and “simulation” which are enabled by computer technology—the very tool used to compose these images.

Electronic media critic and theorist Kimon Valaskakis argues that the digital age has enabled us to enter a state of “informediation,” in which an amazingly realistic simulation and synthesis of events and things is possible. Valaskakis also warns that this phenomenon, when not clearly presented as educational, abstract, and hypothetical, has consequences, including “the increased probability of Reality Blur, which may be defined as a progressive blurring of the distinction between
truth and fiction, reality and fantasy, actuality and potentiality.”

Whole-Earth photography clearly exemplifies Valaskakis’ characterization of inmediation and its effects. When *The New World* and *Big Blue Marble: Next Generation* composite photographs appear without explicit captions to explain their basis in abstraction, these images conflate fact and fiction. ARC Science Simulations, as mentioned earlier, claims that producing “photo-realism,” or blurring the line between fact and fiction, is actually the desired goal of whole-Earth photographs. What we see in *The New World*, a partial product of ARC software and data, is a convincingly real abstraction which carries with it an air of scientific truthfulness because it is based on mathematical science—a trustworthy product of positivist technological advance.

By presenting the averaged, hypothetical appearance of the Earth over time, what we see in a whole-Earth photograph is an image of the general, the schematic, and the ideal. The logic of a whole-Earth photograph is at odds with what Peter Galassi has argued is photography’s unique ability to represent specificity, or “thisness”—following from the logic that photography is the heir to the “spirit of realism” inherent in art since the Renaissance.

Other art historians, such as Jonathan Crary, have argued otherwise. Crary suggests that modern art was marked by a departure from a sense of the real and the indexical: “From the mid century on, an extensive amount of work in science, philosophy, psychology, and art was coming to terms in various ways with the understanding that vision, or any of the senses, could no longer claim an essential objectivity or certainty.”

Whole-Earth composite photography’s detachment from certainty, specificity and objectivity, its affinity for the general and the subjective, and its nature (as a product of mathematical and computer science) makes it an example of what Crary argues has fundamentally been at stake in modern vision starting in the nineteenth century. But digital composite whole-Earth photographs also exemplify a phenomenon Jeffrey Sconce describes as a crisis of “simulation,” in which signifiers cease corresponding to objects:

> Where there was once the “real,” there is now only the electronic generation and circulation of almost supernatural simulations. Where there was once stable human consciousness, there are now only ghosts of fragmented, decentered, and increasingly schizophrenic subjectivities. Where there was once “depth” and “affect,” there is now only “surface.” Where there was once “meaning,” “history,” and a solid realm of “signifieds,” there is now only a haunted landscape of vacant and shifting signifiers.

Frederic Jameson similarly notes what he sees as a postmodern play of surface and simulation. He argues that four binaries have been collapsed in postmodern culture: “essence and appearance,” “latent and manifest,” “authenticity and inauthenticity,” and “signifier and signified.” Jameson contends that the dissolution of these binaries has created a new cultural environment of “depthlessness.” Digital whole-Earth composites antagonize Jameson’s binary of “authenticity and inauthenticity” (by giving convincingly “photo-realistic,” and therefore “authentificated” form to the imaginary and abstract, “unauthentic” Earth). However, the actual Earth (“the signified”) is not, however, synonymous with its binary opposite, the digital composite image (“the signifier”). This binary is preserved by whole-Earth images. Whole-Earth composite photographs are *icons* of the planet Earth, made by abstractions of reflected, “indexical,” light. This light is synthesized mathematically to produce an “averaged” and “simulated”—but not actual, or faithfully indexical—appearance of the planet.

However, tempting as it might be to cast whole-Earth digital composite photography as a manifestation of Jameson’s loss of “authenticity” and a sign of “depthlessness” in the electronic age, or to condemn whole-Earth digital composites for prompting a loss of photography’s assumed relationship to reality because they implode time, these images are part of a lineage of composite practice that began questioning photographic indexicality from the time of the medium’s invention. Composite photographs are—and always have been—abstractions. To Jameson, the
immediacy of the electronic age has produced “depthlessness.” Stephen Talbott similarly articulates that modern life “leaves no room to digest things,” producing reaction rather than synthesis.31 Yet whole-Earth digital composite photographs products of a complicated technical synthesis. They are an expression of an age in which time has been compressed, sped up, made simultaneous, measured and defined in ever-more infinitesimal increments. If time has become elastic in an age of instantaneous communication and rapid travel, so have representations of it. Photography’s peculiar link to temporality lends it a kind of realism to the experience of time that Barthes described as “false on the level of perception, true on the level of time.”32

A more recent whole-Earth photograph, such as Big Blue Marble: Next Generation (Fig. 4), raises even more questions about time. It was the result of one week of data in March of 2000, collected by MODIS sensors aboard the Terra and Aqua satellites. Giving central focus to North America, this image shows a greater degree of surface detail than evident in The New World. The Earth’s terrain varies from green to brown. Swirls of clouds congregate over Canada, the North Pole, and over the western coast of South America. The rest of the globe is relatively free from obstructive cloud cover.

Big Blue Marble: Next Generation represents significant technological improvements over The New World:

Coupled with improved geolocation data, computer hardware, server connectivity, and image processing made it become possible to produce and serve frequently updated, global mosaics at approximately one kilometer per pixel or five kilometers per pixel resolution.33

In Big Blue Marble: Next Generation, improvements in computer systems also reduced data-collecting time to one week (a significant decrease from the four months of data-collecting needed to make The New World in 1996). Advances in computer technology rendered the imprint of additional time unnecessary, and enables the production of an image as quickly as possible. Timothy Druckrey argues that the computer, a unique invention which sprang forth from the habits and priorities of modernity and postmodernity, enables the desire to be fast-acting and efficient—desires he suggests define our time.34 In the book Liquid Modernity, sociologist Zygmunt Bauman also redefines the age of modernity and technological advance as a temporal obsession with “acceleration and the resulting ability to manipulate time.”35

Time in a digital composite image like Big Blue Marble: Next Generation exemplifies an obsession with time’s relentless passage and fluid nature. In them, time is compressed into an imaginary representation of instantaneous time, despite the fact that it is actually the product of a one-week duration, viewed from the various points of view of dozens of satellites. As time is distended, montaged-together, compressed and repackaged to form a new idealized, instantaneous version of time, time’s very laws, contradictions and operations are subject to interrogation. Dorthe Gert Simonsen argues that relentless technological advance, and an increasing valuation of speed, inevitably led to an implosion of our understanding of time:

…acceleration has continuously compressed time and space throughout modernity, reaching a final annihilation of temporal and spatial co-ordinates in the present society of instantaneous electronic communications…. Rather than continuously compressing and finally annihilating time and space, speed has produced diverse and interacting, occasionally conflicting, times and spaces.36

Composite whole-Earth photographs are an example of experimentation with the conflicting properties of time. In them, a duration of light collected from the past appears as instantaneous time. N.A.S.A.’s whole-Earth photographs also are the result of the seamless digital merging of tens of thousands of separate satellite photographs, each of which is an imprint of a different moment in the past, into a composite picture presenting what appears to be a single instant. What we see in digital composite images is a complex synthesis.
of snapshots taken from various viewpoints in space, stitched together to appear unified. Space is collapsed in whole-Earth photographs, and more profoundly, time is fractured and recomposed. These time abstractions express the anxieties of a culture coming to grips with the ubiquity of accelerating speeds and collapsed time, which was itself partly enabled by the technology used to make these composite photographs. Whole-Earth photographs, therefore, provide a unique commentary upon the tools, as well as the time, which produced them.

Kris Belden-Adams is a doctoral candidate in Art History at the City University of New York's Graduate Center in New York, N.Y., and also teaches Art History at the Kansas City Art Institute. She is writing a doctoral dissertation on various twentieth-century vernacular photographic practices' complicated relationship to time; this essay is a condensed version of one of its chapters.

Notes

1 Vicki Goldberg, The Power of Photography: How Photography Changed Our Lives (New York: Abbeville Publishing Group, 1991), 53. In fact, as former Vice President and Nobel Peace Prize winner Al Gore attests, this has been the case. Big Blue Marble (Fig. 1) appears at the start of Gore's Academy-Award-winning documentary on global warming, An Inconvenient Truth (dir. Davis Guggenheim, Lawrence Bender Productions, 2006).

2 Goldberg.

3 Ibid. 54.


5 Ibid. 278. Denis Cosgrove also argues suggestively that: “…representations of the globe and the whole Earth in the twentieth century have drawn upon and constituted a repertoire of sacred and secular, colonial and imperial meanings, and…these representations have played an essentially significant role in the self-representation of the post-war United States and its geopolitical mission. While the Apollo lunar project signified the achievement of the technocratic goals and universalist rhetoric of Modernism, the project’s most enduring legacy is a collection of images whose meanings are contested in post-colonial and postmodernist discourses.” Cosgrove. 270.


7 This image (titled Big Blue Marble, from Apollo 17) is labeled AS17-148-22727, from mission AS17, roll 148, frame 22727.

8 Ibid.


11 Marta Braun, “Time and Photography,” in Tempus Fugit: Time Flies, ed. Jan Schall (Kansas City, Mo.: Nelson-Atkins Museum of Art, 2000). 141. In this essay, Braun was commenting about the partial-Earth image Earthrise. Her thoughts are certainly applicable to Big Blue Marble, too.


13 Despite a flurry of excitement over the Apollo 17 mission, funding and interest in America’s space program have waned since 1972. For more about the decline of interest in America’s space program, see: Cosgrove. 274.

14 Batchen. 140.

15 Stefanov.

16 N.A.S.A. has called its digital composite photography of the Earth Big Blue Marble: Next Generation since around the year 2000. It has been making digital composite whole-Earth images since the 1990s.

17 In addition to N.A.S.A., these other organizations and companies also use ARC technology: the Russian Centre of Cosmonaut Training, the Department of Defense, SPAWAR (Space and Naval Warfare Systems [U.S.A.]), UNAVCO (The University NAVSTAR Consortium, [U.S.A.]), Raytheon, and Lockheed Martin. Customized versions of the software are also available, but at a higher cost. ARC also sells programs for making images of Mars, Jupiter, the moon, and for mapping the surface appearance of the Earth up to six-hundred-million years ago: “Face of the Earth,” ARC Science Simulations www.arcscience.com/face.htm and www.arcscience.com/gallery.htm (accessed December 9, 2006).

18 Ibid. N.A.S.A.’s Image Science and Analysis Laboratory uses a customized version of ARC’s software, laced together by its own
TIME IMPLOSION

technicians with additional data from N.A.S.A.’s own eighteen satellites and additional staff-introduced modifications.


20 ARC’s data is derived from the “NOAA TIROS satellite AVHRR data and colorized by a proprietary methodology patented by ARC. It has continued to be enhanced by MODIS and Landsat derivatives.” ARC Science Simulations.


22 Barthes, Camera Lucida. 77.

23 Ibid.


25 Ibid. 31.


29 He also argues that these binary collapses signal the end of “High Modernism” and “High Capitalism”: Frederic Jameson, “The End of Temporality,” Critical Inquiry 29 (2003); Frederic Jameson, Postmodernism, or, the Cultural Logic of Late Capitalism (Durham: Duke University Press, 1991).

30 The employment of double-exposure, composite, collage, montage, and extended-exposure techniques in order to make an image by manipulating and combining several separate pictures, was pioneered by John Herschel, Johann Carl Enslen, William Henry Fox Talbot, Hippolyte Bayard, Édouard-Denis Baldus and Gustave LeGray in the nineteenth century, and was continued by Oscar Rejlander and Henry Peach Robinson, the Dada artists, and others through the twentieth century and up to today.

31 Talbott. 9.

32 Barthes. Camera Lucida. 115.

33 Stefaňov.


36 Ibid. 99. Simonsen compares our obsession with speed during the online age with the similar drive for speed at the time of the invention of the airplane: “Phrases such as ‘conquering,’ ‘shrinking,’ and ‘annihilation’ of space and time have been used in popular discourse to capture the experience of more than a century of accelerating technology. From this perspective ‘time-space compression,’ which has been among the tropes most often repeated in the rhetoric of globalization and the Information Age, begins to sound like an echo of the former period.” Ibid., 102. The phrase “annihilation of space and time” was commonly used to refer to the effect of rail travel and the telegraph. Although the phrase is less widely used today, Rebecca Solnit argues that “annihilating time and space” is what most new technologies do: technology regards the very terms of our bodily existence as burdensome. Annihilating time and space most directly means accelerating communications and transportation.” Rebecca Solnit, River of Shadows: Eadweard Muybridge and the Technological Wild West (Middlesex, England: Viking Penguin, 2003). 11.