

The Work of Art in an Expanding Universe

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*The cosmos is within us. We are made of star-stuff.
We are a way for the universe to know itself.*

—Carl Sagan

On December 24, 1968, while orbiting the moon aboard the Apollo 8 spacecraft, astronaut William Anders snapped the first color photograph of Earth from space. Taken with a specially designed Hasselblad 500 EL, and custom 70 mm Ektachrome film produced by Kodak, the image captured a partial view of the planet, half submerged in the watery darkness of space. Later, the image was given the title *Earthrise*, and this single photograph has been recognized as one of the main impetuses of the modern-day Earth movement, as well as other national and global causes for the care and preservation of life and the human species. This photograph changed human perspective forever and, by extension, changed our understanding of ourselves and our place in the world. In traveling to the moon, the human species discovered Earth.

The new perspective this image offered could not have come at a more timely moment. The year was one of the most turbulent in recent history: fighting in Southeast Asia reached unprecedented heights, the Prague Spring led to Czechoslovakia's invasion by the Soviet Union, students' and workers' protests in Paris turned violent, and in the United States the assassinations of Martin Luther King Jr. and Robert F. Kennedy further fueled growing civil unrest in cities across the country—from Baltimore and Washington, DC, to Chicago, Detroit, and Kansas City, among many others. At times, it seemed

the entire world was engulfed in flames. In the face of all that strife, however, *Earthrise* provided a sobering, objective view of humanity's place in the universe. Floating through the vast emptiness of space, the human species saw itself for the first time as one, as a singular entity. As cultural theorist Marshall McLuhan remarked: "There are no passengers on Spaceship Earth. We are all crew."¹

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Growing up, I was immersed in educational programs like renowned astronomer and cosmologist Carl Sagan's groundbreaking television show, *Cosmos: A Personal Voyage*, as well as programs like *NOVA* that were both featured on the Public Broadcasting Service. My father, a physicist and professor for many years, instilled in me a great respect for the cosmos early on in life, and I recall spending hours looking through books featuring images of the planets and cosmic phenomena—my imagination racing alongside the spacecrafts depicted in each artist's rendering. This is something I still do today; the wonder and excitement of space exploration has yet to release its hold over me.

The exhibition that this publication accompanies, *Cosmosis*, developed out of this long-standing interest in the cosmos and the scientific fields that attempt to unravel its many mysteries—an interest I share with many artists in the city of Chicago, and elsewhere, with whom I have spent many hours ruminating on the subject. Now, after more than a year in the making, it is my pleasure to launch the exhibition into the universe—its inspiration and subject. Part homage, part response to the work of many artists I greatly respect, *Cosmosis* gathers together these personal and professional strands to present an exhibition that investigates how the cosmos continues to inspire artistic production.

Revisiting the iconic photograph, *Earthrise*, and its lasting impact, I was reminded of the great reach and power of images. Not unrelated, I was reminded too that scientific developments and breakthroughs have tremendous *cultural* relevance. They contribute to our sense of identity and help shape our collective and individual roles within society. At their core, both scientific and artistic inquiry share the same intent: to hold a candle to the dark void of space in the hopes of better understanding the world in which we live, and ultimately ourselves.²

The timing of this exhibition was also an important consideration. In recent years there has been a resurgence of interest in space exploration. With the landing of the Curiosity Rover in the Gale Crater of Mars on August 6, 2012, the reach of human discovery further opened up the possibility of sending a manned spacecraft to the Red Planet. And on January 31, 2014, Curiosity sent back an image of Earth and its moon as seen from the surface of Mars.³ Though not taken directly by the human hand, this grainy image of a pale blue dot floating in the distance of an otherwise darkened landscape induced a humbling feeling—perhaps something like those black-and-white televised images that late December day in 1968. Although the image did not have the immediate cultural impact that *Earthrise* did, there seems to be a parallel between this historical moment and that previous one (with all the tumultuousness of the present included). Additionally, Carl Sagan's popular program *Cosmos* was reimaged and updated by influential astrophysicist Neil deGrasse Tyson in collaboration with Sagan's widow, Ann Druyan,⁴ which seemed to signal a wider popular appeal (or the expectation of such).

Following this line of thinking, *Cosmosis* was born from two observations: first, the current moment of space exploration and advancements in scientific discovery are unparalleled in human history, and thus continue to greatly influence and shape contemporary culture; and second, many artists working today, particularly in Chicago, are actively interpreting the cultural significance of these developments. Each of the artists in this exhibition take inspiration from fields of scientific inquiry as part of their practice, appropriating imagery, scientific technologies, and working methodologies. Together, their interest in the cultural significance of the cosmos intersects the fields of aesthetics, anthropology, philosophy, spirituality, and so on, as is often the case: to look outward and beyond is also to look inward.

An allusion to the ways that the artists in *Cosmosis* absorb and metabolize the information, ideas, and material qualities that inspire their work, the title of the exhibition suggests a nuanced reading of such processes. Combining the words “cosmos” and “osmosis,” the focus of the exhibition is in many ways on the latter term. What ties these artists together is how the many dimensions and different interpretations of the cosmos continue to seep into their minds—and consequently, their work. The exhibition, then, is a visualization of this osmotic process. The cosmos has always been a screen upon which humans have projected their many dreams, fears, and wonders—even today the cosmos provide a kind of foil for our attempts to find meaning in our existence—and the exhibition serves as a lens through which one can see these processes at work.

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In an early conversation with Chicago-based artist Erin Washington, I described my interest in convening an exhibition that reflected the many ways that artists engaged with the different facets of the cosmos, our evolving understanding of it, and how this shapes our understanding of ourselves. Washington suggested that “refracted,” however, might be a more appropriate term than “reflected.” This subtle shift in language has had a lasting effect on my thinking: the artists in the exhibition actively refract the notion of the cosmos, rather than passively reflect—and through this essay I hope to do the same. These artists include: Daniel Baird, Sarah and Joseph Belknap, Erica Bohm, Jeremy Bolen, Dana Carter, Joseph G. Cruz, Carrie Gundersdorf, Jason Lazarus, New Catalogue, Trevor Paglen, Jefferson Pinder, Nicholas Sagan, and Erin Washington.

To accomplish this, I have organized the following discussion of the artists’ work around a set of loosely defined, thematic headers. These are not intended to be prescriptive, but descriptive—and admittedly only partially so. Each of the works in the exhibition warrant more critical attention than space allows for here. But in the hopes of teasing out the different ways that the works speak to and relate to each other, I employ the following headers to help frame my curatorial reading of their work and their contributions to the larger conversations that the exhibition intersects: Bodies, Celestial and Terrestrial; Vision and Imaging; Science (Non) Fiction; and Collapsing Space-Time.

Bodies, Celestial and Terrestrial

There are many bodies and references to the body in *Cosmosis*. These include celestial bodies, like planets, stars, and the moon. But also terrestrial, human bodies. This is meaningful in that

for much of the history of human civilization the cosmos has been understood in anthropomorphic terms: many celestial bodies and constellations carry the name of past deities or other mythic beings, which in turn provided social and political order to the civilizations that manifested them. In this way, the physicality of the cosmos and its different bodily forms has always been considered in relation to human physicality, relationships, and interactions.

Artist Nicholas Sagan’s installation draws inspiration from these associations. Using 3D modeling software, the artist recreates a section of the universe using fiber optics and projected light, through which visitors are invited to enter and explore. The work, *Strange Matter* (2015), ^{Pages 50–51} creates a strangely intimate environment in which visitors traverse a field of “stars.” Provocatively, the stars closest in proximity to the visitor glow with even greater luminescence, since the installation tracks their movement by way of a surveillance camera. In accompaniment, there is also a sonic element that is mixed live, according to the movements of human bodies through the work—all of which provide visitors with a great sense of agency in determining the nature of their experience. In the desolation of space and the ongoing search for meaning in the cosmos, Sagan’s installation offers a reassuring perspective: our individual existence and experiences are unique. The work, steeped in scientific and technological inquiry, is nevertheless an investigation of kinaesthetic experience—the “celestial” body in this case being formed out of flesh and blood, rather than rock and mineral.

Interested in the relationship between kinaesthetics and visual aesthetics, husband-and-wife collaborators Sarah and Joseph Belknap created a floor-based installation for *Cosmosis* that plays upon the perambulatory nature of art-viewing.

Mars Field (blue interior) (2015),^{Pages 30–31} which was inspired by the recent discovery that the subsurface of Mars is actually blue–gray in color,⁵ extends the artists’ practice of constructing three–dimensional celestial bodies out of different kinds of foam and other materials, like lunar regolith—a simulant that approximates the quality of soil on the surface of the moon. Equally invested in the science of space exploration and the artistic exploration of materials, this work gathers together a group of faux–Martian rocks en masse, which are painted in a bi–directional fashion: one side of the assemblage is spray dusted with the rusty reddish–brown color most associated with the Red Planet; the other side dusted with the newly discovered subsurface palette of bluish–gray. Upon entering the exhibition space, however, visitors initially encounter only one side of the installation, which appears static and homogenous. But as one moves around the formation, the colors shift: physically disorienting, one’s perception of these colors migrates along with one’s movement, thereby positioning the abstract experience of these otherworldly forms in relation to human, bodily experience.

One of the works in the exhibition by Daniel Baird, *Quest* (2015),^{Pages 26–27} also derives much of its meaning from its physical presence in the exhibition space and, more specifically, its large–scale. The sculpture is designed after the Quest airlock module on the International Space Station—its front door, so to speak. Interested in the many mechanical bodies that human beings have launched into space, such as satellites, telescopes, spacecraft, and the ISS, Baird also used 3D modeling software in his project to reduce the scale of the capsule to the proportion of a young child. Within the ISS, there is an economy of space, and every inch of room is designed for a specific use or function, all of which is scaled

to an approximation of an adult human. Baird’s intervention, however, does not end there: the artist constructed his work entirely out of cardboard and wood, and then invited a friend’s child to draw on the sculpture with color oil sticks. With its fort–like quality and enigmatic, loosely–drawn narrative, the work taps into the limitless wonder that children access so readily—a reminder of where some of the most profound works of art or scientific experiments begin: the imagination’s uninhibited quest for answers to questions barely understood.

Vision and Imaging

Perhaps not surprisingly, many artists in the exhibition approach the cosmos by investigating the different ways of seeing and imaging space—both literally and metaphorically. The desire to see further, to visually grasp and better know the contents of the sky has led to many innovations over time. Understanding the nature of the universe and the forces of the cosmos also allowed us to launch our own visibility machines⁶ into space, including the Pioneer and Voyager spacecraft, the space probe Dawn, the Hubble Space Telescope, and countless satellites in our own atmosphere. The story of Apollo 8 is but one example. And these perspectival shifts are also the subject of artists’ investigations.

In her drawings and other works on paper, New York–based artist Carrie Gundersdorf appropriates imagery generated by the many optical lenses pointing toward the night sky. Her colorful and laboriously rendered drawings of space phenomena—in the case of this exhibition, *False color image of density waves in Saturn’s A ring* (2015)^{Page 40} and *Mapping Saturn’s rings, yellow and orange* (2014)^{Page 41}—play on the ways that different color spectrums are attributed to images according to the visual information being studied or sought

after. While great efforts often go into ensuring color accuracy in reference to the human eye, many of the images we see of the Martian landscape, of the Sun, or the Pillars of Creation are actually artists' renditions. These false color images⁷ are all approximations carefully crafted in digital technology labs. Playing on this role of the artist, Gundersdorf meticulously studies and generates her own palette for each work on paper, often leaving the color samples of her research visible at the work's edge. In so doing, the artist draws attention to the ways that science relies on and utilizes different interpretive lenses to approach notions of "truth"—and the role aesthetics and subjective judgment also play.

In 2010, after watching an episode of the popular program, *NOVA*, featuring renowned astrophysicist Eric Becklin, artist Jason Lazarus embarked on a cross-country journey to meet and photograph the scientist. Becklin, who is best known for his groundbreaking research into the cosmic formation of our solar system—for which he utilized infrared imaging and spectroscopy—agreed to the visit. In part, Lazarus was fascinated by the idea that Becklin had been able to look back in time, and to see into the center of the Milky Way, which the artist conveys in the title for his portrait: *Eric Becklin, first human to see the center of our galaxy* (2010).^{Page 43} But more importantly, and what Lazarus came to understand, was that what Becklin "saw" was not an image or depiction; it was his ability to read and mentally translate the data mined from his many experiments that allowed him to see and analyze the core of our galaxy. Lazarus's portrait poetically conveys this realization: the white-on-white composition erases much of the other visual information in the image, and focuses on Becklin's eyes—each iris a void as dark and vast as the cosmos.

Artist and author Trevor Paglen is known for his investigative, research-driven projects that develop over many years, which examine issues of visibility and invisibility. His work *Drone Vision* (2010),^{Page 47} takes a critical look at the many mechanical eyes looking back down upon us from above. The footage portrayed in this digital video was initially captured and recorded by an amateur "satellite hacker," who discovered a glitch in an uplink to a communications satellite that was being used to remotely control a drone. Of the work, the artist explains: "The vast majority of the images are the drones targeting, practicing ... but there are a few moments where a drone looks around, looks up, looks at its surroundings. So it's like this drone is lost, looking at the world around it."⁸ In a strange and unexpected reversal, the drone takes on anthropomorphic qualities; it is susceptible to confusion and insecurity. It becomes vulnerable, just like its terrestrial steward below. In this work, Paglen evokes the thin line that space exploration and the technologies that enable such have always walked: an expression of human ingenuity and freedom or politically motivated tools geared towards control and dominance.

Also interested in the visible and invisible—and its sociopolitical undertones—Jeremy Bolen makes photographic prints from film the artist buries at charged sites or inserts directly into the tube of the Advanced Photon Source and its high-brilliance X-ray beams. The latter is the basis for his new, untitled work presented in *Cosmosis*. In recent years Bolen has visited and conducted his own artistic research at scientific institutions like CERN, the European Organization for Nuclear Research in Geneva, Switzerland, and at Argonne National Laboratory in Lemont, Illinois. The work in the exhibition derives from his time spent at Argonne,

where Bolen created a series of photographs by inserting large-format sheets of film directly into the Advanced Photon Source. The resulting images are beautifully enigmatic; far from offering any kind of evidentiary insight, they conjure all sorts of imaginative possibilities: wormholes, cosmic rings, radiating light, and so on. ^{Page 34–35} The artist presents these images by suspending them in front of a 16mm projector whose film is constantly attracting additional particles (dust) that are then projected on and through the sheets of film. Casting even more abstract “images” on the screen behind, the work recalls the initial experimental approach by shooting photon particles (light) through the film. Overall, his work captures what otherwise would be impossible to witness: some trace of the events within the APS. But again this vision does not offer any clear insight. Instead we are confronted with images that convey a sense of all that we have yet to fully grasp.

Science (Non)Fiction

Setting out to organize an exhibition around the cosmos, science fiction is rightfully unavoidable. The header for this section purposefully blurs the boundary between fiction and non-fiction for the important observation that it is not all that uncommon for things that were once fiction to become a reality. Science fiction often follows real scientific developments towards yet unrealized, potential goals. Take the landing of spacecraft on the surface of Mars, for instance. Up until the early 1970s, such thoughts were the stuff of fantasy, but with the early Soviet missions to Mars, and specifically the soft-landing of the Mars 3 space probe on the planet’s surface,⁹ humanity extended its reach to its neighboring planet, making the possibility of a manned mission all the more attainable.

These events in concert with a host of others have long inspired artists to further push the limits of our imagination.

The work of Argentinian artist Erica Bohm is steeped in the genre of science fiction. Bohm appropriates imagery gathered by NASA and other space agencies, with which she has been growing a body of work titled *Planet Stories* ^{Pages 32–33}. For this project, the artist transfers the found, publicly available images to Instax Fujifilm and creates what appear to be family photo album-style photographs of different planets in our solar system and their satellites (moons). As part of this process, Bohm utilizes the dual nature of photography as both an archival tool and form of artistic expression. Instant film is a particularly meaningful photographic format, as Instax are unique images that are not reproducible in the same way that other film-based photographs are since they do not produce a negative. Additionally, their coloration evokes the sense that these photographs are of an older, bygone era of image-making. Thus, the illusion of time-travel goes in both directions: Bohm exhibits her photographs from the past, of the future. And while Bohm’s photographs are playful in their imagining of a tourist visit to the Tycho Crater on the moon, for instance, this reality may not be as far off as it once seemed.

The collaborative duo that make up New Catalogue (artists Luke Batten and Jonathan Sadler) embarked on a project in 2012 stemming from another of Carl Sagan’s well-known endeavors—the Voyager Golden Records.¹⁰ To each of the Voyager spacecraft, Sagan and his collaborators (which included scientists, anthropologists, artists, and designers) attached phonographs containing sounds and images intended to represent the diversity of life and human culture on Earth. Together, the team selected 116 images to be included on the Record, along with music, spoken greetings in an array of

languages, and a printed message from then US President Jimmy Carter. Inspired by this project, New Catalogue set out to crowd-source new information on what is culturally meaningful or definitive today. For the exhibition, Batten and Sadler created a printed newspaper takeaway for visitors to fill out, responding to questions like: “What are ten things aliens would need to see/taste/touch/experience to understand life on Earth?” or “If you could plant an inedible crop on the moon, what would it be?”.^{Pages 44–45} Despite their casual delivery, these questions inevitably stir complex thoughts and emotions as to what is valuable and meaningful about life on Earth.

The limits of understanding and the tenuous nature of theoretical knowledge feed into the work of Erin Washington. While perhaps not science fiction or non-fiction in any straight sense, her drawings in chalk on chalkboard paint both literally and metaphorically flirt with impermanence. What we know one day may be thrown out the window the next, in the same way that the fictional and the impossible may eventually become the norm. Washington produces delicate, ephemeral works—marks are made, lines drawn, marks are erased, lines smudged—for which a patina of use is built up over time. In *Shapes of an Expanding Universe* (2013),^{Page 52} different hypotheses for the expansions and contractions of the universe are drawn and redrawn. There is a clear connection to pedagogy and the tools of the classroom; the exercises of a pupil are evoked. Washington depicts a theoretical knowledge of the universe in such a delicate medium, and in the end her drawings expose the vulnerability and uncertainty in how the (un)known is expressed.

Collapsing Space-Time

One of the fundamental questions that continue to occupy the minds of many physicists, philosophers, poets, and artists alike, concerns the nature and relationship of space and time. The great Albert Einstein published his treaty on general relativity in 1915, a document that largely launched the modern era of physics and today still holds great sway over many theoretical models of the universe. In recent years, however, many new theories have emerged that trouble the singular notion of the universe,¹¹ while the once fictional ideas of space and time warps have now become a well established fact and instrumental tools that enables astrophysicists to probe deeper into space and time through the phenomenon of gravitational lensing. NASA has even gone so far as to begin prototyping a warp spacecraft, the IXS Enterprise.¹² Of course, the nature of space and time has major implications on humanity and our understanding of our own place in the universe, and there are a number of artists in *Cosmosis* that explore how collapsing space and time can provoke different perspectives and create new narratives about life on Earth.

One of the works by Jefferson Pinder in the exhibition, *Funknik* (2013),^{Page 48} appropriates the form of the first artificial satellite to be launched into space—the Soviet satellite Spudnik—which the artist fabricated out of remnants of old tin roofs, fabric, and used audio speakers. His use of found materials is coupled with a complex weaving of sound samples that similarly feel like fragmented remnants of disjointed histories. Assembled and mixed together, new associations develop without any sense of a linear narrative or singular clarity, and refracted meanings begin to emerge. The roughly 40-minute, looped audio track threads a variety of samples

that range from the historically significant to the commonplace. In this way, the sculpture becomes a kind of capsule of both time and space. However, unlike the many other messages sent out into space as representative of human life, *Funknik* seems to both celebrate and complicate the image we create of ourselves.

Further investigating such narratives, Joseph G. Cruz has created a multivalent body of work around the convergence of space exploration, military technology, and culture. His research into the development of the US space program is entangled with the Nazi war machine of the Third Reich and its development of the V2 rocket and modern camera technologies—like Hasselblad, which astronaut William Anders used to capture *Earthrise*. In this way, the artist's installation spans time and space to offer a more complex and nuanced reading of humanity's voyage into the cosmos. As part of his research, Cruz has obtained parts of old V2 rockets from sites in both the United States and Germany, which he grinds up into a powder and uses to make drawings of images from space. ^{Pages 38–39} The resulting installation also incorporates photography, physical artifacts, and steel armatures that support living plants. Presented in this way, the artist collapses different historical trajectories to re-contextualize the otherwise celebratory narrative around the formation of NASA and the US space program. Furthermore, Cruz's materials and processes—metal shards, gypsum, photography, living plants—take on additional meaning as aesthetic vehicles that stand in seductive opposition to the darker, more sinister history they point to.

Dana Carter's work engages the nature of time and space in a more existential way. Her video in the exhibition approaches the scientific with a keen sense of the discipline's

poetic import. ^{Page 37} The work combines footage shot near her grandfather's home in New Zealand with animations she created in her studio in Chicago using fabric, sunlight, and colored laminates. By doing so, the artist collapses different locations of personal importance, drawing together various events and experiences as a comment on the construction of personal narratives in the search for meaningful existence. In New Zealand, Carter filmed herself building a sizeable cairn on top of a boulder. Each placement of a rock is accompanied by a reverberation of what sounds like the shifting of an entire mountain; the sound affects one physically, bodily. Overlaid upon this action are the animations that introduce a distortive kind of patterning, rhythmic in nature. Harnessing the phenomenological quality of sunlight, the artist allows a larger cosmic order to seep in, introducing a sense of the unknown. The work is at once intensely personal and broad in its reach. Inevitably, each of us must confront the possibility that we may never fully understand our place in the larger order of the universe.

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Stepping back and taking a broader view, the works in this exhibition focus our attention on the fundamental human attributes that underwrite all artistic and scientific exploration—specifically, the power of wonder, curiosity, imagination, and a deep, seemingly unquenchable thirst for knowledge. None of the artists in the show produce knowledge merely for its own sake. The artists are interested in the sociability of knowledge, the conveyance of ideas—their communication and communicability. This is something Carl Sagan understood too, which is readily conveyed through many of his projects—whether the television program, *Cosmos*, or the Golden Records and Pioneer plaques—geared towards

communication (albeit, sometimes with other potential life forms). But perhaps it was really the endeavor itself that impassioned him most of all: to deeply consider what makes us human, what defines our humanity, and to celebrate the beauty, complexity and interconnectedness of all life on Earth.

It remains important to consider more deeply the relationship of artistic and scientific research. A story relayed to me by Sarah and Joseph Belknap comes to mind: that of poet John Keats's half-hearted accusation that Sir Isaac Newton had "destroyed all the poetry of the rainbow, by reducing it to the prismatic colours."¹³ Unfortunately, this sentiment still rings true for many people. The objective nature of much of scientific inquiry can come off as cold and lifeless. In response to such accusations, however, and quoting Keats's poem, *Lamia*, ethologist and theorist Richard Dawkins wrote his 1998 book *Unweaving the Rainbow*. In it, Dawkins attempts to dispel the notion that scientific inquiry destroys poetics, stating: "There is an anaesthetic of familiarity, a sedative of ordinariness which dulls the senses and hides the wonder of existence. For those of us not gifted in poetry, it is at least worthwhile from time to time making an effort to shake off the anaesthetic ... We can't actually fly to another planet. But we can recapture that sense of having just tumbled out to life on a new world by looking at our own world in unfamiliar ways."¹⁴

I find it fascinating, but not surprising, to hear such a renowned scientist speak of aesthetics and the uncanny. Aren't each of the artists in the exhibition doing precisely that: "looking at our own world in unfamiliar ways," and creating antidotes to the anaesthetics of familiarity? There is a shared power of vision between the artist and scientist in that respect. But where do they diverge? What makes artistic research

and knowledge production different from the scientific? Artists learn and are inspired by scientists; can scientists learn and be inspired by artists?

Such a line of inquiry requires deeper consideration than I have room for here. But I think the answer lies in the polarization of the objective and the subjective. Much of scientific research operates in the objective realm; the veracity of their findings would be challenged should subjectivity seep in. In order to test and re-test an experiment, the conditions and methodologies must be replicable, and not contingent or dependent on the individuals conducting the research. On the other hand, artistic research quite purposely derives its evocative power from the subjective. In this, humanity is fundamental, as is the fact that much of art today is interdisciplinary in nature, connecting theories, ideas and observations across disciplines to delve deeper into the complexity of life and the human soul. But scientific inquiry is not necessarily required to connect back to humanity. Understanding the universe, the nature of the cosmos, does not revolve around the human species. In fact, the Anthropocene is but a fraction of a second in the cosmic clock of the universe. Yet, perhaps it is the space between these two realms of the objective and the subjective where the most important and significant artists and scientists come together. To approach the objective by way of the subjective, or to approach the subjective by way of the objective, these are different paths to a similar end point—in theory. And in the end, we need both.

Returning to the year 1968, artist-scientist R. Buckminster Fuller first published his perspective-shifting short book, *Operating Manual for Spaceship Earth*. In this work, Fuller offers an image of Earth as a spaceship with humanity

as both its passenger and caretaker. In Fuller's mind: "We are all astronauts"¹⁵—a sentiment that fellow theorist Marshall McLuhan readily absorbed. Importantly, Spaceship Earth did not come with an operating manual, and instead human ingenuity is the guide that will sustain life on the planet, according to Fuller, which he distinguishes as "both physical and metaphysical."¹⁶ In some ways, this bifurcation of life's essence also comes to bear on the differing roles of scientists and artists within society; I would argue, however, that scientists and artists are equally bound to both the physical and the metaphysical.

It is from this vantage point that *Cosmosis* brings together the work of a number of artists who are engaged in the aesthetic and cultural interpretation of the advancements of science and the influence of space exploration on the human psyche. The exhibition thus creates its own space for human exploration—it is a microcosm. Time capsules of sorts, I hope the exhibition and catalogue continue to resonate for years to come: to their own ends, each attempts the difficult task of representing the un-representable: humanity, as "a way for the universe to know itself."

Notes

1. Daniel A. Vallerio, *Paradigms Lost: Learning from Environmental Mistakes, Mishaps and Misdeeds*, Oxford, United Kingdom: Butterworth-Heinemann, 2005, 367.
2. This very notion is the basis for a book by Carl Sagan that left a lasting impression on me as a young adult: Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark*, New York: Ballantine Books, 1997.
3. Tariq Malik, "Curiosity Rover Sees Earth from Mars for 1st Time," *Space.com*, accessed March 14, 2015, <http://www.space.com/24593-mars-rover-curiosity-sees-earth-photos.html>.
4. *Cosmos: A Spacetime Odyssey* debuted on March 9, 2014, airing each Sunday for the following 13 weeks, and like Sagan's original version, the program was geared towards creating popular awareness around scientific inquiry and the nature of the universe.
5. Guy Webster and Dwayne Brown, "NASA's Curiosity Mars Rover Drills at 'Telegraph Peak,'" *NASA.gov*, accessed March 27, 2015, <http://www.nasa.gov/jpl/msl/nasas-curiosity-mars-rover-drills-at-telegraph-peak/#VPSWkVPF9M7>.
6. This phrase, "visibility machines," I borrow from the title of a recent exhibition of the work of Harun Farocki and Trevor Paglen. For more on this concept and exhibition, see: *Visibility Machines: Harun Farocki & Trevor Paglen*, edited by Niels van Tomme. Baltimore: Center for Art, Design and Visual Culture at the University of Maryland, Baltimore County, 2015.
7. For more on the nature of false color images and their different scientific purposes, see: <http://earthobservatory.nasa.gov/Features/FalseColor/>.
8. Susanna Davies-Crook, "Art in the Drone Age," *DazedDigital.com*, accessed March 28, 2015, <http://www.dazeddigital.com/artsandculture/article/16183/1/art-in-the-drone-age>.
9. For more information on this mission and its sister, Mars 2, see: <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1971-049A>.
10. For more on the Golden Records and their contents, see: <http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html>.
11. The notion of a "multiverse" has been gaining ground and stirring much controversy in recent years. For more on this subject, see: Alexander Vilenkin and Max Tegmark, "The Case for Parallel Universes," *Scientific American* (online), accessed March 27, 2015, <http://www.scientificamerican.com/article/multiverse-the-case-for-parallel-universe/>.
12. Abby Phillips, "This is the amazing design for NASA's Star Trek-style space ship, the IXS Enterprise," *Washington Post* (online), accessed April 1, 2015, <http://www.washingtonpost.com/news/post-nation/wp/2014/06/11/this-is-the-amazing-design-for-nasas-star-trek-style-space-ship-the-ixs-enterprise/>.
13. Alexander P.D. Penrose, *The Autobiography and Memoirs of Benjamin Robert Haydon Compiled from his "Autobiography and Journals" and "Correspondence and Table-Talk"*, New York: Minton Balch & Company, 1929, 635.
14. Richard Dawkins, *Unweaving the Rainbow: Science, Delusion and the Appetite for Wonder*, Boston: Houghton Mills Company, 1998, 6-7.
15. R. Buckminster Fuller, *Operating Manual for Spaceship Earth*, Carbondale, IL: Southern Illinois University Press, 1968, 14.
16. *Ibid.*, 16.