A Time-Capsule Launched into Space for Aliens to Find When All the Humans Are Gone

AUSTIN CONSIDINE | NOV 30 2012, 10:47 AM ET

Billions of years from now, when the earth has erased all traces of our stay here, hundreds of dead satellites will remain in orbit around the earth. Along with these pictures.

Soyuz Fg Rocket Launch, Baikonur Cosmodrome, Kazakhstan (NASA/Carla Cioffi)

If humanity's earthly tenure isn't fated to end with the Mayan calendar next month, it is certain to end someday. It's the sort of thing artist and author, Trevor Paglen, thinks about a lot. He knows, for example, that we *homo sapiens* have occupied the earth a mere .004 percent of its 4.5 billion-year history. He knows the sun will one day expand, torching our planet in the process. And he knows that life on earth is a few million years overdue for its next sweeping extinction event. We may someday build lives on other planets; here, we're on a fixed-term lease.

Still, as Paglen's latest multimedia project, "The Last Pictures," underscores, we humans have created a legacy to outlast us: Billions of years from now, when the earth has erased all trace of our inhabitance, hundreds of dead satellites orbiting the planet will remain, immune to the terrestrial effects of rust, erosion, and

decay -- the last artifacts left to say "we were here." A dubious bequest, perhaps. But for Paglen that ring of future space junk seemed the obvious place to put a public art installation: an archive of 100 black-and-white photographic images, built to last for billions of years, launched aboard a communications satellite into outer space from a site in Kazakhstan last week.

Paglen, who holds a master's of fine arts and a Ph.D. in geography, has a history of making art about cosmic-sized ideas. For his 2010 project, "The Fence," Paglen photographed otherwise invisible electromagnetic waves produced by an immense radar system surrounding the United States, part of an early warning system against ballistic missile attacks. For "The Other Night Sky," he produced a series of photographs between 2007 and 2010 documenting American spy satellites and other space debris, using tracking data culled from amateur satellite trackers around the world.

The seeds for "The Last Pictures" began germinating in Paglen's mind while working on such projects, he said during an interview in his New York apartment, the week before the space launch. He began to wonder how long the satellites he was photographing -- or, indeed, any satellite -- remained in orbit.

"Most satellites are in what are called low earth orbits, about 300 to about 1,200 or 1,400 kilometers" above the Earth, Paglen discovered. "There's no clear line that separates the atmosphere from space -- it just kind of gets wispier and wispier and thins out. The vast majority of satellites experience small amounts of atmospheric drag, and that drag accumulates over the years and eventually pulls them back down towards earth." For some it takes a few days, others a few hundred years. All will burn during reentry to our planet, sooner or later.

But satellites occupying a very specific space -- geostationary orbit -- have an estimated lifespan approaching infinity. Forming a ring around the earth 35,786 kilometers above the equator, these machines maintain a relatively fixed position relative to the Earth's rotation (appearing motionless in the night sky). They are high enough to escape atmospheric drag, but not so high as to get pulled away by other gravitational forces. "These satellites are the longest-lasting things that humans have ever made," Paglen explained.

"Very few, if any, traces of human civilization [will remain] on the surface of the earth," he said. "But a ring of dead satellites and spaceships will remain in orbit, essentially, forever."

For an artist, the implications were paradoxical: One could, it seemed, create art effectively guaranteed to last forever -- our people's sturdiest time capsule. But the only place to "bury" it was outer space. It presented obvious challenges that wanted institutional support. Paglen connected with Creative Time, a Manhattan-based arts nonprofit, whose president and artistic director, Anne Pasternak, had long wanted to put art in outer space. Pasternak has witnessed space launches at Cape Canaveral, most recently the Mars rover launch in November, 2011 -- an experience she called "better than the Olympics." That is to say, she recognizes the ennobling sentiments of space exploration, but "there's another side of space exploration that's quite dark," she said. Dark like ballistic missiles and spy satellites. "Trevor completely changed my experience of looking up at the night sky," she said.

"I used to look up at the night sky," she added, "and say 'Oh, stars, oh, planets,

how lovely, I'm insignificant, isn't that wonderful? There's a whole big universe out there, it's so beautiful.' And now, I look up at the night sky and realize that the things I'm looking at are man-made things as well. ... It feels polluted."

* * *

Paglen and Creative Time decided early that they wanted the project to be a photographic archive. Paglen also knew he wanted it to be several shades darker than one of the project's obvious forebears: Carl Sagan's Golden Records.

Launched in 1977 aboard the Voyagers 1 and 2 spacecraft, the Golden Records were designed as a greeting to whatever intelligent alien the spacecraft might meet beyond the solar system. They contained nothing about disease, conflict, or the Cold War nuclear fears that drove the American space program. Its curators attempted to present something like universality, loading the records with analog images and recordings expressing human variety (audio recordings of greetings in 55 different languages) and similarity -- like its drawing of a nude man and woman, criticized for being both puritanical (the woman has no vulva) and chauvinistic (the figures are clearly white and Occidental).

Sagan's records implicitly assumed we would be around for an alien follow-up call. It tried -- ambitiously, if somewhat arrogantly -- to make a good first impression. "The Last Pictures" assumes it is impossible to say anything universal or lasting about humanity, and that we'll be long gone by the time its pictures are discovered, if they're found at all.

"This is not a project that's supposed to explain to aliens what humans are all about and be the definitive record of human civilization," Paglen said. It is, he added, "a collection of images that explained to somebody in the future what happened to all of the people who built the dead spaceships in orbit around the earth. And how they killed themselves." (Or perhaps were killed?)

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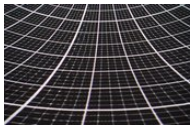
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Greek and Armenian Orphan Refugees Experience the Sea for the First Time, Marathon, Greece (public domain image, courtesy of Trevor Paglen and Creative Time)

Selecting images to outlast humanity is not easy. Paglen interviewed philosophers, scientists and artists for help, and met each week with a group of research assistants from varying academic disciplines who combed through tens of thousands of images from international archives. The 100 images they selected are challenging and unexpected. Where one expects the Berlin Wall or Neil Armstrong, "The Last Pictures" offers, instead, a little Japanese girl smiling at a WWII internment camp, a Rorschach test, orphans touching the sea for the first time, a middle finger extended toward the Eiffel Tower, or an army of bees, wired by scientists to sniff-out explosive material.

Such images don't explain themselves; in some cases, they impart next to nothing without supplemental texts. Paglen insists that's partly the point, an intent he made clear to his research assistants. "He was interested in images that were unstable or undermined their own truth claims," said Katie Detwiler, and anthropology student at the New School, in New York, who was part of the research team. "Sometimes in my own search for images, it became really difficult to commit to any image over another," she added. In deep time, it wasn't "possible to communicate any meaning," she said. "It could be a picture of a flower or a picture of a slaving ship. There's no distinction at the endpoint that we're thinking of."

Migrants Seen by Predator Drone, U.S.-Mexico Border (public domain image, courtesy of Trevor Paglen and Creative Time)

Flipping through the book produced by Creative Time to accompany the project, one experiences the sort of contextual groundlessness a strange being billions of years from now might experience. A photograph of two longhorn cows and a calf means little before reading in the back of the book that one cow is a clone of the other -- and mother to the calf. A picture of two gloved hands holding a human brain means less before you know it is Leon Trotsky's.

Photo captions are presumed to mean nothing to a being that far in the future, when all traces of our language will have been erased. (Earth-bound, 21st-century readers have captions in the book.) "The most important points of reference for this project are cave paintings," Paglen said. "Those are images that are the closest thing that we have now to what this may be in the future. ... We know very little about what [the cave paintings] could mean, although they seem to speak to us."

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To create an archive capable of withstanding the stresses of space travel and eternity, Paglen worked with a development team led by MIT scientists Brian L. Wardle, an associate professor of aeronautics and astronautics, and Karl Berggren, an associate professor of electrical engineering, an expert in quantum nanostructures. Among considerations like weight, size and cost, the archive had to last for billions of years -- a kind of "philosophical constraint," as Berggren put it. Again, Sagan's golden records presented an antithetical model: Gold was perfect for most human purposes, but in deep, cosmological time, it presented a problem.

"Gold atoms have a tendency to migrate with time," Berggren said, adding: "Even if there's only a nanometer of motion -- one billionth of a meter's worth of motion -- in a year, over the course of a billion years, obviously, that's going to be a huge amount."

Cherry Blossoms (Al Jazeera English)

Silicon was a much more static element. It was also, among other things, inexpensive and road-tested, as demonstrated by the innumerable silicon-based integrated circuits filling every modern spacecraft. The team at MIT shrunk Paglen's 100 images and nano-etched them into a thin, silicon wafer just a few inches wide, in such a way that the images are visible to the naked eye and comprehensible with relatively low magnification.

Creative Time found a willing partner in the EchoStar Corporation, which agreed to bolt the wafer and its protective shell to a satellite leased to Dish Network, the *EchoStar XVI*. During its 15-year operational lifespan, the *EchoStar XVI* will broadcast an estimated 10 trillion pictures and video frames to the earth's computers and televisions, each as ephemeral as the next. The silicon wafer on-board will store its images billions of years after the satellite goes dark.

Waterspout, Florida Keys (NOAA)

* * *

Odds say that the silicon wafer will never be found -- perhaps the central paradox among many that animate Paglen's project. But there's always the *possibility* it will be found -- by aliens, or perhaps post-apocalyptic humans (or, to employ one of Paglen's better fantasies, by a future race of highly evolved giant squid).

Paglen admits he doesn't expect it to be found either. The entire project is "deeply non-sensical," he says. But the possibility that it *might* be found creates an ethical obligation. A billion years from now -- or far fewer -- his pictures really may be the last surviving pictures of humanity.

"On one hand you can just say, 'Okay, well you're just throwing some pictures into space, who cares?' and that's kind of true," he said. "But at the same time, the title of the project is 'The Last Pictures,' and that's not a metaphor."

Glimpses of America, American National Exhibition, Moscow World's Fair (© 2012 Eames Office, LLC)

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AUSTIN CONSIDINE is a writer based in Brooklyn. A regular contributor to *The New York Times* and *Art in America*, he has also written for *Guernica, ESPN The Magazine, The San Francisco Chronicle,* and the *Chicago Sun-Times.*

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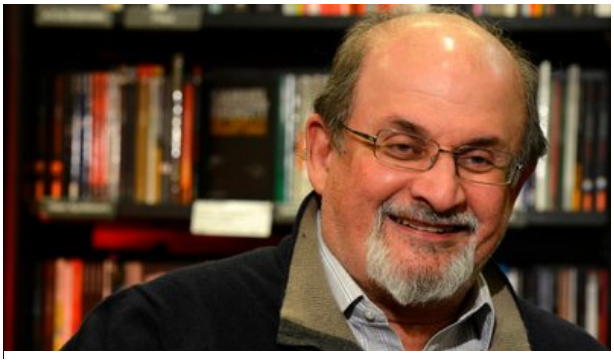

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Uncle_Fred · 5 months ago
Leaving a record of the human race is perhaps the most noble thing we can do as a species.

However, nothing lasts forever, and a satellite in geostationary orbit is no exception. A more inquisitive author might have discovered that *objects in geostationary orbit eventually fall to Earth.*

A perfect geostationary orbit is more an ideal than a reality. In practice, satellites drift out of this orbit due to perturbations like solar wind, radiation pressure, variations in the Earth's gravitational field, and the gravitational effect of the Moon and Sun.

In order to remain in geostationary orbit, a satellite must have a functioning navigational system, fuel supply, and operational thrusters. This process is called station keeping, and requires, at the bare minimum, a lot of complex circuitry to remain functional. We all know how easily electronics fail, much less other ship mechanics like fuel systems.

Anything in geostationary orbit has a lifespan measured in hundreds of years, if conditions are perfect, such a craft might get a few thousand years, but not billions.

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RobertSF ↗ Uncle_Fred · 5 months ago
Yes, I was going to post the same thing.
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Ben Bradley · 5 months ago
Not only is "Uncle Fred" correct in that something in Earth orbit won't stay there for billions of years (it's my understanding that even the Sun will burn out and become a red giant, engulfing the Earth within a billion years), but the subtitle has a sentence fragment ("Along with these pictures").
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rick jones · 5 months ago
I think it was written for LEO satellites, but http://www.ips.gov.au/Satellit... may be something worth playing with wrt orbital decay estimates. I am unable to run it on my system because I'm missing the requisite plugin(s).
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JonF311 · 5 months ago
Re: And he knows that life on earth is a few million years overdue for its next sweeping extinction event.

Um, no. We are in the midst of a great extinction right now.

And don't orbits decay, sometimes after just a few years, with the satellites falling, flaming, down to Earth?
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rick jones ↗ JonF311 · 5 months ago
Orbits do decay. Given this capsule has been placed on a satellite which is slated to go into a geosynchronous orbit the question becomes how long it takes to decay from there. Actually, given that satellites in GEO are now required to be pushed into a graveyard orbit at the end of their useful lifetime, the question would be about the decay rate for that sort of orbit. And, I suppose, just how long the satellite itself will remain intact.
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BanjoBuxby · 5 months ago
tbh - it'd be more fun to make a completely absurd surreal one and put that up too, then the space aliens would earn their space alien money figuring out which was which.
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ilovemingg · 5 months ago

http://al.ly/mbx
[]
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Mike Adamson · 5 months ago

Well said, I was about to say the same thing -- orbital decay affects even geostationary satelites eventually, so notions of billions of years are just not on. Noble idea, sure, but...

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