

# OKLAHOMA HUMANITIES

FALL | WINTER 2025

SPACE



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## PERSPECTIVE FROM THE EXECUTIVE DIRECTOR

Oklahoma Humanities magazine has always brought people together in conversation and contemplation. Some topics presented by the magazine have been difficult, but the essence of the humanities is to examine, evaluate, and face all parts of a situation, particularly those that are challenging.

As many of you know, Oklahoma Humanities is currently navigating a deeply challenging time. In early April, without advanced notice or explanation, our Congressionally mandated federal funding was abruptly terminated. Although a federal district court recently granted a preliminary injunction and ruled that this termination was unlawful, the funding remains inaccessible to state councils.

As we work closely with national and local partners to secure additional support, we are stretching every dollar and adapting to meet the moment. In every decision we make, we are prioritizing our Oklahoma communities that rely on us for access to, and resources for, the humanities while also protecting our long-term sustainability and survival.

As a result, we have had to make difficult choices including vacating our physical office, going fully remote, and suspending all grant programs. Unfortunately, we have also had to make additional budget cuts including laying off members of our invaluable staff.

Still, we are moving forward.

A temporarily stabilizing grant from the Mellon Foundation and generous matching support from local donors like you allowed us to continue delivering core programs this fall in flexible and adaptive ways. Our signature book discussion program, Let's Talk About It, returned in an "abridged" format, bringing meaningful dialogue to rural libraries, tribal and community centers, and correctional institutions across Oklahoma. While smaller in scale, these programs remain grounded in the power of literature to foster dialogue and connection. Our award-winning Oklahoma Humanities magazine also continued with this special digital-only edition that explores a timely theme and amplifies voices from around the state.

While this is not the season we planned for, it is one we are meeting with resilience, creativity, and a firm commitment to our mission. In 2026, we will again offer *Let's Talk About It: Abridged Version* in addition to publishing one digital issue of the magazine. And, if federal funds become available, we will distribute that money back into our Oklahoma communities via grants as we have done for the last fifty-four years.

We are proud to continue this important work, particularly in these uncertain times, and are deeply grateful for the unwavering support of our community, partners, and donors. Your belief in the power of the humanities to connect communities is what fuels us.

Thank you for standing with us.



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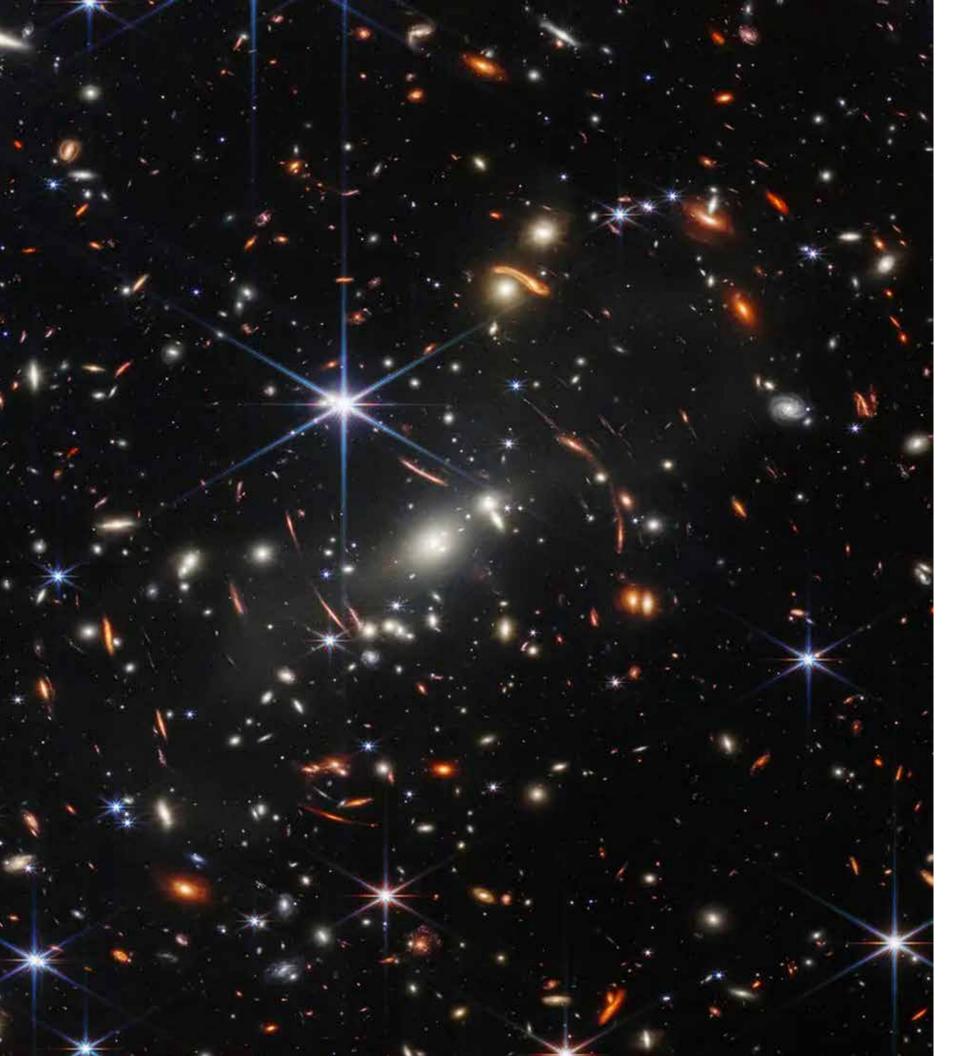
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#### Fran Parchcorn

#### THE 2025 **EDITOR'S CIRCLE**

Donors who designate gifts of \$500 or more for Oklahoma Humanities magazine join the Editor's Circle. Thanks to these generous donors, we distribute this award-winning publication free of charge to Oklahomans in all 77 counties. Thank you—we're grateful for your generosity!

#### OPPOSITE PAGE:

Revealed to the public in 2022, this photograph taken by the James Webb Telescope provided one of the deepest and detailed images of the universe to date. Although containing thousands of galaxies, the image represents a fraction of the night sky, approximately the "size of a grain of sand held at arm's length," according to NASA. The galaxy cluster is SMACS 0723 and its light took billions of years to reach Earth. This is how the galaxy cluster appeared roughly 4.6 billion years ago. When we look at this image, we are looking into the past.

Image credit: NASA, ESA, CSA, and STScl.



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Oklahoma Humanities magazine is an awardwinning collection of cultures, issues, and ideas—a rich mix of humanities scholarship, insightful narratives, informed opinions, and beautiful images, for a read that is smart, balanced, educational, and entertaining. It reaches Oklahomans in all 77 counties and is free of advocacy and advertising, supported by donors

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To William the Conqueror, her arrival in 1066 was a good omen for his imminent invasion of England. The Bayeux Tapestry not only recorded William's subsequent victory at the Battle of Hastings, but the comet that had foretold it. Bayeux Tapestry, Scene 32 showing Halley's Comet in 1066. Myrabella. wikimedia.com.

#### **SIDENOTE**

KIMBERLY ROBLIN kimberly@okhumanities.org

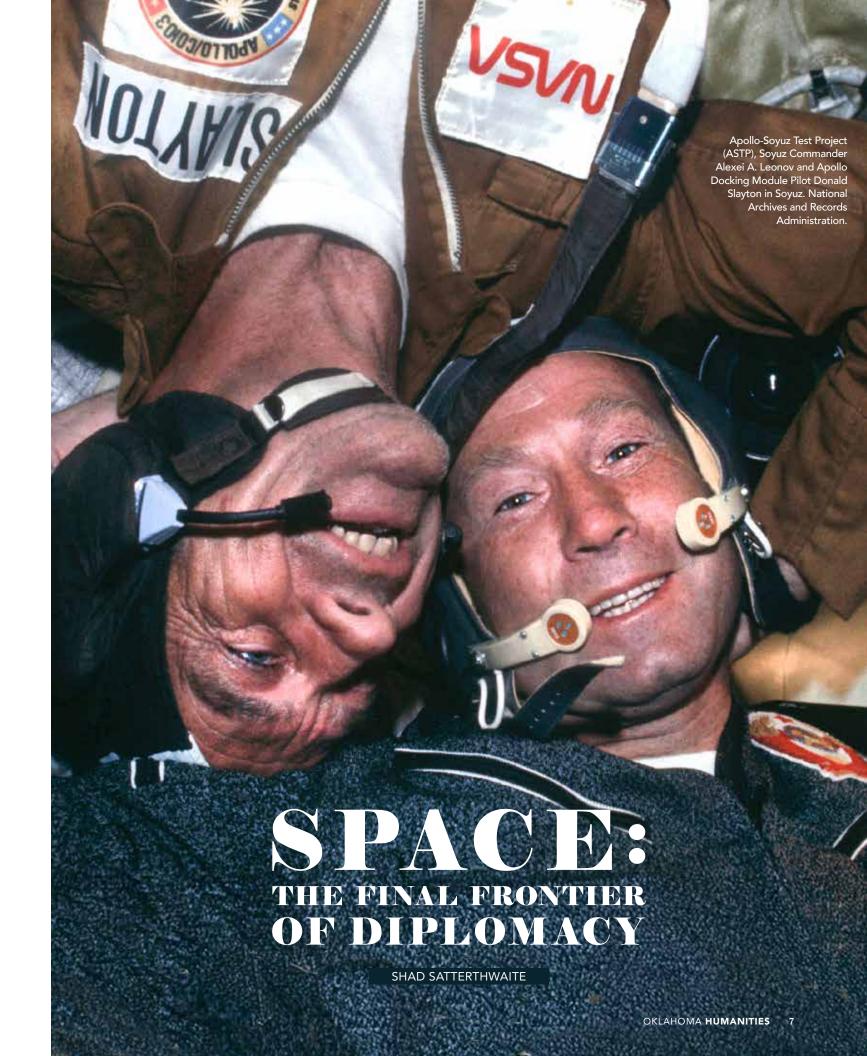
I haven't seen her in nearly forty years. I imagine she looks different now. I know I do. Certainly taller. Not quite four years old or four feet tall, I had to stand on tiptoe as my fingertips found the windowsill. Somewhere between a pull-up and a flexed-arm hang, she came into view. No crisp edges or searing detail—just a cosmic smudge set low in the southeastern sky like someone had tried to erase a star with rubber too old and brittle. My memory of her is similarly hazy, but I do remember. Halley's Comet was beautiful.

I couldn't tell that she was moving, but she was. Her stillness belied a tremendous speed that meant she'd soon be gone. Sensing my disappointment, my mom reassured me that I might see her again. Far in the future, when I was older than my grandparents, she would return. I didn't focus on the details. All I heard was that there was a chance. In that moment, Halley's became synonymous with hope. Now almost four decades later and another three still to go, the traveler of both time and space is coming.

She doesn't intersect with everyone and only visits Earth every seventy-six years on average. Those lucky enough to coincide with her join a unique company. Nomads, hunters, farmers, merchants and mariners, William the Conqueror, Genghis Khan, William Howard Taft, countless others, me, and quite possibly, you, share something concrete. We all looked up, looked out, and saw her streaking across the sky.

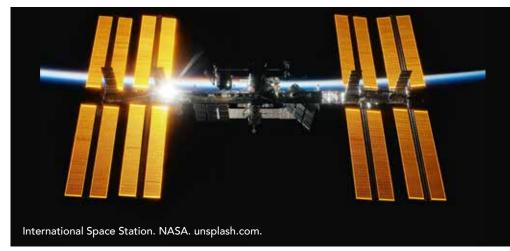
I've thought of her often through the years and especially the past few months. Although we selected the theme of SPACE long before we lost our federal funding, it lends itself to our current situation. Space is a frontier. It represents the unknown and requires optimism and the willingness to push forward when the horizon is unclear. I'm grateful to our longtime graphic designer, Anne Richardson, and this issue's authors—Shad Satterthwaite, Jennifer Levasseur, Kashona Notah, and Joshua Grasso-for their flexibility and willingness to still participate when we moved to a digital-only issue.

We might not know what the future holds for Oklahoma Humanities. Will abridged programming continue despite layoffs? Will there be a new, physical office in five years? What will the organization look like in ten? But we do know that Halley's Comet is coming, no longer moving away, but moving towards us from the darkness. Her orbit, her cycle, gives me hope. Hope that our absence is temporary and that our stillness belies motion. Hope that we will intersect with Oklahomans once again. Hope that Oklahoma Humanities will return-brighter and more visible than before.









n July 15, 1975, Oklahoma native Thomas P. Stafford blasted into space for the fourth and final time. A pioneer of space flight in the 1960s with Project Gemini and Apollo 10, he had come within nine miles of the lunar surface and paved the way for Neil Armstrong's historic steps two months later. This last mission was different.

Below him, the country navigated a tumultuous time. President Ford had assumed office the previous year following Richard Nixon's resignation amid the Watergate scandal. High levels of unemployment, inflation, and stagnant growth plagued the economy still reeling from the oil embargo and subsequent energy crisis. The Vietnam War had ended and triggered debates over its lessons and costs. And all this against the backdrop of the Cold War between the United States and the Soviet Union.

But the Apollo-Soyuz Test Project had the potential to ease this tension. Two days after launch, the Apollo capsule carrying Stafford, Donald K. Slayton, and Vance D. Brand successfully docked with the Soviet Soyuz capsule carrying cosmonauts Alexei A. Leonov and Valery N. Kubasov. The world watched as the doors opened and the crews shook hands, effectively closing the Space Race while opening "up a new era in the history of man," according to Stafford.

It was the first time two countries worked together jointly in space, but it would not be the last. In the pursuit of scientific progress and exploration, more than 600 people from forty-seven countries have flown to space since the Apollo-Soyuz mission. Fostering technological advancement while also strengthening geopolitical stability, international space collaborations demonstrate that even in times of political discord, nations can find common ground high above the Earth.

#### THE INTERNATIONAL SPACE STATION

The International Space Station (ISS) is one of the most enduring and significant symbols of this global cooperation. Its origins trace to President Ronald Reagan's State of the Union Address on January 25, 1984, when he directed NASA to develop a continuously inhabited space station within a ten-year time frame:

America has always been greatest when we dared to be great. We can reach for greatness again. We can follow our dreams to distant stars, living and working in space for peaceful, economic, and scientific gain. Tonight, I am directing NASA to develop a permanently manned space station and to do it within a decade.

A space station will permit quantum leaps in our research in science, communications, in metals, and in lifesaving medicines which could be manufactured only in space. We want our friends to help us meet these challenges and share in their benefits. NASA will invite other countries to participate so we can strengthen peace, build prosperity, and expand freedom for all who share our goals.

Although the first iteration, Freedom, proved too expensive, it solidified involvement from Europe (ESA), Japan (JAXA), and Canada (CSA). When the Cold War came to an end years later, allies and former adversaries could finally combine forces and technologies. In 1993, Russia joined the project and in 1998, all participating agencies signed the ISS Intergovernmental Agreement that established the responsibilities and logistics of using and operating the station. Assembled in orbit, the ISS has been continuously inhabited since November 2000, a temporary home for more than 280 individuals from twenty-three countries. Diplomatically, it has been a cornerstone of peaceful scientific collaboration, bringing together astronauts and researchers from multiple countries to conduct more than 3,000 experiments.

Yet geopolitical conflicts on Earth can and still do influence space partnerships. During periods of political tension—such as the strained relations in the 2010s between the U.S. and Russia—the station has remained a mostly cooperative space, but the recent war in Ukraine has tested this relationship. Russia announced that it would withdraw from the ISS in 2024 to build its own space station. It later deferred its exit until 2028.

The ISS is not the only space station, however. Excluded from the ISS due to U.S. restrictions, China has historically operated independently in space exploration, though they have increasingly sought international partnerships, particularly with developing nations and non-Western space agencies. The Tiangong Space Station, completed in 2022, is open to international cooperation, with experiments from countries like Switzerland, Italy, and Mexico, planned for onboard conduction.

#### **LUNAR AMBITIONS**

Experiments and work done on the ISS inform another international effort—returning to the moon. No one has stepped foot on the lunar surface since Apollo 17's Gene Cernan and Harrison Schmitt more than fifty years ago.

Initiated by NASA in 2017, the Artemis Program seeks to return humans to the Moon and establish a long-term lunar presence. Unlike the Cold War-era Apollo missions, Artemis is an international endeavor, relying on partnerships with ESA, JAXA, CSA, and MBRSC. Key components, such as the Lunar Gateway (a planned space station in lunar orbit), involve contributions from multiple countries. The ESA provides service modules for the Orion spacecraft, while Japan and Canada contribute robotic systems and life-support technologies.

The diplomatic significance of Artemis extends beyond its scientific goals. The Artemis Accords, introduced by NASA in coordination with the U.S. State Department in 2020, serve as a modern space law framework,

reinforcing international teamwork while reducing the risk of conflict over lunar resources. NASA Administrator Jim Bridenstine summarized their significance following the initial signing by the U.S., UK, UAE, Luxembourg, Japan, Italy, Canada and Australia:

With today's signing, we are uniting with our partners to explore the Moon and are establishing vital principles that will create a safe, peaceful, and prosperous future in space for all of humanity to enjoy.

Now signed by over fifty countries, they establish norms for responsible behavior on the Moon, including resource utilization, debris management, and peaceful cooperation. They encourage peaceful international collaboration in space and affirm that such ventures benefit not only space exploration but enhance international relationships as well. Finland, Bangladesh, and Norway became the 53<sup>rd</sup>, 54<sup>th</sup>, and 55<sup>th</sup> countries to join in early 2025.

This initiative builds on decades of global space diplomacy and ensures that exploration remains open to all interested nations. But Artemis is not the only effort. As more nations seek alternatives to Western-led space initiatives, China's growing role in international space efforts continues to shift the balance of global space politics.

The competition between the Artemis Accords and China's International Lunar Research Station highlights the geopolitical stakes in space. Just as the

Cold War Space Race reflected broader ideological battles, today's space partnerships reflect shifting global alliances. As more nations launch their own space programs, balancing competition with cooperation will be crucial. Together, China and Russia have plans for a joint Moon base by the 2030s.



#### RED ROVERS

Returning to the Moon to experiment and establish infrastructure is critical to the exploration of another body in our solar system. According to NASA, "we will use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars." Like the Moon, its exploration has also been a multinational endeavor, with several countries contributing to various missions.

Launched on July 30, 2020, the Perseverance rover landed February 18, 2021, on a site believed to have once held water. Relying on specialized sensing instruments from international

partners including France, Italy, Spain, and Norway, the rover's primary mission is to search for signs of past microbial life, collect soil and rock samples, and prepare

for sample return missions.

Through the Mars Sample Return (MSR) mission, NASA and ESA are leading efforts to return Martian soil samples through a landmark interplanetary and multi-launch collaboration planned for the 2030s. Rover-collected samples will be retrieved and sent to Earth by an ESA-developed orbiter.

Developed by ESA in collaboration with Roscosmos, the ExoMars program investigates the Martian environment, habitability, and whether life ever existed.

In July 2020, China launched the Zhurong rover, its first successful Mars rover. Its mission aims to study Martian surface geology, soil, climate, magnetic fields, and search for subsurface water ice to better understand Mars' history and potential habitability. It is equipped with scientific instruments including ground-penetrating radar and climate sensors. The project involved collaboration with European researchers, with ESA supporting data relay and scientific cooperation in atmospheric modeling and surface analysis.

These international efforts strengthen diplomatic ties by fostering shared scientific goals. The complexity

## SPACE AGENCIES—Acronyms from around the Globe

The National Aeronautics and Space Administration (NASA) is the United States government agency responsible for the nation's civilian space program and for aeronautics and aerospace research. Established in 1958, NASA has led numerous pioneering missions in space exploration, Earth science, planetary science, and human spaceflight.

The European Space **Agency** (ESA) is a prime example of a multinational space agency. Founded in 1975, ESA brings together 23 member states, pooling resources to compete with major space powers like the U.S., Russia, and China. Its collaborative approach strengthens diplomatic ties by uniting European nations in a shared vision. By partnering with the U.S., Russia, and emerging space nations, ESA acts as a bridge between global powers.

The Canadian Space Agency (CSA) is Canada's national space organization, established in 1989. The agency is responsible for all civil space-related activities in the country and is headquartered in Saint-Hubert, Quebec. CSA coordinates space science, research, satellite communications, Earth observation. and international collaborations.

The China National Space Administration (CNSA) is the national space agency of the People's Republic of China, responsible for planning and executing the country's civil space missions. It was established in 1993, and oversees satellite development, crewed spaceflight, deep space exploration, and international cooperation.

The Japan Aerospace **Exploration Agency** (JAXA) is Japan's national space agency, established in 2003 through the merger of three previous organizations. It is responsible for space and planetary research, satellite development, Earth observation, astronomy, and human spaceflight. It is headquartered in Tokyo and plays a leading role in both national and international space exploration.

The Russian Federal Space Agency (Roscosmos) is Russia's national space agency responsible for the country's space science, exploration, satellite systems, and crewed spaceflight programs. Established in 1992 (and restructured in 2015 into a state corporation), Roscosmos continues the legacy of the Soviet space program, which achieved launching the first artificial satellite (Sputnik) and sending the first human (Yuri Gagarin) into space.

The Asia-Pacific **Space Cooperation** Organization (APSCO) is an intergovernmental organization established to enhance regional cooperation in space science, technology, and applications by sharing satellite data, developing joint space missions, building capacity through training and education, and promoting peaceful uses of outer space. Officially founded in 2008, it's headquartered in Beijing, China, and includes member states such as China, Pakistan, Iran, Thailand, Turkey, Bangladesh, Peru, and others.

The Mohammed Bin Rashid Space Centre (MBRSC) is the United Arab Emirates' (UAE) leading space agency, established in 2006. It is responsible for the UAE's national space program, including satellite development, space exploration, and research initiatives aimed at advancing science and technology in the region.



of Mars exploration demands expertise from multiple nations, and by working together, space agencies reduce costs and increase mission success rates. Diplomatically, Mars cooperation serves as a neutral ground for countries with otherwise competitive relationships, promoting peaceful engagement in the long-term push for interplanetary exploration.

#### **READING WAVELENGTHS**

Just as critical to physically exploring space is looking at, and in a sense "listening" to it, with radio telescopes. The James Webb Space Telescope (JWST) is a space observatory developed through an international collaboration between NASA, the ESA, and the CSA. Launched on December 25, 2021, it is designed to observe the universe in infrared wavelengths, enabling it to study the formation of stars and galaxies, explore exoplanet atmospheres, and look deeper into the cosmos than ever before.



ESA played a crucial role in its mission by providing key components and support, including: the Ariane 5 launch vehicle (which successfully delivered JWST into space from the Guiana Space Centre in French Guiana), and two of JWST's four scientific instruments: the Near-Infrared Spectrograph (NIRSpec) and the Mid-Infrared Instrument (MIRI). ESA also contributed personnel and expertise to mission operations and science planning, ensuring strong European participation in the telescope's discoveries.

The Square Kilometer Array (SKA) is one of the world's most ambitious radio telescope projects, aimed at exploring deep space phenomena, including black holes, cosmic radiation, and extraterrestrial signals. SKA is led by an international consortium of countries, including Australia, South Africa, the UK, China, India, and others. Once operational, it will be the largest and most advanced radio telescope ever built.

Another example of international deep space cooperation is the Laser Interferometer Space Antenna (LISA), a gravitational wave observatory involving NASA and ESA. LISA will revolutionize our understanding of black holes and the universe's structure.

Such deep space projects require decades of collaboration, reinforcing long-term diplomatic relations. They also highlight how space research extends beyond Earth-focused geopolitics, fostering partnerships purely for scientific discovery. Nations involved in projects like SKA and LISA commit to shared governance structures, ensuring that discoveries remain open to the global scientific community.

Exploring deep space allows us to "see" into the past, but what about the future?

#### **UNLIMITED OPPORTUNITIES**

International collaboration in space exploration has consistently led to scientific breakthroughs, technological advancements, and strengthened diplomatic relations. From Cold War rivals working together on the ISS to emerging space powers like China developing inclusive programs, these collaborations prove that space remains one of the last frontiers where countries can set aside political differences in pursuit of common goals.

As humanity moves toward Moon settlements, Mars exploration, asteroid mining, and deep space research, such cooperation will be even more critical in shaping the future of space governance and diplomacy. Will nations establish a space equivalent to the United Nations? How will resource claims be managed to prevent conflicts? Questions such as these will shape the next frontier of space diplomacy.

The rise of commercial space players such as SpaceX, Blue Origin, and Axiom Space introduces a new dynamic to space diplomacy. With multinational investments and collaborations, private companies now influence international space policies alongside governments. The partnership between NASA and SpaceX for lunar missions exemplifies how public-private cooperation is shaping the future of exploration.

At the heart of collaborative space exploration though is still the human element. The men of the Apollo-Soyuz are a testament to this. They worked together for only forty-seven hours but became friends for life. When Leonov died in 2019, Tom Stafford traveled to the Moscow suburb Mytishchi and delivered his friend's eulogy in Russian.

ESA astronaut Andreas Mogensen described a similar perspective he gained while orbiting 250 miles above the Earth on the ISS:

When you look down, you see continents. You can pinpoint where countries are, but you can't see borders between countries. You realize that we're all just humans living on the same planet, and if we could learn to get along a little bit better and cooperate a little more, our challenges would disappear because they are self-made . . . you really get a feeling of the Earth as a single globe, not 195 different countries.

As Alexei Leonov once eloquently summarized, "My home is Tom Stafford's home."

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#### EXTRA! READ | THINK | TALK | LINK

- How was the ISS constructed? Watch an animation of the International Space Station's assembly. NASA. bit.ly/4iYwxSx.
- How do experiments in space impact life on Earth? "15 Ways the ISS Benefits Humanity." nasa.gov.





JENNIFER LEVASSEUR

arely does a weekend pass by when I don't wake to the sweet scent of French toast and sizzling sausages, but it's not until I smell coffee that my eyes feel the urge to open. Weekday meals are a far more functional affair. After a trip to the gym, I might have toast with jam, yogurt with fruit, and a cup of tea. Or if I'm already sitting behind my desk at the office, a bowl of microwaved instant oatmeal. Lunch is a salad or leftovers and for snacking I keep apples, bananas, or oranges in my work bag. And at the table with my husband and children, I'll have a dinner of steamed vegetables, potatoes, and some kind of protein.

Recognizable to many, my routine demonstrates the role food plays in our daily lives. On a biological level, it's a necessity. Our physical bodies require calories and nutrients to convert into energy. On a social level, it fosters comfort, connection, and community. Either way, we want food that tastes, smells, and looks appetizing. None of that ends just because a person leaves the Earth's surface. It intensifies. For astronauts, familiar food serves up a chance to feel closer to home when so distant.

But microgravity turns the sensory experience of food on its head. We've all seen the videos of astronauts floating candy-covered chocolate candies (NASA's non-commercial name for M&Ms) from one person's hand to another's mouth. This flying food ballet, while eye-catching and humorous, demonstrates the challenge for astronauts and engineers: eating in space is fundamentally different than eating on Earth. Luckily, since 1961 when Yuri Gagarin became the first person in space and the first to eat food—beef and liver paste with a chocolate sauce chaser—things have only improved for those reaching orbit and beyond.

#### PASTES, PILLS, AND A CORNED BEEF SANDWICH

When the human part of the Space Race kicked off, rockets powerful enough to put anything into space had only been around for about a decade. Almost everything for these first launches was experimental and military technologies informed most of the work. The space program utilized pressure garments, life support systems, control systems, and urine containment devices developed for sustaining high altitude test pilots and soldiers during the 1940s and 1950s. They often utilized the test pilots as astronauts, and they utilized food technology.

Throughout history, food preservation improvements allowed people—nomads, soldiers, explorers, and astronauts—to venture farther and farther from home and known sources of food. Metal and glass packaging in the early nineteenth century followed by pasteurization in the 1860s, and the introduction of tins and plastic during World War II, was revolutionary. Food became lighter to carry and more convenient to store and heat. When it came time to consider what and how an astronaut might eat while orbiting Earth, NASA engineers turned to the U.S. Army's nutritional and technological research done in the 1950s.

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LEFT: John Glenn's "meal" of beef and vegetables eaten on Friendship 7. 1962. Smithsonian National Air and Space Museum. RIGHT: Beef steak and potatoes. MaraZe. shutterstock.com.

> Comfort food was not on these early menus. With the changing gravity and pressure, the first flight foods included simplified items like mashed fruits and vegetables stored in tubes, tablets, and sticks. Almost no consideration was given to flavor, seasoning, or even similarity to actual food. Yuri Gagarin and John Glenn both "enjoyed" mashed versions of familiar foods that had the texture and appearance of toothpaste. To test if people could easily chew and swallow in microgravity, NASA then sent along chocolate-flavored malted milk tablets. While both methods were successful in terms of packaging and format, their bland flavor left much to be desired.

> On the Soviet side of the food iron curtain, pureed versions of common foods remained the norm for cosmonauts into the 1980s, something Russian commander Alexei Leonov took full advantage of during the Apollo-Soyuz Test Project in 1975 when he pranked the American crew by replacing the labels on the tubes of borscht (beet soup) with those of famous vodkas.

Thankfully, the somewhat insulting suggestion that astronauts eat a baby food-equivalent ended quickly for Americans—Glenn was easily able to chew and swallow the chalky tablets. Later Mercury missions included experimental bite-sized foods and some freeze-dried powders that required added liquid. There was a limited supply of six pounds of potable water inside the spacecraft, so astronauts were expected to "rehydrate" the food cubes with their own saliva. Powdered drinks required some creativity with the water drinking hose and tube system the astronaut used for hydration. The final Mercury astronaut, Gordon Cooper, orbited Earth for over a day and benefited from new additions such

for the evations in d food.

as a water dispenser for the latest innovations in dehydrated food.

The crewed Gemini program ran for just two years in 1965 and 1966, but included a wider array of food types and preparations. Especially helpful was the ability to use a special dispenser to rehydrate some foods with warm water. Packaging was lighter and included more flexible, sealed plastic bags with small valves for inserting the water spigot.

Despite the growing options, enjoyment of the food became the biggest battle for U.S. astronauts. Mercury astronauts, often the commanders of early Gemini missions, feared the food would continue to be mostly dry and tasteless. Anyone who has eaten dehydrated strawberries in cereals or what some claim to be "astronaut ice cream" from a museum gift shop will testify that the removal of water removes flavor as well. Hopes were not high as the program began with Gemini 3 in March 1965, but its pilot John Young had an idea.

After entering orbit, the noted prankster pulled a corned beef sandwich, somewhat fresh from a Florida deli, from his spacesuit pocket. He and mission commander "Gus" Grissom took a few bites of the rather warm sandwich before it started to break into crumbs—the bane of any microgravity eating experience, to be avoided at all costs. The two were lightly disciplined after the mission ended, but the stunt would never be forgotten.

The corned beef sandwich incident strikes at the very heart of what NASA's astronauts have always sought in communicating with engineers about the state of their spacecraft. From an Earthbound point of view, it sounds obvious that as



Survival food kit used by Mercury astronauts. On the menu? Orange-grapefruit juice, pineapple juice, cocoa, pears, strawberries, mushroom soup, chicken with gravy, beef with vegetables, and more. 1962. NASA.

much as possible, *leaving* Earth shouldn't be too different from *living* on Earth. Understandably, some things have to change when a spacecraft needs to travel at certain speeds to achieve orbital velocity, and rocket engines, even when combined, have a limit on how much weight they can propel. The comforts of home, things often taken for granted, need to be redefined or reconfigured.

People, however, still want to share meals with each other. They want food to taste, smell, and feel like they remember from the last time it was eaten. They want to smell things that recall memories of childhood or special moments in life. Leaving Earth, at great risk to their own lives, prompts the human emotional need for connection rather than the disconnection taking place. Food becomes a simple representation of the social, nutritional, emotional, and physiological cravings of each person. Absence makes the heart grow fonder. A perfectly crafted corned beef sandwich symbolized the need for flavor and the familiar, not rebellion.

#### FRUITCAKE AND FINGER FOODS

If the eating experience of Mercury and Gemini taught engineers and astronauts

anything, it was that neither Jetsons-like food pills nor deli sandwiches would suffice for human spaceflight. Not everything that goes into space needs to look "spacey." Some foods can look and taste just as they always do. But not everything can or should look like a warm corned beef sandwich either. Gemini menus for pre-flight selection expanded significantly, with attention paid to replicating typical meals for nutritional, psychological, and personal preference needs.

Human spaceflight hitting its stride meant that research into nutrition and packaging for the special conditions of microgravity allowed the food itself to reflect socially common food norms. Spacey food headed to the Moon could look more like normal food, just packaged in ways to account for health, logistics, and microgravity. For each astronaut, food scientists packed meals that looked relatively close to what you might expect to see on the table of a middle-class family's home in the mid-1960s. Chicken salad, bread, brownies, and instant coffee—though packaged in laminated plastic packages—made a fairly normal mid-day meal.

A significant technological development that directly influenced space food—and many foods in grocery stores today—was something



Food for the two-man Gemini 7 spaceflight in preparation for stowage. December, 1965. NASA.



Astronaut Ed Gibson near the "kitchen" of Skylab 4.1973. NASA.



Three members of the Apollo-Soyuz Test Project sample and select food options for the mission. From left to right, cosmonaut Valery Kubasov, astronaut Vance Brand, and Alexei Leonov, commander of the Soyuz crew. Leonov tries butter cookies while Brand drinks orange juice. April 23, 1974. NASA.

Coffee with milk, Soviet. National Air and Space Museum. you might not have heard of but have probably handled a few times—the retort pouch. Rather than squeeze rehydrated food from a plastic bag through a straw and into the mouth, the retort packaging of flexible plastic and metal layers allowed food to retain its water content and consistency while being thermostabilized. This made it possible to provide items like meats, stews, and "wet" foods that retained their original shape and taste, though not temperature. Unfortunately, Apollo spacecraft did not include an oven. This packaging was literally a space age development, one that transformed the ability of food manufacturers to keep foods shelf-stable for far longer periods of time. Grocery stores today show the reach of this technology with shelf-stable milk, fishes, meats, and other foods contained by flexible metal and plastic pouches.

While Apollo astronauts benefitted from warm water that made rehydratable foods more palatable, room-temperature hot dogs from thermostabilized retort packages probably did little to satisfy their cravings. Flavor, or at least the intensity of flavor became a point of contention with most of the food provided by the food researchers at NASA's Johnson Space Center and its contracted food providers and packagers. Many astronauts experience a sensation like nasal congestion while in space. Without gravity pulling body fluids towards the feet, fluids circulate in the body more evenly, thus creating the feeling of a head cold. More fluid near the nose and mouth tends to affect the sense of taste, so the stronger the flavor, the more obvious to somebody with excess fluid in the head. Popular foods of the time ripe for their own space iteration included the globally popular 1960s dessert: fruitcake. The spices in fruitcake offered more flavor intensity than spaghetti with meat sauce or turkey and gravy. Fruitcake had the added benefit of being naturally more shelf-stable than other desserts, so gelatin-coated bites were packaged for easy consumption and minimal crumbs.

But fruitcake is hardly the real food innovation or most popular food culture phenomenon to come from the Apollo program. In the category of debunking space mythology are two of the most beloved tropes of the human spaceflight program: the orange powdered beverage, Tang, and freeze-dried astronaut ice cream. As a government agency, NASA cannot purchase commercial items and identify them, which would constitute free advertising for a brand. So, while NASA did purchase Tang to use as a powdered beverage option for any spaceflight, it certainly was not invented for space (it entered the commercial market before astronauts were even selected in 1959).

Similarly, the idea of having an ice cream treat sounds like an ideal way to end a day of hard work in space. Blocks of freeze-dried

ice cream sold in museum gift shops around the world defy the lesson learned by NASA during the corned beef sandwich incident. Opening a package immediately reveals a fragile Styrofoam-like block already broken and shedding crumbs. While some NASA sources claim that the brick-shaped treat flew on Apollo 7, interviews with the mission's lunar module pilot Walt Cunningham revealed it was not included or remembered from the flight. And considering the multiple references to Apollo food packaging, taste, and hydration issues in the Apollo 7 spacecraft audio transcript, ice cream would certainly have been novel enough to make the list of comments.

#### AT THE TABLE

The three rotations of crew to the Skylab orbital workshop in 1973 and 1974 used much of the remaining Apollo hardware and equipment, all launched with the station itself in May 1973. That included the food. With the luxury of a homier environment, the galley of Skylab was stocked with canned food rather than dehydrated or thermostabilized packages. The galley itself was spacious by comparison even to an Apollo command module. A central pedestal "table" split into three sections, one for each crewmember, with a series of slots for the cans in each tabletop. Those slots were not only holders for the cans but also conductive heating slots—canned meats, vegetables, and other dishes could be warmed and eaten. Skylab astronauts, like nineteenth-century naval crews, could have meals with high caloric density and relatively preserved nutritional content, in extraordinary comfort.

Skylab's large galley and complement of foods created a different atmosphere that crews previously had no opportunity to enjoy: a space of community and sharing in an almost traditional setting. With a literal kitchen table at the center, Skylab crews prepared and ate meals in an Earth-like way, enjoying more Earth-like food than ever before. This centralized location for eating was part of the grander design of the orbital space station. In design of the facility and the design of the missions, the collaboration and community created became part of the research.

Could crews stay in space for weeks or even months and sustain a psychologically and physiologically healthy environment? While not as elaborately furnished as imagined by designers, the living and working spaces of Skylab became the first U.S. experiment in long-duration space habitation. It laid the groundwork for how crew composition, mission planning, space design, and equipment available proceeded well into the early twenty-first century on the International Space Station (ISS).



An uneaten, compressed coffee cake flown on Skylab. Not quite as appealing as the real thing. LEFT: National Air and Space Museum. RIGHT: Rachael Gorjestani, 2017. unsplash.com.



Candy-coated chocolates returned from the STS-27 Space Shuttle (Atlantis) mission. 1988. National Air and Space Museum.



ESA astronaut and flight engineer, Samantha Cristoforetti, makes her lunch on the International Space Station using a food rehydrator. 2014. NASA.



Karen Nyberg, engineer of Expedition 36 on the International Space Station, has a bit of fun with her food. 2013. NASA.



In the fifty years since the Skylab 4 crew left NASA's first orbital outpost, food choices, packaging, and eating habits in space have progressed dramatically. Not only are foods today more flavorful thanks to feedback from past recipes, but there are also options for sending supplies of fresh foods, including *real* ice cream, to orbit. Rehydratable shrimp cocktail is a preferred food (probably due to the strong flavor of horseradish in the sauce), as is the extended shelf-life tortilla (an all-purpose container for just about any contents). A vast array of new menu options addressed nutritional needs for longer duration missions. Astronauts cannot go to a grocery store, though they do have a type of pantry. Perishable and shelf stable foods arrive in batches during resupply spacecraft arrivals. Selections for daily meal plans

happen well in advance of a mission so the packages can be organized into containers before launches.

Cultural preferences and specialty diets can be accommodated, from Asian-derived tofu dishes to treats sent from celebrity chefs. With larger conduction ovens and rehydration stations (now with hot water), crews can enjoy meals together and have their favorite condiments close at hand to modify food if it doesn't strike the right flavor profile on any given day. And with the international composition of most crews, with members from Russia, the United States, Japan, Europeans, and south Asian countries at any given time, sharing meals from home that tap into memory and eating traditions allows an actual international family of astronauts to thrive in low Earth orbit.



Dinner time for Samantha Cristoforetti during Expedition 42 on the International Space Station. 2014. NASA.



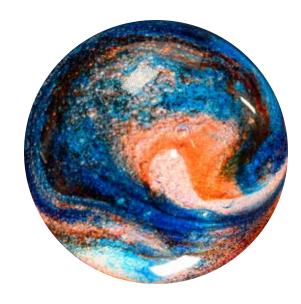
Space charcuterie delivered to Expedition 62 on the International Space Station. Includes cheese, figs, nuts, and salami. 2020. NASA.

#### THE NEXT COURSE

Engineers and food nutrition specialists are studying how to use the knowledge gained from twenty-five years on the ISS for future trips to the Moon and Mars. How do we minimize the size of those food supplies while maintaining nutritional value? Could growing vegetables or baking with pre-measured ingredients help minimize the volume needed for food? We know from the ISS that watching plants grow and smelling baked goods brings joy to crewmembers (though nobody got to eat the cookies baked in space). How can anything shelf-stable for years maintain the necessary macro- and micronutrient requirements of hard-working astronauts? And just how long should we make a tortilla last?

Maybe the future will require a Mark Watney (Matt Damon's character from *The Martian*) to "science the sh\*t out of this" when supply ships run late getting to Mars. Or might food all look like pills taken by the Jetsons of cartoon fame? Sixty years later and we're still discovering and troubleshooting just how different eating in space is than eating on Earth. The evolution of space food is a testament to engineering, experimentation, and the endurance of early astronauts. Although it has significantly improved even in just the last few decades, there is still much to learn before the first delicatessen opens on Mars.

JENNIFER LEVASSEUR is a curator at the National Air and Space Museum and is responsible for the astronaut cameras, chronographs, the Space Shuttle, and International Space Station programs. She received her BA in History from the University of Michigan in 1999, an MA in American Studies from George Washington University in 2002, and a PhD in History at George Mason University in 2014. Her book, *Through Astronaut Eyes: Photography from Early Human Spaceflight* looks at the cultural significance of astronaut photography.



A drop of water filled with food coloring by Don Pettit, flight engineer of Expedition 72 on the International Space Station. 2024. NASA.

## ANYTHING BUT LANDLOCKED



We might be bound by Kansas, Missouri, Arkansas, Texas, New Mexico, and Colorado. But above? We're bound by nothing. From astronauts to an astrobleme, museums to observatories, Oklahoma is a land of wide-open space.

#### **OPPORTUNITIES & OBSERVATORIES**



**Stafford Air & Space Museum** 3000 Logan Road | Weatherford staffordmuseum.org

Explore the history of early flight, the Space Race, and find out what Snoopy, space, and General Thomas Stafford have in common at this Smithsonian Affiliate located just one hour west of Oklahoma City.

#### Tulsa Air and Space Museum

3624 N 74th E Ave I Tulsa

tulsamuseum.org

Step into the cockpit of a shuttle simulator or travel the galaxy at the planetarium. Don't miss the exhibition on the Tuskegee Airmen!

#### Science Museum Oklahoma

2020 Remington Pl I Oklahoma City sciencemuseumok.org

Train in a Mercury capsule simulator, tour the Oklahoma Aviation and Space Hall of Fame and sit back, relax, and enjoy the show at the state-of-the-art, renovated Love's Planetarium where 8 million stars await.



#### **Ames Crater and Astrobleme Museum**

Main Street | Ames Open every day 24/7

What lies beneath the small town of Ames, Oklahoma, might surprise you. More than 400 million years ago, a meteor slammed into the Earth's surface and created a crater several miles across. Drop by the outdoor museum and learn how this event

still impacts Oklahoma's oil and gas industry today.

#### **Lunar Sooners**

ou.edu/cas/physics-astronomy/outreach/lunar-sooners

This student organization at the University of Oklahoma frequently hosts stargazing events and is even

available to make off campus presentations with its traveling planetarium.

**University of Oklahoma Observatory** ou.edu/cas/physics-astronomy/outreach/

Stop by Norman any Wednesday evening from mid-August through early May to attend a "star party" hosted by the Physics and Astronomy Department on the roof of Lin Hall. Find specific times on their website.



Lunar Sooners logo. Courtesy Lunar Sooners

#### **ACT Observatory**

astrotulsa.com/events

Operated by the Astronomy Club of Tulsa, this observatory is located thirty miles southwest of downtown Tulsa. Find dates and times for viewing on their website.

#### Oklahoma Air & Space Port and **Aerospace Industrial Park**

spaceport.ok.gov

Located in Burns Flat, this airport is one of only fourteen FAA-licensed spaceports operating in the United States and was the first built in a landlocked state.

#### International Space Station

nasa.gov/spot-the-station

Download NASA's "Spot the Station" app to determine when the ISS will be visible from your location.

#### **Oklahoma City Comets**

milb.com/oklahoma-city

Oklahoma City's minor league baseball team honors Oklahoma's Mickey Mantle, known as the "Commerce Comet."



#### **ASTRONAUTS & OTHERS**

#### **Colonel Leroy** Gordon Cooper, Jr.

Hometown: Shawnee Missions: Project Mercury "Faith 7" and Gemini 5

Hours in space: 222

#### **General Thomas** Stafford

Hometown: Weatherford Missions: Gemini 6, Gemini 9, Apollo 10, and Apollo-Soyuz Hours in space: 507

#### **Stuart Roosa**

Town: Claremore Missions: Apollo 14 Hours in space: 216

#### **Owen Kay Garriott**

Hometown: Enid Missions: Skylab 3 and Spacelab 1 Hours in space: 1,674

#### William Poque

Hometown: Okemah Missions: Skylab 4

Hours in space: 2,017 hours (84 days)

#### **Shannon Wells Lucid**

Town: Bethany Missions: Discovery STS-51G; Atlantis STS-34; Atlantis STS-43; Columbia STS-58: Atlantis STS-76

Hours in space: 5,354 hours (223 days)

#### **John Herrington** (Chickasaw Nation)

Hometown: Wetumka Missions: Endeavour STS-113

Hours in space: 330

#### **Geraldyn Cobb**

Mercury astronaut

wearing a spacesuit during Mercury-Atlas 9

prelaunch activities.

L. Gordon Cooper Jr.

Hometown: Norman

Mission: Although Cobb never went to space, she was the first female astronaut trainee in 1960 and successfully passed the rigorous physical and psychological testing. She testified unsuccessfully before Congress in 1963 for the inclusion of women astronauts.

#### **Donna Lee Shirley**

Hometown: Pauls Valley

Mission: An aerospace engineer, Shirley worked at NASA before joining Caltech's Jet Propulsion Laboratory in 1966 where she served as a mission analyst and conceptual developer. She was also the founding manager of its Mars Exploration Program.

This view of North America at night is a composite image assembled from data acquired by the Suomi National Polar-orbiting Partnership (Suomi NPP) satellite over nine days in April 2012 and thirteen days in October 2012. NASA.



Jerrie Cobb poses with a Mercury capsule at Kennedy Space Center. Cobb spent nearly three years in the early 1960s trying to convince government leaders to permit female astronauts. NASA.



umans instinctively fear the dark with one exception—
the expanse overhead. For millennia, we've looked up
and looked out into the darkness of space. The night sky
has drawn us, mystified us, and inspired us. Sometimes
we can even glimpse it during the day.

On April 8, 2024, a total solar eclipse transfixed those in its path, including many in Oklahoma. Easy to take for granted, the event is not a given. It is a Goldilocks. The Moon is 400 times smaller than the Sun yet completely obscures it for a few minutes because the Sun, by chance, is 400 times farther away than the Moon. The cosmic conditions are just right. If the Sun was larger or closer, or if the Moon was smaller or at a greater distance, totality would not exist. The Moon's slowly expanding orbit means that one day, millions of years from now, it won't.

We invited the public to submit photographs or short descriptive pieces of what they witnessed on April 8. For the first time in our magazine's history, we did not require authors with degrees, cultural knowledge, or relevant careers. To be human and to experience the eclipse was expertise enough.

Composite image shows the progression of the total solar eclipse in Dallas on April 8, 2024. Keegan Barber, NASA.





#### **REBECCA JACOBS-POLLEZ**

An Obfuscated Day

Once off the freeway, my husband and I must have made thirty turns along narrow roads before finally reaching our friends' house and property near Austin, Texas. Their home was in the path of totality for the 2024 eclipse. We had become friends while working at NASA, and the other two guests were current NASA employees. The idea of spending the eclipse with space aficionados seemed perfect. That was until we watched the clouds grow darker and thicker the closer we came to the house.

At supper, the ominous clouds continued gathering as we discussed what might happen the next day. How dark would it get? How cold? What would the animals and birds do? Our hostess had been looking for hummingbird nests to see if the birds would return to them during the darkness.

The morning dawned ash colored and dim. Once the eclipse started, we looked through our black glasses and pin hole viewers, but the occasional glimpse is all we saw of the Sun. Totality was blocked by thick, slowly swirling clouds. It never became dark, just a shade of late sunset. And yet, the temperature fell, surprisingly quickly. The hummingbirds vanished. The songbirds quieted. The world became silent except for a few dogs barking in the distance. Finally, as light began to return one bird started singing. Our host said, "Listen, it's the morning song." Clouds may have obscured totality, but nature still provided a fascinating display of the eclipse's impact.

## JANICE FRANCIS-SMITH April Eclipse

Kerrville, Texas Hill country Music festival campgrounds Path of totality The skies did exactly What had been explained Scientifically, astronomically Timed to the moment The show started right on schedule Played out upon a stage of clouds The spotlight, at last Itself the center of attention Predicted and yet completely Surprising, disorienting Darkness and light Inverted. High on the hill The old men stood Squinting toward the sky Out of all the things they'd seen In this world, this was A true first, signs and wonders A sliver of sun and then The brilliant flood As the day returned Nonchalantly Impersonating normalcy



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#### **CHARLES D. KENNEY**

Here is one photo that I particularly like, as it shows just a hint of color from erupting jets of plasma. I could not see those things with my eyes and was astonished to see this when I looked at my photos, taken with a hand-held 14-year old camera. It seems so suggestive to me, which was what the whole eclipse experience was like, suggesting worlds and realities beyond those we encounter every day.

OKLAHOMA HUMANITIES 33



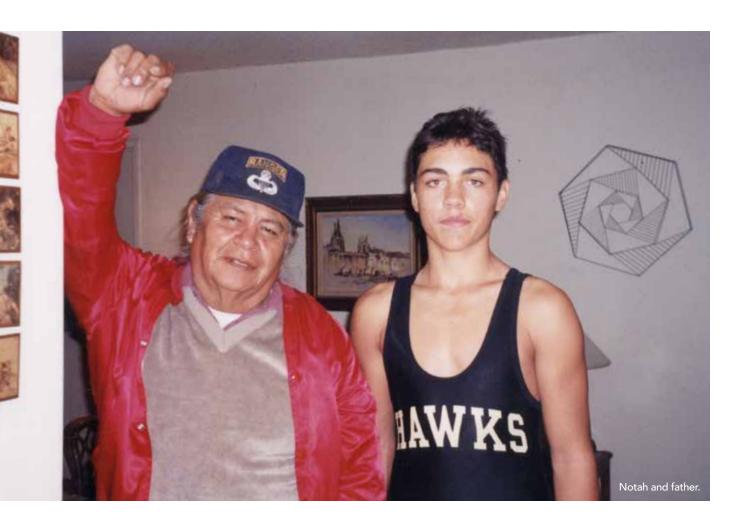
#### **RHYS MARTIN**

Nobody can prepare you for a total eclipse. People will use words like "amazing" or "unreal" but those words are also used to describe other things. You may have even experienced an eclipse yourself at, say, 80% coverage. Or 90%. Maybe even 98%. You might think that seeing it at 100% totality is no big deal. Again, nobody can prepare you for it. Not even yourself. There are no words that can accurately describe how the entire environment changes. The birds change. The bugs change. The temperature cools. It gets so dark that the streetlights come on, but it's not the same darkness that we know from a lifetime of sunsets. There is a moment of silence, from everyone and everything around you. In that short window of time, you are all united in awe. In that moment, you are an incredibly small part of the universe . . . but also someone special. You are a person on Earth witnessing a remarkable celestial event, one that seems mathematically impossible. Then, just as quickly as it happened, it is over. The Sun peeks out and everything goes back to how it was before; everything, that is, except you. You'll go on and try desperately to tell others what the experience was like, knowing that nobody can truly prepare them.



Kashona Notah

Monument Valley in the Navajo Nation. Ganapathy Kumar, 2018. unsplash.com.



y dad never got to see me become a writer or educator. Although he was always supportive of my creative pursuits, he passed away when I was nineteen and working full-time in construction. He did not get to see me decide to go to college after almost ten years in the workforce, graduate, get into an MFA program for fiction, or pursue creative writing as a profession. He did not get to see how I now share my passion through education. It might have been hard for him to even imagine back then.

Born on the Diné (Navajo) Nation in 1940, my dad came from an era when Native people and voices were not supported in the ways they are now. Like a lot of Natives from his generation, he experienced deep racism and lived through things that are unimaginable for most. During his lifetime, Native writers like Joy Harjo, Leslie Marmon Silko, N. Scott Momaday, Louise Erdrich, and Greg Sarris became literary heroes only by fighting fiercely to gain exposure and defy the odds.

While I personally believe my dad still watches over me in some way, witnessing my choices and current realities, it is still hard to really know what he might say about who I have become. Like a lot of folks who have lost a loved one, I long for one more conversation with him, but first I revisit his memory. I revisit our memories. They remind me of how lucky I was, that I was born to something special, and even if I did not know it at the time, it reminds me that I was given the tools to become what I am today.

#### **LOOKING TO THE STARS**

We lived in a HUD home on the West Side of San Bernardino, California, a desperate existence in many ways, but there was a lot of love there. I wrestled and played football and would lift weights under the starlight, imagining stories that might exist in the cosmos.

My father would sometimes come out and sit with me while I pumped iron. Our home did not have air conditioning, the blazing summers a part of what brought us together on those nights. After a little time together, perhaps after a story or two about his job or our family, my dad would leave me to my workout. He would walk a bit further out onto our plot of land and begin whispering Diné to the sky.

I didn't understand his first language, only a couple of words here and there. A few times I asked him what he was doing, knowing his routine was related to prayer, something he did most mornings with the sunrise, but also knowing he was not holding ceremony. As an Indian boarding school survivor, my dad sometimes grappled with sharing Diné traditions and teachings he grew up with before Catholic influence. So unfortunately, he did not ever fully explain. His answers were interrelated though.

He said he was speaking to our grandparents and that everyone comes from the stars. He said that leaders of the past were up there, and he said he was asking the stars for answers. In all instances, his responses signaled something I only came to understand later, the Diné belief that one can look up into the firmament for guidance. For Diné people, origin figures are represented in the sky, and if you are having trouble in your life, or you need to better understand familial roles and responsibilities, you can look to the stars for direction.

#### **LUCY**

My dad would have liked Lucy in the sky with stories. Launched by NASA in 2021, she is the first spacecraft to explore the Trojan asteroids that orbit the Sun with Jupiter. She'll never return to Earth and unlike Voyager 1 and 2, will never leave our solar system. But like the golden records on those earlier spacecrafts, Lucy does carry messages meant for the future. Her expanded mission is not to communicate with extraterrestrial life about human existence but to advise our own successors. Humankinds' distant







Kashona Notah family photographs.

descendants, perhaps astro-archaeologists of sorts, are meant to find Lucy and read a plaque on board that protects "words of advice, words of wisdom, words of joy, and words of inspiration" from diverse and prominent leaders including Albert Einstein, Carl Sagan, Juan Felipe Hererra, Paul McCartney, Martin Luther King, Jr., and 23<sup>rd</sup> U.S. Poet Laureate and Muscogee Nation citizen, Joy Harjo. Harjo's included words read:

Remember the earth whose skin you are: red earth, black earth, yellow earth, white earth, brown earth, we are earth.

Remember the plants, trees, animal life who all have their tribes, their families, their histories, too. Remember you are all people and all people are you. Remember you are this universe and this universe is you.

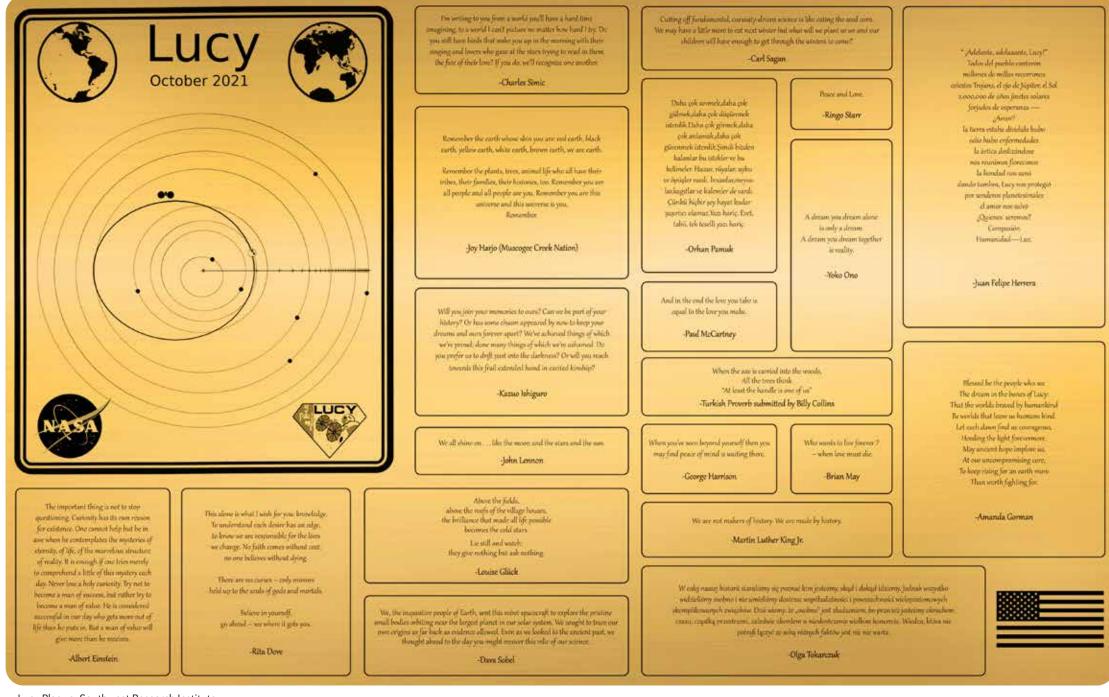
Remember.

Harjo's chosen poem does more than break down barriers for all Native people. It puts a Native writer's voice out beyond the stratosphere, perhaps a mark of just how far we have come. The Lucy Plaque is a representation of what humankind is today and what we want the future to know, or not to forget. If I am being optimistic, which becomes harder and harder with ongoing attacks on Native people, lands, and sovereignty, Harjo's inclusion feels like we have more of a seat at the table.

With bestselling books like Tommy Orange's *There There*, Terese Mailhot's *Heart Berries*, and the many modern Native writers that followed, and with successful shows like *Reservation Dogs*, *Dark Winds*, and *Rutherford Falls*, Native voices are now far more prevalent. We have more control of our own narrative, which is a beautiful thing. Of course there are still problems, obstacles rooted in that deep kind of racism my dad faced, but the mere fact that a Native poet can advise the future of humanity feels like Native people are very much a part of literary traditions now recognized by the world.

#### **BECOMING A STORYTELLER**

News of my dad's cancer came one day after school when I was fourteen. My family was told that it was terminal, that he probably had four years, and that the



Lucy Plaque. Southwest Research Institute.

battle would be filled with intense therapies and surgeries. We were told the illness would take his life. The news was devastating. Distraught and confused, it seemed that writing was all I could do to stay sane. I needed to put it all somewhere. Beginning with poems, that became songs, that became short stories and novels, I wrote to understand unfairness in the world.

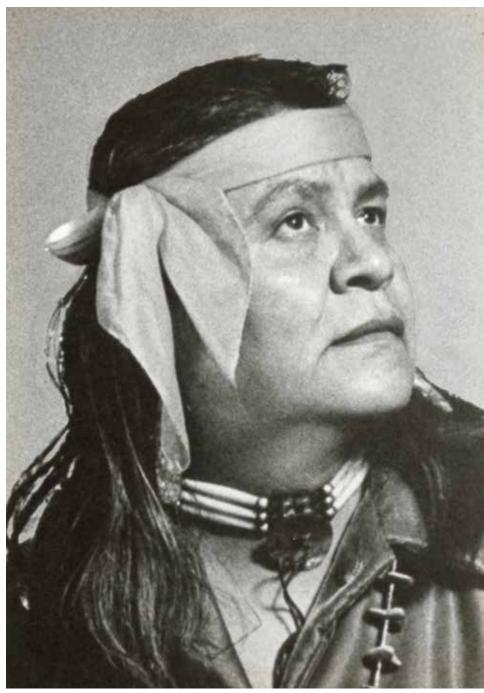
I was consumed with feeling wronged. I simply could not understand why the Creator would ever take my dad away, even if I was told he would go into the next world where there is more joy and happiness. It almost felt personal. My father, the man who met my mom when she

was already pregnant with me, raising me as his own since birth, my protector, would suffer before leaving this world, and there was nothing our family could do to stop it.

As hard as it was, instead of completely losing myself, I found a way to become my truest self through writing. My answer was literature. Books were not really supported in the underfunded district and struggling community I grew up in, but I was lucky because everyone at my house read regularly. Hurting, I leaned into home, becoming an avid reader and writer, regardless of what anyone outside might say. And if there was ever any bullying, I gave the bullies hell.

Looking back now, I know that writing is probably what saved my life. Writing served the important purpose of organizing my thoughts, allowed me to escape when I needed, and it kept me going all at the same time. I always had something I was working toward. I could always get through the next day if I knew there was still more to do on my projects. Writing music, poetry, and stories gave me goals to accomplish, things to try and work out, and I could still dream about what might come next for my characters in whatever medium I was working in. Writing kept me on track.

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Notah's father.

#### LIVING THROUGH LOSS

I ultimately lost my father at nineteen. As the doctors had promised, after several years, the cancer overtook him. When he passed, I lost my best friend, which I know a lot of people say after someone has passed, but he really was. He was who got me through my hardest moments, and I feel I owe him everything. He was the best father I could ever ask for.

It has never been easy, but I have learned to live through my dad's absence by filling my life with words. Inspired by writers like Harjo, I now do my best to bring the stories that are closest to my heart forward. More than anything, I see myself as a storyteller, and I hope to inspire future generations by teaching them the art and craft of writing too. I believe in the power of writing, and I refuse to believe that writing is not all that important, or that it is something that can be outsourced to AI. Writing and storytelling, the true power of it, is how we can connect as human beings. And writing has the power to continue saving lives.

It has taken me a lot of years to process, but I sometimes think of myself as the same person I was back in San Bernardino. Although my life has changed exponentially, I am still sitting with my dad out underneath the stars, I am still that kid watching his father speak Diné to the sky, I am still dreaming. But I am different too. Because of the Native writers that preceded me, those who are part of my story too, I am no longer destined only for labor. Instead, I am living my life as a writer. I am everything before me, everything behind me, I am everything below me, and everything above me.

#### **ONE MORE NIGHT**

I imagine a reality where my dad has returned for one more night to look up at the stars with me. Maybe I have bought a telescope and am trying to find Lucy through the viewfinder. He is sitting on a nearby weight bench and drinking sweet tea. As I look, I tell my dad that a Native poet's words are on a

spacecraft up there somewhere, waiting to be read by the descendants of all humanity. I tell him that I am a writer too, and if a Native writer can make it to space, maybe I can make a life for myself too. I tell him that I am happy and that I love what I do.

My dad smiles. "Native poets have been in the sky all along, advising Diné since the beginning of time."

I think about his words, what he means, and then after a moment, we both laugh because his sense of humor is on point. I feel acknowledged, supported, and that my dad knows what I do is important.

"Dad. I wish you were still here."

"I am. I am always with you, protecting and supporting you."

"But I can't see you."

"You can. Don't forget where I looked for guidance. You watched me do it. You know how."

"The night sky?" I ask.

"Shit yeah, you're writing about it right now for a reason," he says. "It's a reminder, a way you can always find me. Remember to always look up at the stars."

My dad casts his eyes skyward again. "There is space for Native voices like yours now," he says. "That was not always the case. I'm proud of the life you have chosen. I see you, and I love you, Son. Ayóó anííníshní."

KASHONA NOTAH is a writer and 2024-2026 Tulsa Artist Fellow. His work has appeared in Ploughshares, The Southern Review, Yellow Medicine Review, and elsewhere. He earned an MFA in fiction from the Helen Zell Writers' Program at the University of Michigan, and a BA in English with a minor in Native American Studies from Stanford University. Among other honors, he is the recipient of the Alice Hoffman Prize for Fiction, the Hopwood Award for Fiction, the Hopwood Award for Nonfiction, and the National Native Media Award for environmental coverage. In addition, his writing has been supported by Blue Mountain Center and the Sewanee Writers' Conference. He is an Iñupiag tribal citizen and was raised since birth within a Diné family through his late adoptive father. Originally from San Bernardino, California, Notah currently lives in Tulsa, Oklahoma.

## INNER SPACE:

## Voyager's Love Letter to Earth

**JOSHUA GRASSO** 

try to show it once a semester, always teasing it out first. I tell my Humanities and World Literature students that during the course we'll examine the most important image in the history of civilization. A photo that encompasses the meaning of the word 'humanities' more than anything else. I usually wait until midterms, when we've grappled with several key ideas and the students feel more comfortable with the material and each other. On that fateful day, I ask: "Remember that picture I told you about? Are you ready to see it?"

Voyager 1's simulated perspective for the Family Portrait of the solar system that included the Pale Blue Dot image. NASA and JPL.

The choreographed reveal begins. I pull down the screen and power on the projector. In the glare of fluorescent lights, the first slide appears dark, out of focus. "There it is," I tell them. "The only textbook you'll ever need for this class." A hush of amusement, confusion, and uncertainty deepens.

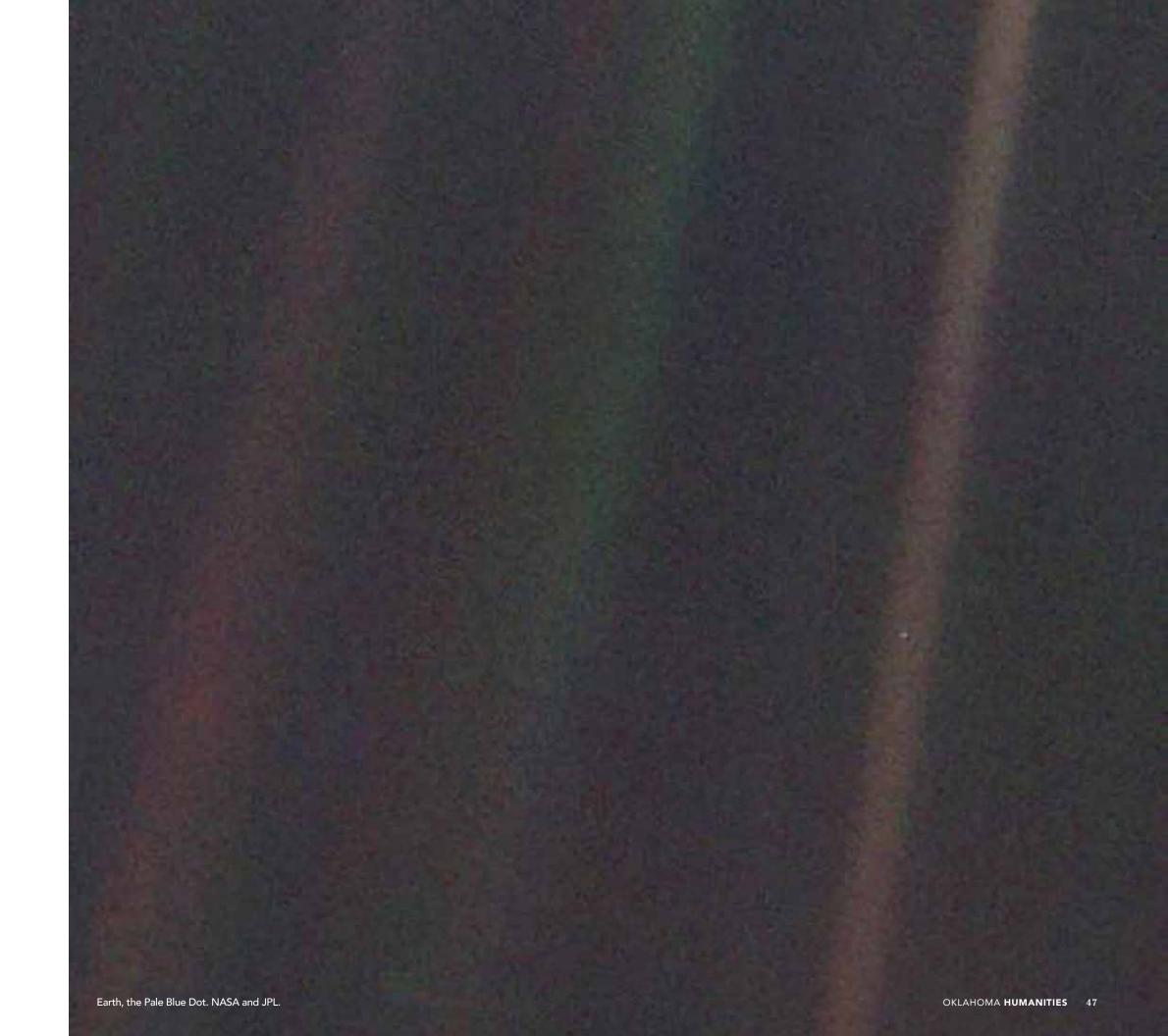
Wondering aloud if it's the wrong one, I feign a careful inspection before proclaiming it is indeed the correct slide. "Ah, it must be the lights." I flick them off while the slide looms ominously overhead and a largely black square with three, faint bands of color emerges: the dimmest one at the far left, reddish in color; a greenish-blue one in the center; and a much bolder one at the far right, appearing yellowish red. As the students' eyes adjust to the darkness, they can make out one more detail in the ambiguous photo's vellow-red band—a dot so small it might be a speck of dust on the projector or the screen itself.

How could this be the most important photo in the history of mankind? I let the students speculate about its nature. At least one student ventures: "Is it the night sky through a telescope?" Another counters, tentatively, "It looks like a microscope slide." I congratulate them both on being right as more confusion and nervous laughter follow. Finally, sensing that the students are at or near the breaking point, I reveal its identity and quote the photo's true expert, writer and astronomer Carl Sagan.

Look again at that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives ... every hunter and forager, every hero and coward, every creator and destroyer of civilization, every king and peasant, every young couple in love, every mother and father, hopeful child, inventor and explorer, every teacher of morals, every corrupt politician, every "superstar," every "supreme leader," every saint and sinner in the history of our species lived there—on a mote of dust suspended in a sunbeam.

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Sighs of understanding replace the silence. The students finally get the 'punchline,' though not everyone appreciates the joke. Sure, it's a picture of the Earth from millions of miles away, but why take a picture if no one can tell what it is? If a picture is worth a thousand words, how much did they pay for this one? And who or what took it?





#### TO BOLDLY GO ...

On September 5, 1977, the Voyager 1 spacecraft lifted off from Cape Canaveral on a journey that straddled science fact and fiction. Following in the wake of Voyager 2, launched two weeks earlier, it was also bound for Jupiter and Saturn to take historic photographs of the gas giants and their rarely-glimpsed moons.

The previous Pioneer 10 and 11 missions had already charted the neighborhood of Jupiter and Saturn, but even with the map they produced, the Voyager navigators were basically flying blind. Messages and commands took hours to reach one another. Nothing could be experienced or corrected in real time. Not the 'hard geography' of uncharted rocks and dust or the 'soft geography' of solar storms and radiation belts.

Human beings were incapable of such a feat

without computerized assistance. The Voyagers were among the first autonomous spacecraft, able to transmit data and exert some self-control over their maneuvers and machinery. This union of man and machine allowed the Voyagers to defy time, space, and a thousand obstacles in-between. For two years, they conducted hairpin maneuvers and navigated asteroids before somehow slipping into Jovian orbit, an object so vast and deadly that the smallest mistake would scrap the entire mission—and possibly, the future of NASA space exploration—in a nanosecond. They captured some of the most jaw-dropping images of the planet and its moons, including a now-famous image of Io with an erupting volcano.

Next, they turned to Saturn with Voyager 1 arriving in the fall of 1980 and Voyager 2 in the summer of 1981. They gave us our first clear images of Saturn's moons, even discovering new ones. Titan's atmosphere and Enceladus' icy exterior came into focus. Day after day, the Voyagers filled in the gaps of our solar system's geography, making the mission, by anyone's metric, a resounding success. But the cosmic cartographers were not done.

Built to only last around five years, they surprised everyone by continuing their journeys as their trajectories dramatically diverged. There would be no more flybys for Voyager 1 as its path past Titan had irrevocably taken it out of the solar system's planetary plane, but an alignment that happens every 175 years meant that Voyager 2's trajectory would take it past the outer planets of Uranus and Neptune—farther than the Pioneer predecessors had ever gone.

The Voyagers had become smarter, more seasoned travelers, learning to negotiate the hostile environment without round-the-clock software updates. This was crucial for the continuing mission, as Uranus is as far from Saturn as Saturn is from Earth. A signal from either Voyager would be almost impossibly weak, far less than that of a watch battery. To compensate, NASA would have to use an array of receiving dishes around the globe and even build new ones to pick up the signals.

Amazingly, Voyager 2 made it, offering us our first glimpses of the mysterious planet Uranus in 1986. From there, it undertook an even more perilous journey to Neptune, which at the time of the voyage, had drifted even further from the Sun than Pluto.

With each encounter we came face-to-face with worlds that had previously only been pale blue dots, or in some cases, fuzzy white ones. The swirling storms of Neptune swam into view, as well as the crazy mishmash of Uranus' moon, Miranda, that resembles two or three planets stitched together.

As Voyager 2 made its way out of Neptune's orbit in 1989, it was the end of an era. The world back home had changed irrecoverably since Voyagers' conception in the late 1960s. Much of the original ground crew had either moved on or retired. There seemed to be nothing left for the Voyagers to do but quietly sign off as they sped toward the forbidding blackness of interstellar space.

#### **A FAMILY PORTRAIT**

Strangely enough, the picture that came to define the entire journey—what is today known as the "Pale Blue Dot"—was a highly-contested afterthought. While the Apollo missions had elicited visceral and emotional thrills with their manned crews, Carl Sagan understood that without astronauts, the Voyagers risked losing the public's interest and investment. He suggested Voyager send a photograph of Earth, a 'postcard,' from Saturn. Let the people of Earth see what Voyager sees. Let them imagine themselves in space and become, even for a few seconds, its crew.

Yet many NASA scientists frowned on photography in tandem with exploration. Pictures had limited scientific value and much of Voyagers' instrumentation was aimed at capturing the invisible phenomenon of stars and planets. While cameras eventually won the day, as well as the hearts of millions with images of rings and red spots, Voyager was still a mission of science; they couldn't stop mission-critical activities every few hours to stage a convenient photo-op. They also worried pointing the cameras towards the Sun might damage them. Sagan conceded their point, but in late 1989, the Voyager team granted his sixth and final request. The original mission was all but over. There was almost nothing left to photograph.

On the poetically appropriate day of February 14<sup>th</sup>, 1990, the team asked Voyager 1 to look towards home one last time and snap a series of photographs "just 34 minutes before it powered off its cameras forever," according to NASA. This 'love letter' was a vision of the receding solar system as seen from 6 billion kilometers (3.7 billion miles or 5.5 light hours)



Antenna in Goldstone, California, being upgraded for Voyager 2's trek past Neptune, 1989. NASA and JPL.



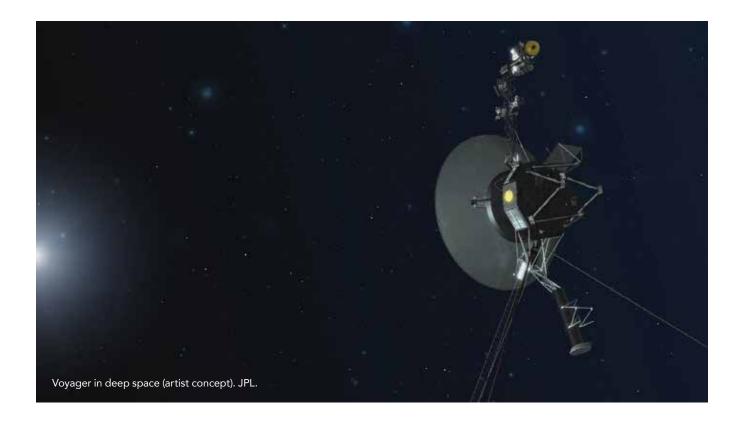


#### TRAVELING THE SOLAR SYSTEM WITH VOYAGER

- 1) September 18, 1977: Voyager 1 was 7.35 million miles from home when it took this picture. Showing the Earth and Moon, it was the first of its kind taken by a spacecraft.
- 2) March 24, 1979: Voyager 1 captured a closeup of Jupiter.
- **3) November 3, 1980:** Voyager 1 recorded Saturn and two of its moons.
- **4) January 25, 1986:** Voyager 2 snapped a parting shot of Uranus.
- **5) July 3, 1989:** Voyager 2 returned this image of Neptune and its largest satellite, Triton.

All photos NASA and JPL.

Radio telescopes can still "see" Voyager by detecting its signal. Here, Voyager 1's signal, received on February 21, 2013, is another kind of pale blue dot. It was 11.5 billion miles away at the time. JPL.



from the sun. Though difficult to distinguish, there are six planets visible: Venus, Earth, Jupiter, Saturn, Uranus, and Neptune.

Sunlight bouncing off the spacecraft near the camera caused the beams of faint, colored light. This magical mistake allowed the Earth to appear like a "mote of dust suspended in a sunbeam" in Sagan's words. Earth occupies less than a pixel. The last photograph ever taken by Voyager 1 was, in a sense, a cosmic selfie.

#### **FULL OF METAPHORS**

Manipulated to enhance the colors and magnify the Earth, the photograph is a work of art, not just an image, that tells a story. Though many would call it science *fact*, in some ways, the "Pale Blue Dot" is the ultimate work of science fiction. And as Ursula K. Le Guin famously wrote in the introduction to her 1969 novel, *The Left Hand of Darkness*:

Science fiction is metaphor... What sets it apart from older forms of fiction seems to be its use of new metaphors...[s]pace travel is one of these metaphors; so is an alternative society, an alternative biology; the future is another. The future, in fiction, is a metaphor.

This sense of metaphor evokes René Magritte's famously cryptic and cheeky painting of a pipe, *The Treachery of Images* (1929) which boldly proclaims (in French) this is not a pipe. We might similarly caption this photo, this is not the Earth, or, this is not in space. A photo this cosmically impossible to comprehend is no longer a static image, or a mere illustration of the Earth from space. Like any work of art, it now has the power to question, complicate, inspire, and illuminate our very existence.

Like a Pollock or Kandinsky painting, it is not entirely clear what the viewer is supposed to see in the image. It might be anything—or nothing at all. Yet with a gentle nudge from Sagan—"That's here. That's home. That's us."—we are rocketed straight into the realm of science fiction. We realize that this speck represents a vision of humanity reduced to Lilliputian terms, where mankind's greatest cities and empires are not just small, but invisible. Where countries are nonexistent, and the differences between their nations obsolete. It erases distinctions and is simultaneously a vision of the future and the past. It suggests space is a perspective. Outer space compels us to look inward.

If every work of art comes from a specific perspective at a specific point in history (think Shakespeare in the Elizabethan era), then the stars truly aligned to capture this image. It was taken from a machine, looking with human eyes at a void impossible to glimpse from Earth, in the twilight of the twentieth century. It was only through these 'eyes,' at that particular moment, that we could see ourselves as others see us. We could see everybody who ever lived in a single instant, in one great family portrait of life. We could reduce everything we know to a pale blue dot in an infinite sea of nothing.

This is the vision of space which Sagan always championed, and one of the main reasons he wanted mankind to explore the cosmos. Not merely to see *out there*, but to glimpse *in here*, and understand what we could become in the twenty-first century. As he wrote in his 1980 book, *Cosmos*:

Understanding where we live is an essential precondition for improving the neighborhood. Knowing what other neighborhoods are like also helps. If we long for our planet to be important, there is something we can do about it. We make our world significant by the courage of our questions and by the depth of our answers.

What does it mean, after all, to live on a planet in a solar system in a vast galaxy of stars? How can we live thoughtfully on this world if we have no conception of other worlds, and thus fail to recognize the great beauty, and utter fragility, of our own? As Sagan suggests, we can ask better questions about ourselves (practical ones, ethical ones, hypothetical ones) by seeing ourselves as the 'aliens' would.

By merging with Voyager, a semi-autonomous spacecraft, basically a robot, we were able to transcend our limitations long enough to finally glimpse our humanity. Technology allowed humanity to finally see ourselves in a way we never could.

#### **FINAL TRANSMISSION**

Ultimately, space travel is not about *space* at all. It is a quest. If we are not transformed by the journey, then why walk out the front door, much less rocket ourselves through space? Like all quests in literature, it inevitably leads back home. What we learn 'out there' becomes the raw material for future stories, works of art, and lesson plans. What we learn out there helps us explore and understand our 'inner space.'

When I show this picture to my students, I want them to see the entire world—our world, all worlds—as a work of art. Not just because of its beauty and originality, but because of its possibility. We look up to see the stars, but in this photo, there is no up or down, no 'over here' and 'out there.' Space is everywhere, and the Earth is a small but indivisible part of it. The same is true of this world, down here; the only directions and divisions we see are internal, man-made. This means we can erase them with a simple change of perspective, from viewing it through the eyes of another.

So if you ever find yourself in a classroom with a dark, out-of-focus slide staring back at you, don't suspect foul play or technical difficulties. Think of Voyager 1, now the most distant manmade object from Earth at roughly 15.4 billion miles away in interstellar space. Think of that spacecraft still speeding away from us and prepare to look deep into the void as it did. See yourself. Note the family resemblance which makes us all one species on a lifelong quest to find our humanity in the cosmos.

Look again at that dot. That's here. That's home. That's us.

JOSHUA GRASSO has a PhD from Miami University, Ohio, and is Professor of English at East Central University in Ada, Oklahoma, where he teaches courses in British and World Literature. As a lifelong lover of fantasy and science fiction, his stories have appeared in speculative journals such as *Broadswords and Blasters, Red Planet Magazine*, Apparition Lit, and the anthology Magissa. Learn more at his Amazon author page.

Pale Blue Dot Revisited. To celebrate the 30th anniversary of the Pale Blue Dot, NASA used modern image-processing software OKLAHOMA HUMANITIES 55 to revisit the famous photo. NASA and JPL.

Pale Blue Dot, NASA used modern to revisit the famous photo. NASA a



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#### NOTEWORTHY



FROM THE **BOARD OF TRUSTEES** Sarah Milligan, Chair

While I am humbled to serve as the Chair of the Board of Trustees for such an amazing organization, it is surreal to summarize this moment as we face unprecedented precarity for our future and that of all state humanities councils. When the new Board Members began their term in November 2024, navigating the abrupt loss of federal funding previously appropriated through Congress wasn't part of their orientation. We could not have predicted that our Congressional mandate, in place since 1965, would be in jeopardy.

What we do know is that Oklahoma Humanities (OH) has made an incredible impact over the last fifty years and I want to use this time to acknowledge and celebrate it. Oklahoma was one of the first five states to launch state humanities councils through a program developed by the National Endowment for the Humanities in 1971. Early efforts engaged Oklahomans on issues related to "Citizen Values in Community Decisions," a prescient inauguration for an organization that has subsequently and steadily supported creative opportunities that promote topics focused on people, culture, communities, and our societal civic underpinnings. OH has encouraged Oklahomans in all of Oklahoma's 77 counties to be curious, keep learning, and communicate across perceived boundaries about what matters to us as human beings sharing space and time.

We've done this through our in-house programs as well as grants. For forty years, OH has initiated and mediated community discussions through our book club, Let's Talk About It, in rural and urban community hubs, libraries, tribal centers, and even places of incarceration. Since 1994, we have partnered with the Smithsonian Institute to bring traveling exhibitions to rural Oklahoma with Museum on Main Street. And for more than fifteen years, we have sparked conversations and continuing education with Oklahoma Humanities magazine. In addition, we have distributed \$42 million in federal funding for community events and educational opportunities, planting seeds of interest and knowledge about history and culture. Matched 1:1 through non-federal support systems, these funds amplified local agency and interactions.

Our organizational footprint is evident in every single Oklahoma county and it is devastating to envision a future where this quality-of-life enrichment epicenter is not available to us all.

While the Board works to support OH staff through this time of uncertainty, we also work to foster optimism and resilience. In this moment, I am particularly grateful for the varying skills and expertise of all Board Members and their overwhelming show of support and efforts on behalf of this organization we so value.

There will be an "other side" of the events we are currently experiencing. The solid foundation and organizational management established over the decades makes it possible for OH to weather this current storm. We do not know what the other side will look like, but I remain hopeful and thankful when I see the swell of supporters that there will be a point for rebuilding. We hope to see you then.

## THANK YOU

In 1971, we joined five other states in a National Endowment for the Humanities (NEH) pilot program that established a grassroots network to ensure federal funding reached communities most at need. The pilot was so successful that 56 state and jurisdictional humanities councils arose across the country.

For more than fifty years, we shepherded funds from the nation's capital directly to Oklahoma neighborhoods, annually awarding over a quarter-million dollars in federal grants to cultural organizations at the local level.

We also connected Oklahomans in all 77 counties to the humanities through our free programs: the curious reader to our dynamic book club, Let's Talk About It; the teacher to

David "Chip" Carter

accessible and engaging content in Oklahoma Humanities magazine; and the small-town resident to the Smithsonian through Museum on Main Street.

We are proud to have a legacy of responsible federal grant management, equitable funding distribution, engaging public programs, and support for humanities scholarship.

Our work and success were made possible not only through our partnership with the NEH, but with nonprofits statewide, generous foundations, individual donors, Board Members, and engaged citizens. Together, we all connected Oklahomans to cultural programming, important conversations, and to each other. Thank you for all being a part of our

Wylma Smart

Dr. Glenda Zumwalt

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