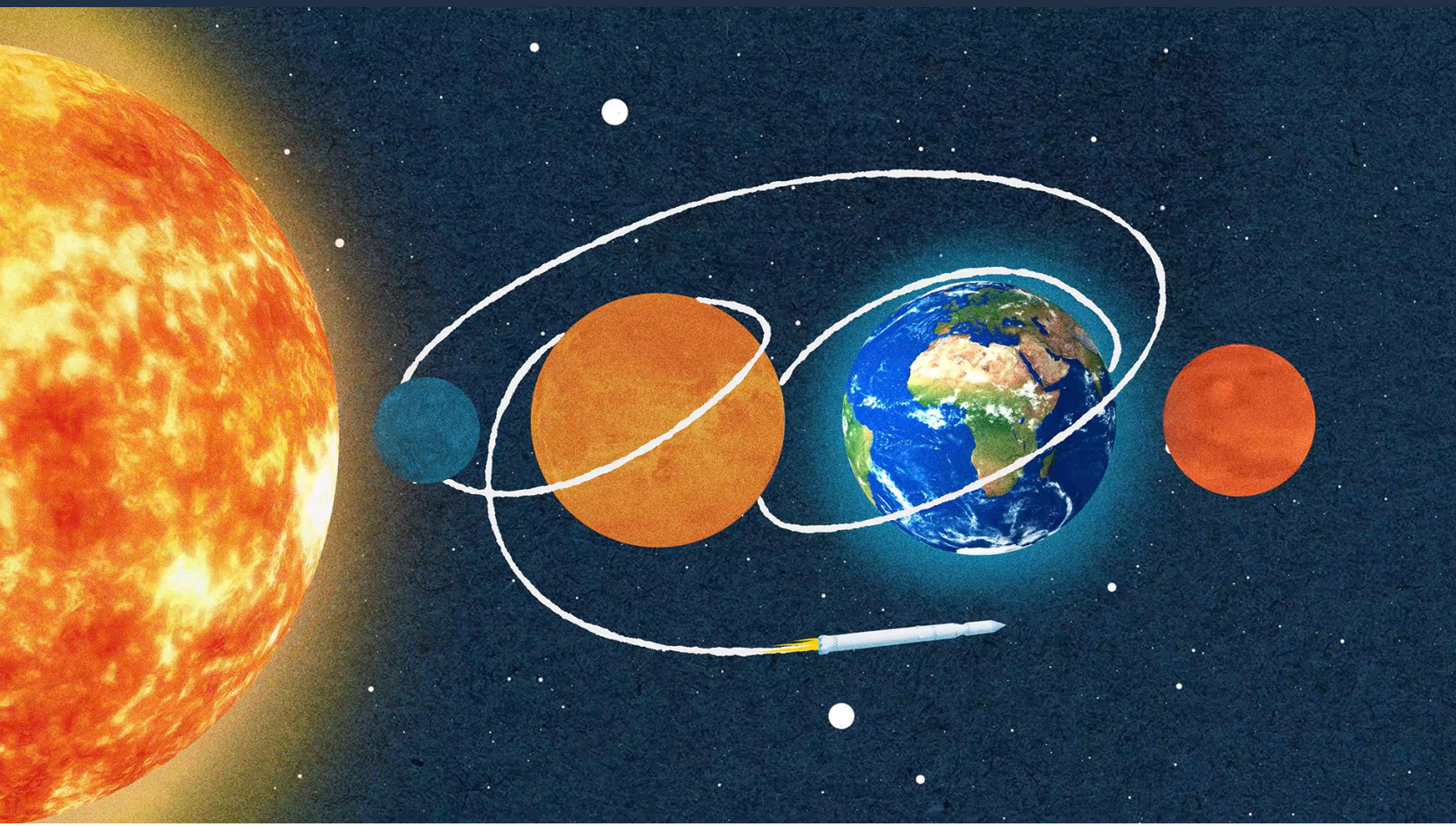

Space: The Final Threshold?

Will the next chapter of the Universe’s story be set beyond Earth or even beyond our Solar System?

0:00 *A collage sequence of space exploration: the moon, early telescopes and an astronomer, rockets and a space telescope in orbit, a glowing orange planet with rings, and scenes of observatories, an astronaut, a rover, and a rocket engine.*	For millennia, people have looked up to the sky and wondered what's out there. For decades, we've sent spacecraft, telescopes, a chimp, and astronauts beyond our atmosphere to explore space. Today, we dream of going farther. This dream could be the key to our future. It could help us cross a new threshold of increasing complexity and turn the page to the next chapter in the story of the universe.
0:36 *A series of planets with the Sun on the left, Earth in the center, and a rocket looping through space. The rocket passes Earth, between planets, and approaches a red planet.*	Our journey toward the future might start close to home. Lots of people have started working on the idea of colonizing space, beginning with the other planets in our solar system, like Mars. But getting to and living on new planets isn't easy. With current technology, it would take about 9 months to reach Mars.
0:57 *Astronauts shown with highlighted muscles, an eye, and medical charts, followed by Mars and Earth side by side. A white orbit line loops around both planets.*	That much time in space takes a toll on the human body. After just a few weeks in space, astronauts can start to lose muscle and bone mass and experience changes to their eyesight. Plus, conditions on Mars are a lot different from Earth. There's very little oxygen in the atmosphere. Temperatures can range from around 70° F to -225° and radiation levels are about 40 to 50 times higher than they are on Earth.
1:32 *A planet shown with bright colors and clouds, followed by a spacecraft flying past carrying a large basket of vegetables.*	So for us to survive there, we need to make some changes. Some think that terraforming Mars by doing things like warming up the planet, thickening its atmosphere, or changing its terrain could make it more habitable for humans. But changing conditions in this way could be disastrous. Or it could launch a new age of exploration and provide a new planet of resources for humanity.
1:57 *A colorful series of planets fills the sky, some Earth-like, others fiery or shaded. The scene expands into a glowing galaxy with countless worlds. The view shifts to the outer planets with a spacecraft. The sequence ends with the spacecraft traveling toward a distant glowing star.*	But will we even need terraforming? There might be millions of planets out there that could already sustain life if we can travel to them. There's an entire universe beyond our solar system, and we've barely started to explore it. Back in 1977, NASA launched two spacecraft to explore the farthest reaches of our solar system. All these years later, they're still traveling away from Earth, and they're still in the solar system. Scientists estimate it would take another 70,000 years before they reached the next closest star. So for us to actually explore our galaxy, we'd need to move a lot faster.
2:44 *A rocket flies through space toward a glowing star. Mechanical blueprints overlay Earth. A spacecraft orbits against a colorful grid background, then an astronaut is shown standing holding a flag with Earth's image.*	Even at the speed of light, which is theoretically impossible, it would take us more than 4 years to reach the closest star. To make even a fraction of that kind of speed possible, we'd need to come up with new solutions for fuel and energy, like laser propelled spacecraft or discover wormholes that would bring us to distant regions of space without having to travel at impossible speeds. That's all theoretical, but making these solutions a reality would mean major changes in what humans can do and where we can go.

3:16 *A starfield of colorful planets, some marked and one highlighted. An Earth-like planet appears with a scale beneath it, followed by a large telescope dome aimed at the starry night sky.*	But maybe the next threshold isn't about where we go at all. Maybe it's about who is already out there. When scientists think about life beyond Earth, they focus on planets in the Goldilock zone. Those are places that aren't too hot or too cold, but are just right for liquid water to exist. But it's hard to know how many of these planets there are. It's even harder to know if any of them have life.
3:46 *A chalkboard shows a mathematical formula. The scene shifts to a starry background filled with colorful planets. One panel compares these planets to Earth.*	One way to think about the answer is through the Drake equation. It's a way to estimate the amount of intelligent extraterrestrial life in our galaxy by considering factors like the number of stars with planets and the amount of life that becomes intelligent. Since it's based on estimates, the equation can have a huge range of solutions. There could be hundreds of thousands of complex civilizations or just us. Knowing this answer could reshape how we understand the origin and evolution of life on our planet and just about everything else about our universe
4:27 *A scientist appears, then illustrations show skeletons in stages of evolution. Spacecraft, rockets, and telescopes surround Earth, which ends the sequence glowing with expanding rings in a starry galaxy.*	Then again, maybe we're alone. In 1950, physicist Enrico Fairmy asked, "But where is everybody?" His point called the fairmy paradox argues that if there's other life in the universe, it's kind of weird that we haven't found it yet or that it hasn't found us. There are plenty of factors that might have kept other life in the universe from evolving. And there are things that could stop us from evolving toward new thresholds of complexity, too. Like if we don't figure out how to get humans to Mars or never uncover new energy sources or wormholes to carry us beyond our solar system. But humans have made it this far on Earth because we're always evolving and learning. If we keep doing that, we'll continue to grow and evolve far into the future, taking us to places we've never gone before in ways we can hardly imagine.