EXPLORATION INNOVATION BROUGHT DOWN TO EARTH

sparks & honey

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Space isn't just a moonshot.

It's your business.

Space is a vast canvas for the human imagination, and a fertile ground for technological exploration. What was once the realm of government and academia is now open for business in a way that it's never been before. Space is the next big race, fueled by private-sector dollars and NASA's guiding hand.

We're on the cusp of exploring an unprecedented abundance in innovation, research, resources and technological connection in space, all with Earth-bound resonance.

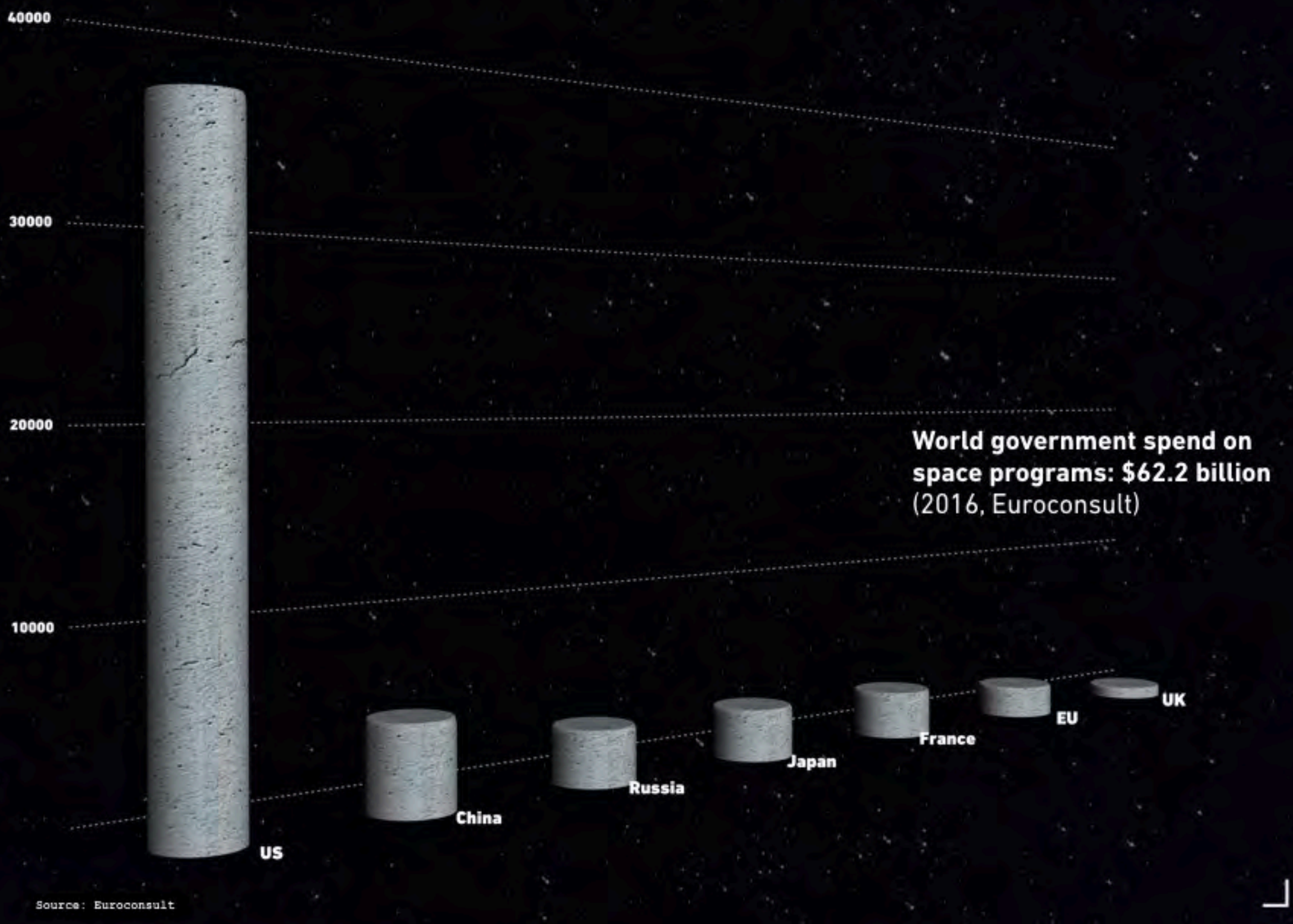
The exploration of space is the great flattener: a nonpartisan, secular quest that unites us under the umbrella of humanity. Space technology is transforming life, not just in orbit, but here on Earth.

This is the state of space.

> “Ad Astra means ‘to the stars,’ the Latin phrase that is said all the time in the space community, often as a sign-off on an email. It’s really like saying: we are on a mission together.”
>
> **- Dr. Sarah Jane Pell, Space Artist, Researcher and Occupational Diver**

It all starts with the money trail.

SPACE PROGRAMS WITH THE MOST SPEND BY COUNTRY:



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DECREASED FEDERAL SPACE $$$$

The US has the biggest federal space budget at 0.4% today — but it's a tenth of what it was in the Apollo era (1965-1966), at 4%.

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Source: Bill Nye, The Mars Generation, Netflix

MORE MONEY

Private-sector investment is skyrocketing, and opening up access to outer orbits like never before.

$4.2b

Over the last two years, a combined $4.2 billion in venture capital investment has poured into Space 2.0 ventures.
= More more money pouring in from the private industry than ever before.

Source: CB Insights

This new era is unleashing an unprecedented symbiotic relationship between space and Earth.

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New vantage points, unique data sets and technology innovation will touch almost every industry imaginable — transportation and tourism, food and farming, energy, fashion and beauty, and your home.

Space is a minefield.

SPACE — ON SALE

The private-sector dollars have brought costs down of launching into orbit, and next, sending civilians into space, and astronauts further. But NASA laid the groundwork for the private sector, and it continues to work hand in hand with SpaceX and other private companies.

SpaceX's payload launch in 2010 marked the first foray of a private company into something only government agencies had done before. And with competition came cheaper price tags.

Valued at $21.2 billion, SpaceX is the fourth most valuable privately held tech company in the US.

Source: Air Force, NASA, Time, The Verge

$440m

Cost of the first flight of SpaceX's Falcon 9 rocket: $440 million — a third of what it would have cost NASA. - Air Force, NASA study

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CO-WORKING IN SPACE

The government fuels business for private companies like SpaceX, and vice versa.

In 2016, the Air Force awarded SpaceX an $83 million contract to launch a GPS 3 satellite; this year SpaceX won another contract worth $96 million.

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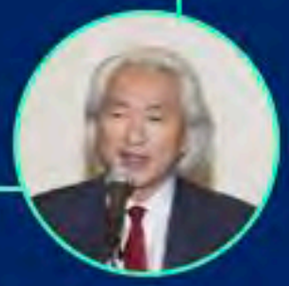
Source: Space News

“There is a nasty four-letter word that has haunted the space program; it's the C-word. Cost. Imagine if your body was made of solid gold. That's how much it costs to put your body into outer space. That is why we have to drive down the costs.”

- Michio Kaku, The Mars Generation



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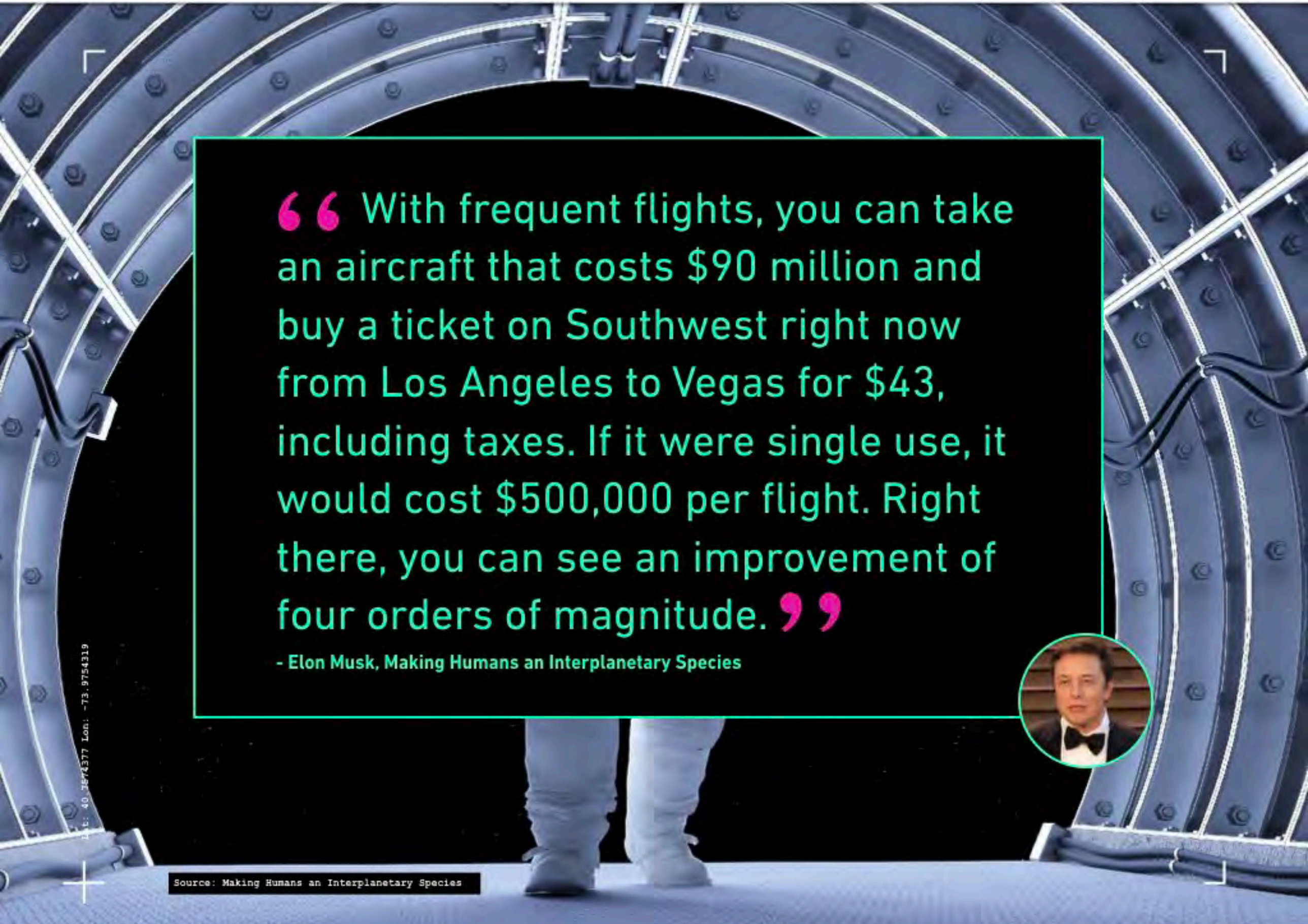
Source: Mars Generation, Netflix

Competition = lower launch prices + more trips to space

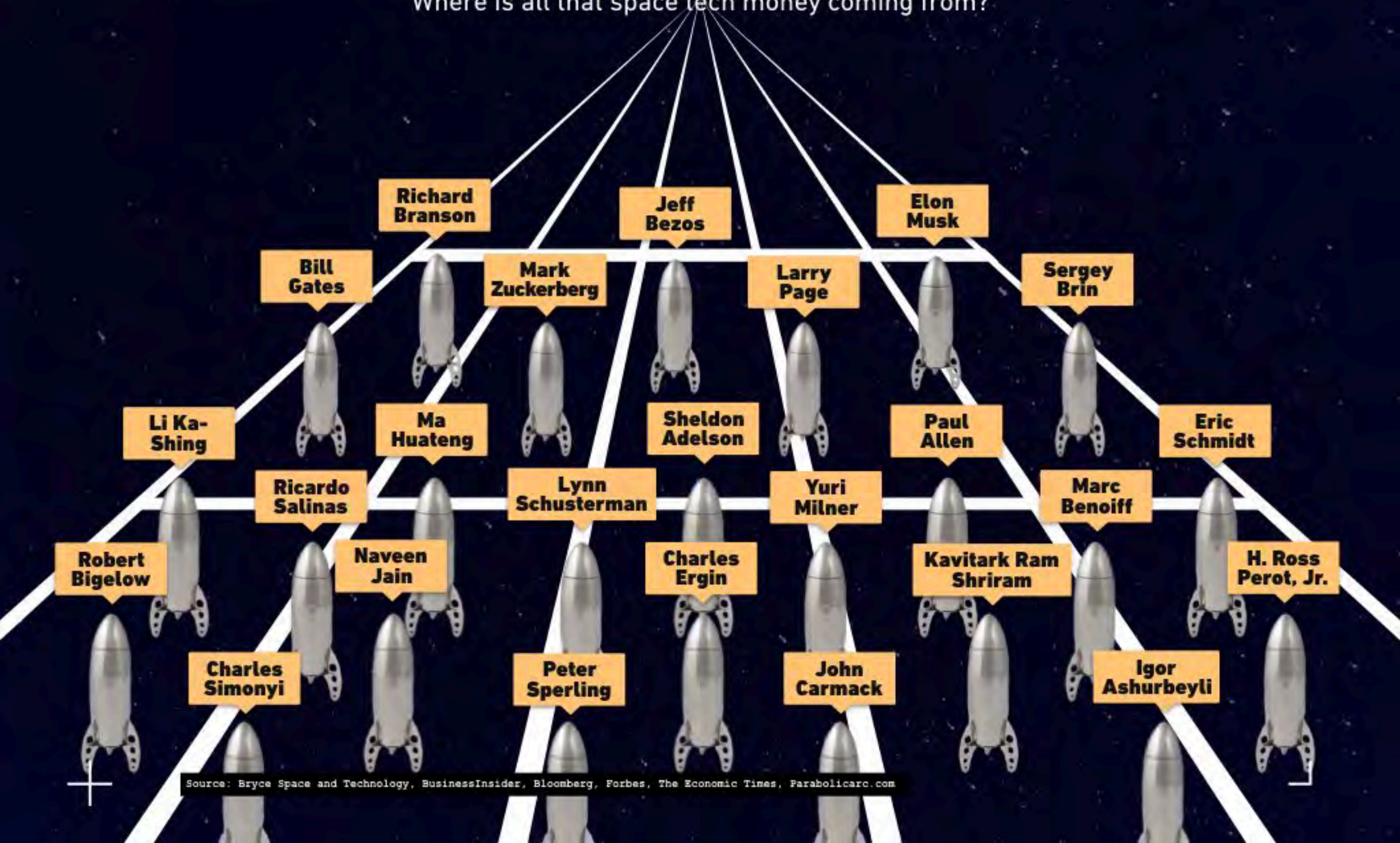


> “With frequent flights, you can take an aircraft that costs $90 million and buy a ticket on Southwest right now from Los Angeles to Vegas for $43, including taxes. If it were single use, it would cost $500,000 per flight. Right there, you can see an improvement of four orders of magnitude.”
>
> **- Elon Musk, Making Humans an Interplanetary Species**

Source: Making Humans an Interplanetary Species

25 BILLIONAIRES HAVE A CONNECTION TO SPACE

Where is all that space tech money coming from?



Source: Bryce Space and Technology, BusinessInsider, Bloomberg, Forbes, The Economic Times, Parabolicarc.com


“How do you become a millionaire in space? Start out as a billionaire.”
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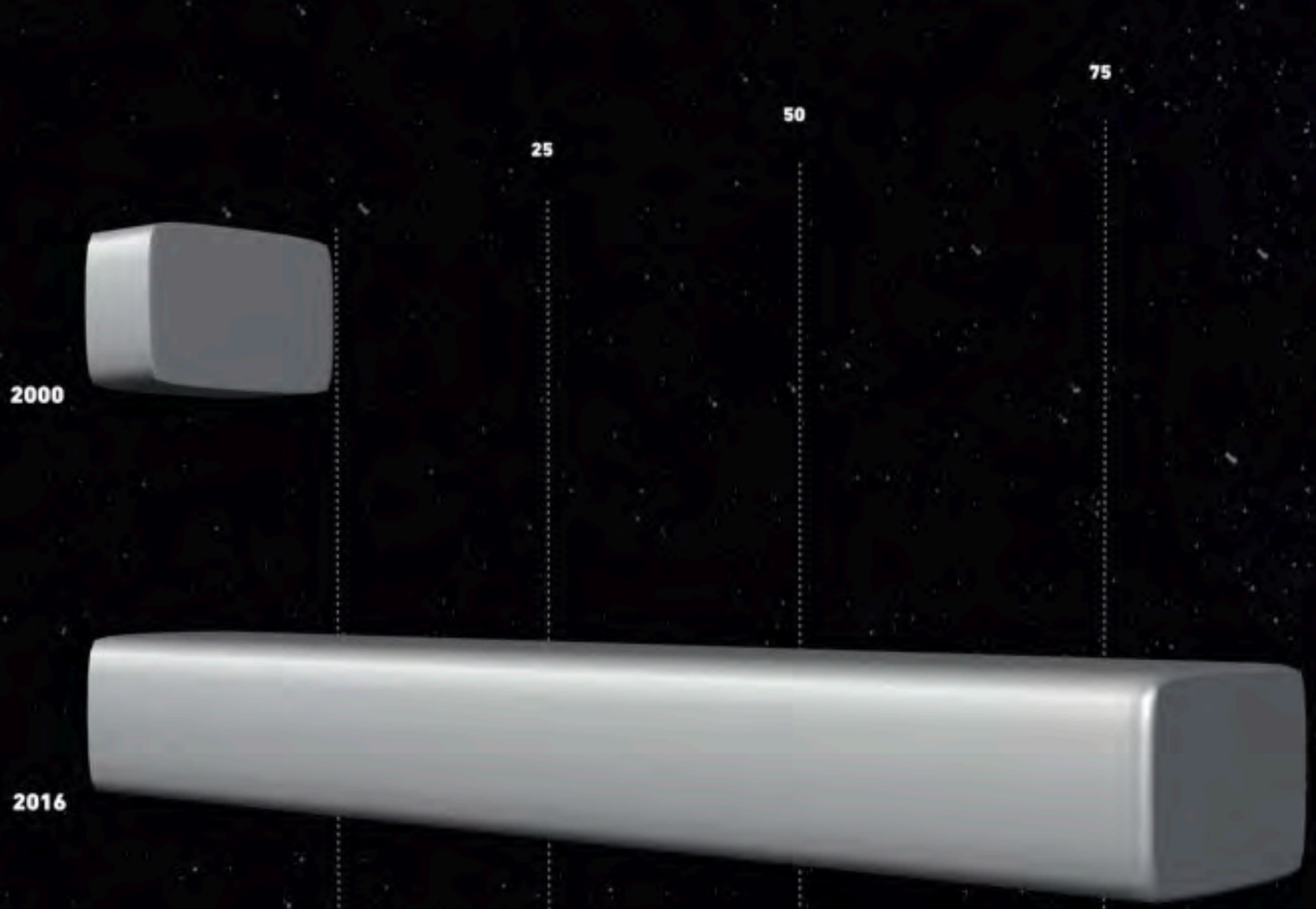
THE BILLIONAIRE EFFECT

Billionaires. You've heard the names: Elon Musk, Jeff Bezos and Richard Branson. They're leading the way in private space investments, and with them, drawing increased media eyes and public fascination with space.

The money has been pouring in for access and travel to space, but we're only on the cusp of seeing products and industries develop.

THE AVERAGE NUMBER OF SPACE INVESTORS HAS GROWN



They're not just out-there numbers.

Source: Bryce Space and Technology

“Some people have made money in smallsats through high valuations, but no one has made real money yet by selling product. That’s why it’s a really exciting time to see how these companies perform.”

- Carissa Christensen, Founder and CEO, Bryce Space and Technology

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Source: Carissa Christensen

DOWN TO EARTH:

SPACE DESIGN

Finding space in visual aspiration

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Sci-fi silver pantsuits, beauty products touched by moonlight, and movies and music that captivate the imagination — it's the aesthetics of space that are permeating culture, from fashion and entertainment to advertising and design.

Space isn't just a new frontier, but an opportunity for brands to look up to the sky for storytelling inspiration.

Space design and inspiration take our minds to a place where we inspire creativity and think differently about ourselves — and our future.

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READ MORE SCI-FI

Fantasy fuels business. Leaders should read more science fiction. Far-out concepts are attached to dollar signs, and a new vision of near-term opportunities.

100+

# of published sci-fi writers at SciFutures, which helps brands create the future

Source: Harvard Business Review, SciFutures

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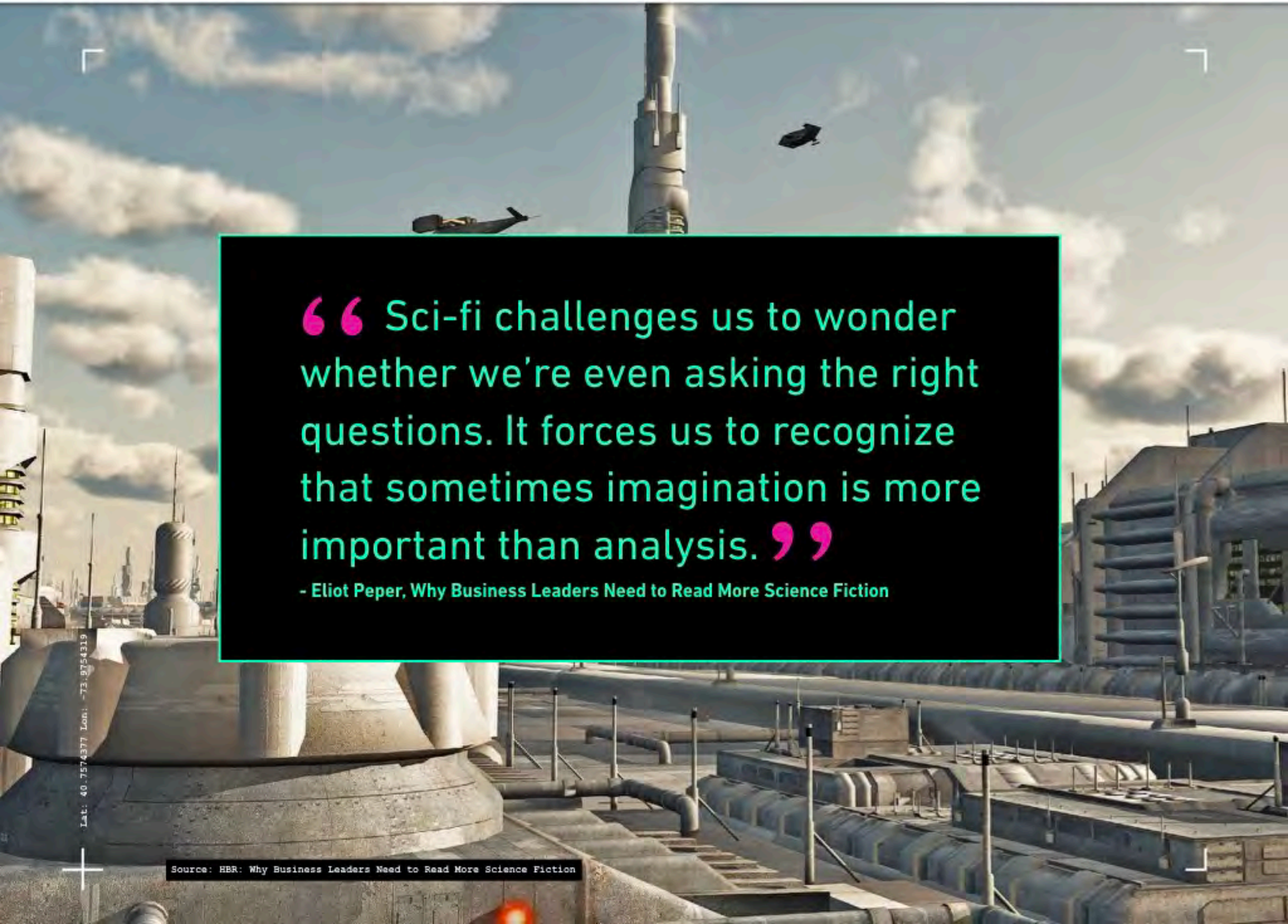

> “Sci-fi challenges us to wonder whether we’re even asking the right questions. It forces us to recognize that sometimes imagination is more important than analysis.”
>
> **- Eliot Peper, Why Business Leaders Need to Read More Science Fiction**

Source: HBR: Why Business Leaders Need to Read More Science Fiction

Imagination = human progress

> “The work I am doing as an artist is about opening up a new frontier in space — it's just as vital and just as symbolic as other activities that are occurring in exploration and discovery disciplines.”
>
> **- Dr. Sarah Jane Pell, Space Artist, Researcher and Occupational Diver**

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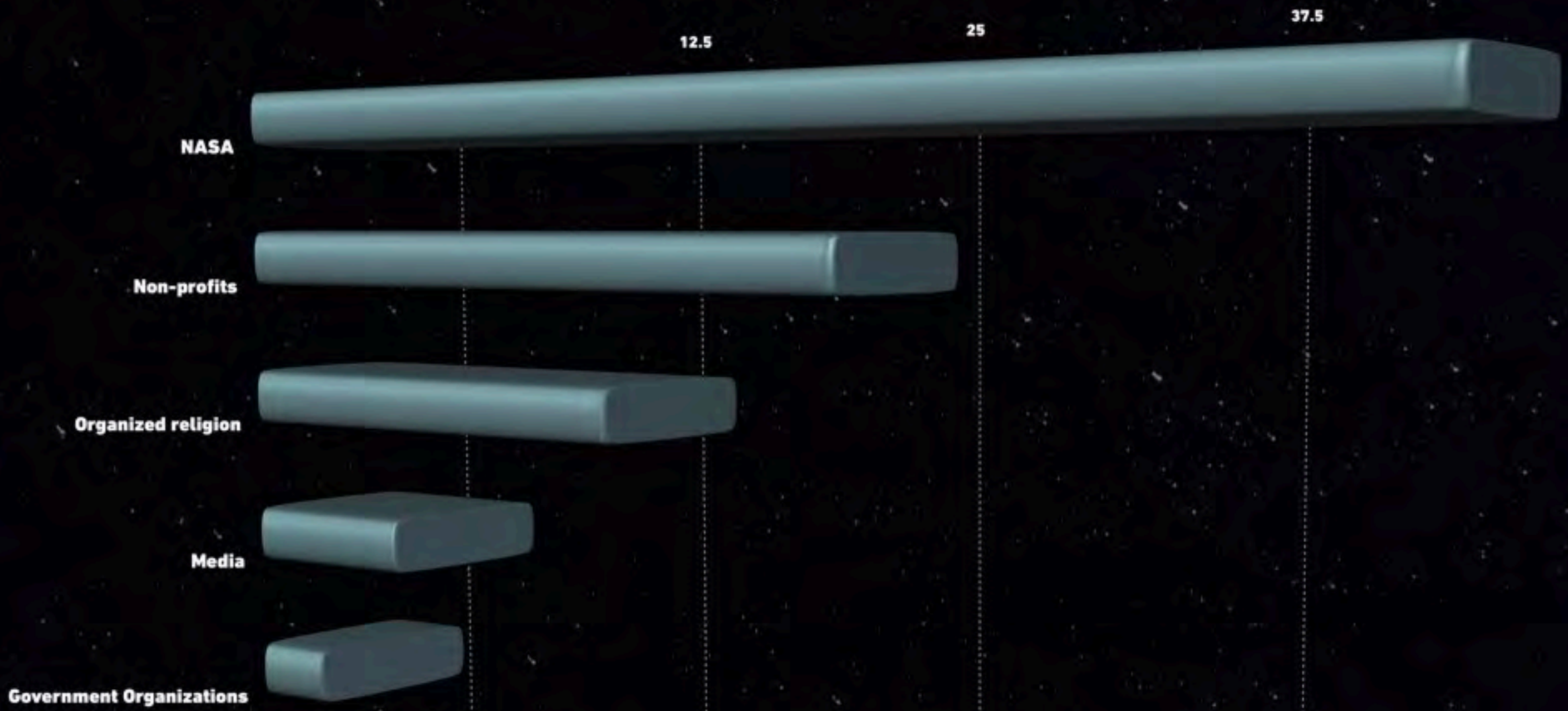
Source: Sarah Jane Pell, Image Source: Slooh

IN NASA WE TRUST



47% of Americans ranked NASA as the most trusted institution.

Source: sparks & honey

WANTED: NASA LOGO

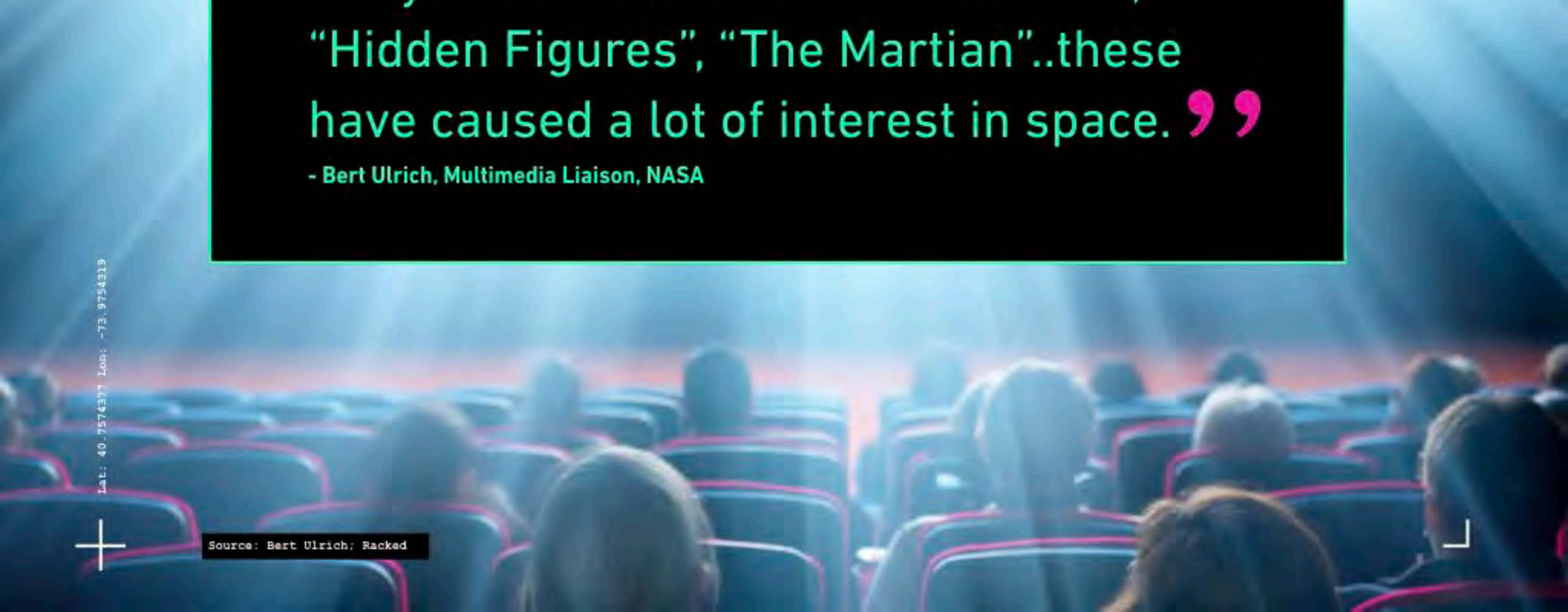
If we can't be in space, we want to look like we are. From Coach's space collection to menswear moon shoes in 2018, space is a coveted look. NASA has a full-time job just fielding requests for their logo.

SPIKE IN NASA LOGO REQUESTS

Source: Bert Ulrich, NASA; Racked

“ Social media has propelled us forward in a way I’ve never seen before. Hollywood movies like “Interstellar”, “Hidden Figures”, “The Martian”..these have caused a lot of interest in space. ”

- Bert Ulrich, Multimedia Liaison, NASA



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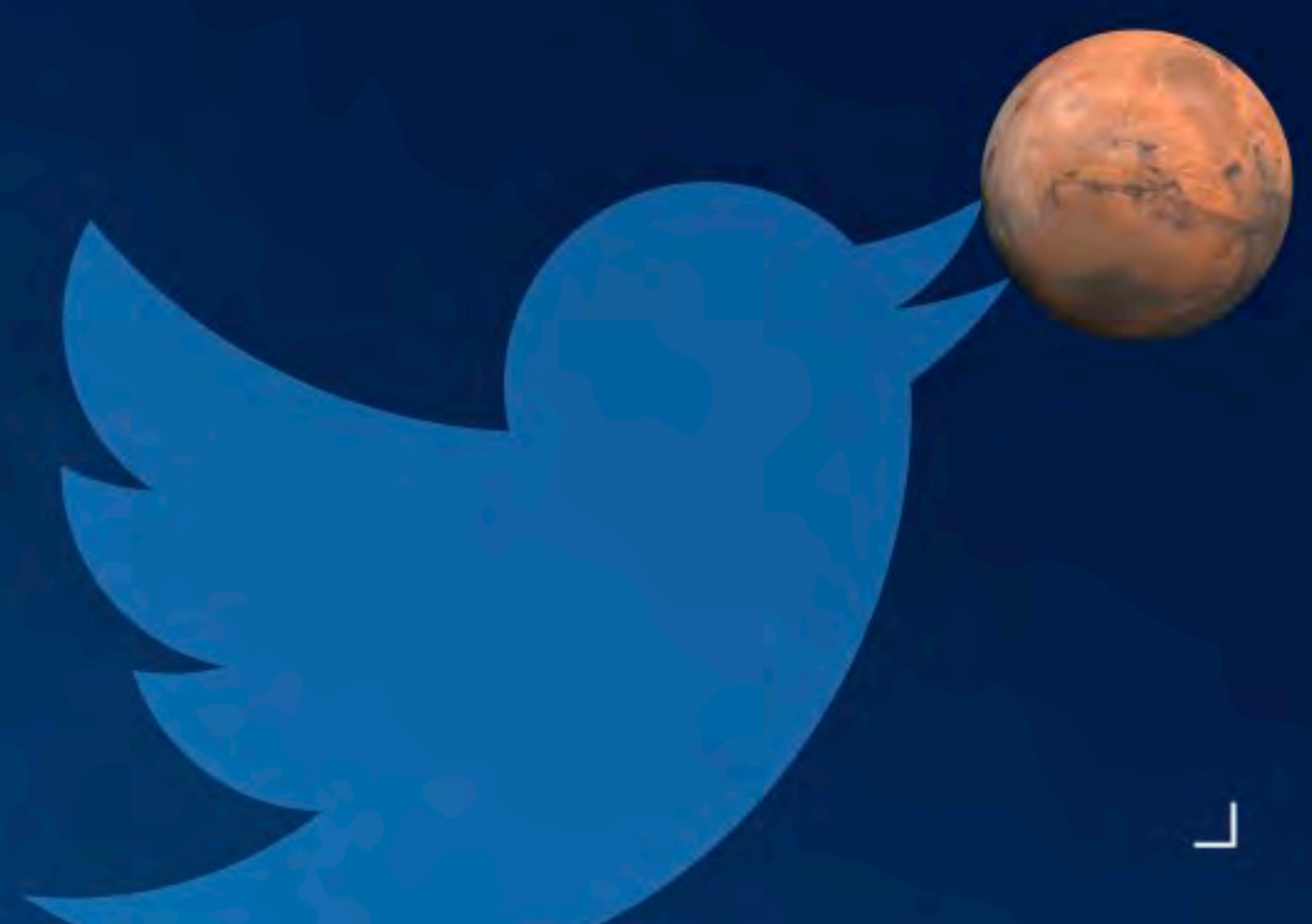
Source: Bert Ulrich; Racked

54th

@NASA is the 54th top Twitter account

26.3

million followers



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Source: twittercounter.com; 9.20.17

> “The Martian” suddenly made going to Mars real and accessible.
>
> - Dr. Cady Coleman, Astronaut

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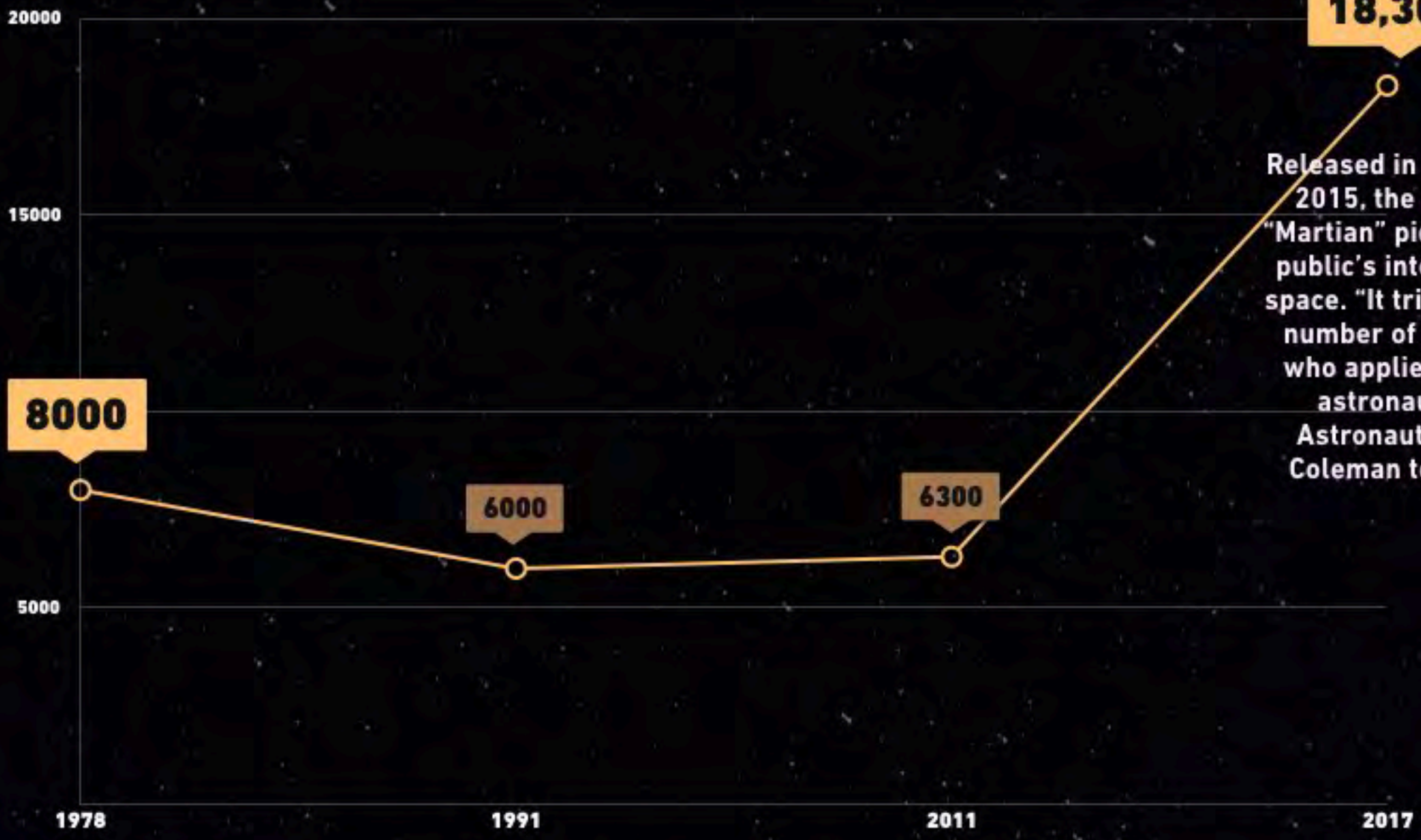
Source: Dr. Cady Coleman

MOVIES TEASE OUR COLLECTIVE FASCINATION WITH SPACE



Released in October 2015, the movie "Martian" piqued the public's interest in space. "It tripled the number of people who applied to be astronauts," Astronaut Cady Coleman told us.

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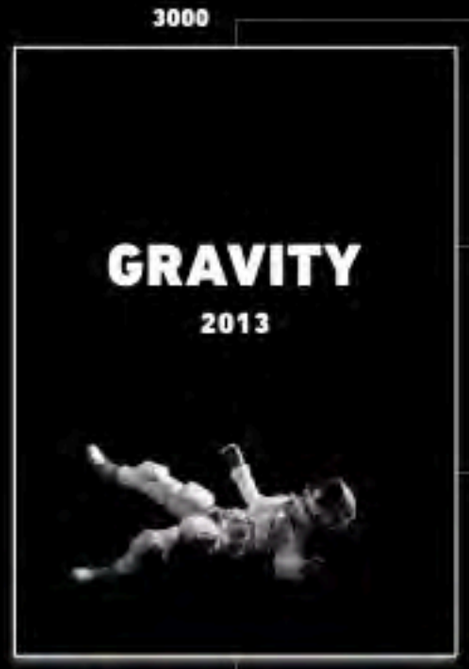
Source: NASA; Popular Science; sparks & honey

SPACE MOVIES = SPACE INVESTMENT

From "Interstellar" to "The Martian", movies that imagine and design new worlds actually encourage real life progress here on Earth.



2013 2014 2015

Source: CB Insights

CRAVING SPACE

> “When people talk about the 60s, they talk about three things: the civil rights movement, the Vietnam War and space. It made me wonder if there is a linkage: do we get more excited about space when things are really hard on the ground?”
>
> **- Astronaut Pam Melroy**

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Source: Astronaut Pam Melroy

SPACE DESIGN ATTRACTS

36%

Of Americans would be more likely to buy a product if it was inspired or created by technology developed for outer space exploration.

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Source: sparks & honey

Access to space isn't just for the rich, but is now within reach from the ground up.

> “Every man can look into space and dream about what’s out there. That’s what we have done with our platform Slooh — anyone can control a telescope and see something amazing.”
>
> **- Michael Paolucci, CEO and Founder, Slooh “the interface to outer space”**

Lat: 40.7574377 Lon: -73.9754319

Source: Michael Paolucci

Entertainment and fashion have brought space themes to the forefront, and now rockstars are becoming space cadets — and astronauts are becoming celebrities.

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SCIENCE CELEBS

Astronaut Buzz Aldrin, who first walked on the moon, took another walk in 2017 — as the first astronaut on the NYFW runway at designer Nick Graham's futuristic Life on Mars: Fall/Winter 2017 collection — with scientist Bill Nye.

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Source:Space.com

1st

Astronaut to walk a runway at NYFW

Source: Fortune, Virgin Galactic is almost ready to launch

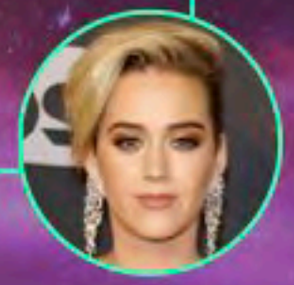
$250k

Cost of Virgin Galactic suborbital flight on yet-to-be launched SpaceShipTwo

Singer Katy Perry is reported to be one of 700 ticket holders for Virgin Galactic's first flight into space. The singer announced that her 2017 Video Music Awards appearance would be space-themed.

“I’ve been training with @MTV in zero gravity, eating astronaut ice cream, and I’m on a group text with Buzz Aldrin and Neil deGrasse Tyson.”

- Katy Perry



Lat: 40.7574377 Lon: -73.9754319

Source: Katy Perry Twitter

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SPACE CONCEPTS FOR REAL-WORLD RESULTS

Space sparks awe and fuels desire.

As an ingredient in entertainment, space concepts translate into real results.

The flavor of space added to entertainment and music transforms an intangible, far-out world into a desired experience on Earth.

SONIC SEASONING FROM THE STARS

Songwriter Meklit Hadero's song, "Supernova," uses sonifications of data collected from the Kepler telescope, with the help of the NASA. Ames Research Center. An eclipsing binary called KIC 12268220 was music to Meklit's ears.

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Source: Gizmodo, This song uses star sounds to blow your mind

TUNES FROM NASA ARCHIVED SOUND RECORDINGS

Wilco keyboardist Mikael Jorgensen and art historian James Merle Thomas teamed to form the group Quindar. Their album “Hip Mobility” infuses sounds recorded from the Apollo and Skylab eras.

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Source: NPR, One giant leap for music

DANCING WITH THE STARS

The Washington Ballet was inspired by spending time with female NASA astronauts and observing their process of dressing for space travel. Referred to as “donning” and “doffing,” this ritual was integrated into the ballet, “Frontier.”

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Source: New York Times, Taking flight with Julie Kent

OUT-OF-THIS-WORLD BEAUTY

Space themes are the look-du-jour for beauty brands, with the addition of galactic glimmers and glows to make your face #outofthisworld.

BEAUTY PROVENANCE

The growing obsession with the provenance of everything we consume, eat or adorn on our bodies renders space as the next coveted ingredient.

IMPROVE YOUR EARTHLY SKIN WITH METEORITE POWDERS

Brands like GlamGlow and Milk Makeup use actual meteorite powder, said to be rich in minerals.

Milk Makeup's Supernova and Mars highlighters are "made with real meteorite power and twilight pearls for mesmerizing iridescence on eyes, lips and cheeks. In other words: that sh*t's from space, man." - Milk Makeup

Premium Space Price

$36

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Source: Milk Makeup; Refinery29

SPACE FOOD

What we eat is taking us to space. Food brands are adding outer-worldly taste and aesthetics to our grub, whether it's hypnotizing galaxy cakes or vegetables associated with space.

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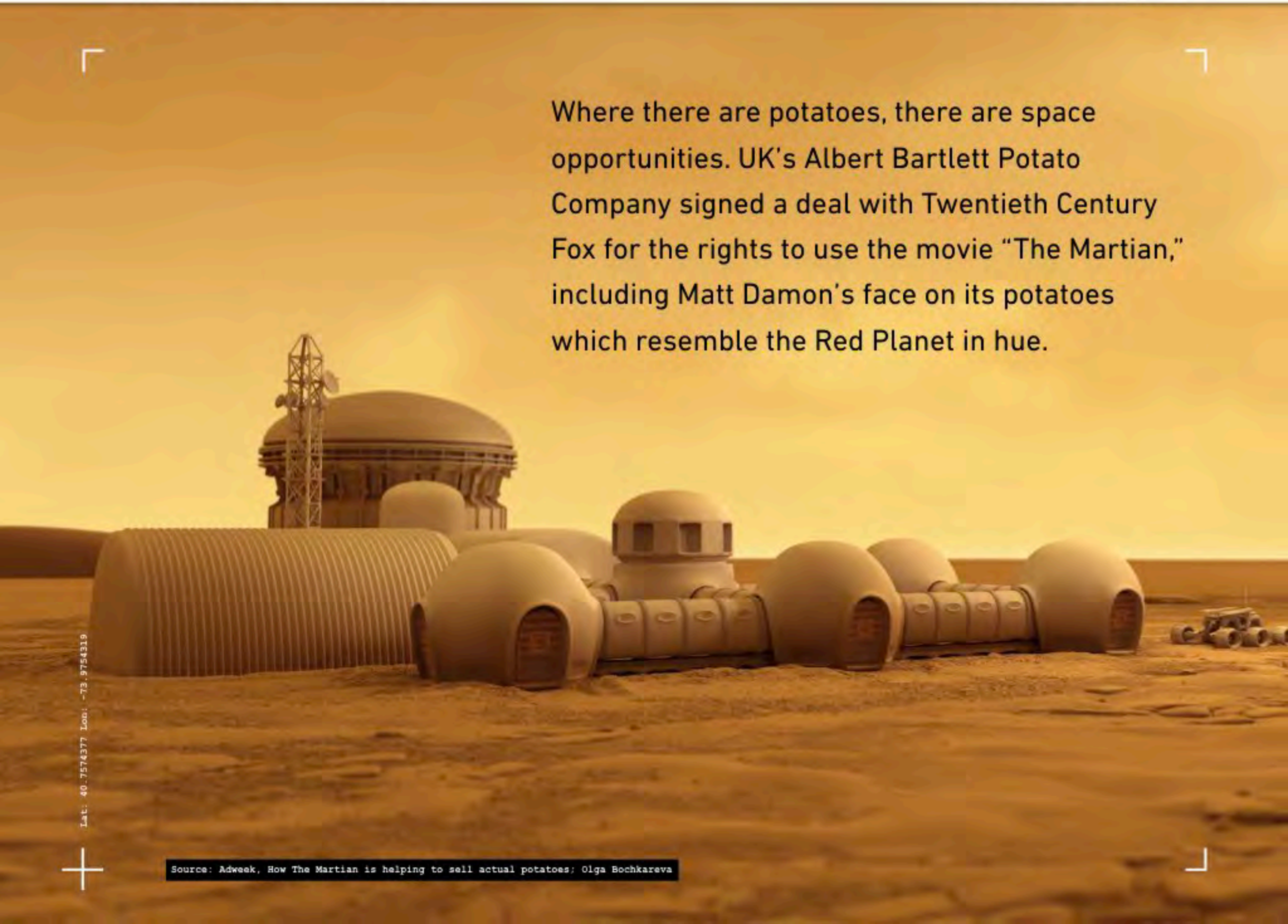
Where there are potatoes, there are space opportunities. UK's Albert Bartlett Potato Company signed a deal with Twentieth Century Fox for the rights to use the movie "The Martian," including Matt Damon's face on its potatoes which resemble the Red Planet in hue.



Source: Adweek, How The Martian is helping to sell actual potatoes; Olga Bochkareva

EAT LIKE AN ASTRONAUT

If we can't go to space, we may want to eat like astronauts. We're turning to minimalist eating as an aspirational meal in our time-starved lives. Space-style food, dehydrated and vacuum-packed, is now available in some vending machines, too.

7-11

Soylent now available!

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Source: Quartz, 7-Eleven will sell Soylent

Or you may want to go without, because that's what real astronauts do.

> “For a couple of months we had no snacks at all because the supply ships were late. We ate the bad chocolate, too.”
>
> **- Dr. Cady Coleman, Astronaut**

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Cady Coleman

EAT, AND REPEAT

9days

Length of the menu cycle for astronauts in space.

Space food is available on the ground, too. Vending machines in Moscow International Airport and in leisure parks around the Russian capital are dispensing select items from astronauts' menus, for an average price of $5 for a main course or dessert.

Source: NASA; Olga Bochkarevka

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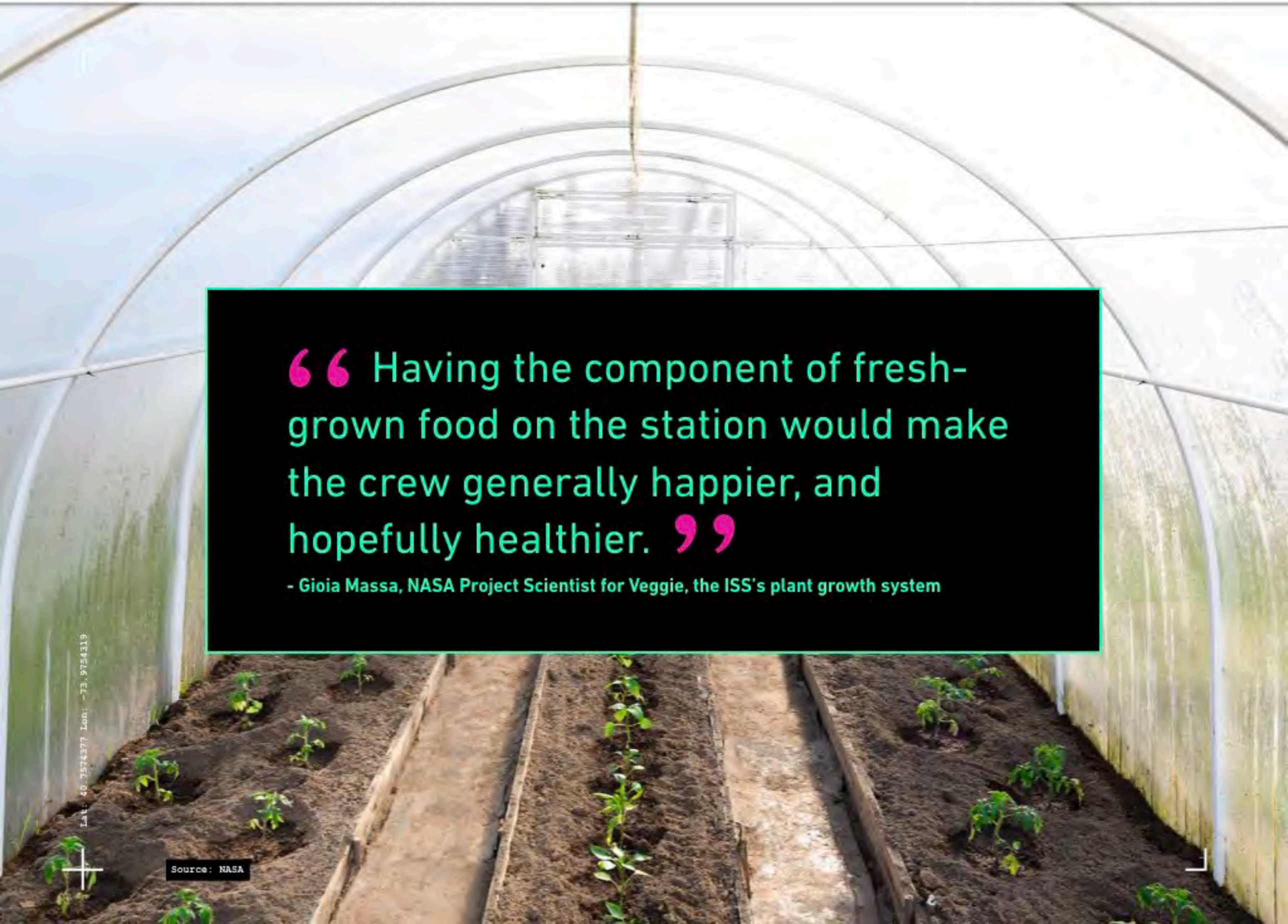
RED ROMAINE LETTUCE

Was the first freshly harvested space-grown vegetable in 2015, which marked a massive growth in vertical farming innovation.

350x

More greens grown by vertical farming than conventional farming, according to Plenty, a vertical farming startup which has attracted more than $200 million in investments.

Source: NASA; Business Insider



> “Having the component of fresh-grown food on the station would make the crew generally happier, and hopefully healthier.”
>
> **- Gioia Massa, NASA Project Scientist for Veggie, the ISS's plant growth system**

SATELLITE DATA AS A NATURAL RESOURCE

Data divinity from space fuels life on Earth

Lat: 40.7574377 Lon: -73.9754319

7:05

Wake up alarm

7:15

Check the weather

8:00

Sip cup of coffee

8:15

Check train timetables

9:30

Dial into a conference call

17:15

Track your yoga, running, boxing class

20:00

Watch that TV show

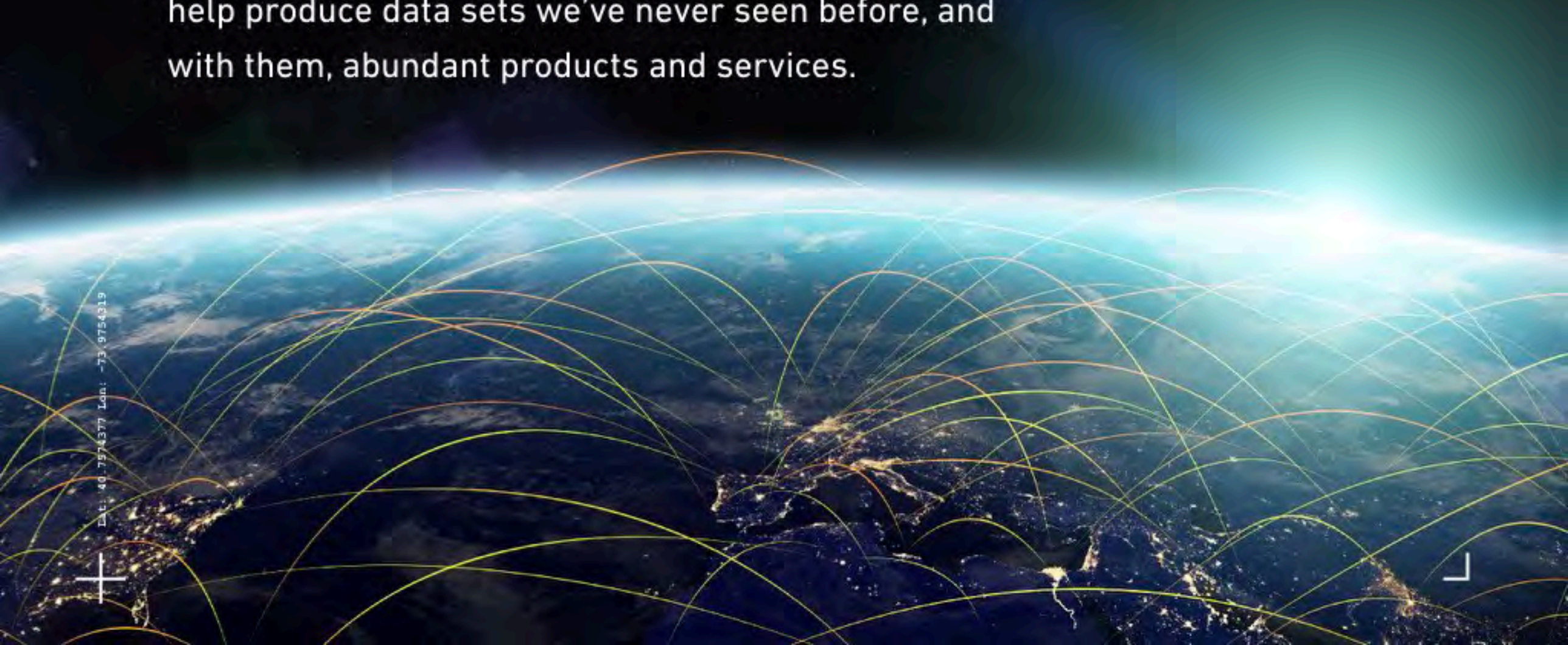
Satellites roam our orbit, far beyond where our minds can imagine. Day to day, we're connected to satellites, whether we know it or not.

Source: sparks & honey

CHEAPER SATS, MORE VANTAGE POINTS

The sats in orbit aren't just connected to you, but to new business opportunities.

The promise of new, cheap and small satellites can help produce data sets we've never seen before, and with them, abundant products and services.



APP OR SAT?

> “It costs about as much to launch an app as it does to make and launch a satellite.”
>
> - Sunil Nagaraj, Vice President, Bessemer Venture Partners

Source: LA Times, Trips to Mars won't make quick money

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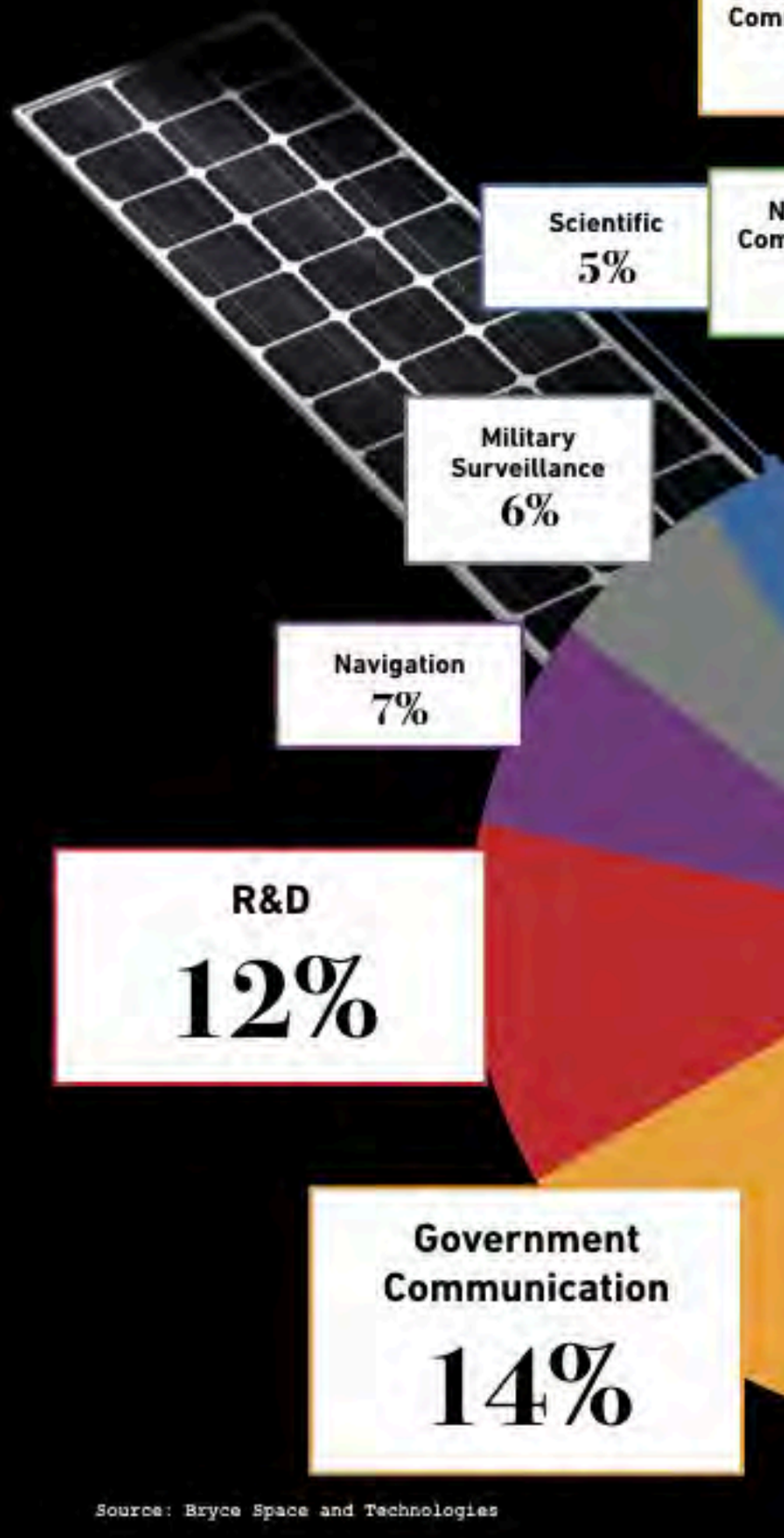
Commercial satellites are going to skyrocket even more than before.

1,459

Number of current satellites in orbit (December 31, 2016)



Source: Bryce Space and Technologies

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> “The space surveillance network is a collection of sensors that maintains the catalogue of known objects in space — it’s important for safety.”
>
> **- Bill Welser, Director of Engineering and Applied Sciences Department, RAND Corporation**

Source: Bill Welser

53%

Between 2012 to 2016, the number of satellites launched increased by 53% — and they're also staying in space longer.

The growing footprint of small satellites and cheaper satellite costs are opening up a vast world of data and vantage points that have the potential to change industries and the way we live.

6200

Number of small sats expected to be launched over the next 10 years.

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Source: Bryce Space and Technology; Euroconsult

With so many sats, who's keeping track of them?

A NEW VIEW ON DATA AND LIFE

They may be too far out for the eye to see, but satellites are unveiling shifts in human behavior that help us build more efficient infrastructure, predict disasters and stock prices and simply grow coffee beans.

From space, satellite data bends time, and transforms our understanding of the world, reflecting the trend of Perceptual Diversity.

WE LOVE THE VIEW

24%

Of Americans ranked "seeing the Earth from a new perspective" as the most exciting thing about outer space.

Source: sparks & honey

> “If you think of the first time you were on an airplane, that view, versus the view of driving — you see things so differently.”
>
> – Carissa Christensen, Founder and CEO, Bryce Space and Technology

Source: Carissa Christensen

SAT STAKES FOR BRANDS

CPG and retail companies are gaining unique data sets from satellites — and companies are starting to recognize that it's in their own interest to look above to meet consumer demand below.

> “A company could put 80 or 100 small satellites up to take pictures of the Earth, yielding a totally unique data set.”
>
> **- Carissa Christensen, Founder and CEO, Bryce Space and Technology**

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Source: Carissa Christensen

SODA SPACE

Coca Cola is using OneWeb to expand its global footprint and manage its remote locations with internet access and supply chain management.

1.2b

Satellite data company OneWeb has drawn $1.2 billion in investments from seven brands, including Coca Cola, showing the growing footprint of brands entering the space race.

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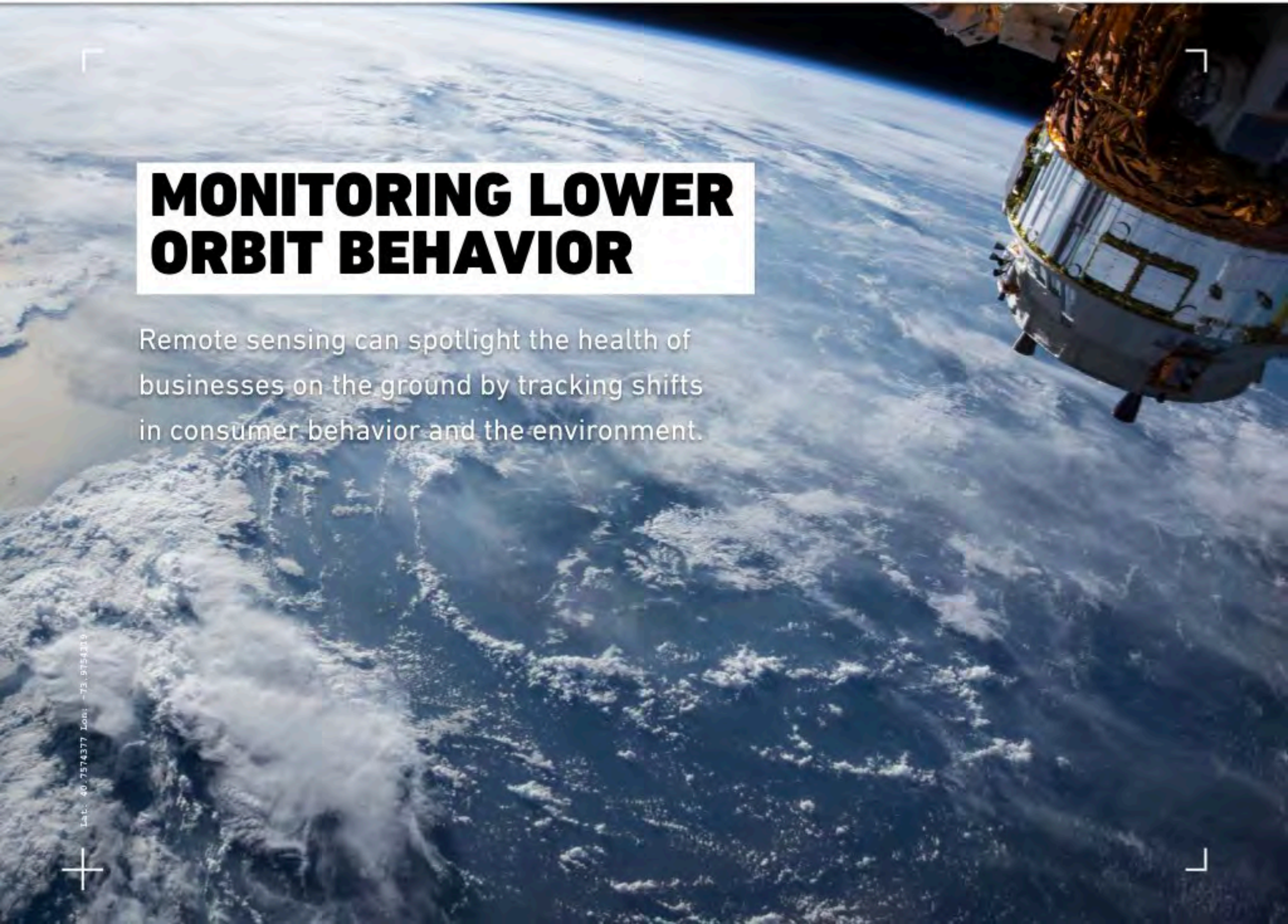
Source: Satellite Today

> “We operate in 207 countries...A lot of those countries are beyond what most people would consider a point of access. We go beyond that last mile.”
>
> - Bea Perez, Chief Sustainability Officer at Coca-Cola in *Satellite Today*

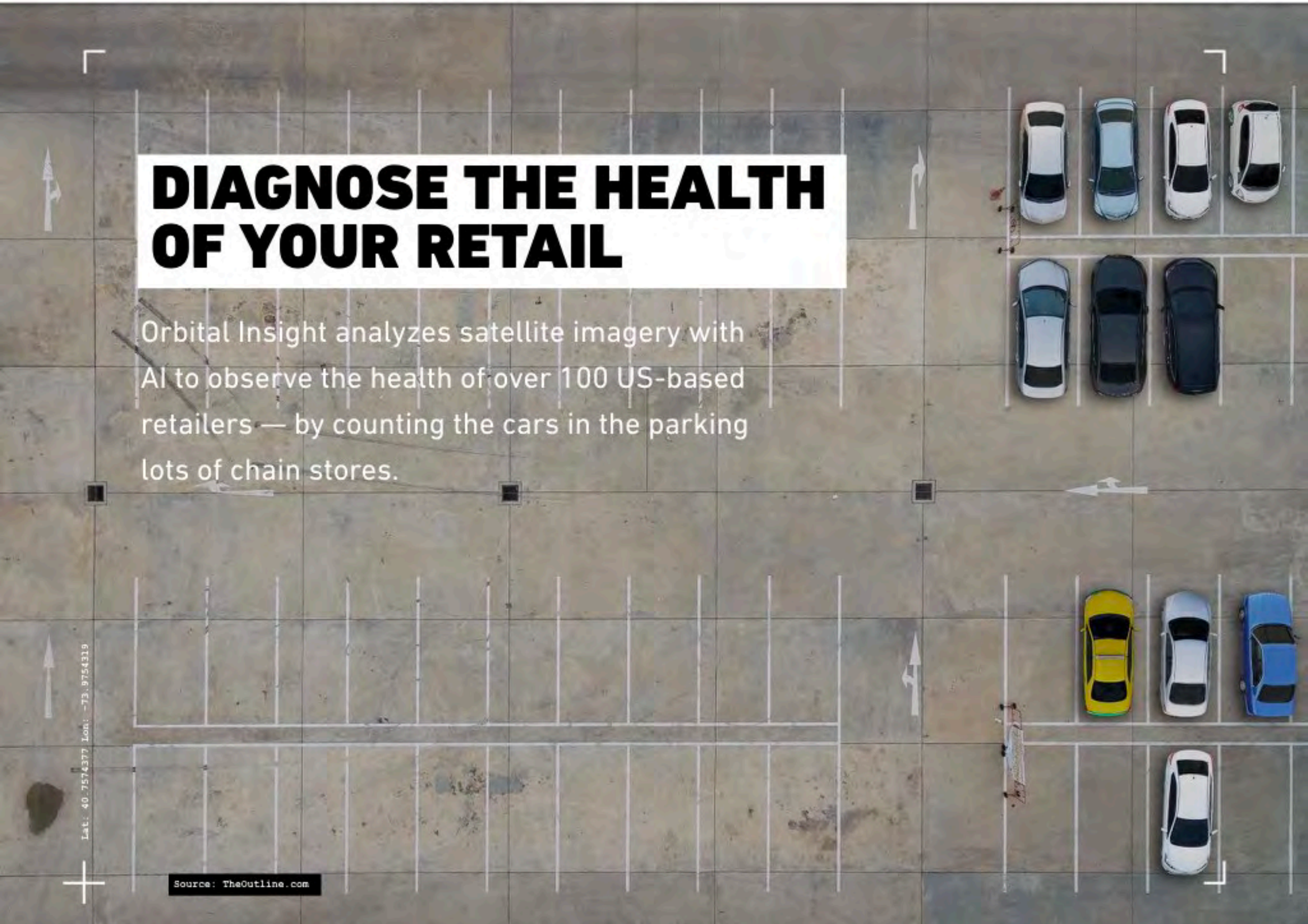
MONITORING LOWER ORBIT BEHAVIOR

Remote sensing can spotlight the health of businesses on the ground by tracking shifts in consumer behavior and the environment.



DIAGNOSE THE HEALTH OF YOUR RETAIL

Orbital Insight analyzes satellite imagery with AI to observe the health of over 100 US-based retailers — by counting the cars in the parking lots of chain stores.



PREDICT STOCK PRICES

Satellite-sourced insights can predict stock prices.

Companies like Remote Sensing Metrics and Orbital Insight can estimate a retailer's sales numbers before official statistics are released. Remote Sensing Metric's key clients are hedge funds which use the satellite data to forecast publicly traded companies' stock prices.

-5%

Orbital Insight found that J.C. Penney parking lot car counts were down 5 percent year-over-year in the last quarter of 2016 — a mirror to in-store sales during the same time, which decreased 0.7 percent.

Source: Bloomberg; TheOutline

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MEASURE SHADOWS, DETECT OIL AND ENERGY RESERVES

A shadow can tell a detective story, where oil tankers are concerned. By observing the shadows cast by floating lids of giant oil tanks in China in 2016, Orbital Insight calculated that the country had stored more crude oil than official government estimates.

Using similar techniques, Orbital Insight has teamed up with the World Bank to help identify global areas of extreme poverty.

Lat: 40.7574377 Lon: -73.9754319

Source: Bloomberg

“Satellites can provide practical insights for daily life — from improving crop yields to predicting weather patterns, and better understanding our changing climate. The unique vantage point of space is essential to understanding our Earth.”

- Chris Blackerby, COO, Astroscale and Former NASA Attache at U.S. Embassy Tokyo

Source: Chris Blackerby

DETECTING GROUNDWATER

The global economy is rooted in the internationally traded crops of wheat, rice, sugar, cotton and maize — all of which depend on irrigated agriculture, and make up some 70 percent of global freshwater withdrawals. NASA satellites have an eye on our groundwater supplies, enabling detection and improvements for agriculture.

11%

of disappearing groundwater in the US was used to grow internationally traded crops in the global economy -NASA's Goddard Institute of Space, University College London study

Lat: 40.7574377 Long: -73.9754319

Source: NASA

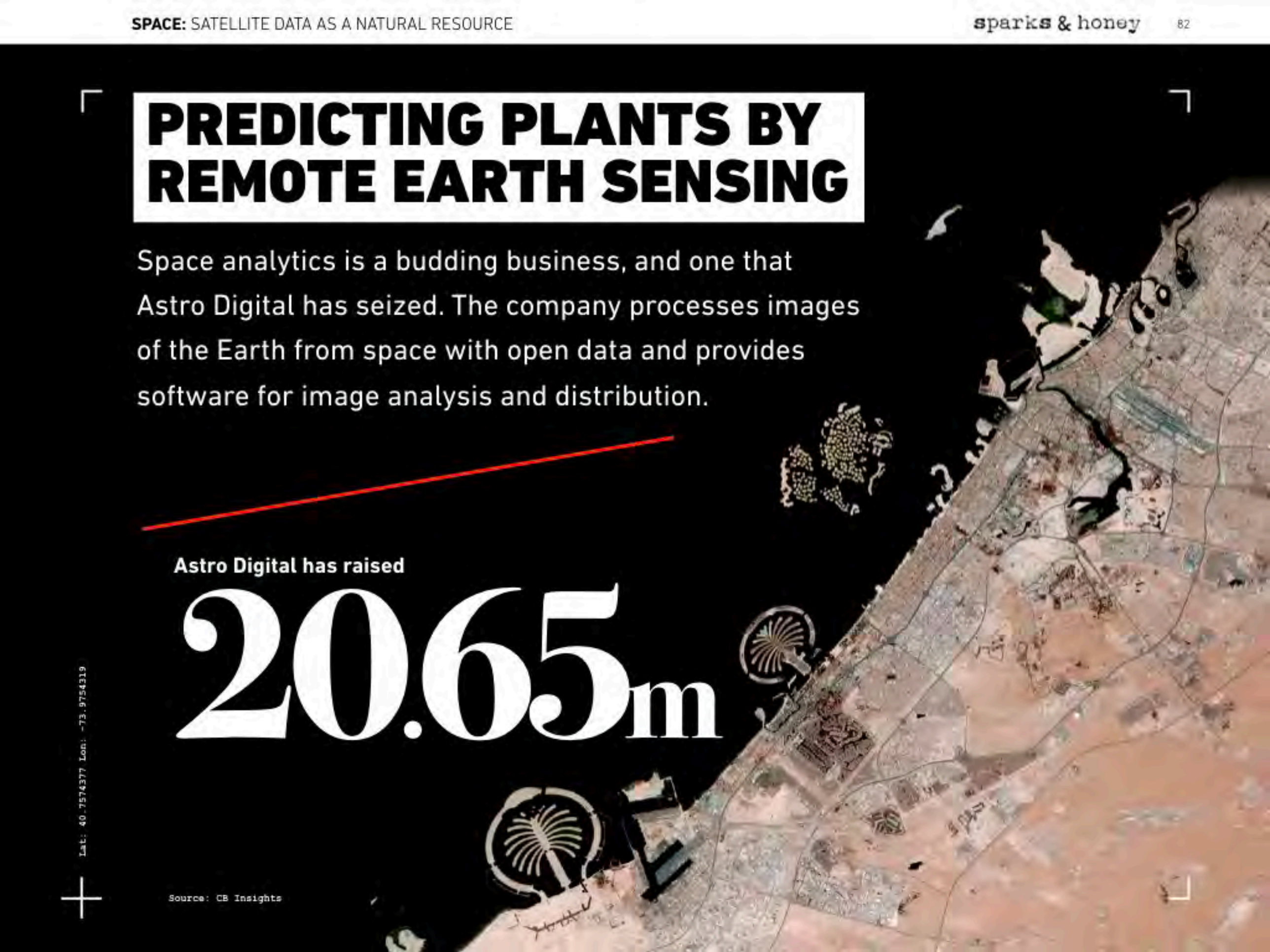
PREDICTING PLANTS BY REMOTE EARTH SENSING

Space analytics is a budding business, and one that Astro Digital has seized. The company processes images of the Earth from space with open data and provides software for image analysis and distribution.

Astro Digital has raised

20.65m

Source: CB Insights



FARMING OF THE FUTURE

The vegetation maps created by Astro Digital use the Normalized Difference Vegetation Index to help farmers and other stakeholders understand the stages of crop growth and predict its growth rate in the future.

What grows from Earth and is immortalized in space tells stories of real-time changes in vegetation.

MAPPING PEAK FLAVOR

By examining images of plants, Astro Digital can measure the level of chlorophyll in the leaves, based on how much light is reflected off of them. Such plant data is an indicator of how well the vegetation is doing, or not, as the case may be.

Monitoring plant health could be a means to preserve the "peak flavor" cycle of plants, when crops can be picked at the most opportune times.

Source: CB Insights

When an entire business is based on the health of a plant, space analytics can provide valuable health predictors of your investment. So, whether you own an avocado bar or farm avocados, satellite images can warn of a disease or a drought coming — and you can pivot.

SATS AS REAL ESTATE PREDICTORS

“These data sets can have an impact on housing prices. If you find that your neighborhood is prone to sinkholes and your street is going to be under water in 20 years — it has a direct impact.”

- Mike Nelson, Science Advisor, Office of Science and Technology Policy

Source: Mike Nelson

MAPPING NEW CITIES

Data from the ground — such as from smartphones or social media — combined with satellite data can be used to understand communities on the ground, and those that are just emerging.

Starlab, a company that's using satellite data with sensor data and other open information, is looking at the potential of mapping new nomadic societies by observing Earth from above.

Lat: 40.7574377 Lon: -73.9754319

> “This is something that will be big in the future — when there is no infrastructure, satellite data is your only option. Basically, this can help provide infrastructures to communities like refugee camps that become permanent.”
>
> **- Stephen Dunne, Managing Director, Starlab & Neuroelectrics**

Lat: 40.7574377 Lon: -73.9754319

Source: Stephen Dunne

SATELLITE CAMERA CULTURE

Satellites also act as projections of our fascination with space. Occasions on Earth, from funerals to special events, can be enhanced with satellite tech.

DEAD SPACE

We may even see ourselves in upper orbit in the afterlife. With satellite technology, the future of funerals is no longer ashes to ashes, but ashes to space dust.

$2490

Cost of sending a loved one's ashes to space

Lat: 40.7574377 Lon: -73.9754319

Source: WIRED UK, You can now send your loved one's ashes into orbit

San Francisco startup Elysium Space has made the unexpected mashup of space with the funeral industry into a business. It hopes to work with SpaceX to send human ashes into orbit on a "memorial mission" on a SpaceX Falcon 9 rocket. Before burning up in the Earth's atmosphere on reentry, your ashes will orbit around the Earth for two years. And your loved ones can follow your posthumous orbit on an app.

Source: WIRED UK; Elysium Space

100

People have signed up to send their ashes to space on the Elysium Star 11 mission

Lat: 40.7574377 Lon: -73.9754319

SPACE AS A CANVAS

Space is fueling awe by becoming a canvas for special events. With the rise of satellite art and space-themed events, looking to the sky is our next entertainment.

For the Tokyo 2020 Olympic Games, Japanese company ALE is bidding to launch an artificial meteor shower, SkyCanvas, as a spectacle for the games. This 'fake space' project involves launching a satellite into space, which is loaded with 500 to 1,000 source particles that transform into ingredients for shooting stars.

SkyCanvas has legs beyond igniting awe from the audience. The manufactured meteorites burn in the atmosphere and their particles will be studied for science.

Lat: 40.7574377 Lon: -73.9754319

Source: Science Alert; Designboom

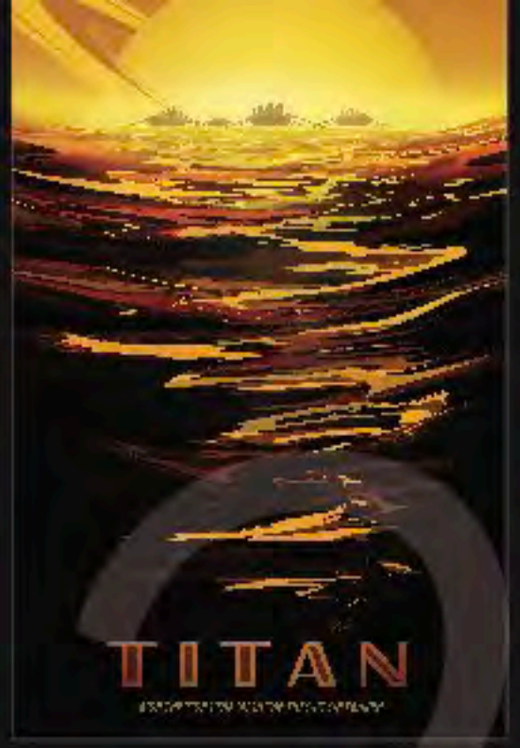
On Broadway, meteor-themed shows are opening for the holiday season. Set to debut in November 2017, Steve Martin's Broadway production "Meteor Shower" stars Amy Schumer and features a sun lounger smoking from the remains of a collision with a meteor.

100km

Visibility of ALE's SkyCanvas man-made meteor shower

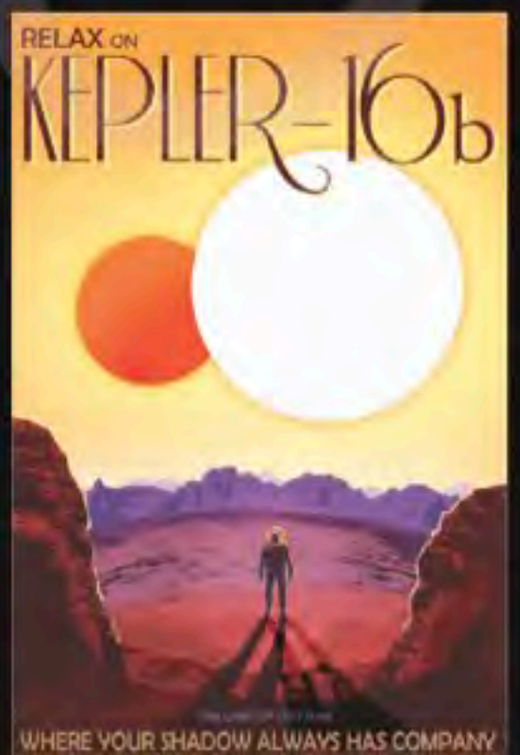
Lat: 40.7574377 Lon: -73.9754319

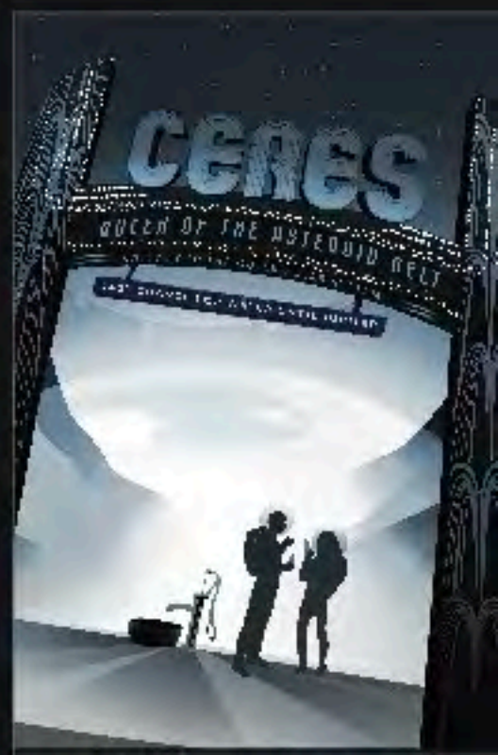
Source: Science Alert; Instagram



ASTRO TOURISM

New horizons of exploration





Space may be the new Harvard. Everyone wants to go, but very few will get in — at least in a rocket.

The new luxury is exploring the unexplored. Space is the next aspirational experience, both on the ground and for those who will travel to outer orbits.

Exploring outer worlds taps into a human longing to be part of something bigger than we are.

> “Any frontier is about looking for something better. Humans look up at the night sky just like humans looked up at birds — who doesn't like the idea of flying? The idea of flight is a fundamental human longing, and space is the same.”
>
> **- Carissa Christensen, Founder and CEO, Bryce Space and Technology**

Lat: 40.7574377 Lon: -73.9754319

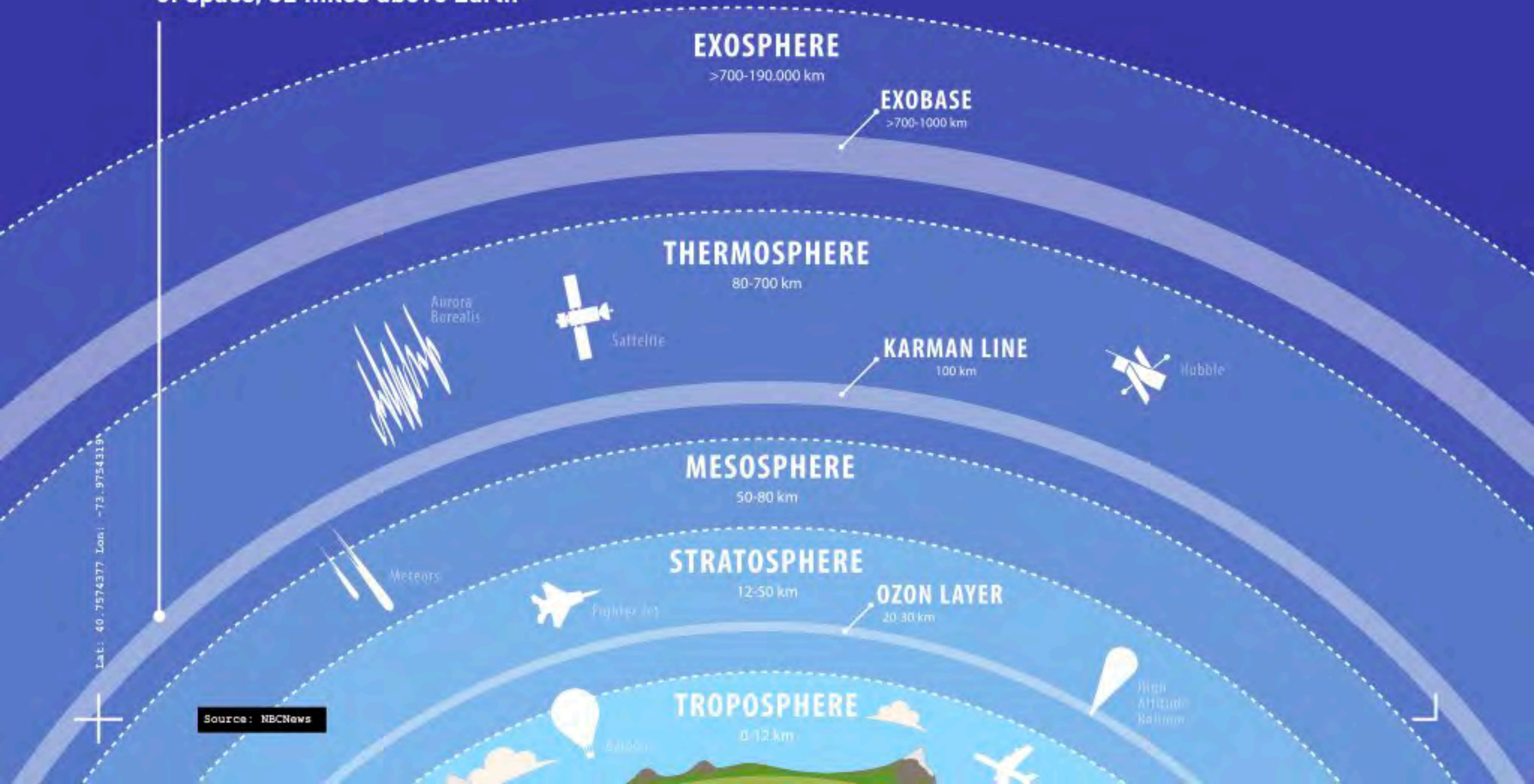
Source: Carissa Christensen

You won't have to launch into orbit when space is expanding on Earth with new leisure concepts, consumer space flights and space destinations, such as spaceports. Just as Elon Musk's Hyperloop changes the way we think about traffic, the technologies developed for space travel are shifting our perceptions of tourism, on Earth and beyond.


Welcome to the era
of Astro Tourism
Lat: 40.7574377 Long: -73.9754319

600

Number of people who have gone above the Kármán line — the point that marks the beginning of space, 62 miles above Earth



SPACE FOR THE WEALTHY

There's a suborbital race for space tourism among SpaceX, Virgin Galactic and Blue Origin. For a select few (and wealthy) ticket holders, suborbital spaceplanes will be the luxury travel of the future. On June 1, 2017, Virgin Galactic successfully tested SpaceShipTwo Unity's nine-minute flight above Earth. CEO Richard Branson has said he hopes to see space tourists in flight by the end of 2018, although others say this is an optimistic timeline.

$34b

Estimate of global space tourism market by 2021

Source: NBCNews

Lat: 40.7574377 Lon: -73.9754319

AMERICA FIRST

20%

Of Americans ranked "being the first to discover or see something" as the most exciting thing about outer space.

Source: sparks & honey

$250k

Cost of Virgin Galactic suborbital flight on yet-to-be launched SpaceShipTwo

The cache of possessing a ticket to space extends beyond the flight. Entrepreneur Solomon Mordechai, who has purchased a ticket to space, called out the unexpected community around the adventure as the most life-changing, even though it will be years before the spaceplane launches.

Source: NBCNews

Lat: 40.7574377 Lon: -73.9754319

“Signing up with Virgin Galactic has transformed my life in so many ways. I've met so many people who have made me rethink my life, where I am, and where I should be — the impact this ticket has had on my life is beyond going to space.”

- Solomon Mordechai, Virgin Galactic ticket holder

Lat: 40.7574377 Lon: -73.9758319

Source: Solomon Mordechai

SOME OF US REALLY WANT TO TRAVEL TO SPACE

40%

Would give up coffee for a month to go to space

18%

Would give up sex for a month to go to space

10%

Would give up internet access to go to space

Lat: 40.7574377 Lon: -73.9754319

Source: sparks & honey

AND OTHERS WOULD RATHER HOLD ON TO THEIR EARTHLY COMFORTS

32%

Don't want to give anything up to go to space

Lat: 40.7574377 Lon: -73.9754319

Source: sparks & honey

PRIVATE CITIZEN SPACE

1 week

Length of a SpaceX journey to the moon and back purchased by two private citizens, announced by CEO Elon Musk in 2017.

$75,000

For the price of a small down payment, you can take a 4.5-hour flight at 100,000 feet above the Earth (20 miles), on World View's capsule flight.

2021

NASA's supersonic passenger jet, the QueSST X-plane, could be ready for takeoff as soon as 2021. Developed together with Lockheed Martin, the jet was designed to suss out sonic booms into sonic thumps, and with it, transforming the speed of travel here on Earth.

3.3 hr

Travel time to Paris, estimated by Boom, which expects to offer supersonic travel to customers by 2023.

Lat: 40.7574377 Lon: -73.9754319

Source: Travel Weekly

SPACE TOURISM TAKES OFF — ON THE GROUND

While the cost may yet be prohibitive for many, space tourism is firmly rooted on the ground.

The public's fascination with space travel has been ignited by the live-streaming of NASA launches. In the near future, we can expect to see a bump in space travel destinations on Earth.

Spaceports, where rockets take off, could become destinations much like theme parks or Cape Canaveral. The first commercial spaceport, Spaceport America, is home to SpaceX and Virgin spaceplanes.

Lat: 40.7574377 Lon: -73.9754319

Source: Spaceport America

> “Spaceports will become tourist destinations in and of themselves. Each of these spaceports has their own nice little niche.”
>
> **- Eric Stallmer, President, Commercial Spaceflight Federation**

Lat: 40.7574377 Lon: -73.9754319

Source: Eric Stallmer

Once the space flights take off, there's a budding industry for tourism to develop with new hotels and space-retail in this New Mexico-based industry.

With a captive audience, brands have the opportunity to seize space tourism on the ground.

2019

Opening of the world's first private astronaut training center, Blue Abyss, in Bedfordshire, UK

Source:Bedfordshire News

Lat: 40.7574377 Lon: -73.9754319

ATMOSPHERE AS AN INGREDIENT

Ascending into orbit is just one way of experiencing space. On Earth, the look and feel of space — its atmosphere — is a key sensorial ingredient for brands to attract celestial consumers.

Designs that are made to respond to specific environments are adding a twist to beverage brands.

Lat: 40.7574377 Lon: -73.9754319

SPACE GLASS, ON THE ROCKS

Scottish whiskey producer Ballantine created a whiskey "space glass" designed for enjoyment in zero gravity. A collaboration between the distillery and the Open Space Agency (a collective of tech connoisseurs, designers and space enthusiasts), the 3D-printed space glass taps into the aspiration of space travel as the norm, complemented by drinks for the journey.

Lat: 40.7574377 Lon: -73.9754319

Source: CNBC

ALTERED TASTE BUDS

In flight, our sensitivity to sweet and salty foods drops by 30 percent in the air, compared to on-the-ground consumption.

Airlines like Cathay Pacific are using atmosphere as an ingredient in designing a beer especially made to be consumed at 35,000 feet. "Betsy Beer" contains honey and a potent fruit called dragon eye.

Creating the right flavor profile for foods or drinks consumed in high altitudes or in the air may require extrasensory ingredients.

The environment affects "the way the brain interprets signals, so that changes the flavor of your beer," Peter Barham of the University of Bristol told *The New York Times*.

Source: New York Times

FASHIONED FOR SPACE

Earthly fashion labels are finding a footprint in space fashion, for future space tourists and astronauts alike. Both NASA and private companies are investing in designs and materials from brands like Y-3, a label from Adidas and Japanese designer Yohji Yamamoto, and Reebok.

40 years

Since the existing space suits used on the ISS were designed

Source: FastCompany

There's no outfit more important than the one you wear in orbit. Protective and high-tech, the space suit is a space explorer's individual home.

> “Our spacesuit is our spaceship. It really needs to be as reliable as it can be, and we have stuck with the same design for a really long time.”
>
> **- Dr. Cady Coleman, Astronaut**

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Cady Coleman

$200million

Amount spent by NASA on development efforts for the next generation of space suits

Whether it's shuttling astronauts to and from the space station with Boeing and SpaceX or for on-ground use, fashion companies are designing space gear.

Lat: 40.7574377 Lon: -73.9754319

Source: FastCompany

Reebok, working with the David Clark Company, unveiled its Space Boot SB-01 — the first update to the space boot in 50 years. The boots, which use Reebok's Floatride Foam, were "exclusively designed to accompany the final space suit that will shuttle astronauts to and from the International Space Station in Boeing's new vessel, the CST-100 Starliner," the company said.

NASA is turning to fashion startups for design inspiration, too. Brooklyn-based Final Frontier Design, founded by designer Ted Southern and engineer Nikolay Moiseev, has won multiple contracts with the space agency to develop future suits and components.

Lat: 40.7574377 Lon: -73.9734319

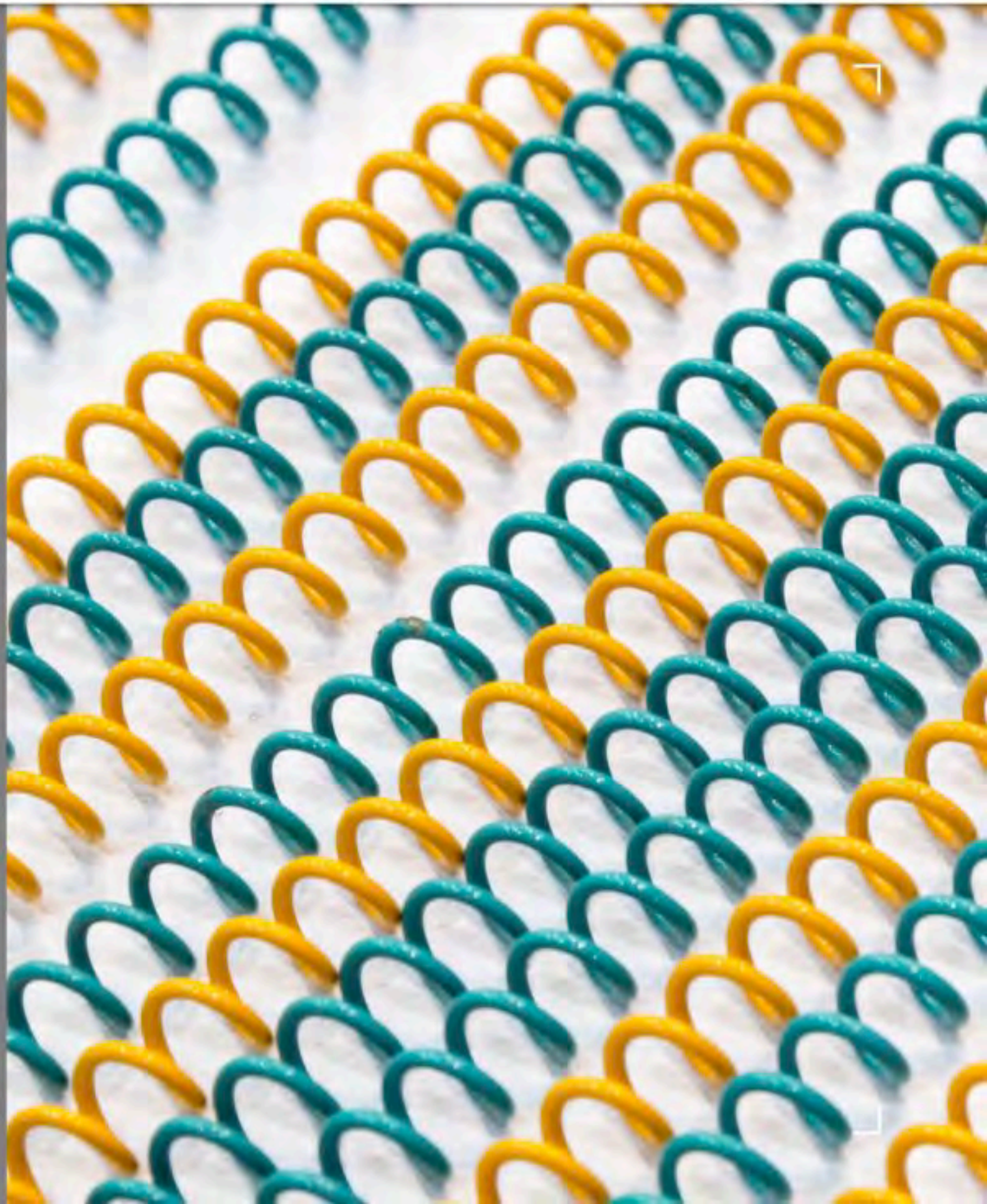
Source: FastCompany

WEAR THE BIOSUIT ON MARS

Developed by MIT, the BioSuit has tiny, spring-like fibers to mechanically pressurize an astronaut's body without the need of a bulky, gas-filled garment.

Lat: 40.7574377 Lon: -73.9754319

Source: MIT, Shrink-wrapping spacesuits



ARMCHAIR SPACE EXPLORATION

Via technology, space comes to those with a VR headset. Stepping into space — without physically going anywhere — will open new worlds of celestial access and entertainment forms.

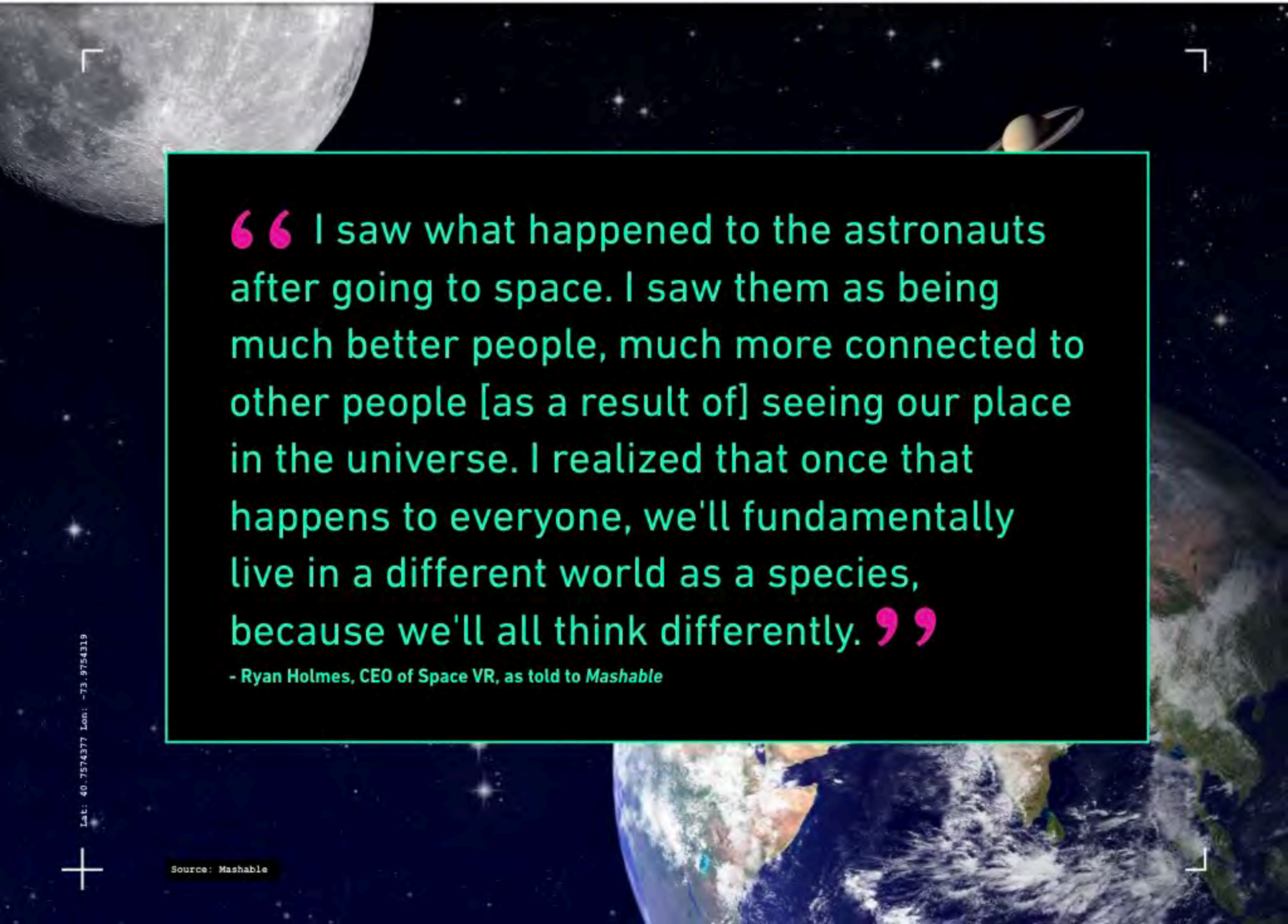
$1.35 million

Seed investments in SpaceVR, a company that creates cinematic, virtual space tourism via mini satellites

Lat: 40.7574377 Lon: -73.9754319

Source: Mashable, Space X is taking SpaceVR's camera into orbit

The overview effect, the experience of seeing Earth from space, is described by astronauts as life-changing. As access to space opens up, our perception of humanity will evolve. Taking in our planet from an utterly new vantage point may flatten divides and fuel a feeling of oneness.



“ I saw what happened to the astronauts after going to space. I saw them as being much better people, much more connected to other people [as a result of] seeing our place in the universe. I realized that once that happens to everyone, we'll fundamentally live in a different world as a species, because we'll all think differently. ”

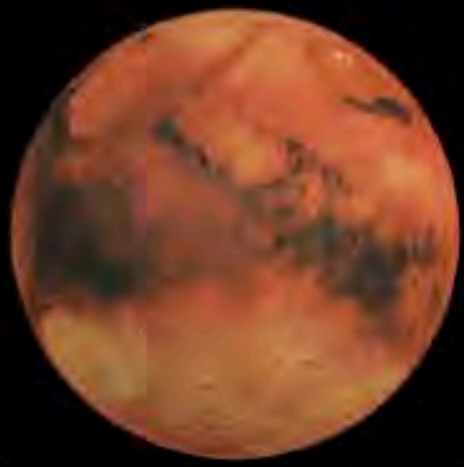
- Ryan Holmes, CEO of Space VR, as told to *Mashable*

Lat: 40.7574377 Lon: -73.9754319

Source: Mashable

Distance to Mars from your sofa

33.9 million miles

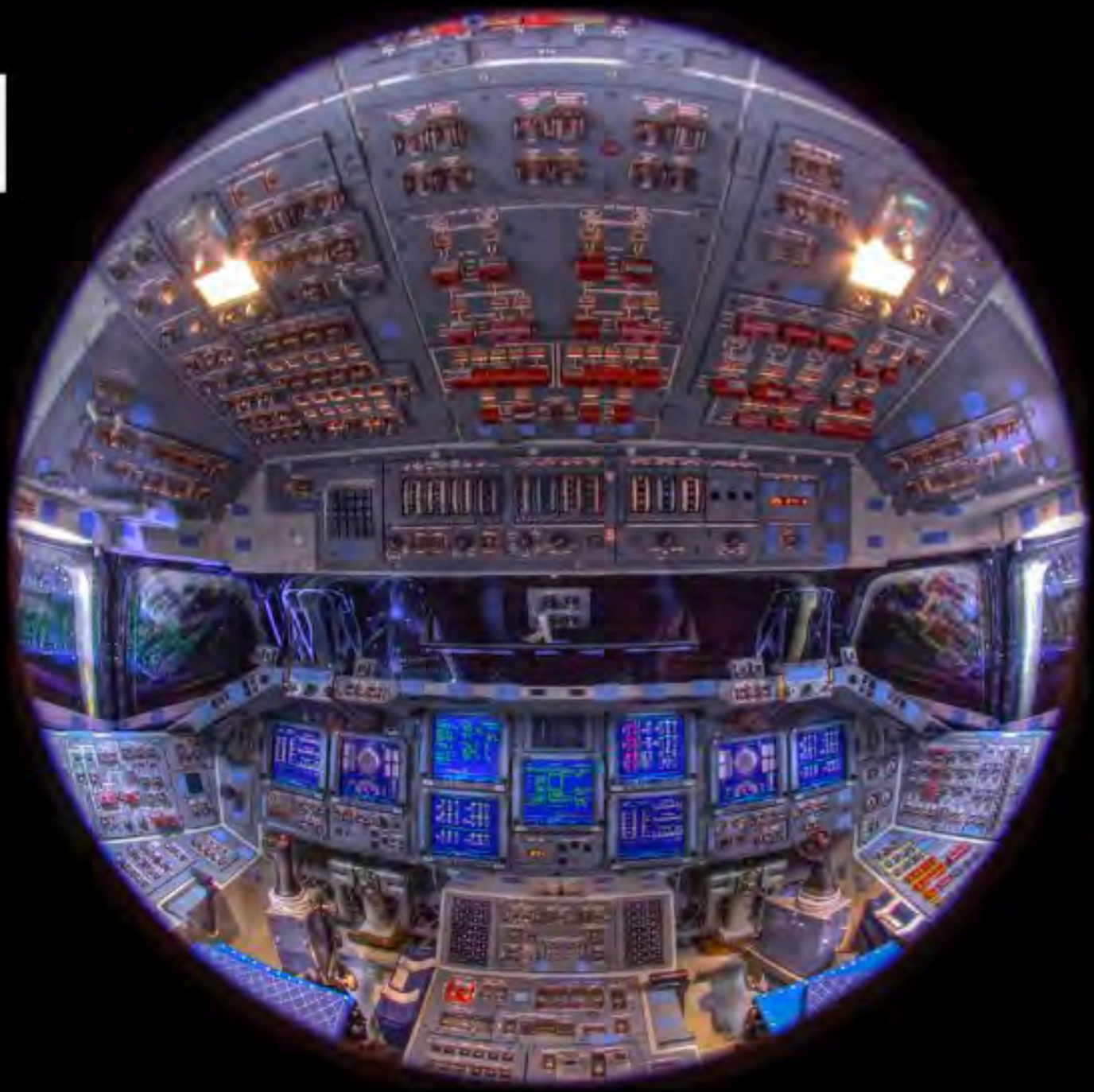


Distance to Mars from your sofa with VR

0 miles

SPACE STREET

Exploring Lower Earth Orbit is only a few swipes away. Google Maps' Street View has unveiled a new destination: the International Space Station. Google recruited astronauts on the ISS to take hi-res images, which were used to create panoramic images of life in orbit, as seen from the ISS bird's eye view.



Lat: 40.7574377 Lon: -73.9754319

Source: space.com

VACATION ON AN EARTHSHIP

Space architecture translates into leisure principles on the ground. Earthships blend biology, architecture and physics to create completely self-sufficient homes, where you can grow your own food and even recycle rainwater. The vision of architect Michael Reynolds, these "closed-loop" homes are becoming tourist destinations in Taos, New Mexico.

TOTAL ECLIPSE OF THE ECONOMY

On August 21, 2017, millions of people emerged from their homes, workplaces, tents and coffee breaks at the exact time of the total solar eclipse. Online, the awe was captured in livestreamed events by NASA and Slooh, a service that allows the audience to patch into and control telescopes around the world. The total solar eclipse was a rare occasion of humanity connecting — by looking up at the sky.

50%

US population estimated to have viewed the eclipse (CNN)

Lat: 40.7574377 Lon: -73.9754319

Source: CNN, The New Yorker

4.4 million

Number of people who had viewed NASA's livestream of the eclipse at its midpoint (NASA)

The eclipse is turning something that used to be ordinary, the sky, into an extraordinary event or celebration. It's one of many forms of astro-tourism on Earth. Whether it's going to see the northern lights in Saariselkä, Finland, or exploring dark skies in Joshua Tree, brands are leaning into celestial phenomena.

Lat: 40.7574377 Lon: -73.975431

Source: NASA

ECLIPSE BABIES

Eclipse Alizabeth Eubanks was named after the celestial event which marked the Greenville, SC, baby girl's unexpected birth on August 21, 2017. As millions gathered to celebrate the total solar eclipse, we can expect to see a spike in eclipse babies being born — some nine months down the line.

Source: People; sparks & honey

> “Watching the moment of totality was like “the eye of God suddenly looks down on you and says, ‘What’s up?’”
>
> **- Bill Kramer, Founder of Eclipse-Chasers.com, as told to *Esquire***

Lat: 40.7574377 Lon: -73.9754319

Source: Esquire

SKY-HIGH SALES

Weeks before the eclipse, prime eclipse locations such as Portland, Oregon, reported skyrocketing sales of alcoholic beverages. The Oregon Liquor Control Commission estimated a 43% increase in distilled spirits sales leading up to the eclipse — a large stream of revenue for the state.

Source:Oregon Liquor Control Commission

In legal marijuana markets such as Nevada and Oregon, cannabis supplies were soaring pre-eclipse. Cannabis shops such as Oregon's Finest had fun with astronomy-themed products, such as the Moon Puppies strain.

Source: High Times

ASTRO-BOOM TOWNS

6,000 → 100,000

Population swell in the small town of Madras, Oregon, the weekend before the eclipse. A prime eclipse-viewing locale, Madras organized a SolarFest together with NASA.

$30 million

Amount brought into eclipse town Hopkinsville, Kentucky, population 31,811.

Lat: 40.7574377 Lon: -73.9754319

Source: The Atlantic

> “It got our name out there. We're a small town. We've got a nice big reservoir. And a lot of people that live within driving distance of us have never heard of us.”
>
> **- Brenda Hagen, Treasurer of Glendo, Wyoming, as told to *The Atlantic***

Lat: 40.7574377 Lon: -73.9754319

Source: The Atlantic

THE ECLIPSE EFFECT

Brands embraced the chance to bring the August 21, 2017 eclipse to life for people, as they gazed at the most-observed and most-photographed eclipse in history.

$694 million

Cost in disrupted productivity caused by the eclipse

Source: Associated Press; Challenger, Grey & Christmas, a law firm

TECH AND THE TOTAL ECLIPSE

GE created Snapchat filters for the millions who were in the path of the total eclipse, while Google and UC Berkeley solar physicists joined forces to create Eclipse Megamovie project, a crowdsourced video made from images captured by 1,500 volunteers spread out along the path of totality.

Source: eclipsemegamovie.com

Lat: 40.7574377 Lon: -73.9754319

AUTO ASPIRATION

CNN and Volvo partnered for the livestreaming of the eclipse, including interviews with science experts, author Andy Weir and Astronaut Cady Coleman — creating an organic connection with Volvo and the science and tech community. CNN's brand studio Courageous produced live ads for Volvo in 4K virtual reality and 360-degree video across all of CNN's digital and social platforms.

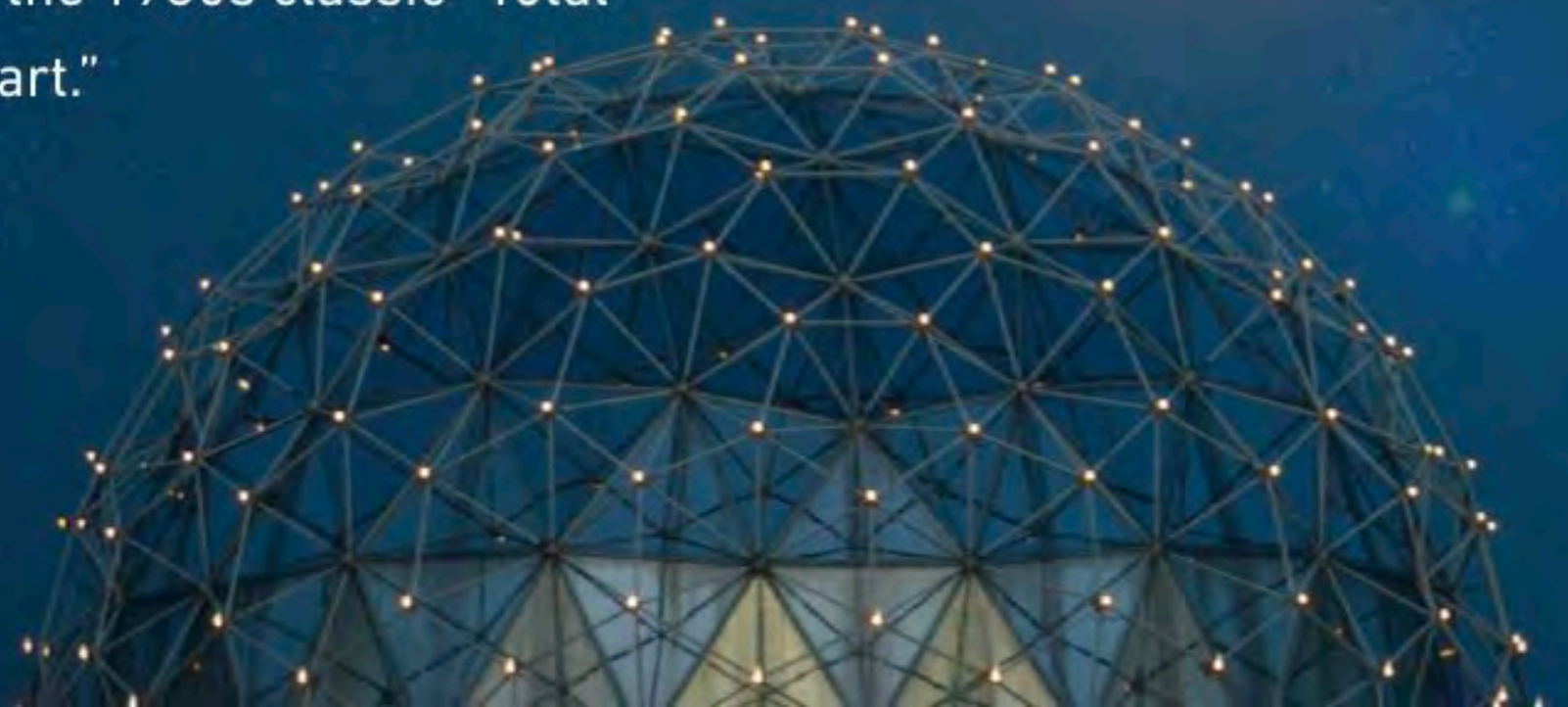
Lat: 40.7574377 Lon: -73.9754319

Source: Adweek

TRAVEL AND SLEEP UNDER THE STARS

Two lucky winners got to sleep under a see-through geodesic dome in Bend, Oregon, the night before the eclipse, and meet two National Geographic explorers, in a contest organized by Airbnb and National Geographic.

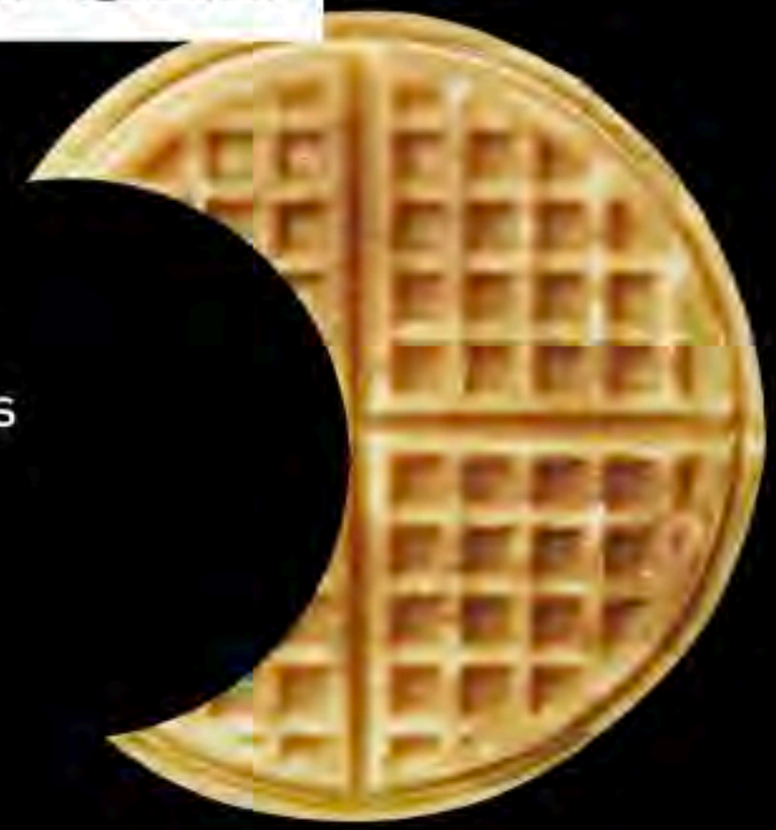
At sea, Royal Caribbean Cruises and the Weather Channel brought fans Bonnie Tyler's live broadcast of the 1980s classic "Total Eclipse of the Heart."



Lat: 40.7574377 Lon: -73.9754319

Source: TIME

EAT, DRINK AND BE ECLIPSED



Food and beverage brands played with the fun of the event, creating special occasion recipes like the Total Especial Eclipse by Jose Cuervo, and the Dark Side of the Sun by Corona. Eclipse viewers and photographers could also use a "Corona toast kit," complete with eclipse glasses.

Krispy Kreme created special glazed donuts for the occasion, while Dunkin' Donuts' creative shop, Red Pepper, made a parody video of the brand's R&D efforts with a "moonchkin" and augmented reality.

The eclipse path was turned into a map of conveniently located chicken and waffle spots for hungry viewers.

Lat: 40.7574377 Lon: -73.9754319

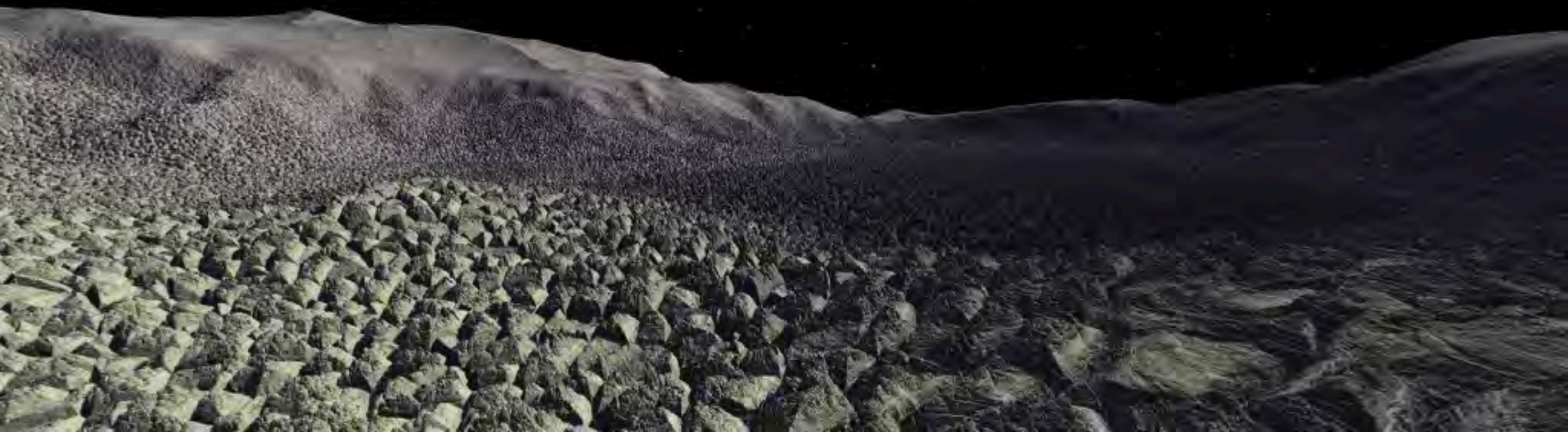
Source: Adweek

FACTORIES OF THE FUTURE

Mining the resources and energy of space

Lat: 40.7574377 Lon: -73.9754319

Space is a vast well of infinite resources and energy that can be harnessed on Earth.



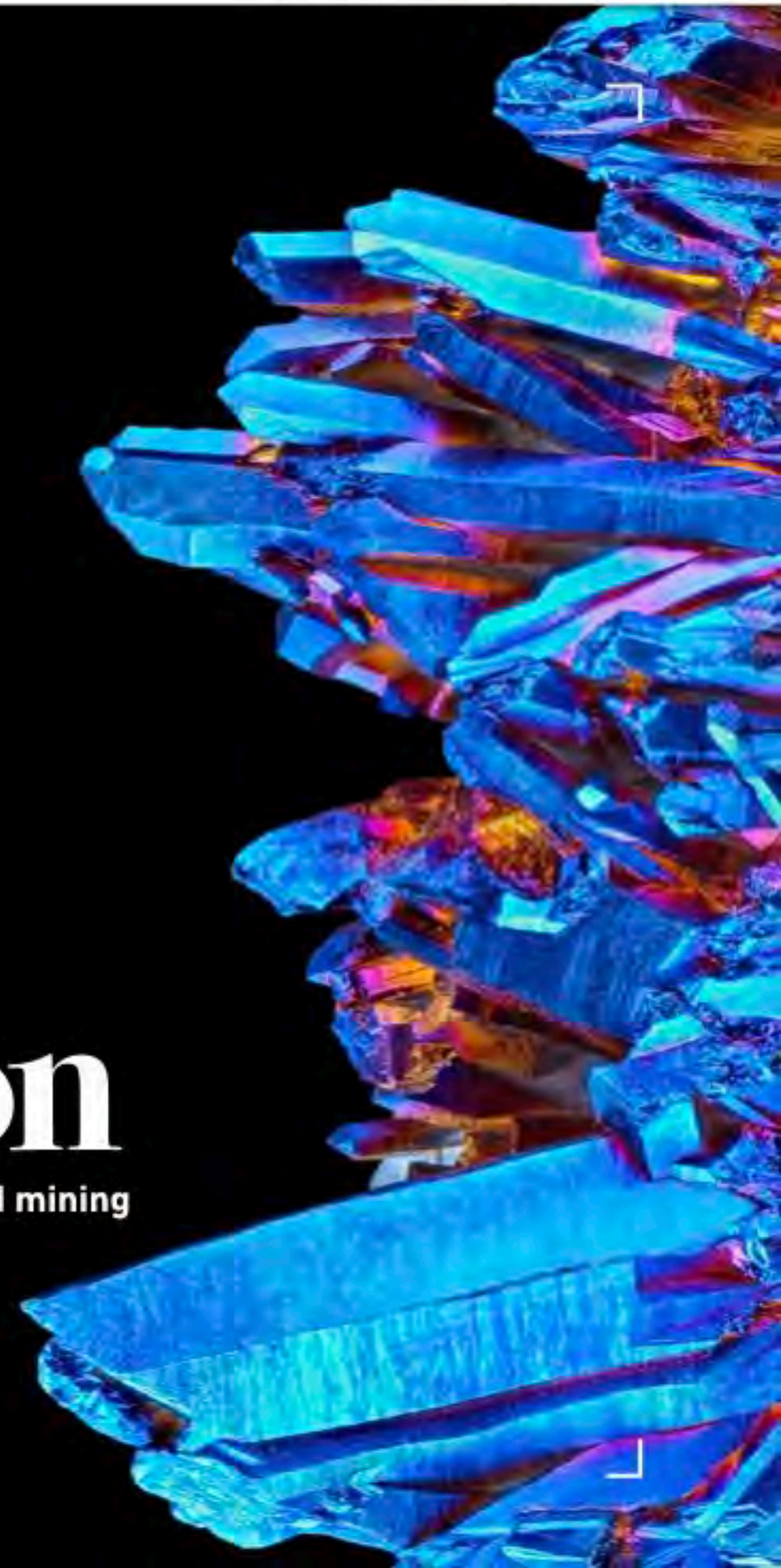
The resources of space can help advance our energy capabilities on the ground.

In the far future, asteroid mining will be the next gold rush.

Lat: 40.7574377 Lon: -73.9754319

ASTEROID RICHES

Part of our long-term future is in mining asteroids and their inherent resources for material wealth. Asteroids are economically attractive, and some planets have been discovered with materials that would cost a fortune here on Earth.



$48.8 million

Amount raised by the Planetary Resources company to fund asteroid mining

Source: Planetary Resources

Lat: 40.7574377 Lon: -73.9754319

“ If we could find an asteroid with the right composition — full of platinum and rare metals — we might completely change our economics here on Earth with this overabundance of resources. ”

- Dr. Michael Nelson, Internet Futurist and Chief Policy Advisor, Cloudfare

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Michael Nelson

IS THIS ASTEROID...MINE?

Space mining is becoming an attractive business proposition. In 2016, President Obama signed the US Competitiveness Space Act H.R. 226, a law that recognizes the right of US citizens to own resources they obtain from space, and encourages the exploration and commercial use of resources from asteroids. Luxembourg has also given empyrean companies the right to mine materials from asteroids.

2017

Luxembourg launched a $227 million fund to invest in space mining

Source: Committee on Science, Space & Technology

Lat: 40.7574377 Lon: -73.9754319

If you can get up there — the minerals obtained from asteroid mining could be yours. But, the actual asteroid, however, belongs to space. The UN Outer Space Treaty of 1967 suggests that space resources may not be rights anyone can own legally, but the US and Luxembourg used loophole laws that allow them to claim just the minerals — and not the asteroids.

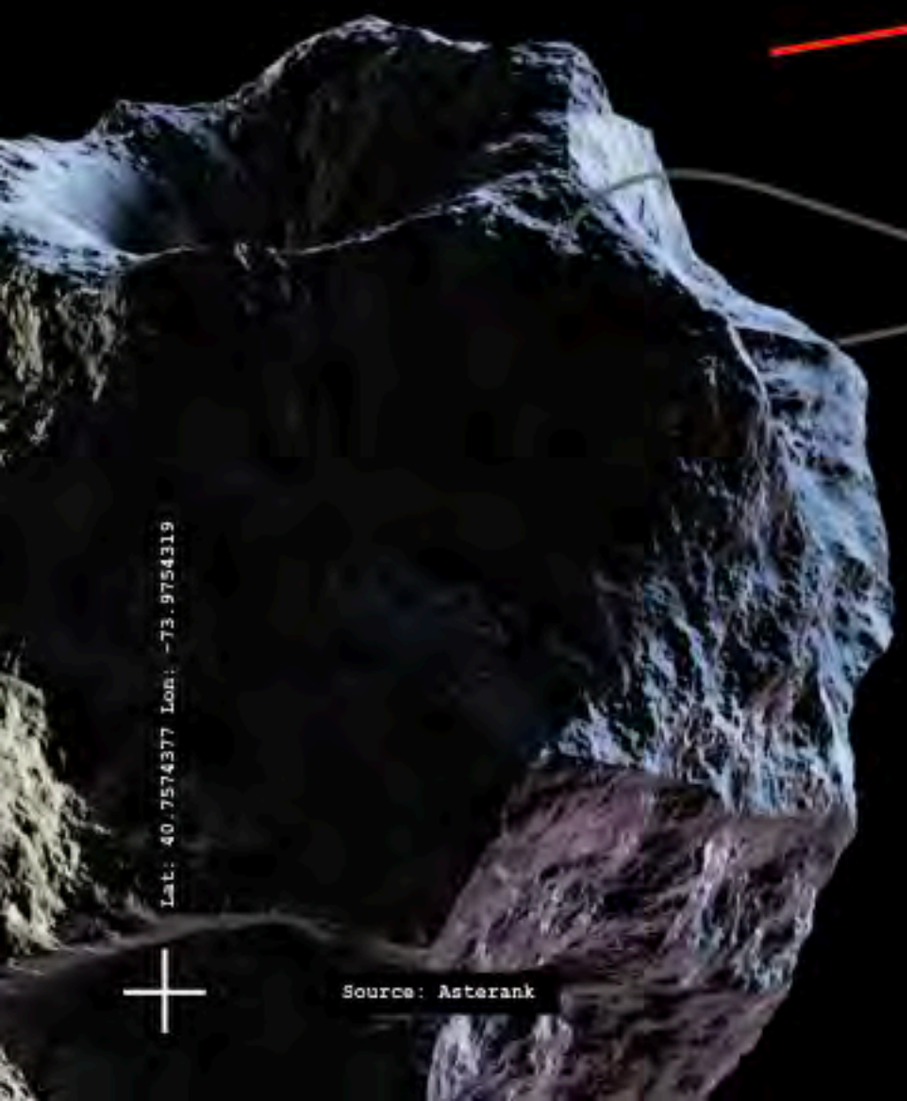
20 years

Earliest estimate of time before companies actually mine asteroids, according to our space sources.

Source: WIRED UK, Inside the startup that wants to mine asteroids

Cost of Platinum on Earth

$30,000/KG



Source: Asterank

$50 billion

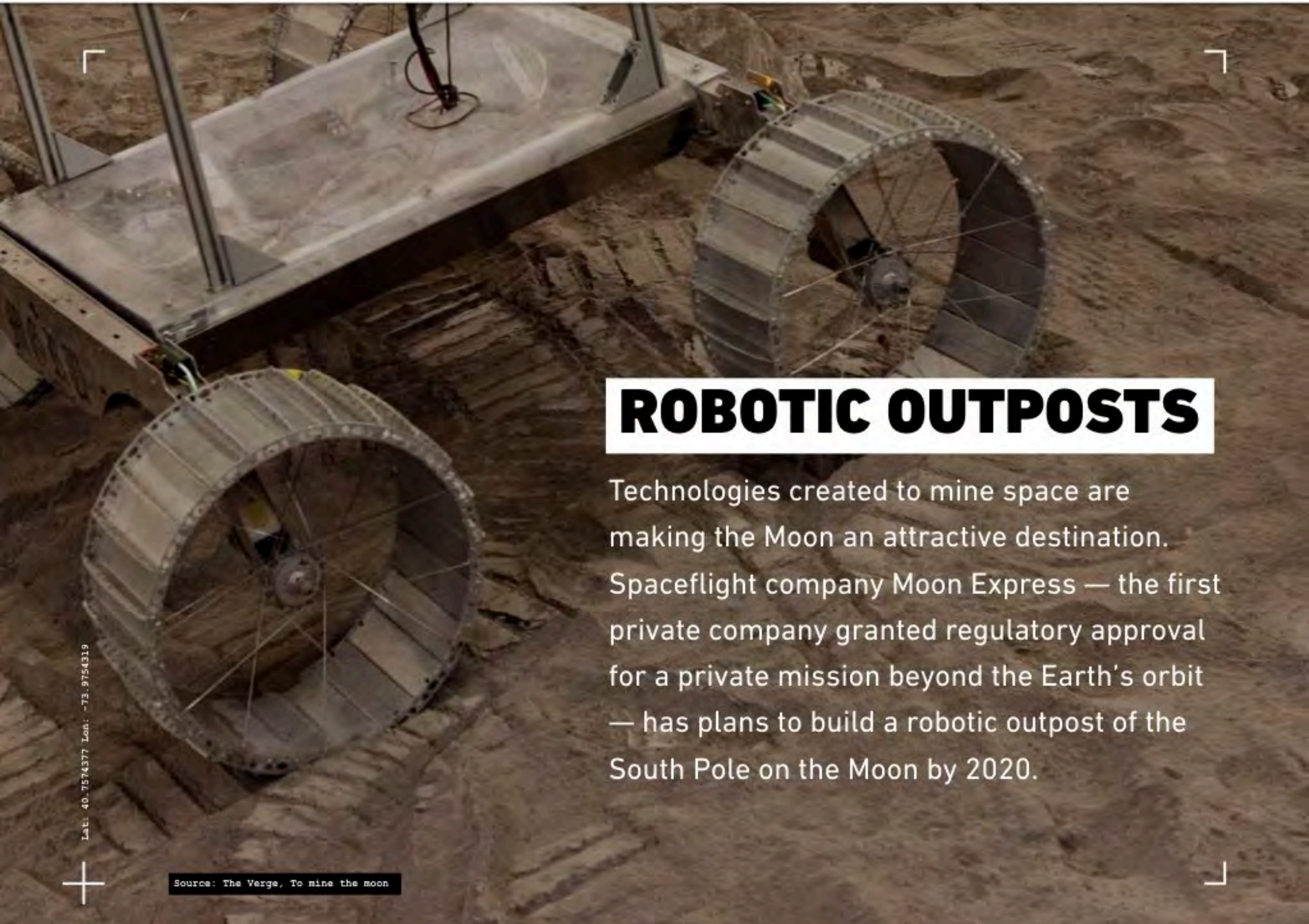
Worth of a 90-ft-wide platinum asteroid on Earth

GAS STATIONS OF THE FUTURE

Asteroids could become a pit stop in space, like an outer-orbit gas station. Home to water, ice and hydrogen, asteroids contain the building blocks of rocket fuel. Companies like Canada's Deltion Innovations are creating hardcore robotic drills and excavation systems to be used in outer space for mining purposes.

Lat: 40.7574377 Lon: -73.9754319

Source: NBC News, The Next Frontier



ROBOTIC OUTPOSTS

Technologies created to mine space are making the Moon an attractive destination. Spaceflight company Moon Express — the first private company granted regulatory approval for a private mission beyond the Earth's orbit — has plans to build a robotic outpost of the South Pole on the Moon by 2020.

Source: The Verge, To mine the moon

Water and minerals

Resources Moon Express robots will mine on the Moon, for profit on Earth

Lat. 80.7574377 Lon. -73.6758319

Source: The Verge

POWERED BY THE SUN

The rays of the sun may keep our planet warm and our vacationers tan, but the Sun is also growing into a preferred energy source.

Last year, solar power was the top fuel source for the first time in a calendar year, according to the US Energy Information Administration.

As the cost of solar power cheapens, solar farms could become the next destination, or even fashion statement. The Sun's energies are being harnessed to power homes and other designs, from fabrics used in fashion to architectural structures.

Source: US Energy Information Administration

2016

The year when solar panels became cheaper than fossil fuels in the US

9.5 gigawatts

Amount of photovoltaic capacity added to the US grid in 2016

Lat: 40.7574377 Lon: -73.9754319

Source: Quartz, 2016 was the year solar panels became cheaper

SUN STUDIES

NASA and the ISS are studying the potency of the Sun for the future of solar power. NASA's Roll Out Solar Array design, a compact cylinder for launch with less mass and volume than current solar arrays, could offer "substantial cost savings as well as increase in power for satellites," says NASA.

Solar energy also has the power to severely thwart our infrastructure, a nuanced focus for research. In a mission set for 2018, NASA's Parker Solar Probe will explore the sun's atmosphere, marking the closest touchpoint to the Sun ever.

Lat: 40.7574377 Lon: -73.9754319

Source: Cnet, See NASA's flexible solar array; CNN

Cheaper solar energy = Acres of solar farm attractions

DESTINATION: SOLAR

Companies like Budweiser are building their future around sustainable energy. The beer brand is planning to source its electricity from renewable sources, such as solar panels, by 2025. While solar power becomes an organic part of business infrastructure, the source of the energy itself will also evolve as an attraction.

"Entire communities were formed to mine," author Barbara Freese wrote in *Coal: A Human History*. Just as coal created its own geographical areas in the US, solar farms and alternative energy sources will emerge as new entertainment and tourist destinations.

Lat: 40.7574377 Lon: -73.9754319

Source: Bloomberg; Barbara Freese, Coal: A Human History

1 million tons

Amount of coal the Panda Green Energy Plant will avert the need for over 25 years

China, a world leader in solar investments, has designed its new solar farm in the shape of a Panda bear. The Panda Green Energy solar farm used a combination of darker monocrystalline silicon (the light-absorbing material in most solar cells) and lighter-colored thin-film solar cells to create the likeness of the country's national animal.

Lat: 40.7574377 Lon: -73.9764319

Source: Forbes; Washington Post

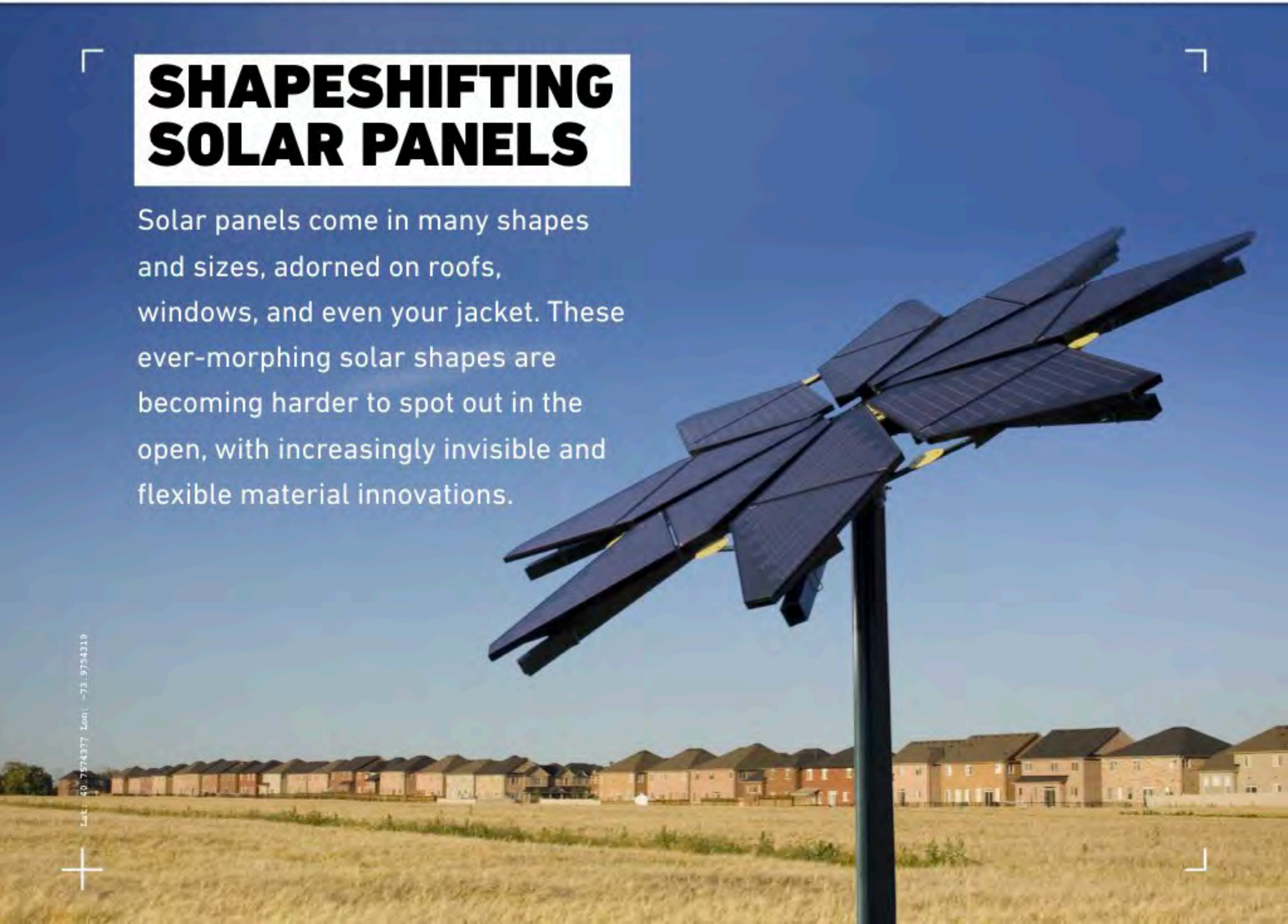
SO-LAR OUT THERE

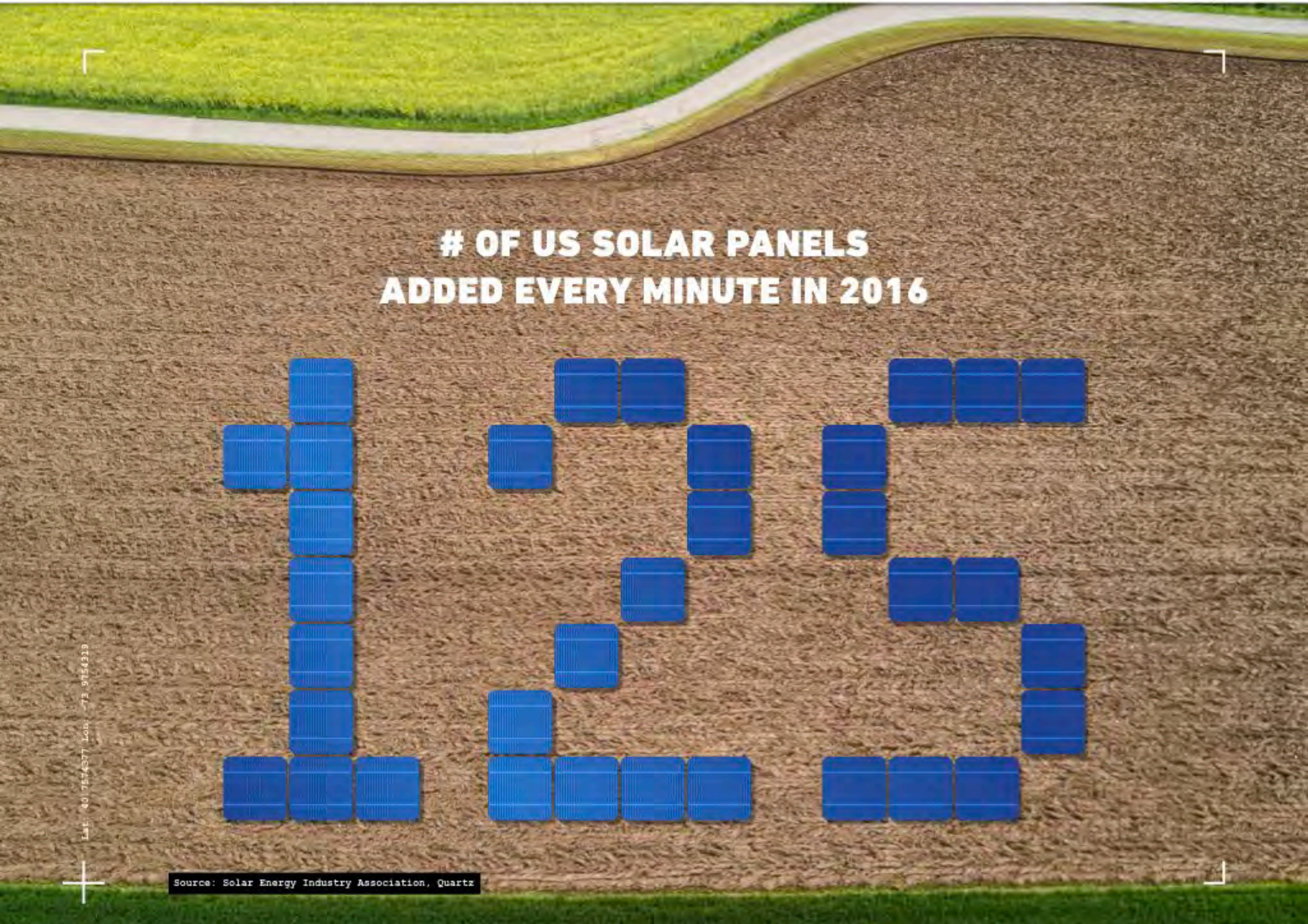
Harvesting the power of the Sun creates the potential for hosting events in unconventional, hard-to-reach places: mountain tops or deserts with self-contained solar power. Melbourne, Australia, is already home to a solar-powered music and arts festival, Off The Grid, where meat was cooked on solar dishes and the party continued well after sundown.

Source: VICE, Soaking up the rays at Australia's only solar powered music festival

SHAPESHIFTING SOLAR PANELS

Solar panels come in many shapes and sizes, adorned on roofs, windows, and even your jacket. These ever-morphing solar shapes are becoming harder to spot out in the open, with increasingly invisible and flexible material innovations.




OF US SOLAR PANELS
ADDED EVERY MINUTE IN 2016
Lat: 40.7543577 Lon: -73.9754319
Source: Solar Energy Industry Association, Quartz

FLOWER POWER

Shaped like a flower, the solar Smartflower is a solar system that follows the path of the Sun during the day, using GPS-based dual axis tracking. Its "petals" move with the Sun's path across the sky — at an optimal angle that generates 40% more energy than traditional solar panels.

Abundant with energy, minimalist solar designs mask their potency.

LIGHT-HARVESTING SMART FABRICS

Put a jacket on and become your own wearable. Researchers in China's Jinan University have designed a fabric made of cotton and electronic fibers which generates power from sunlight, stores the electrons and provides a chargeable current. You could, then, charge your phone with your jacket.

Lat: 40.7574377 Lon: -73.9754319

Source: Bloomberg, Your jacket may charge your phone; Vollebak

$350

Cost of the Vollebak Solar Charged Jacket, with a lightweight, reactive fabric that glows bright green in the dark

MADE IN SPACE

Space is an ideal environment for manufacturing with a precision unparalleled on Earth.

On the ground, this "orbital manufacturing" can mean a future of faster internet, cleaner computer chips and even lab-grown human hearts.

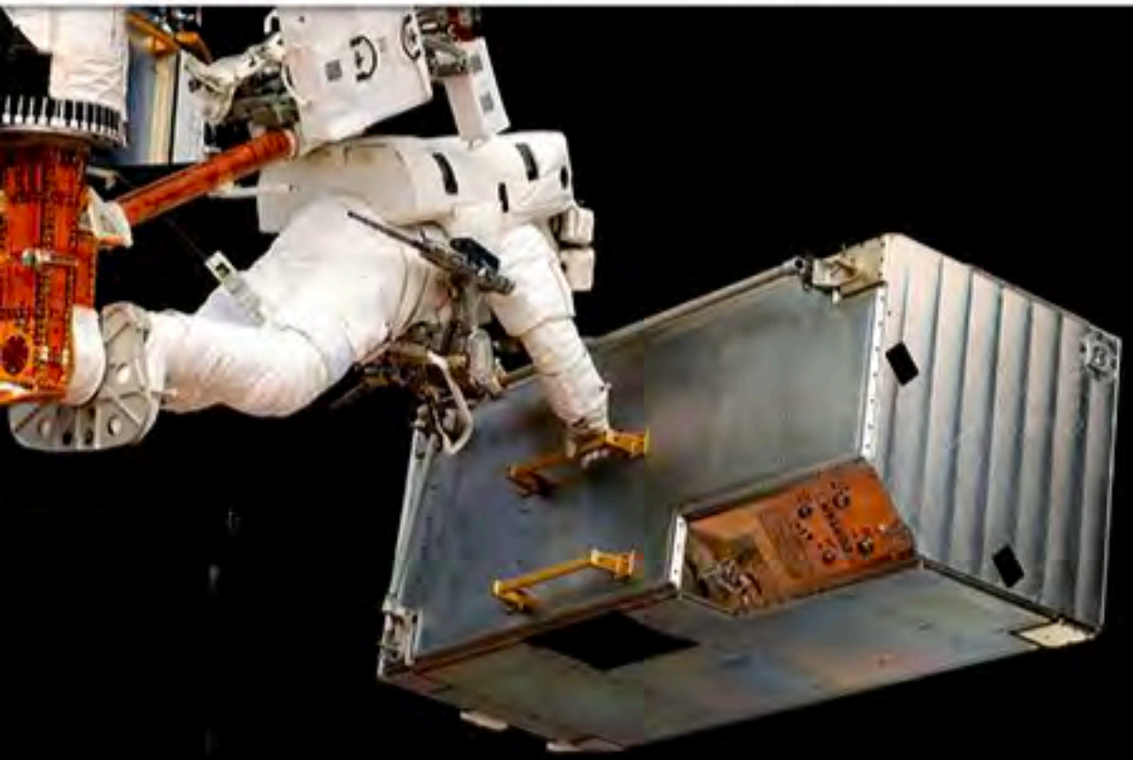
Lat: 40.7574377 Lon: -73.9754319

Source: Popular Science, The factories of the future

Microgravity is suitable for studying tissue engineering — and the human heart

> “Because the environment is so different in space, it lets us understand the tiny forces we can't measure very well on the ground. Take liquids, for example — space helps us examine how liquids flow through pipes here on Earth or other important processes related to liquids.”
>
> **- Dr. Cady Coleman, Astronaut on the precision of space for manufacturing on Earth**

Source: Dr. Cady Coleman



Down Mass

= the ability to transport material from space to the Earth

WATER

$9,100-43,180

LEMONS

$2,000

In space, everyday items come with a hefty price tag. Elon Musk is hoping to bring the cost of shipping objects to less than $1,000 per pound for reusable rockets.

COFFEE

$1,900,000

Source:Business Insider, Here's how much money it actually costs to launch stuff into space

Lat: 40.7574377 Lon: -73.9754319

With launch costs to space decreasing, the ability to transport materials is also getting cheaper.

$5k

Cost of launching 1kg (2.2 pounds) of materials to space today

$30k

Cost of launching 1kg of materials to space in the space shuttle era

Lat: 40.7574377 Lon: -73.9754319

Source: Business Insider

3D PRINTING IN ORBIT

The ISS has its first 3D printer, courtesy of the Made in Space company. So far, the 3D printer has printed medical tools by doctors, tools to use around the space station and even a game designed by California students.

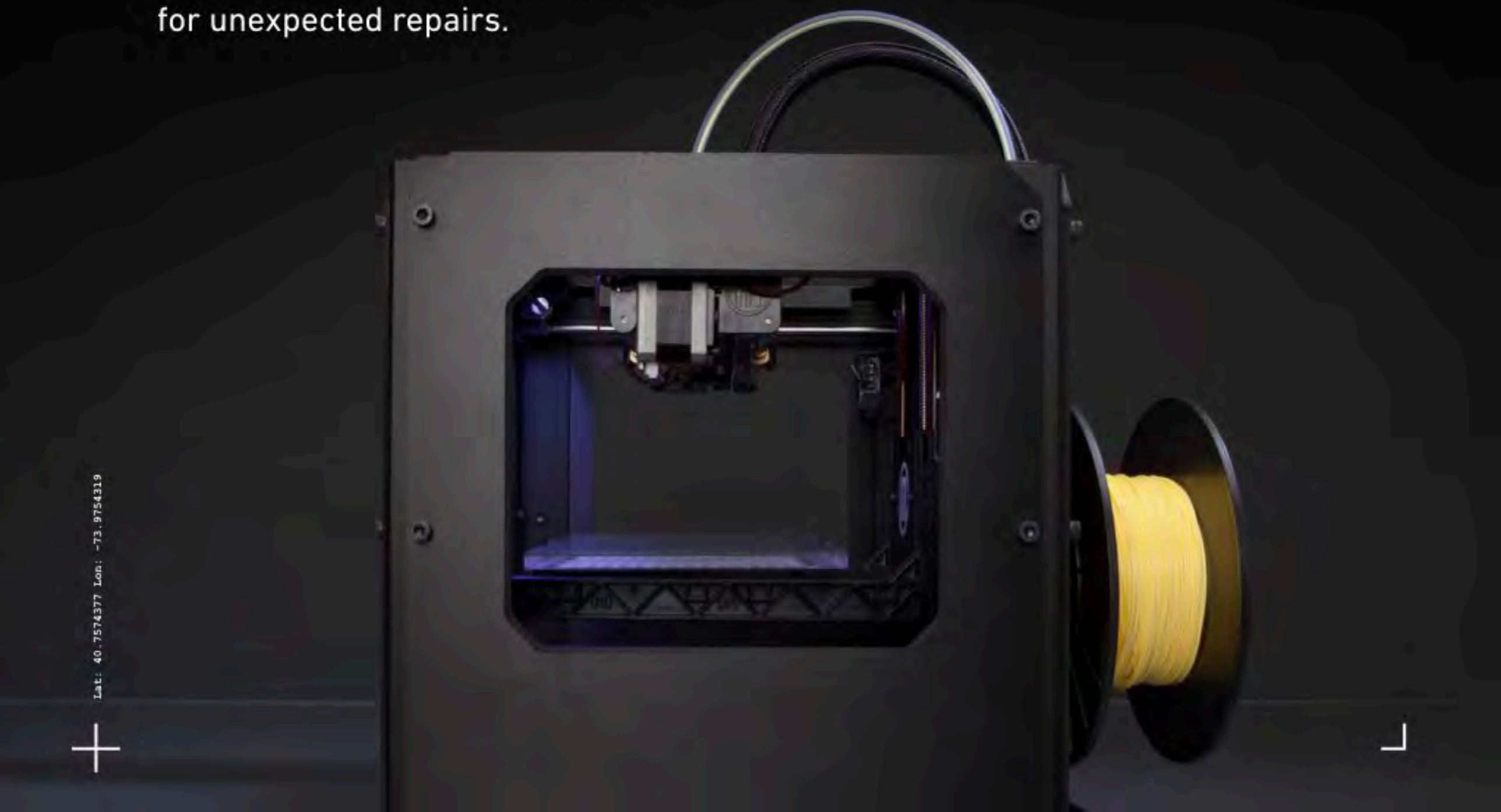
33.5k

Length of the largest polymer-alloy objects created by Made in Space's 3D printer, during a 24-hour test in a thermal vacuum chamber at NASA's Ames Research Center in June 2017.

Lat: 40.7574377 Lon: -73.9754319

Source: Space News, 3D printing and in orbit manufacturing

In the lab that is the ISS, the 3D printer allows astronauts to build the exact materials they need in orbit, such as plastic tools needed for unexpected repairs.



Lat: 40.7574377 Lon: -73.9754319

Sugarcane

An ingredient of the future for making plastic in space

Astronaut pee

Has a second life as an ingredient for making plastic in space

Source:BGR, Astronaut pee could be turned into plastics

Made in Space has plans to build fiber optic cables in space — for faster internet on Earth. It's expensive to produce ZBLAN on the ground, due to the impurities that form in the development process. The purer version developed in space, however, has the capacity to carry light further and with more bandwidth.

100x

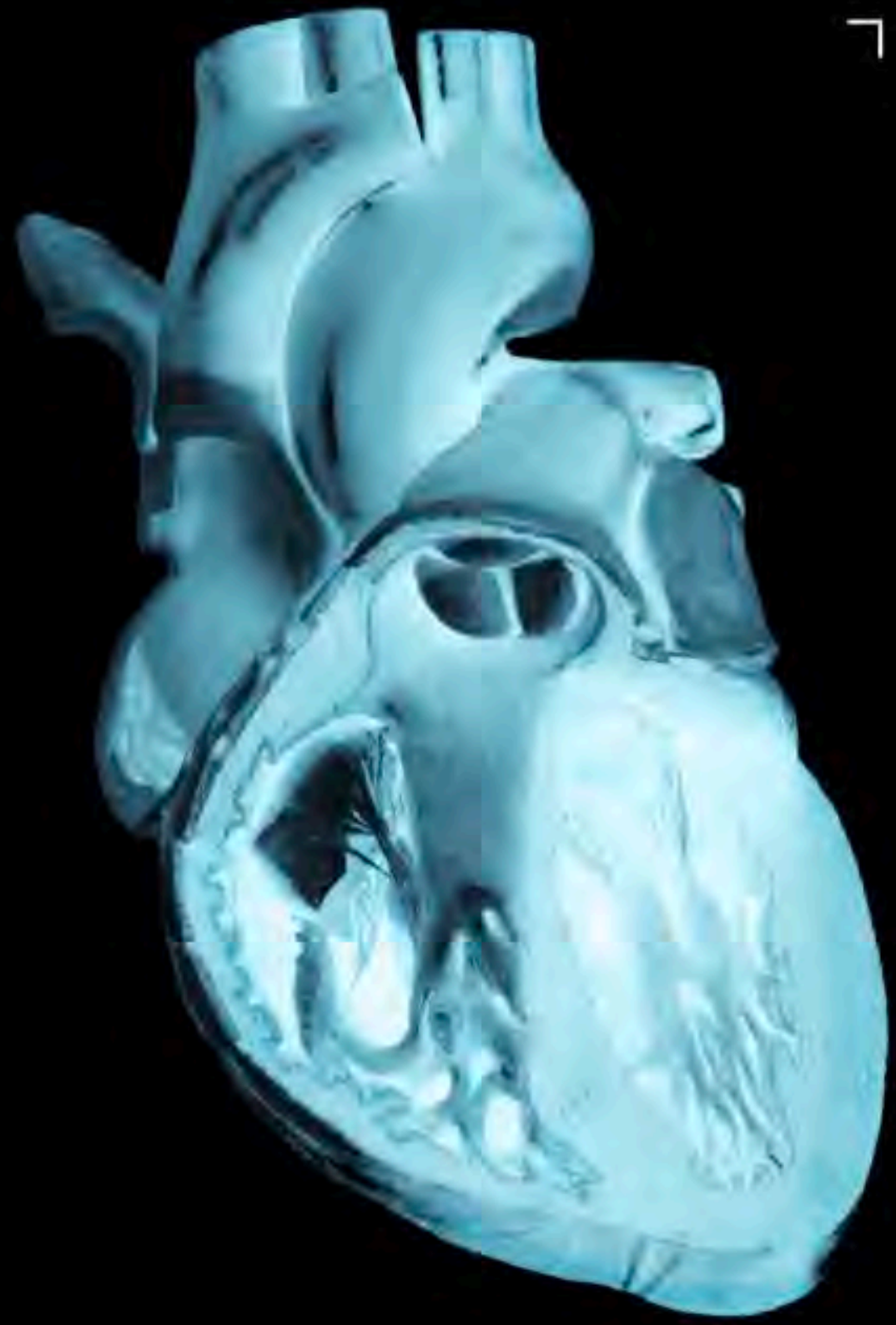
better fiber optic cable developed in space

Lat: 40.7574377 Lon: -73.9754319

Source: Made In Space

HEART HARVEST

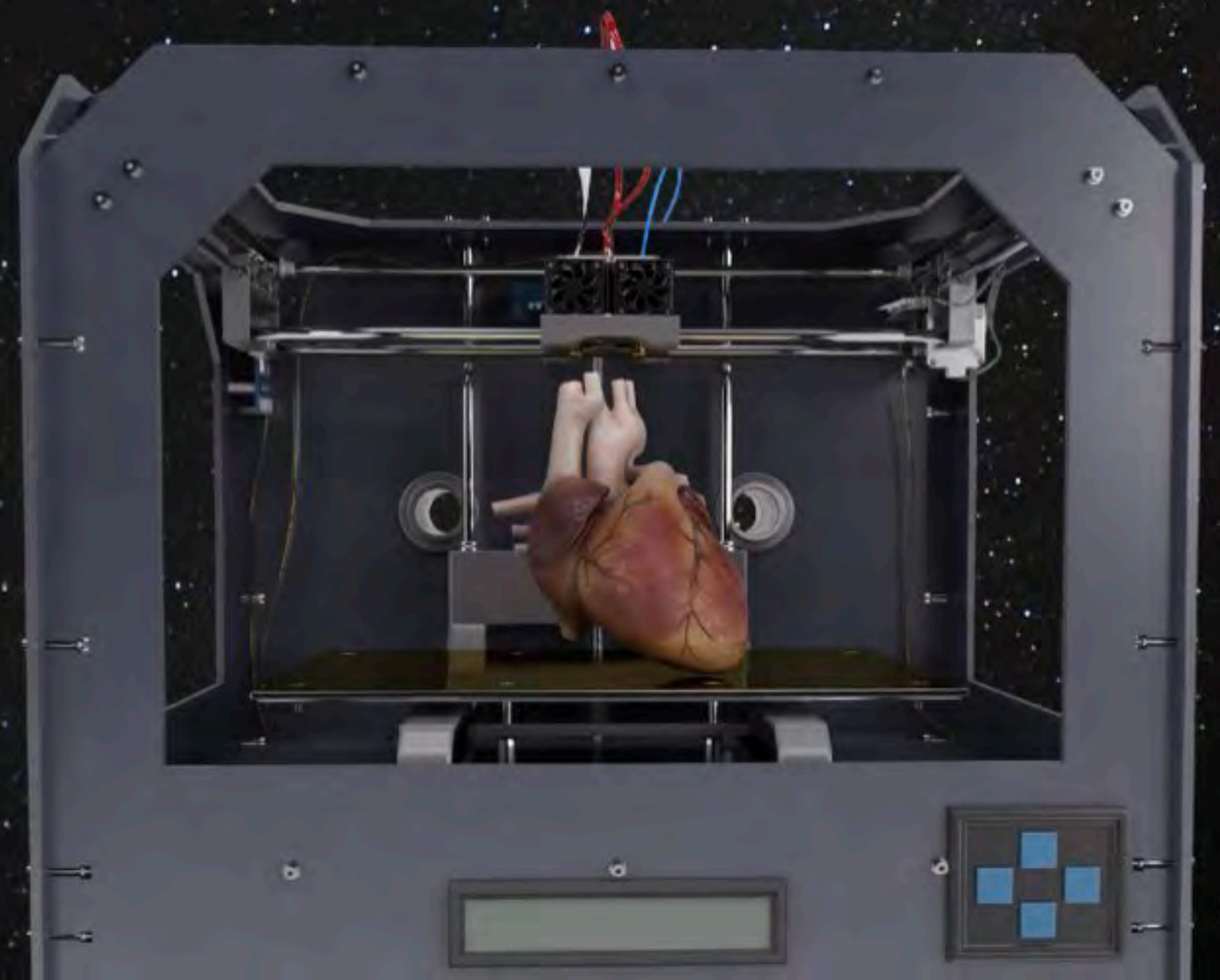
By 2019, beating heart patches will be 3D printed aboard the ISS, according to plans by mScrypt, the makers of stem cell print, Biofical Organs, the ink provider, and Techshot, the company charged with creating the experiment. In 2016, the trio successfully printed out cardiac stem cells into a two-chambered, simplified structure of an infant's heart in an environment simulating microgravity.



Lat: 40.7574377 Lon: -73.9754319

Source: Soace News, 3D printing and in orbit manufacturing

Heart transplant patients face long waiting periods for a suitable organ. In the future, a heart 3D printed in space, from the patient's own stem cells, could reach them faster. ..



Lat: 40.7574377 Lon: -73.9754319

Source: Space News

> “We designed a 3D scanner on the space shuttle. The data is sent to the ground and an engineer designs it and sends the repair data back to the space station — in the exact shape of the damage.”
>
> **- Ping Fu, Founder of Geomagic and Futuremaker**

Source: Ping Fu

CREATING SOMETHING OUT OF NOTHING

Given that we are rapidly depleting the Earth's resources, humans can find some comfort in the evolution of new technologies, which will allow us to harvest resources — out of thin air.

These "spin-in" technologies will help us survive longer, and develop communities both on Earth and in space.

Lat: 40.7574377 Lon: -73.9754319

VAPORWARE: TURNING WATER INTO ENERGY

Using solar power, water can be turned into fuel. Sunlight can change water or carbon dioxide to combustible chemicals, but additional materials are also needed for this process — which scientists are working on.

The Sun's rays are also being used to harvest water out of the air. This solar-powered harvester, designed by scientists at the Massachusetts Institute of Technology, can pull liters of water out of the air in conditions as low as 20 percent humidity.

POLLUTION AS FUEL

Scientists in Belgium have come up with a device that can convert air pollution into power. The hand-sized contraption cleans the air on one side and generates hydrogen gas on the other. The dirtier the air, the stronger the electrical currents.

MAGIC PROTEIN

The air we breathe could become the air we eat. Scientists in Finland have discovered a way to create protein out of CO2 with ingredients like phosphorous.

Whether you're isolated on Earth or in space, the possibility of printing or making your own food could be part of a new energy cycle of the future.

Sources: Futurism; Nanowerk

SPIN-OFF TECHNOLOGIES INSPIRED BY NASA, USED BY YOU

NASA technologies not only ease life in remote locations, but they also advance the engineering and design of everyday items. These "spin-off" technologies are used by companies for everything from showers to beer.

Lat: 40.7574377 Lon: -73.9754319

SUPER CLEAN TECH

Sweden's Orbital Systems, a clean-tech company, has created the Oas shower, which reuses and reduces water consumption through a purification system.

90%

Water saved by using the Oas shower, compared to normal showers - Orbital Systems

Lat: 40.7574377 Lon: -73.9754319

Source: TechCrunch; Orbital Systems

RECYCLED 'CRAP' BEER

Would you drink a waste positive beer? The Stone Brewing Co. has crafted a beer made from treated sewage water. This crap beer, the Full Circle Pale Ale, is one of the brand's top-three pale ales, according to the company.

Source: Huffington Post

Lat: 40.7574377 Lon: -73.9754319

LAUNDRY-FREE FUTURE

Silver-ion threads could mean a future of self-cleaning clothes. A University of Arizona undergraduate is working on incorporating silver-ion threads into astronaut clothing, drastically reducing the need of space travel carry-ons.

On Earth, silver-ion technology has been used for self-cleaning pillowcases. The future of bedding may be one less load at the laundromat.

Lat: 40.7574377 Lon: -73.9754319

Source: New Atlas, Dealing with spaceflight's dirty secret

THE FUTURE OF HABITATION

Human habits and other planets

Lat: 40.7574377 Lon: -73.9754319

New technologies are creating the possibility of human habitation beyond Planet Earth. Our future on Earth leans on systems that allow us to travel to and live in space.

Our future is interplanetary: from Lower Earth Orbit to the Moon, Mars and beyond.

WE ENVISION LIFE BEYOND PLANET EARTH IN THE FUTURE

69%

Of the majority of Americans believe that we should continue to explore space so we can live on another planet one day.

Source: sparks & honey

> “What's trending now is our shift to a spacefaring species, perhaps as significant as the transition of amphibians from the oceans to the land.”
>
> **- Bob Richards, CEO of Moon Express, Lunar Xprize candidate**

Source: Bob Richards

THE 500-YEAR PLAN

A plan for the colonization of Mars, created by Christopher Mason at the department of Physiology and Biophysics at Cornell University, considers the genetic modification of humans to better live on Mars.

Long-term, the question remains if we'll be creating a new species of humans, modified, tweaked and optimized just for space.

NASA PLAN FOR SPACE EXPLORATION

Phase 0

Research and testing on the ISS to solve exploration mission challenges. Understand if and when lunar resources are available.

Phase 1

Conduct missions in cis-lunar space, assemble Deep Space Gateway (a cis-lunar station), and Deep Space transport (crewed spacecraft to Mars with 6 people)

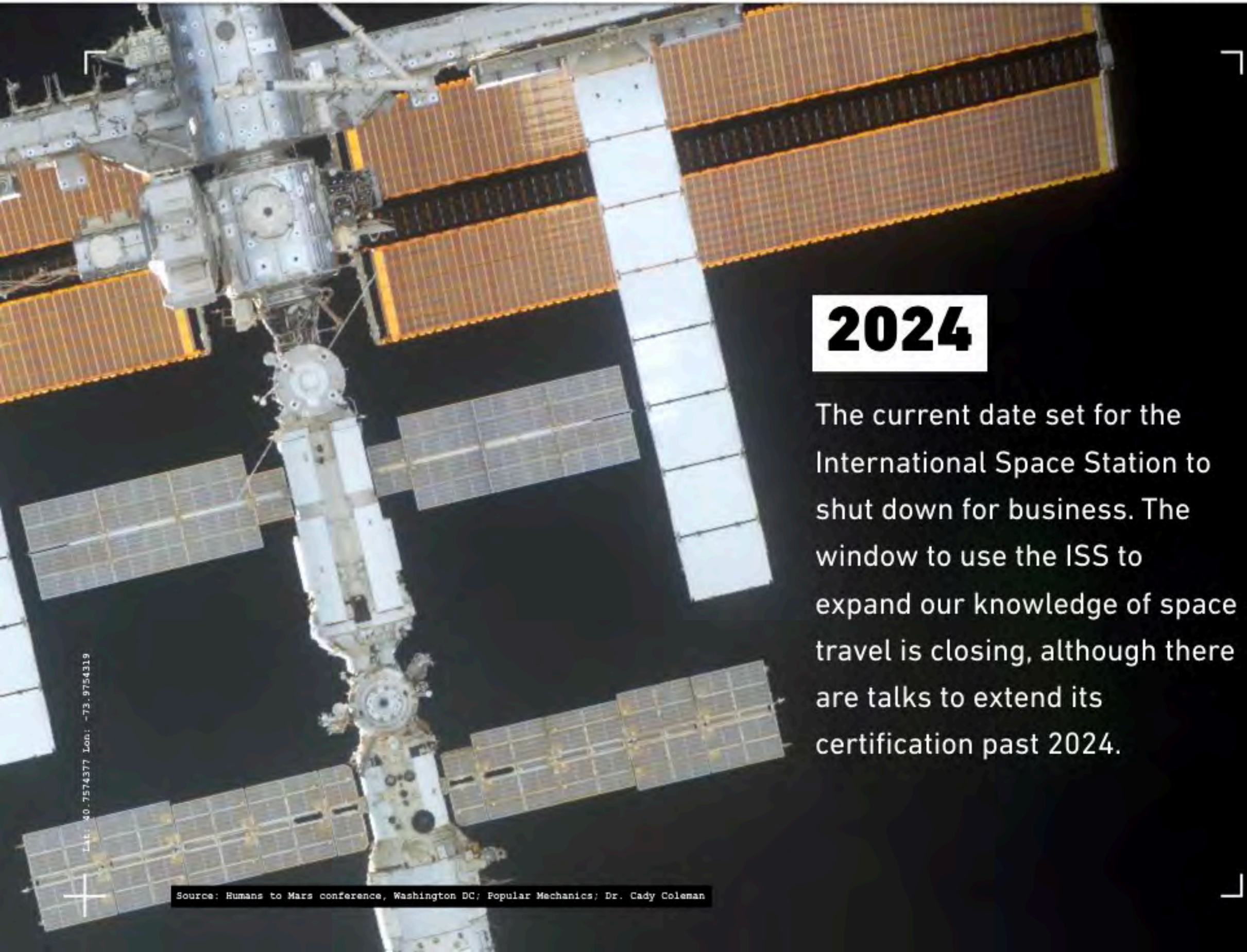
Phase 2

Complete Deep Space transport and conduct Mars verification mission.

Phase 3-4

Missions to the Mars system and the surface of Mars.

Source: Popular Science; NASA



2024

The current date set for the International Space Station to shut down for business. The window to use the ISS to expand our knowledge of space travel is closing, although there are talks to extend its certification past 2024.

Source: Humans to Mars conference, Washington DC; Popular Mechanics; Dr. Cady Coleman

TAKE OUT THE SPACE TRASH

We're transferring our Earthly sustainability issues into space by filling it up with space junk. The growing pile of space trash includes millions of pieces that are too small to register, or space glitter. A seemingly small piece of garbage in space can have a domino effect. As access to Lower Earth Orbit expands, space will become even more crowded and congested.


20,000
Pieces of space debris larger than a softball orbiting the Earth
500,000
Pieces of space debris the size of a marble or larger
Lat: 40.7574377 Lon: -73.9754319
Source: NASA


If we don't look after our space junk, life on Earth could get very testy.

"Everything we rely upon for life on Earth — communications, weather, tourism, and for future space exploration — is predicated on a clean orbital environment. If we don't address the problem now, orbital debris is going to preclude us from doing what we want to do. If a communications satellite gets hit by space trash, it could fundamentally impact our daily lives."

- Chris Blackerby, COO, Astroscale and Former NASA Attache at U.S. Embassy Tokyo

Lat: 40.7574377 Lon: -73.9754319

Source: Chris Blackerby

THE HUMAN BODY IN ORBIT

The perceived glamour of traveling to space, and even living there one day, may quickly evaporate. Life in space requires withstanding tough conditions that result in physical changes in your body.

The microgravity environment in space accelerates certain degenerative processes in the body.

Are you ready to take on space?

SPACE BRAIN

Simple Earthly tasks like stepping out of a vehicle become more crucial in an unfamiliar world, like on a journey to Mars.

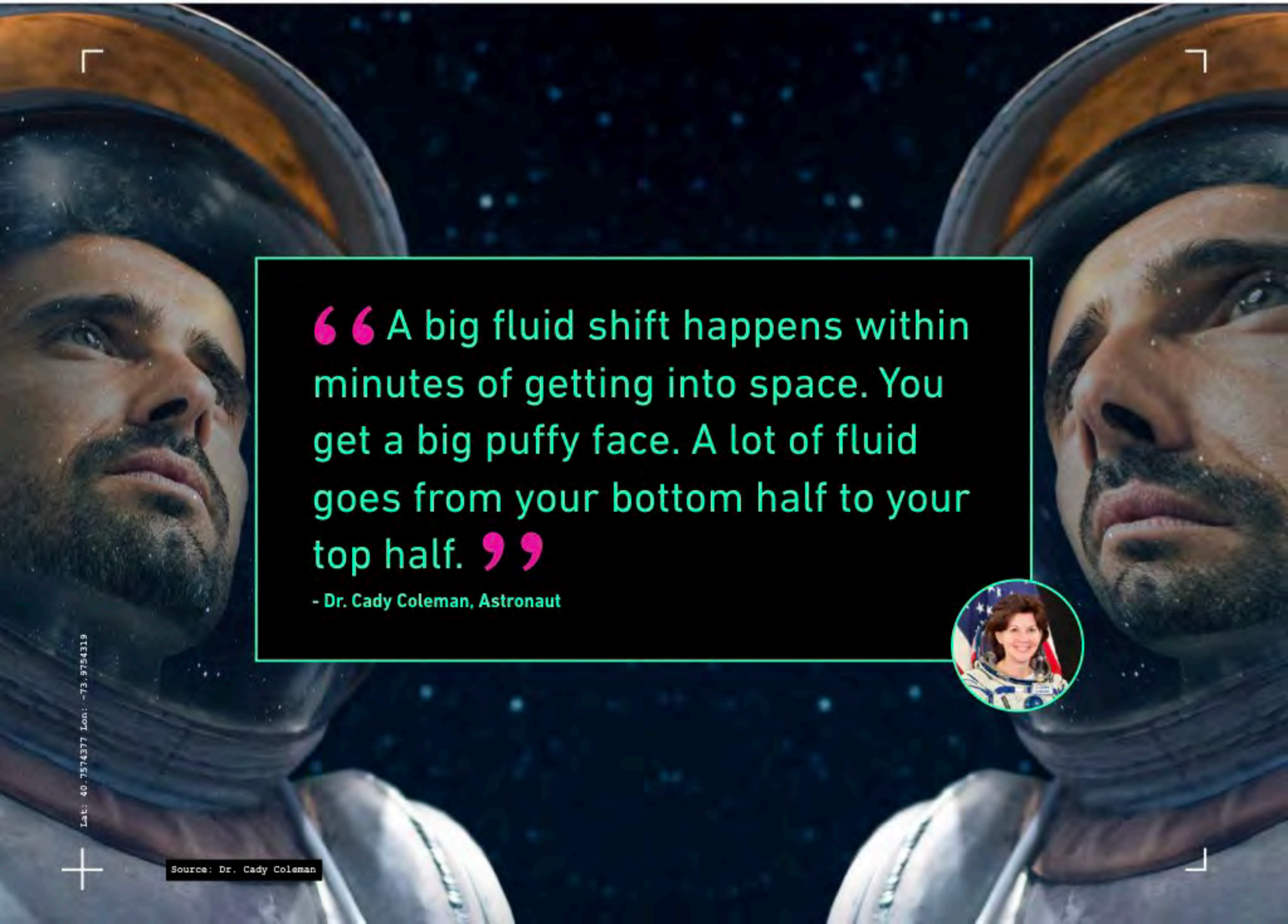
Your body has to work hard to be in space.

The microgravity environment changes how the brain interprets sensory signals, and it makes your muscles weaker and alters your cardiovascular system.

NASA's Human Research Program is investigating how spaceflight affects astronauts' bodies with a view to helping future deep space missions.

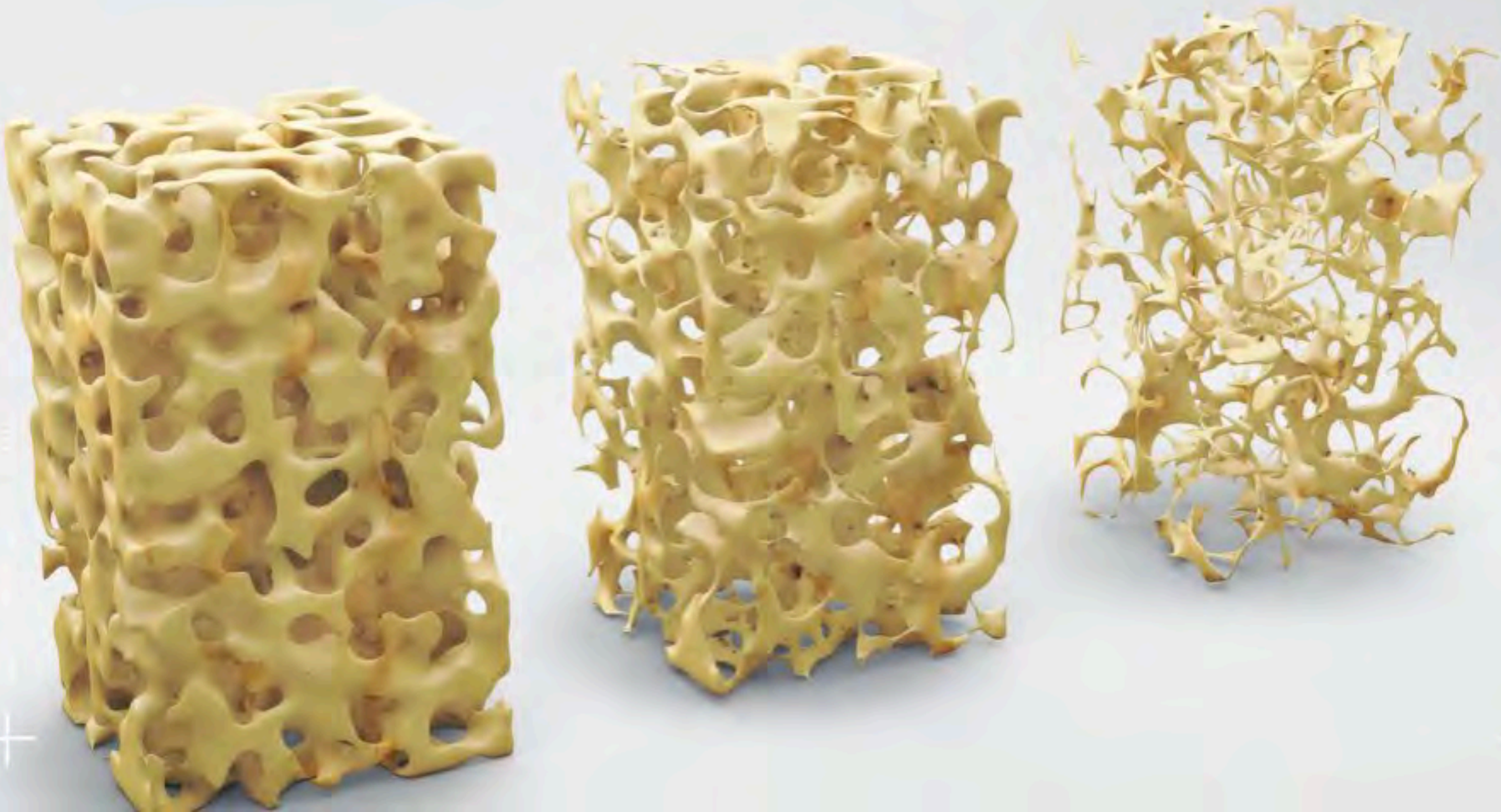
Lat: 40.7574377 Lon: -73.9754319

Source: NASA


“A big fluid shift happens within minutes of getting into space. You get a big puffy face. A lot of fluid goes from your bottom half to your top half.”
- Dr. Cady Coleman, Astronaut
Lat: 40.7574377 Lon: -73.9754319
Source: Dr. Cady Coleman

YOUR BONES GET OLD

Six months in orbit means returning to Earth with an accelerated level of osteoporosis. Space exercises help, however.



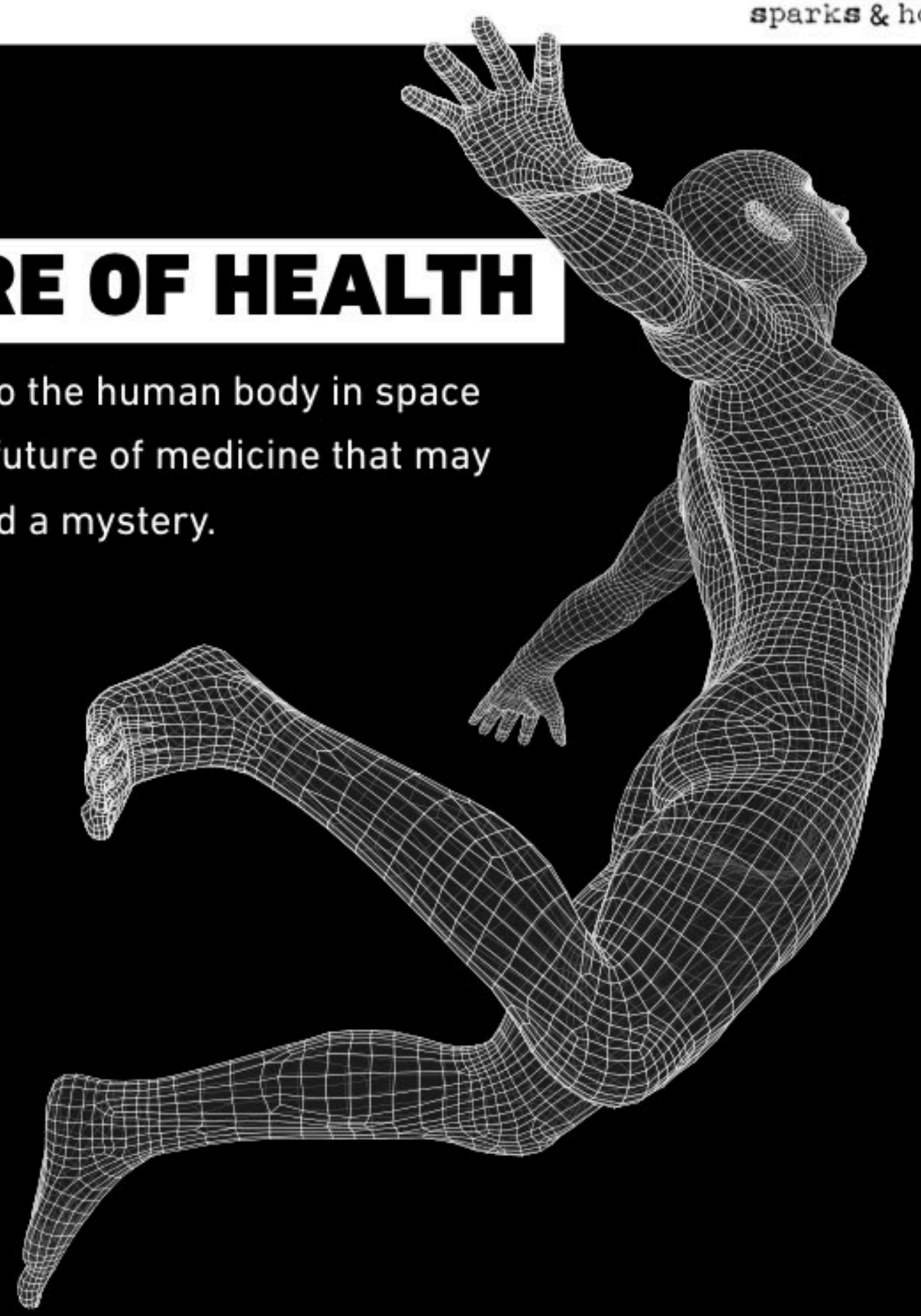
> “You can lose bone 10 times faster than a 70-year-old woman with osteoporosis — if we do nothing to counteract it in space. Weight-bearing exercise seems to be the answer.”
>
> **- Dr. Cady Coleman, Astronaut**

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Cady Coleman

THE FUTURE OF HEALTH

Observing the changes to the human body in space provides insights into a future of medicine that may have otherwise remained a mystery.



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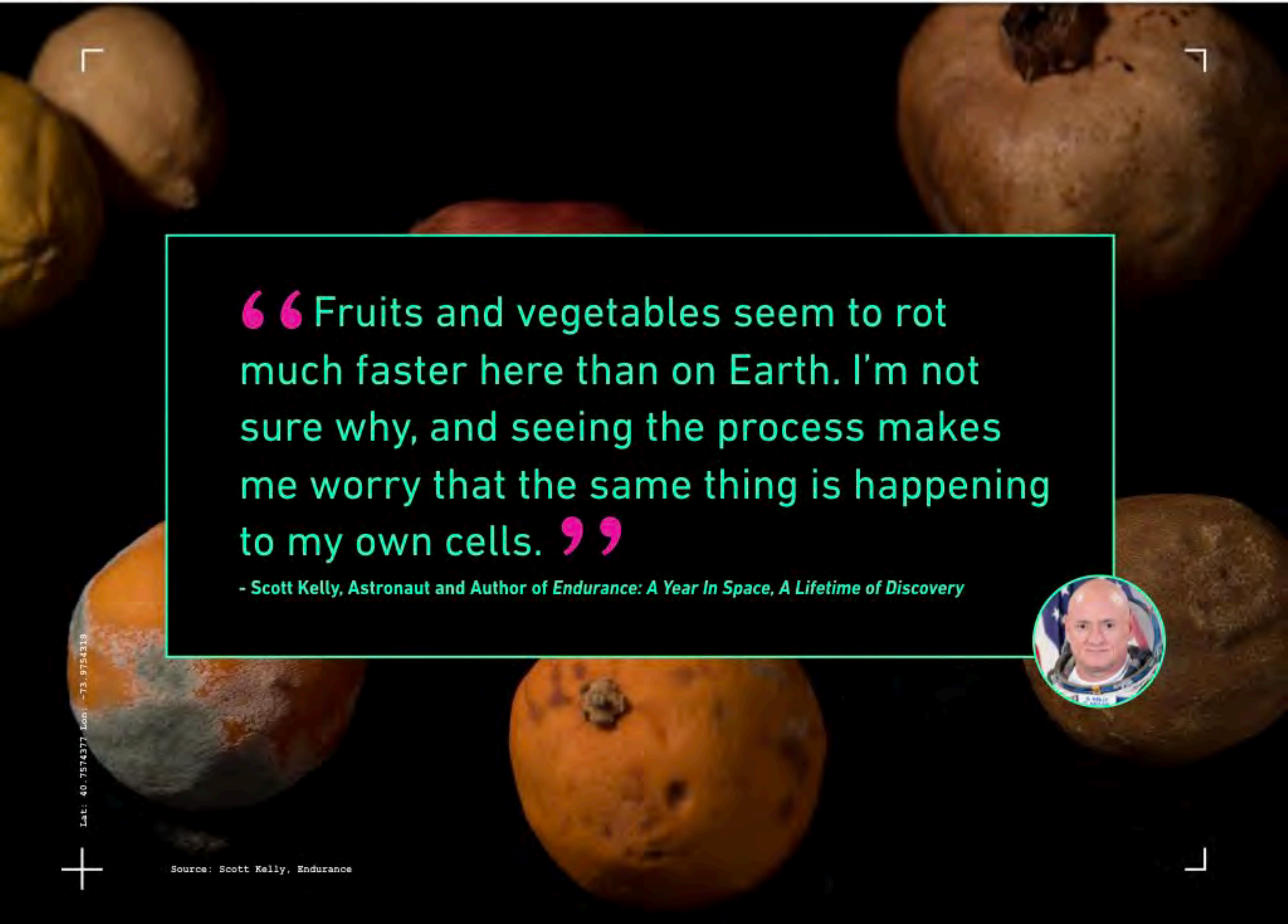

> “Fruits and vegetables seem to rot much faster here than on Earth. I’m not sure why, and seeing the process makes me worry that the same thing is happening to my own cells.”
>
> **- Scott Kelly, Astronaut and Author of *Endurance: A Year In Space, A Lifetime of Discovery***

Lat: 40.7574377 Lon: -73.9754319

Source: Scott Kelly, Endurance

> “The physical changes in the environment mimic what happens here on Earth: our immune system declines in effectiveness as we age, our bones and muscles weaken. In space, those conditions are accelerated.”
>
> **- Michael Roberts, Deputy Chief Scientist, CASIS**

Source: Michael Roberts

Studying the vertebrae of astronauts, Dr. Jeffrey Lotz of the University of California SF is working with NASA to develop exercises specifically designed for the limitations of a spaceship and low gravity.

Designing cures for the muscle and bone health of astronauts could benefit mortals on the ground, too.

Lat: 40.7574377 Lon: -73.9754319

Source:Trendintech.com

SPACE DRUG LAB

The ISS is like a lab in Lower Earth Orbit, where experiments abound. Managed by the Center for Advancement of Science in Space, the ISS U.S. National Laboratory works with companies such as Target, P&G, Merck, HP and the Boy Scouts on experiments to advance mankind. Space R&D is is growing, as private companies are unearthing its benefits. "Every year, space R&D gains traction from private companies. 2016 was a great year, and 2017 is going to be even stronger," said Brian Talbot of the Center for the Advancement of Science in Space. The company currently has more than 100 experiments in space.

Source: Brian Talbot

“P&G has flown a series of experiments in space to understand how soaps and shampoos could have a longer shelf life. It looked at the physical chemistry of fluids to understand how complex mixtures of colloids are suspended in fluid.”

- Michael Roberts, Deputy Chief Scientist, CASIS

Lat. 40.7578877 Lon. -73.9754311

Source: Michael Roberts

2-3 years

Length of a Mars mission — which is longer than the shelf life of drugs

Space exploration is unearthing the need to create medical solutions on the go. In the far future, could we vertically farm our own organs?

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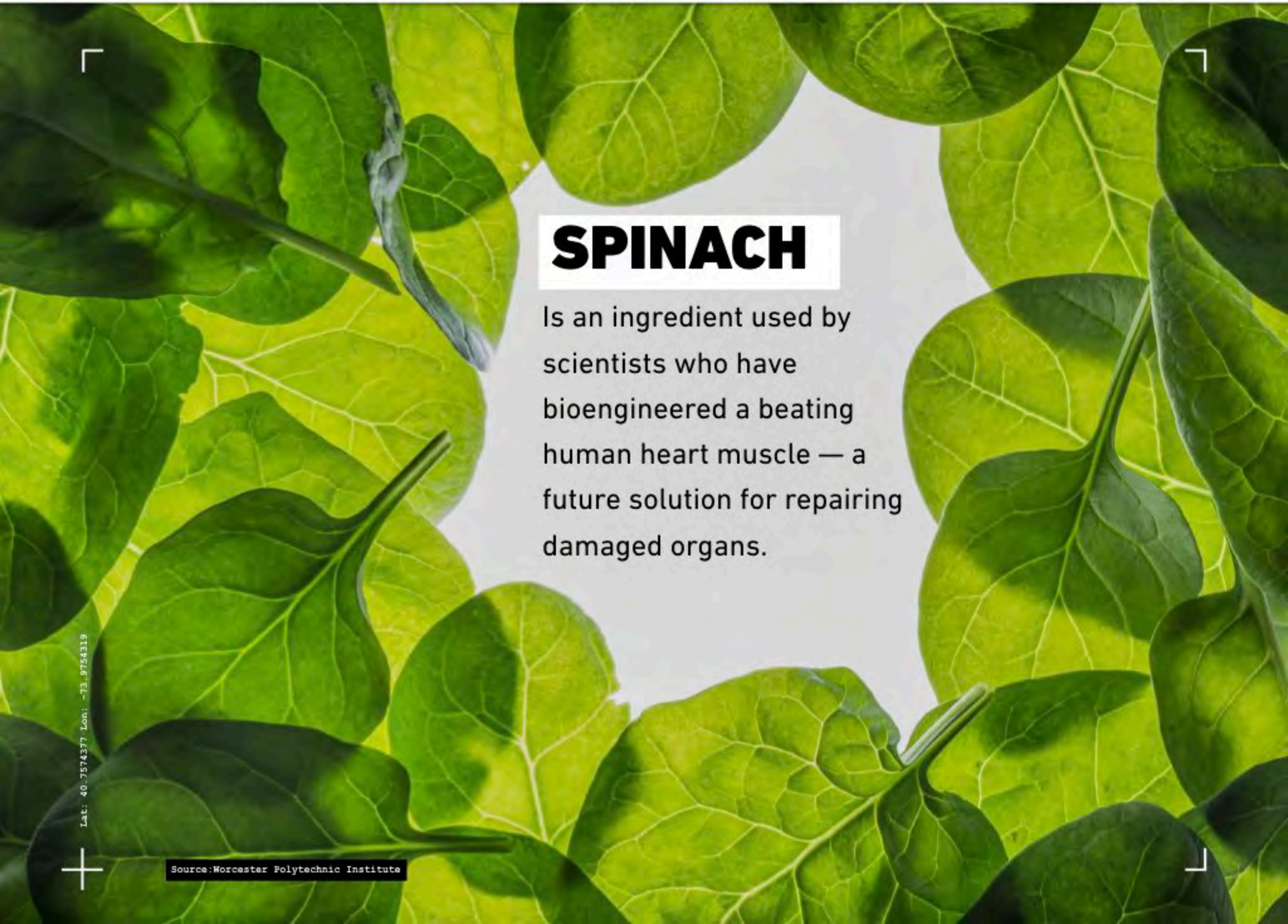

SPINACH
Is an ingredient used by scientists who have bioengineered a beating human heart muscle — a future solution for repairing damaged organs.
Lat: 40.7574377 Lon: -73.9754319
Source:Worcester Polytechnic Institute

REMOTE CURES VIA TELEMEDICINE

Isolated in space, the future of your health relies on self-care, and access to healthcare remotely, or telemedicine.

Before a mission, all astronauts are trained to use the medical equipment on board a spacecraft.

As space-travel access opens to the public, we could see similar training for future astro-travelers.

NASA'S GROUND MEDICAL TEAM INCLUDES

40hrs

Paramedic-level training by some astronauts, for missions that do not include doctors on board.

Doctors

Biomedical engineers

Nurses

Imaging specialists

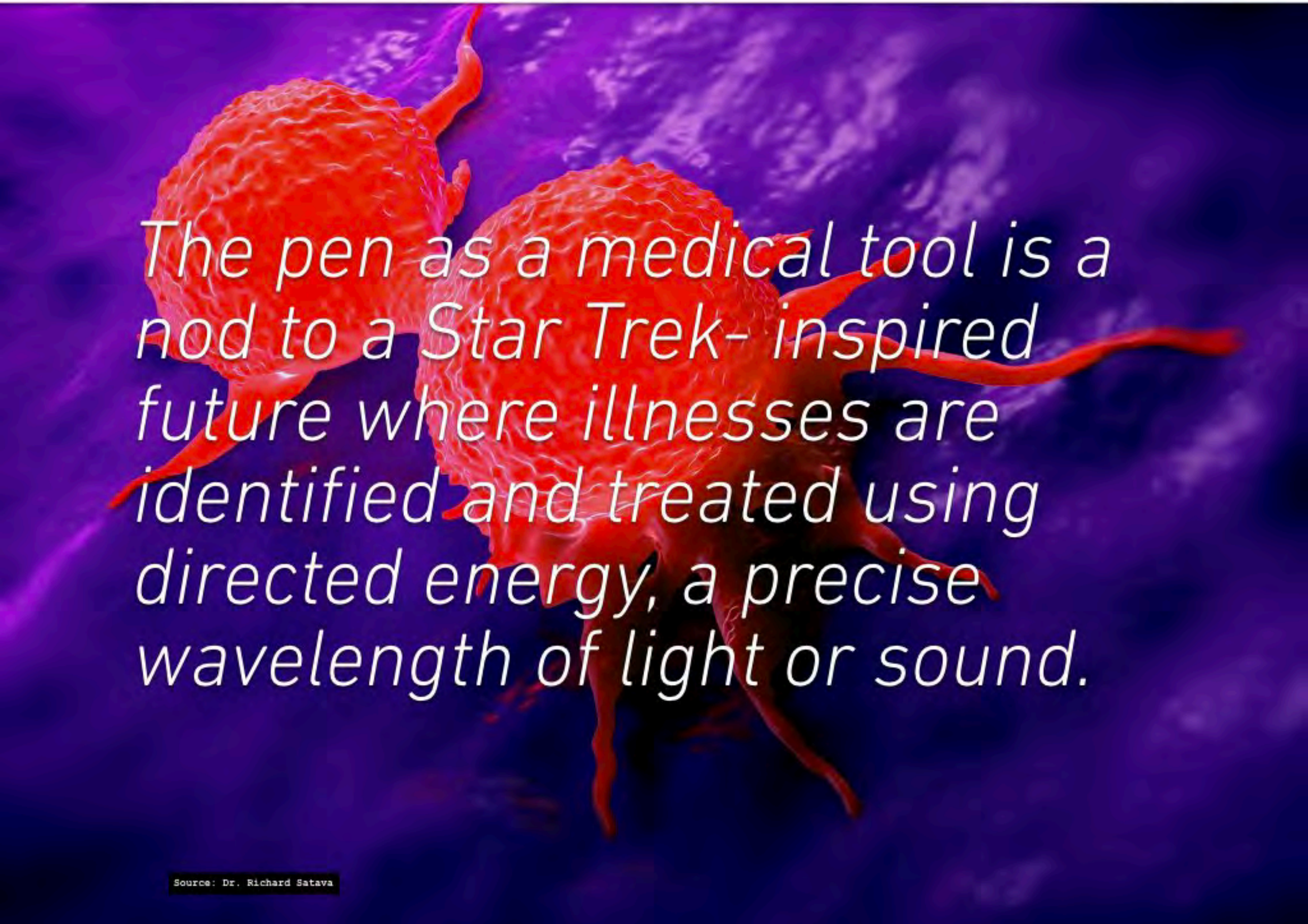
Psychologists

Source: Harvard Business Review

MAGIC MEDICAL WANDS

A pen isn't just for paper. Researchers at the University of Texas at Austin have developed a pen-like tool that identifies cancerous tissue during surgery, which can mean the difference between a successful procedure or not.

Source: New Atlas


The pen as a medical tool is a nod to a Star Trek- inspired future where illnesses are identified and treated using directed energy, a precise wavelength of light or sound.
Source: Dr. Richard Satava

Directed energy is employed with a wand that moves over the body to pinpoint what ails within.

"We can do that," said Dr. Richard Satava, a surgeon who worked with NASA. "With this technology, you can help Alzheimer's patients with a specific wavelength of light, or stop a hemorrhage bleeding internally with a super wavelength of sound."

Dr. Richard Satava warns that drug companies aren't interested in directed energy.

Lat: 40.7574377 Lon: -73.9754319

> “Ignoring directed energy because the drug companies’ business is making drugs is like where we were 20 years ago with digital imaging and photography. Now the pharmacy is equivalent to Kodak.”
>
> **- Dr. Richard Satava, surgeon who worked with NASA**

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Richard Satava

CITIZEN SURGEONS

Directed energy is already used in LED lights with skincare and plastic surgery. Tomorrow's self-health care will be one of citizen surgeons zapping away wrinkles, blemishes and what lies beneath.

$19.99

Zap zits with light
Neutrogena's Light Therapy
Acne Spot Treatment

Source: Neutrogena

> “During the 12th and 13th centuries, when we explored the world in cramped ships — they had the same problems as astronauts.”
>
> **- Dr. Richard Satava, surgeon who worked with NASA**

Source: Dr. Richard Satava

The idea of small-scaling, or living in smaller spaces, is a coveted lifestyle in growing cities, where people choose to live in simpler, modified apartments. But small-scaling has its roots in exploration inherent in space — and long before space.

Many centuries ago, those who set sail across unknown seas faced similar circumstances of small-scaling living: a complete reliance on immediate resources, a common unity with others in close proximity and a modified design to meet life's immediate needs — and the threat of a potentially hostile environment.

HUMANITY, AS VIEWED FROM A SPACESHIP

"Looking out the window, it occurs to me that everything that matters to me, every person who has ever lived and died (minus our crew of six) is down there (on Earth). Other times, of course, I'm aware that the people on the station with me are the whole of humanity for me now."

- Scott Kelly, Astronaut, Author of Endurance

Lat: 40.7574377 Lon: -73.9754319

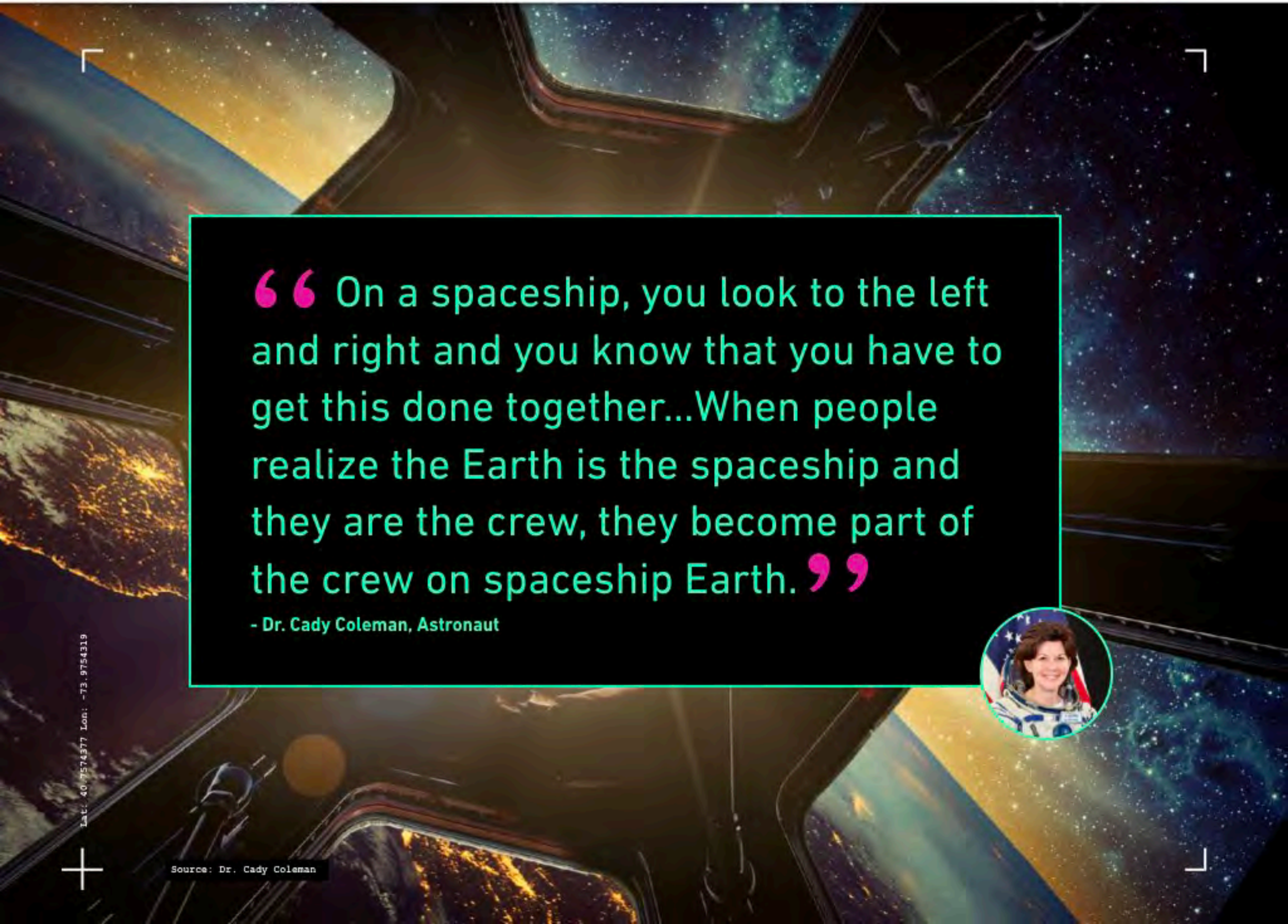
Source: Scott Kelly, Endurance

300,605

Number of Asgardians, members of nonprofit organization Asgardia, which is forming the first nation in space. It has a declaration of unity: Asgardia is a "free and unified space nation."

Lat: 40.7574377 Lon: -73.9754319

Source: Asgardia



> “On a spaceship, you look to the left and right and you know that you have to get this done together...When people realize the Earth is the spaceship and they are the crew, they become part of the crew on spaceship Earth.”
>
> **- Dr. Cady Coleman, Astronaut**

Lat: 40.7574377 Lon: -73.9754319

Source: Dr. Cady Coleman

CREATING SPACE FOR INNOVATION

Our ability to think of life from new perspectives, from the ground above and back, is just the beginning. This flattening effect of oneness, often cited by astronauts, unites humanity.

If anything, space is an aspirational ingredient we can all tap into.

Ask yourself, what is your space strategy? Look above, and find one.

Lat: 40.7574377 Lon: -73.9754319

CONTRIBUTING THOUGHT LEADERS

Dr. Cady Coleman

Former Astronaut

Having flown twice on the Space Shuttle and spent almost six months on the International Space Station (ISS), Dr. Cady Coleman has been privileged to see the world from a different perspective than most. She envisions a future where people from all over the world work together to solve problems that affect everyone on planet Earth, and she is certain that these problems can be solved by mandating diverse and inclusive teams. Cady was educated at MIT and the University of Massachusetts at Amherst as a polymer chemist and was commissioned in the U.S. Air Force, retiring as a Colonel. While aboard the ISS, she served as the Lead Science and Robotics Officer for Expeditions 26/27. Her ground-based jobs for NASA's Astronaut Office included serving as the Lead Astronaut for supply ships from NASA's commercial partners, and the Chief of Robotics. Before retiring from NASA in 2016, Cady led open-innovation and public-private partnership efforts at the Office of the Chief Technologist at NASA Headquarters in Washington, D.C. and is especially proud of her work with LAUNCH.ORG, an innovation platform dedicated to using public-private partnerships for sustainability challenges. A public speaker and consultant, Cady is passionate about sharing her leadership, inclusive collaboration and about advancing the human footprint in this exciting new era of space exploration. She resides with her husband, glass artist Josh Simpson and son Jamey in Shelburne, Mass.

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Dr. Michael Nelson

Internet Futurist, Chief Policy Advisor, Cloudflare

Dr. Michael Nelson works on Internet-related global public policy issues for CloudFlare, a startup that has improved the performance and security of more than four million websites. Previously, Mike was a principal technology policy strategist in Microsoft's Technology Policy Group and a Senior Technology and Telecommunications Analyst with Bloomberg Government. He has taught Internet policy and innovation as a Visiting Professor in the Communication, Culture and Technology Program of Georgetown University. As Director of Internet Technology and Strategy at IBM, he shaped and communicated IBM's vision for the Next Generation Internet. He was Director for Technology Policy at the Federal Communications Commission and a Special Assistant for Information Technology at the White House Office of Science and Technology Policy where he worked with Vice President Gore and the President's science advisor on issues relating to the Global Information Infrastructure,. Mike serves on the boards of the Arthur C. Clarke Foundation and the European Institute. Mike was recognized as a Global Leader of Tomorrow of the World Economic Forum. He has a B.S. from Caltech and a Ph.D. in geophysics from M.I.T.

Ping Fu

Founder of Geomagic, Entrepreneur, Author, Futuremaker

Honored by Inc. Magazine as "The Entrepreneur of the Year" in 2005, Ping Fu co-founded Geomagic, a leading US software company which pioneers 3D technologies.
From repairing vintage cars at Jay Leno's garage to preserving US treasures and digitally recreating the Statue of Liberty, Geomagic enables design and production at a cost lower than that of mass production. As Chief Entrepreneur Officer at 3D Systems, Ping led the corporate growth strategy, new market development and entrepreneurial and innovation programs.Awards for her leadership include Outstanding American by Choice Award from U.S. Citizenship and Immigration Services (USCIS), Entrepreneur of the Year by Inc. magazine, Ernst & Young Entrepreneur of the Year (Carolinas), and Life Time Achievements award by Business Leader magazine. Current board roles include Gelsight Inc, The Long Now Foundation, and Advisory Board roles for Modern Meadow and the International Advisory Board of the Mohammed Bin Rashid Centre for Government Innovation. Ping has a MS degree in Computer Science from University of Illinois Urbana-Champaign and studied Chinese literature at Suzhou University in China. Her 2013 memoir "Bend, Not Break: Life in two worlds", is a New York Times bestseller.

Stephen Dunne

Managing Director Starlab & Neuroelectrics

Stephen Dunne is the Managing Director at Starlab, where he is focused on bringing Science to Market in order to exploit this research through partnerships and spin-offs. Stephen graduated from the University of Wales Aberystwyth where he studied Planetary and Space Physics and Queen's University Belfast where he studied Optoelectronics and Information Processing, carrying out a research thesis on spiral galaxy rotation at the Instituto de Astrofísica de Canarias,Tenerife. Following several years in Software Engineering, he joined Starlab Barcelona in 2003 in order to continue working on Space technologies, particularly Earth Observation, for the European Space Agency and other industrial clients.

CONTRIBUTING THOUGHT LEADERS

Dr. Sarah Jane Pell

Space Artist, Researcher of New Worlds

Australian artist Dr. Sarah Jane Pell explores themes of human-aquatic adaptation to other worlds and extreme-performance interfaces are central to her work. She is best known for pioneering "aquabatics," performed underwater or shown in museums as films and artifacts. She designs civilian space-analogues, produces speculative fiction, live art, and novel experiments, and contributes to exploration science and outreach. In 2016, Dr. Pell qualified as an Artist-Astronaut Candidate for the suborbital spaceflight aeronomy experiment with Project PoSSUM. She partnered with Project MOONWALK as the Simulation Astronaut for the Human-Robotic Collaboration EVA Simulation Mission trials at the Comex Undersea Lunar Analogue site, Marseille FR. Dr. Pell will join the SeaSpace Research and Exploration Society team at Aquarius Reef Laboratory, US in 2018 as Prime Crew for the Project POSEIDON: 100 Day Undersea mission as an Artist-Aquanaut. Dr. Pell is a TED Fellow, Gifted Citizen and Australia Council Fellow. She serves on SeaSpace Boards and Committees including: Co-Chair, European Space Agency (ESA) Topical Team Art & Science [ETTAS]; Senior Advisor of Space Art and Human Exploration Initiatives, Icarus Interstellar.

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Bill Welser

Director of Engineering and Applied Sciences Department, RAND Corporation

William (Bill) Welser IV is the director of the Engineering and Applied Sciences (EAS) Research Department at the RAND Corporation, a professor at Pardee RAND Graduate School, and co-director of RAND's Impact Lab. His design of a cryptographic solution for avoiding collisions in space was developed into working prototypes via the DARPA PROCEED program. His research has been published in Scientific American, Foreign Affairs, Time, and BusinessWeek, and others. His military service included time spent at the Space and Missile Systems Center and the Electronic Systems Center. Bill received his B.S. in chemical engineering from University of Virginia, his M.B.A. from Boston College, and his M.S. in finance from Boston College.

Eric Stallmer

President, Commercial Spaceflight Federation

Eric Stallmer is the President of the Commercial Spaceflight Federation. CSF is the largest trade organization dedicated to promoting the development of commercial spaceflight, pursuing ever-higher levels of safety and sharing best practices and expertise throughout the industry. Under Stallmer's leadership, CSF has worked tirelessly to craft the modern Commercial Space Launch Act, as well as to promote innovation as a national policy to spur the economy and create high technology jobs. In addition, CSF works to develop industry standards and encourages further growth in the commercial spaceflight industry.

Olga Bochkareva

Innovation Marketer, Russian Aerospace Expert

Olga Bochkareva is innovation marketer, trendspotter, space enthusiast and expert on Russian aerospace movements and trends. She has been infatuated with outer space and its influence on our day-to-day lives since childhood when her father, the aircraft engeneer, introduced her the basics of aerodynamics and the universe of science fiction. Nowadays the Russian cosmism, space exploration, private space and global New Space Oddity trend are spheres of her interest as a consultant.

CONTRIBUTING THOUGHT LEADERS

Dr. Michael Roberts

Deputy Chief Scientist, CASIS

Dr. Michael Roberts is Deputy Chief Scientist of the Center for the Advancement of Science in Space (CASIS) ,where he works to imagine and enable science in space for life on Earth utilizing the International Space Station National Lab. Prior to joining CASIS, Michael worked as a microbial ecologist, molecular biologist and group lead in the NASA Advanced Life Support program at the Kennedy Space Center. He has a B.A. from Maryville College, a Ph.D. in microbiology from Wesleyan University, and was a post-doctoral researcher in the Center for Microbial Ecology at Michigan State University and the RIKEN Institute in Wako-shi, Japan.

Pam Melroy

Former Astronaut

Pam Melroy is a retired Air Force test pilot and former NASA astronaut and Space Shuttle commander. She received a degree in Physics and Astronomy from Wellesley College and a Master of Science degree in Earth and Planetary Sciences from the Massachusetts Institute of Technology. Colonel Melroy is a United States Air Force test pilot. She flew the KC-10 for six years at Barksdale Air Force Base and is a veteran of Operation Just Cause and Operation Desert Shield/Desert Storm, with more than 200 combat and combat support hours. After attending the Air Force Test Pilot School at Edwards Air Force Base, California she was then assigned to the C-17 developmental test program. Selected as an astronaut candidate by NASA, Colonel Melroy reported to the Johnson Space Center, Texas, in March 1995. She flew three missions in space: as Space Shuttle pilot during STS-92 in 2000 and STS-112 in 2002, and as Space Shuttle Commander during STS-120 in 2007. All three missions were assembly missions to build the International Space Station. She is one of only two women to command the Space Shuttle, and has logged more than 38 days in space. Colonel Melroy retired from the Air Force in 2007, and left NASA in August 2009. After NASA, she served as Deputy Program manager for the Lockheed Martin Orion Space Exploration Initiatives program and as Director of Field Operations and acting Deputy Associate Administrator for Commercial Space Transportation at the Federal Aviation Administration. She went on to serve as Deputy Director, Tactical Technology Office at the Defense Advanced Research Projects Agency (DARPA). Colonel Melroy now is a consultant and serves on several technology advisory boards.

Dr. Richard Satava

Professor Emeritus of Surgery, University of Washington Medical Center, Former NASA Commercial Space Center Director, Former DARPA Program Manager

Director, Yale University-NASA Commercial Space Center for Medical Informatics and Technology (CSC/MIT). Richard Satava, MD, FACS, is Professor of Surgery at the University of Washington Medical Center, and Senior Science Advisor at the US Army Medical Research and Materiel Command in Ft. Detrick, MD. Previously, he held positions as the Professor of Surgery at Yale University with the NASA Commercial Space Center for Medical Informatics and Technology (CSC/MIT). He also held a military appointment as Professor of Surgery (USUHS) in the Army Medical Corps assigned to General Surgery at Walter Reed Army Medical Center and Program Manager of Advanced Biomedical Technology at the Defense Advanced Research Projects Agency (DARPA).

Solomon Mordechai

Chairman & CEO Global Eye Investments, Innovation Board Member at XPrize

Solomon 'Sony' Mordechai is the Chairman and CEO of Global Eye Investments Group. Sony is a graduate of Singularity University, and holds a B.Sc. in Banking & Finance from City University. He is currently attending Harvard Business School's executive program for Young Presidents & CEOs. Sony is a member of the Innovation Board of the X-Prize Foundation and a co-founder of Novus Summit. In 2008, Sony bought a ticket to space with Virgin Galactic.

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Chris Blackerby

COO, Astroscale and Former NASA Attache at U.S. Embassy Tokyo

Chris Blackerby is Chief Operating Officer for ASTROSCALE PTE. LTD, a venture company focused on space debris mitigation. In this role, Chris provides strategic management and direction to the company and helps to lead negotiations for global partnerships. Prior to joining ASTROSCALE, Chris was the NASA Attaché in Asia and the senior space policy official in the U.S. Embassy Tokyo from 2012-2017. In that capacity he identified multiple opportunities for cooperation in the region; served as strategic space advisor to the U.S. Ambassador to Japan and senior U.S. Government officials; acted as an official intermediary between NASA and its partners in Asia in negotiating agreements and resolving disputes; and participated in numerous outreach events highlighting NASA activities.

Brian Talbot

Director of Marketing & Communications, Center for the Advancement of Science in Space (CASIS)

Brian Talbot is the Director of Marketing & Communications for the Center for the Advancement of Science in Space (CASIS), where he is responsible for communications and outreach for the International Space Station National Laboratory. Brian is responsible for a range of marketing, public relations, events, and social media programs aimed at increasing awareness of the International Space Station as a platform for innovation. He has more than 18 years of experience serving in marketing and leadership positions in the information technology, aerospace, and consumer electronics. Brian has previously worked for Ogilvy Public Relations Worldwide, Consumer Technology Association (CTA), GTSI, Terabeam Wireless and Paragon Technology Group.

Carissa Christensen

CEO, Founder of Bryce Space and Technology

Carissa Bryce Christensen is an internationally known expert on the space industry and technology forecasting. She led the creation of widely used data tools now considered global metrics for the commercial space and satellite sectors, providing non-advocate, data-driven insights. She is a frequent speaker and author on space and satellite trends, serves as a strategic advisor to government and commercial clients, and has been an expert witness and testified before Congress on market dynamics. Ms. Christensen is the CEO of Bryce Space and Technology, LLC (formerly a division of The Tauri Group), an analytic consulting firm. She is also an active investor in technology-focused startups and advises several companies she has helped seed. She serves on the board of QxBranch, an early stage quantum computing software firm that she co-founded. Ms. Christensen holds a Master of Public Policy degree from Harvard University's Kennedy School of Government, where she specialized in science and technology policy. She also completed the General Course in Government at the London School of Economics and was a Douglass Scholar at Rutgers University. Ms. Christensen is an Associate Fellow of The American Institute of Aeronautics and Astronautics Association.

Michael Paolucci

CEO, Founder of Slooh

Michael is an internet media pioneer, having founded several startups in New York and Connecticut, including Interactive Imaginations, Inc, and 24/7 Real Media, Inc.,which went public in 1998 and was ultimately sold to WPP Group. During that time, Michael innovated the interstitial ad and the first demographically targeted internet ad format. In 2002, he founded Slooh, a worldwide community of people peering into space together. Michael holds patent US 7,194,146 B2, a method for computer image processing of telescope-received camera images of celestial objects. Michael graduated from Cornell University with a degree in economics and is an avid blue water sailor, which he writes from time to time while at sea aboard his beloved boat Marlow.

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AD ASTRA: SPACE EXPLORATION INNOVATION BROUGHT DOWN TO EARTH
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METHODOLOGY

For this report, sparks & honey conducted primary research and interviewed experts in the field of space, including astronauts, industry experts, and thought leaders from our Advisory Board. We surveyed 1,000 people in the US, aged 18 to 65, to engage their perceptions on space. With our proprietary cultural intelligence system, Q, we combed through thousands of signals to build a vision of the future cultural landscape of the space race.

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