

The Human Exploration of Space



**We are adapted to Earth,
our home. Why would
we want to leave?**



**Earth, seen from 6
billion km away by
Voyager 1**

**Someday, something like
this will happen again.**





Or something like this.



And eventually this.

**Ultimately, we will leave
Earth or we will die.**

**So there's at least one
good reason to leave.**

**But what about all the
reasons not to leave?**

**We have responsibilities to Earth
that we are not fulfilling.**



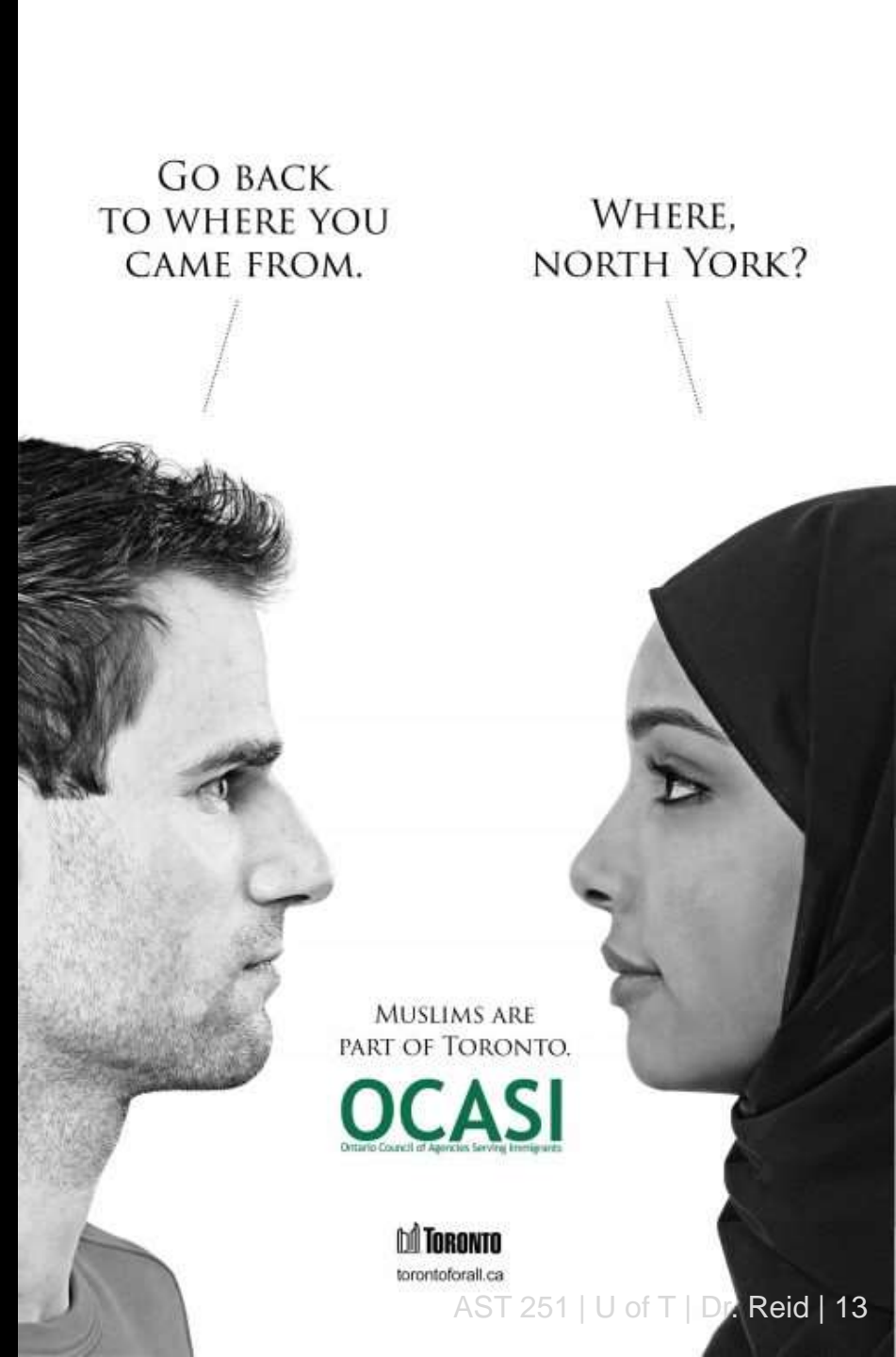
We have responsibilities to each other that we are not fulfilling.





**Too often in our history,
“colonization” has meant
the atrocities of colonialism.**

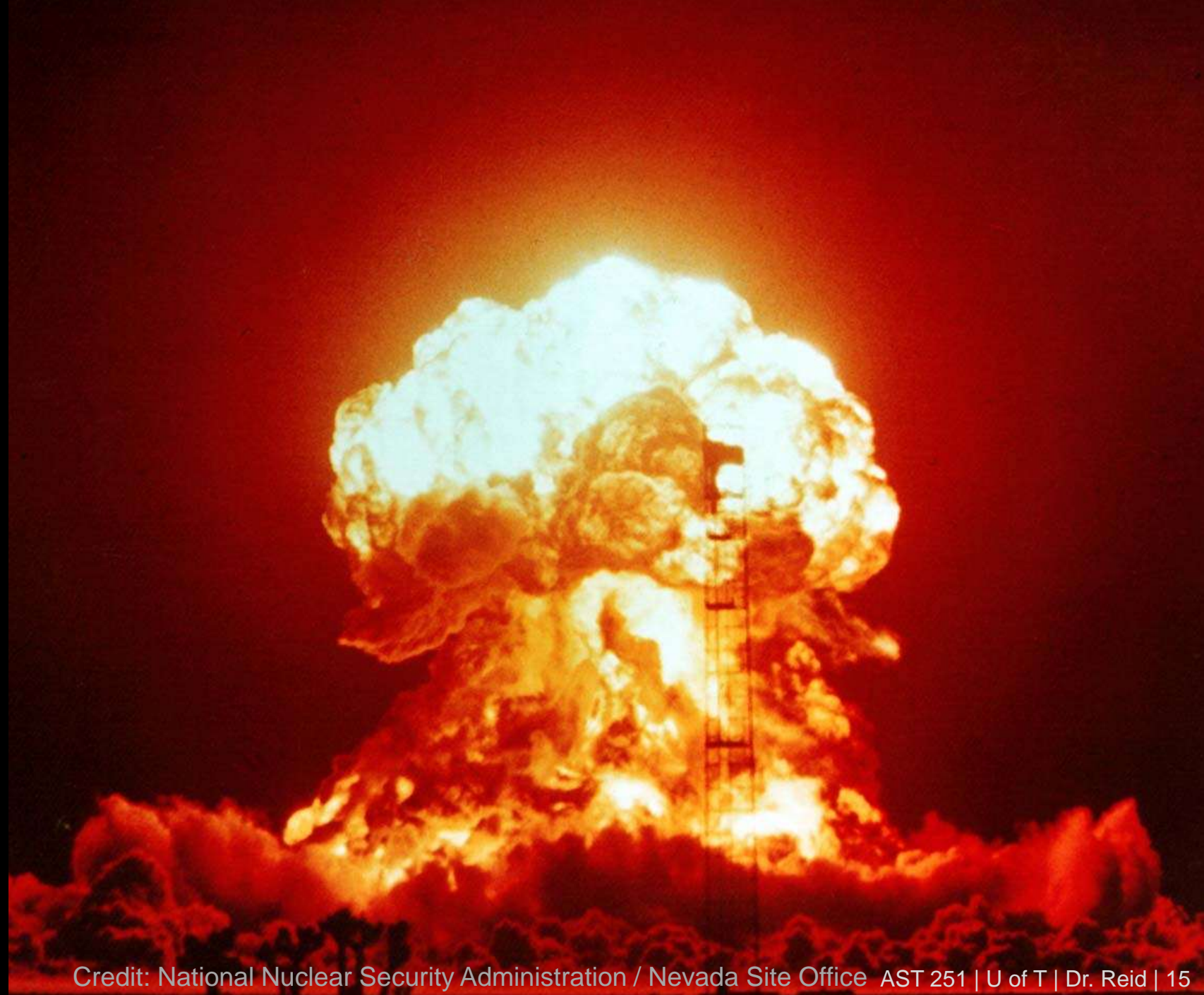
We react to difference with fear and violence. Life on other worlds will be very, very different.





**We show little compassion for
other species, even when they
are very similar to ourselves.
How would we treat aliens?**

Historically, we have responded to new discoveries by making new and more terrifying weapons.



**These are all extremely
compelling arguments.**

**We *should* take care of our
problems at home, and do
some soul-searching.**

**Maybe we don't need to leave
Earth *right now*.**

**Maybe we can wait a bit, until
we've gotten a little wiser. The
universe will still be there
later.**

**But it's vital that we
don't fall prey to false
dichotomies.**



VS





vs



**Estimated cost to send the first
human crew to Mars:**

~\$120 billion

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**Annual global spending on video
games:**

~\$160 billion

**Estimated cost to send the first
human crew to Mars:**

~\$120 billion

**Annual global spending on
tobacco:**

~\$740 billion

**Estimated cost to send the first
human crew to Mars:**

~\$120 billion

Annual global military spending:

~\$2,000 billion

What about all the
positive, amazing,
wonderful reasons to
leave Earth?

The iconic “Blue Marble” photo, taken by human hands aboard Apollo 17, helped kickstart the environmental movement by showing us our planet as a single, coherent entity.



50 years later,
Earth-monitoring
satellites play a
crucial role in
monitoring
climate and the
environment.

7 WAYS TO FIGHT CLIMATE CHANGE WITH SATELLITES



Assess the state of the ozone layer in order to continue protecting it



Monitor air quality and measure pollution



Track changes in ice and permafrost conditions



Provide the authorities with scientific data so that they can make the best possible decisions for the health of our planet



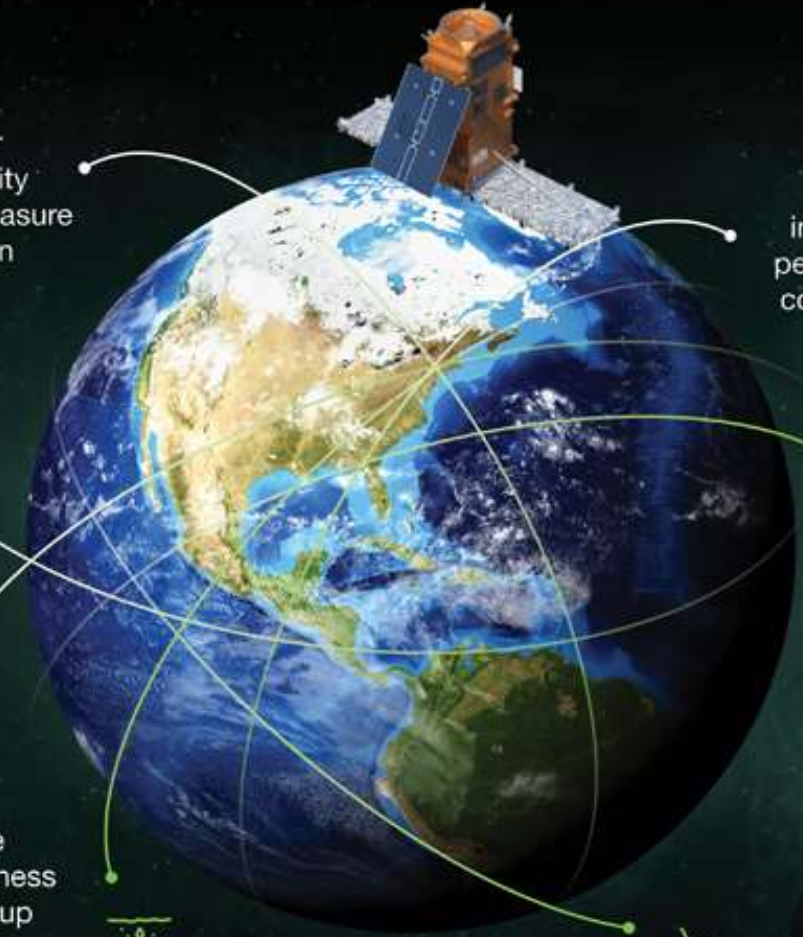
Verify the effectiveness of clean-up initiatives



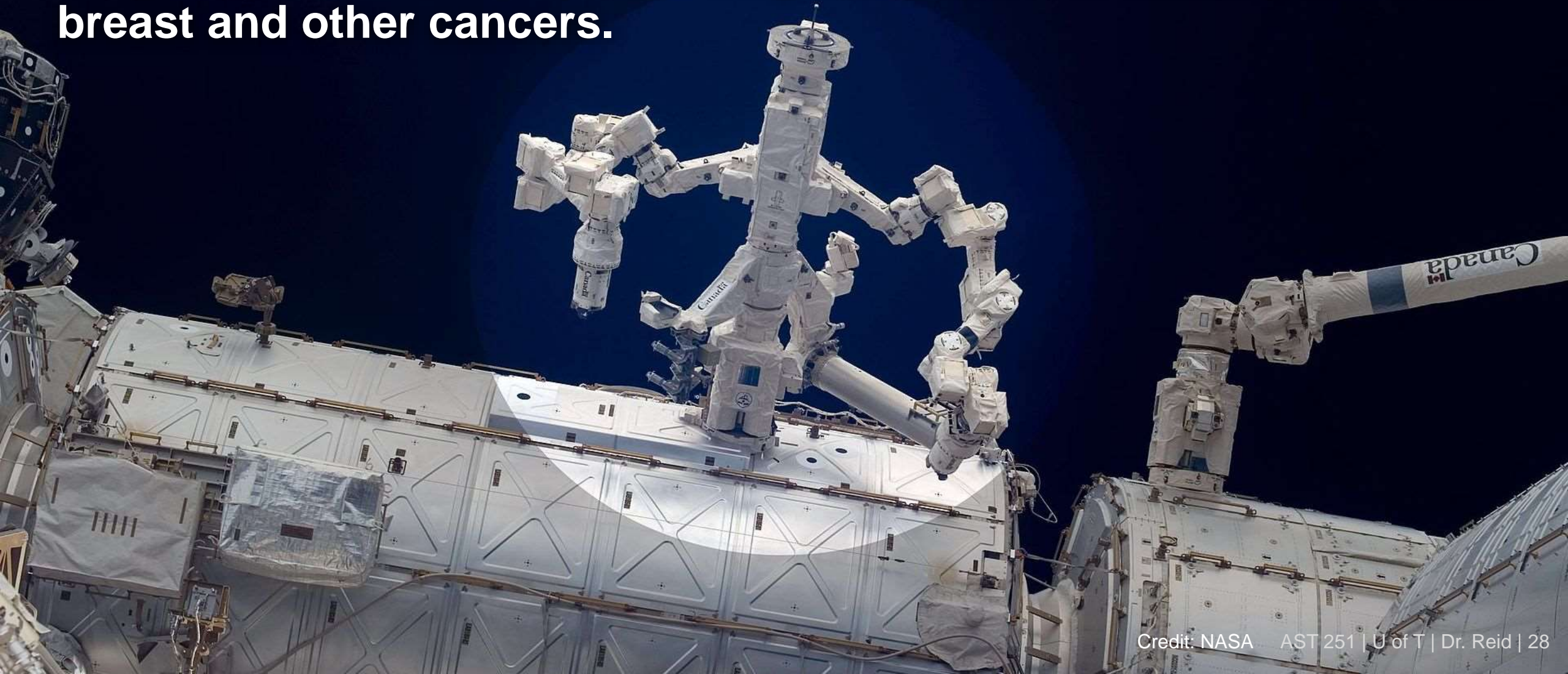
Monitor soil moisture on a global scale



Protect the integrity of forests and ecosystems



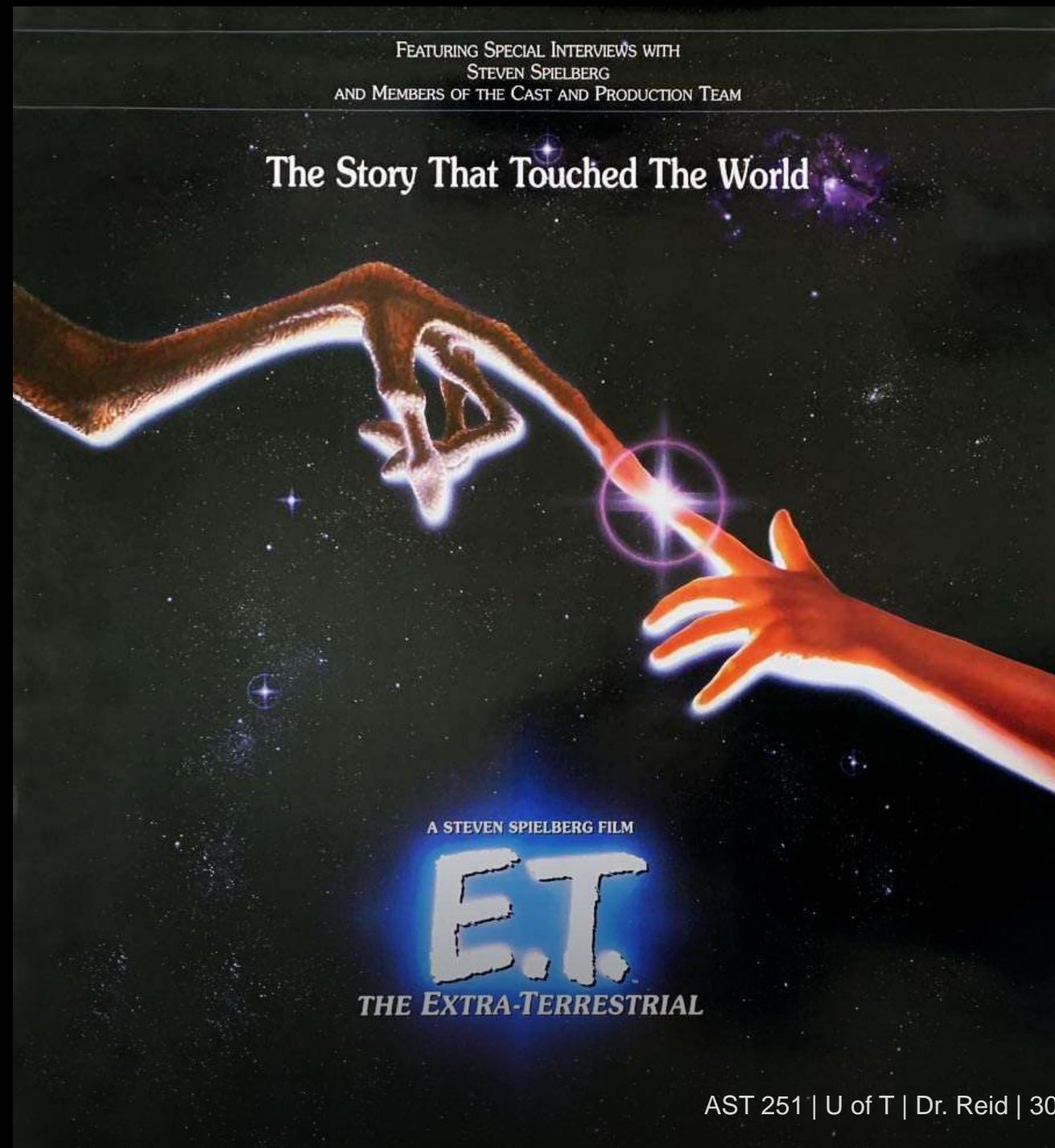
Robotics technologies developed for the Canadarm and Dextre have been used to develop surgical robots that can perform surgeries no human can, and diagnostic tools to identify and treat breast and other cancers.



Exploration is a powerful motivator. It inspires us to reach our maximum potential—then exceed it.



Many people feel a deep longing for contact beyond our species—to know that we aren't alone.



In the humanities, it would make no sense to say “We should only allow future Mozarts to become composers, or future Toni Morrisons to write novels”

That’s not how human potential works.

You have to give everyone the freedom to create and make mistakes, to explore new pathways so they can figure out which are the dead ends, and which lead to transformative new understanding.

It's the same in science—you can use science to try to solve specific problems, but often the results you want will come from a totally unexpected, seemingly unrelated direction.

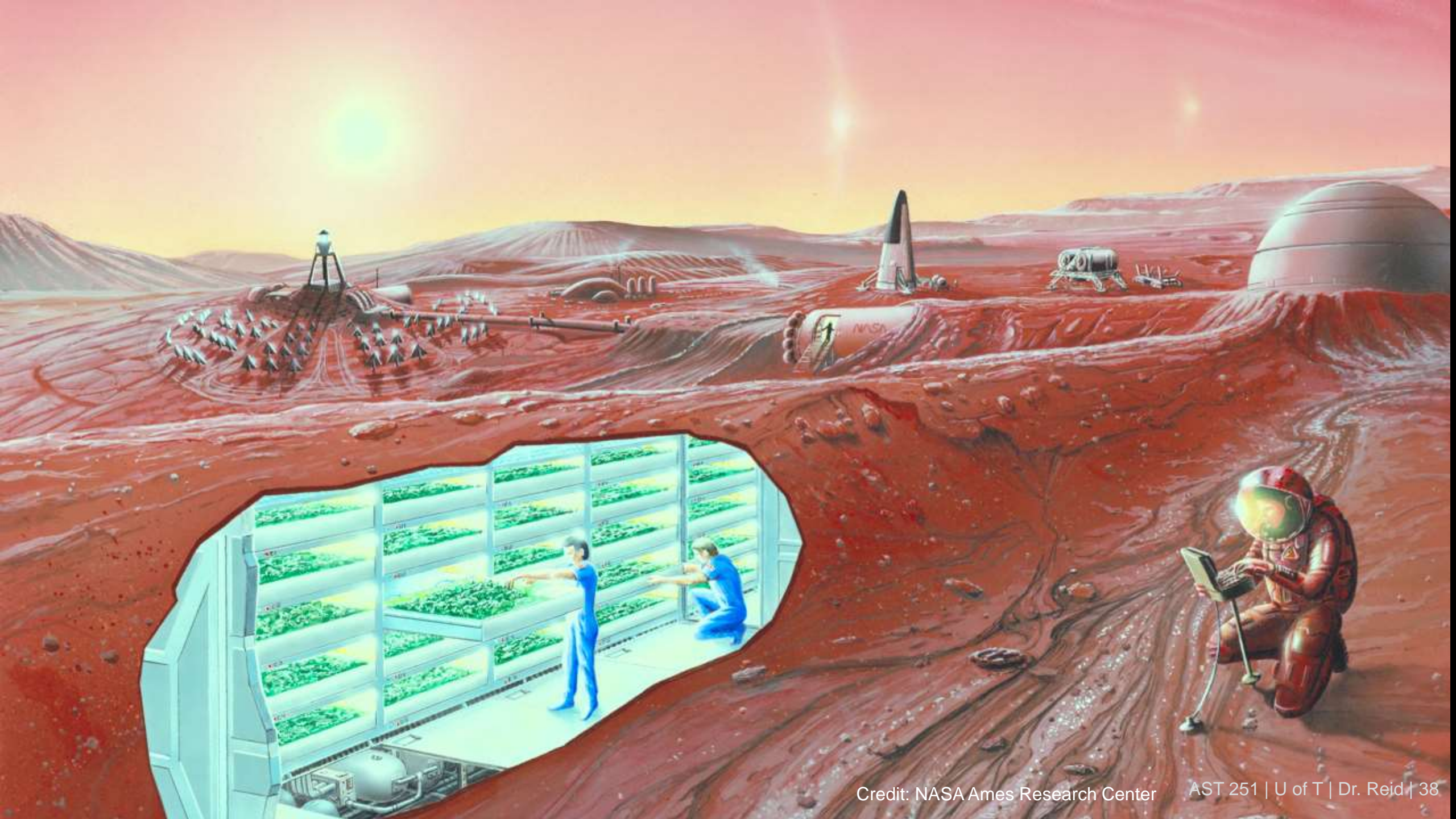
**What you can do is try to
make sure everyone benefits.**

**If we chose to leave
Earth, where would we
go?**

**Nearly all of the focus
right now is on Mars. It's
fairly close and has
many Earth-like
properties.**

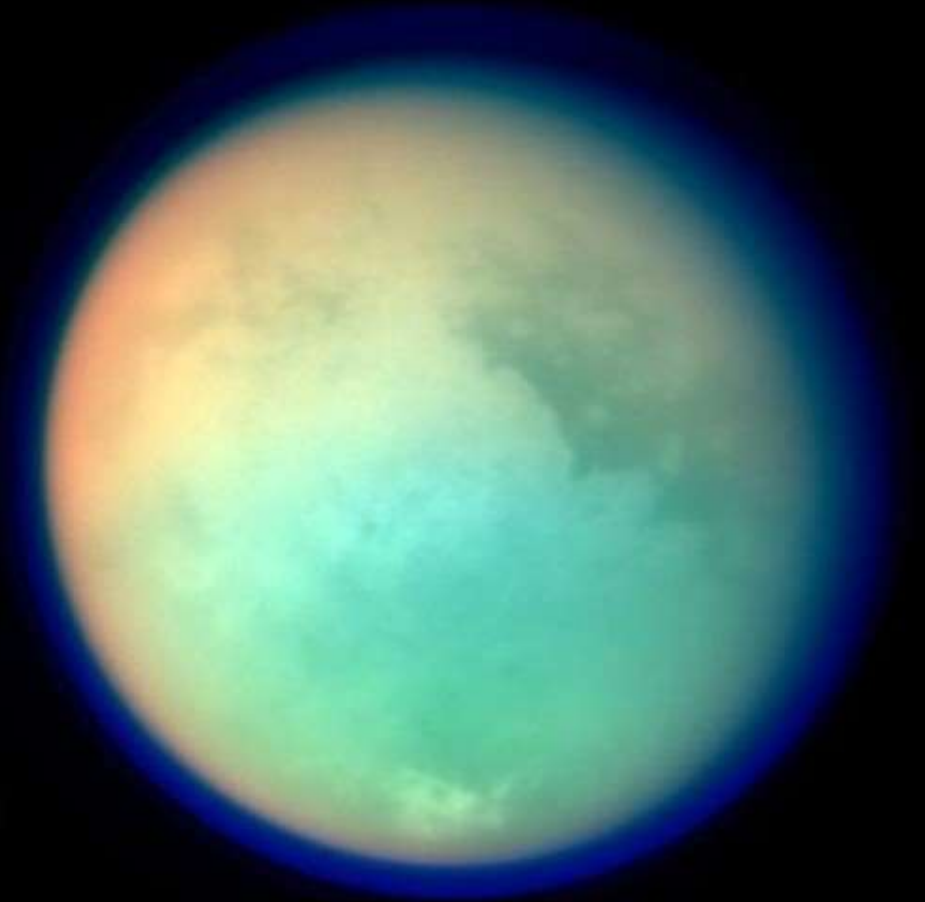
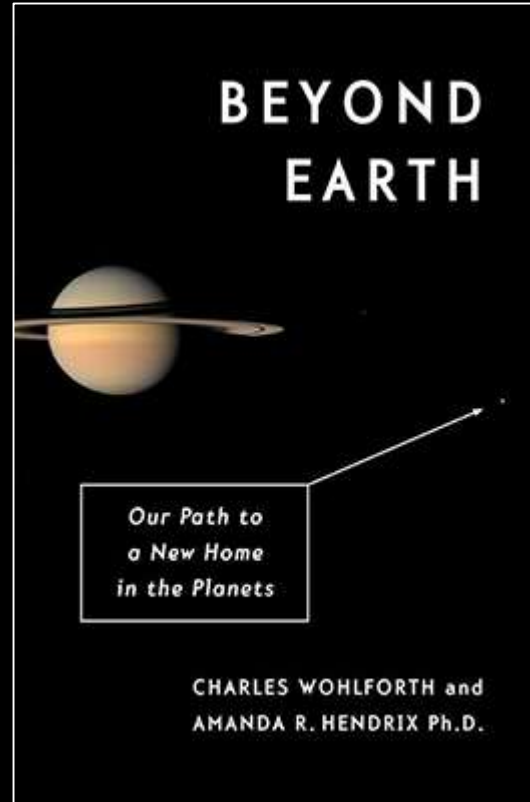
Artist's renderings make life on Mars look easy—even cozy.

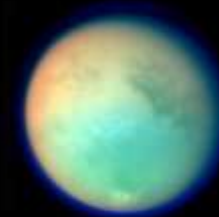




But consider that the most barren desert on Earth is a near paradise compared to Mars—living there will not be easy or cheap, at least initially.

More and more attention is turning toward Titan, which has several advantages over Mars.





Mars

Titan

Atmospheric pressure similar to Earth?	N	Y
Abundant hydrocarbons?	N	Y
Atmospheric and magnetic protection from radiation?	N	Y
Abundant water?	Y	Y
Can fly with strap-on wings?	N	Y
Relatively easy to get to?	Y	N
Written about lovingly for generations in media and sci-fi?	Y	N

At this point, we have most of the **technology we need to go to Mars and potentially stay there.**

The problems we haven't solved are the **ethical, psychological, and political ones.**

**As we make our first great
leap to another planet, who
should go?**

Who should decide?

Currently, the leading contenders to get to Mars are a private American corporation and the US government, via NASA.



The 12 humans who have set foot on another world. They did so between 1969 and 1972.

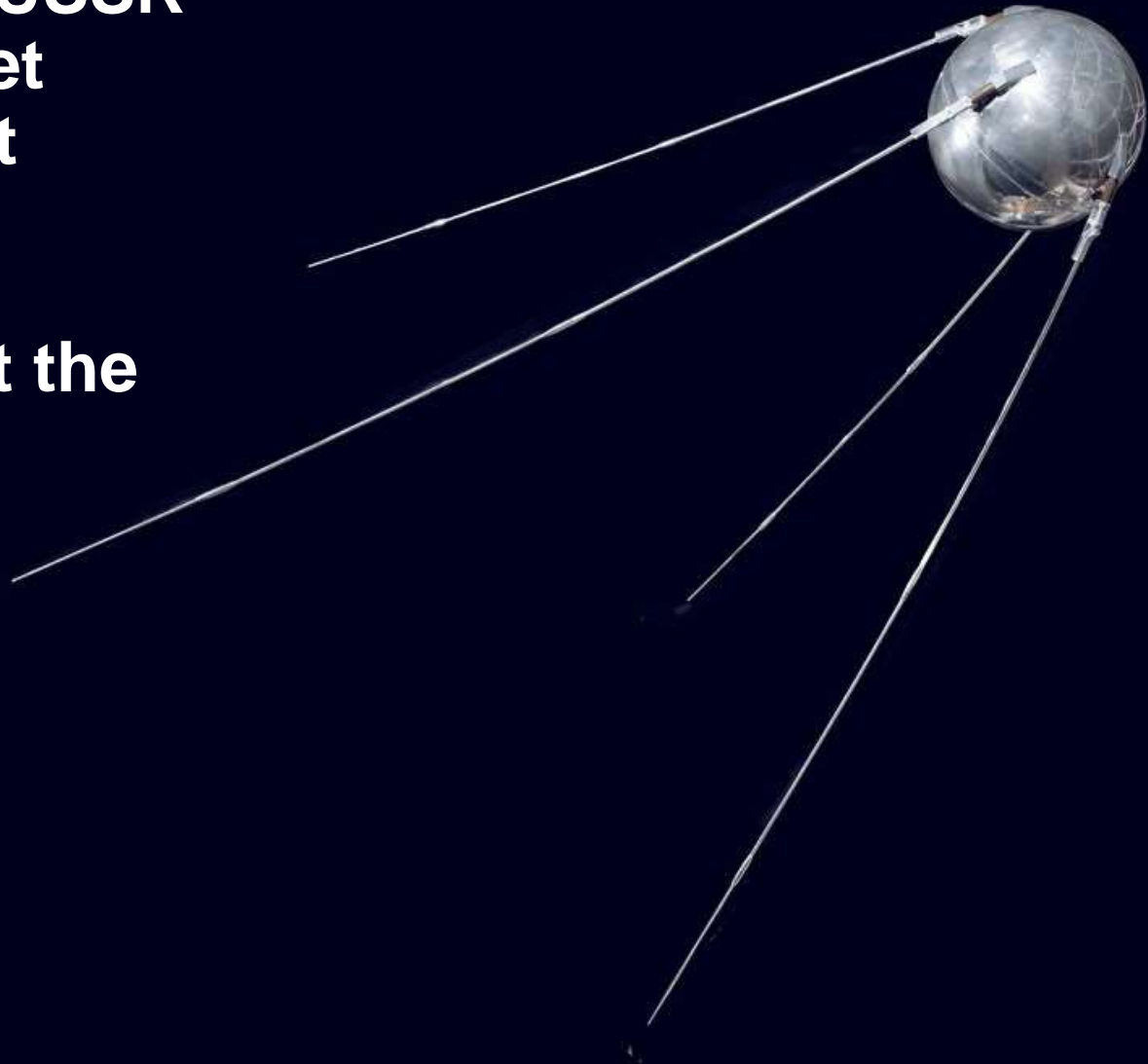
The 9 humans chosen for the first joint NASA/SpaceX crews.



**What's the dominant
narrative for human space
travel?**

Arguably, the first “space race” between the USA and the USSR was triggered by the Soviet launch of Sputnik, the first artificial satellite.

Sputnik raised fears about the weaponization of space.



But the Cold War is over now, so we don't have to worry about militarization of space....right?

After 50 years, it seems that a new space race might again be triggered by nationalism.



In 2014, 178 countries voted in favour of a UN resolution against an arms race in space. 2 countries abstained: Israel and the USA.

On a further initiative against the placement of weapons in space, 4 countries voted against: Georgia, Israel, Ukraine, and the USA. 46 countries abstained.

(Source: <https://www.un.org/press/en/2014/ga11593.doc.htm>)

In 2019, the Trump administration created a new branch of the US military, the Space Force, whose members are named “Guardians”.

What are they guarding?



ROBERT ZUBRIN



THE CASE FOR SPACE

HOW THE REVOLUTION IN SPACEFLIGHT OPENS
UP A FUTURE OF LIMITLESS POSSIBILITY

*"At last, here is the vision we were aiming for when we landed on the Moon.
The Case for Space is the case for the future!"*

—BUZZ ALDRIN, Apollo 11

“We must seek to totally outgun them by obtaining a radical technological advantage. This can be done by achieving space supremacy.

...it is imperative that the United States possess space capabilities that are so robust as to not only assure our own ability to operate in and through space but be able to comprehensively deny this to others.

***Space superiority* means having better space assets than an opponent. *Space supremacy* means being able to assert a complete monopoly of such capabilities. The latter is what we must have.”**

-Robert Zubrin, “The Case for Space”, 2019

If you don't imagine our
future in space, *it will be
imagined for you.*

Very, very soon.

People who value access to space for peaceful, scientific and exploratory purposes are at risk of having their intentions conflated with those who want to exploit and militarize space.

**What other narratives are
there for space exploration?**

**Space exploration can be
about conquest and
exploitation.**

**Or it can be about peaceful
co-operation and discovery.**

Harrison Schmitt is the only scientist ever to have visited another world—on the last Moon mission in 1972.



When I was a child, one of my great space heroes was Dr. Roberta Bondar, a neuroscientist and physician who performed experiments on human physiology in space.

She later became a nature photographer and environmentalist.



**Mae Jemison: engineer,
astronaut, science
literacy advocate, and
the first African
American woman in
space.**



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Credit: NASA, Paramount

In 2014, India became the first country to put a probe in orbit around Mars on their first try





The United Arab Emirates' Hope Mars mission represented a peaceful collaboration between the UAE and several American universities

“I really wanted to go and study [space science]. But I soon came to the realization that space science—that form of physics, that form of creation and finding a new fundamental understanding—was something that was for a few nations. It was segregated towards a small portion of Earth.”

-Sarah Amiri, Deputy Project Manager and Science Lead of the Emirates Mars Mission (Hope)



**The Planetary Society
is a civilian
organization that
advocates for the
peaceful exploration
of space.**



JOIN

From the first flight of my boyhood rubber band-powered airplane, I began searching for My Place in Space. Sitting in professor Carl Sagan's class years later, my path began to crystallize. Today I'm ecstatic to carry on my mentor's legacy as CEO of The Planetary Society.

At The Planetary Society, passionate space fans like you join forces to create our own missions, nurture new science and technology, advocate for space, and educate the world—all to advance space exploration. We're your place in space!

Let's change the world together.

A handwritten signature in blue ink that reads 'Bill Nye'.

BILL NYE
CEO, THE PLANETARY SOCIETY

JOIN OUR JOURNEY



A solar sail spacecraft is shown in space, with its large, crinkled, silver-colored sail fully deployed. The sail is composed of many triangular panels. In the background, the Earth is visible as a curved horizon with blue oceans and white clouds. The scene is set against the blackness of space.

The Planetary Society uses donations to fund the development of solar sailing spacecraft.

**In astronomy, we often
speak of the power of the
Cosmic Perspective.**

**It's possible that we on
our Pale Blue Dot are
unique and alone in
the entire universe.**



But it's a very, very big universe and you never know who might be out there, looking back at us, wondering the same things.