

Why We Explore Earth and Space

Dava Newman

April 27, 2017 · *Interstellar Communications*

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Newman D. Why We Explore Earth and Space: Dava Newman. The Galactic Inquirer. 2017 Apr 27 [last modified: 2017 May 8]. Edition 1.

Abstract

Why do we explore Earth and space? To answer 3 enduring scientific questions for humanity: Are we alone? Are there other habitable planets? Is there life somewhere in the Universe?

Eleanor Roosevelt once said that the **“future belongs to those who believe in the beauty of their dreams.”** So today, I want to take this moment to thank the organizers, the Marchers, the families, and the leaders in science. I thank you for your creativity, innovation, imagination, and for your **“belief in the beauty of your dreams!”**

I think the most important thing we can do is to inspire young minds and to advance the kind of science, math and engineering education that will help young people literally take us to Mars. I call anyone in school today, the **Mars Generation!** Students, it will be one of you who first steps on Mars in the 2030s! I have no doubt that we will become an interplanetary species, within two decades and that we will likely find the existence of life, or past life, on another planetary body, within the next decade.



Why is that so important? Because the scientific discovery of life tells about our own planet, which I call Spaceship Earth! We are all on this precious blue planet together, in the same lifeboat in the Universe, and we urgently need to take better care of it. We need the planet, we need spaceship Earth. Earth really doesn't need us, Earth doesn't need humanity. Earth existed billions of years before we were ever here. Earth and Mars are sister planets each at 4.5 B years old. 3.5 B years ago Mars likely had life, water and was warm, but not today. Today Mars is cold, below freezing and if there is life, it's might be frozen and fossilized. What went so terribly wrong at Mars? We need to know the scientific answer to help us better understand life here on Earth.

As an aerospace engineer and rocket scientist, I have spent my entire career dedicated to furthering STEM education, but I think we delivered the wrong message. We made STEM a thing – you were either In or Out. I often hear from young girls and boys, “that’s not me,” I’m not good at STEM. **I’d like to change the conversation**, I now call it STEAMD. I bring in the ARTS, I bring in DESIGN – the Makers. I’m STEAMD we’re not making more progress, more rapidly and we need to be inclusive! We scientists need the artists, poets, historians and visionaries to paint the pictures and to tell the stories of our Journey to Mars – just like they did during the Apollo program when we explored the moon, when we pushed human scientific and engineering potential beyond what anyone thought was possible and reached another planetary body and looked back on Spaceship Earth – a beautiful, fragile blue planet. Everything we know and love is here on Spaceship Earth.

My message to the Mars Generation: You don't have to be the best in biology, calculus, physics and chemistry. Those are just

tools. As scientists and engineers, we use those tools, so you need to be proficient, but my message to you is... If you want to “discover the origins of the universe?” “find out if there are other habitable planets?” or “build the spacecraft and technology to get humanity to Mars, or provide Clean Water for all, or Cure Disease?” then we need you and it’s my job as a teacher to filter everyone in! No more filtering anyone out, no weeding people out of the sciences. Whatever your passion, in any discipline, then we’re in this together – with me as an educator, teacher, & coach to help you learn and be successful. Surely, if we **change the conversation** and help the students, the Mars Generation, to realize their passions, then we will have the positive impact in the STEM fields that we intended all along.

I like the word STEAMD, because I’m also STEAMD that women are so underrepresented in the workforce when it comes to science, engineering and math. I’m STEAMD that Americans of color are underrepresented. I’m STEAMD that this year there were eight states – eight! – where fewer than 10 girls took the AP (advanced placement) Computer Science exam. I’m especially STEAMD that in my home state of Montana not a single high school girl took the exam. I’m also STEAMD that the same is true of Mississippi.

If our country is going to reach our fullest potential when it comes to science and discovery and economic growth, we must be a place where everyone has the opportunity to reach their fullest potential.

My goal: infinite diversity – infinite combinations! Thank you Gene Roddenberry. We all need to be a part of the solution when it comes to closing these disparities. My next message can be summarized in two words: **“you belong.”**

Be bold, be fearless, dream big dreams, and don’t listen to anyone who tells you can’t do something or you don’t belong. Don’t waste your time trying to explain yourself or your identity to anyone.

When I attended the University of Notre Dame, I was one of only 2 women out of 40 aerospace engineers in my class. When I joined the MIT faculty, I was one of two women on the aerospace faculty with 35 male colleagues. Being first, second, or third is not important. It’s when we stop counting that we know we’ve succeeded. The past two years, I had the distinct privilege of serving in the Obama Administration as the NASA Deputy Administrator (that’s the #2). Our space agency depends on science, discovery, and engineering. And me, a woman from Montana and Massachusetts, got to help lead our investments in science & engineering.

I hope you’ve read the book and seen the movie Hidden Figures. By a show of hands, how many people have? Hidden Figures tells the story of NASA pioneers – Mary Jackson NASA’s first African American engineer and Katherine Johnson. Katherine grew up in segregated West Virginia where her father and mother had to move their family 120 miles away so they could live near a school that allowed African American girls to receive a high school education. team who were referred to as **“computers who wear skirts.”** Yes, the first computers were human!

Within weeks she broke gender and race barriers, joining NASA Langley’s Space Task Force group as a computer. Astronaut John Glenn personally requested that she recheck the calculations made by the new IBM electric computer before the launch of his Friendship 7 mission, in which he became the first American to orbit spaceship Earth! She went on to play a role in virtually every major NASA human spaceflight from Mercury to Gemini to Apollo to Skylab to our Space Shuttle. In 2015 President Barack Obama awarded Katherine Johnson the Presidential Medal of Freedom, the highest honor the President can bestow on a US citizen. And at age 98, she joined us a few months ago to watch the premiere of Hidden Figures, a major Hollywood motion picture about her life’s story. Her true story inspires us all, the Mars Generation, to accomplish the impossible!

We all belong, **you belong**, and I believe we can turn the impossible into the possible! For me, ultimately, science, exploration and discovery are all about raising humanity’s potential. Investment in science, research and technology – helps to cure disease, implement renewable energy, feed the world, and explore the oceans and planets. Scientific research is the lifeblood of a high-tech economy and plays a critical role in the economic and personal well-being of citizens. **If America wants to maintain our innovative edge, create new jobs and realize economic growth, then we must fund scientific research as a top national priority.** Amelia Earhart said: “Never do things others can and will do, if there are things others cannot do or will not do.” Scientists live these words daily, turning science-fiction dreams into science fact. Science expands the horizons of human possibility.

Finally, it is URGENT that we heal Spaceship Earth! Our scientific data show us, without a doubt, with certainty that 2014 was the hottest year ever recorded in the past 140 years. And then 2015 smashed the record – becoming the hottest year ever recorded. Recently, 2016 just broke the record again for the hottest average year we’ve recorded. Matter-of-fact the past 12/13 months have all broken records for the hottest average months recorded. The glaciers in Greenland and Antarctica are melting faster than ever before. Earth is a connected system and oceans have **risen 2.6 in (67 mm) globally in the past 25 years.** These are the scientific facts. The question is: What are we going to do to heal Spaceship Earth, keep our oceans, land and air healthy? There are solutions and I remain ever optimistic that **collectively, we will March, we will Vote, we will Change our behavior, and we will take the corrective ACTION for the betterment of humanity and for Earth** For our children and grandchildren, we should all **COMMIT** to leaving Earth better off than how we find it today.

In the words of Boston’s own R. Buckminster Fuller: **“make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation, without ecological offense or the disadvantage of anyone.”**

Thank you all!

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