SPACE ACE

ASK A SPACE SCIENTIST

Our universe is full of mysteries, and some of the most mind-boggling are in space. Curious kids asked questions, and we sent them to a space scientist. Have questions about space? Send them to brilliant@usbnc.org (with your name and age).

Can you notice environmental issues or changes from up in space? – Iulia, age 12

Artist's concept of the Landsat 9 satellite, launched in 2021, which measures changes to Earth's surface from both natural and human causes.

Hi, Iulia,

Yes! Scientists detect environmental effects on a global scale by observing Earth from orbit. Dozens of satellites orbit Earth, monitoring the atmosphere, the seas, and land. They send back data on Earth's **energy budget**—the difference between energy received from the Sun and energy radiated back to space from Earth. The energy budget is important to understanding our climate. When less energy goes back to space than Earth receives, the planet gets warmer. This is called **global warming**. It affects both the global climate and local weather conditions, such as heat waves.

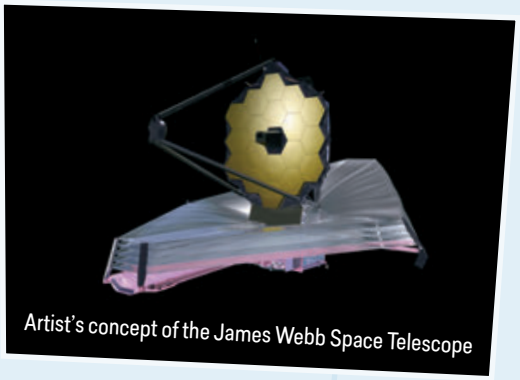
Satellites monitor precipitation, wind velocity, seawater and land temperatures, water levels, and snow depths on land. They also measure chemicals in the atmosphere that affect the **ozone layer**, which protects us by absorbing harmful radiation from the Sun. Satellites can even track wildfires to help manage them and see how they affect ecosystems.

NASA spends over $2 billion each year for these and other Earth observations. They help scientists understand Earth's environment and improve computer programs that predict how it may change in the future. – Steve

COSMIC QUIZ

The James Webb Space Telescope, the most powerful space telescope ever built, was launched in 2021. Its cameras are protected by a sunshield about the size of a tennis court! The telescope sees the universe in a kind of light that is invisible to human eyes, but we can feel it as heat. This light is called:

A) Night Light
B) Gamma Light
C) Infrared Light
D) Hot Light



Artist's concept of the James Webb Space Telescope

Images: NASA/JPL-Caltech/SwRI/MSSS/Kevin M. Gill, NASA/Tony Gray and Tim Powers, NASA, NASA/ESA/Hubble, NASA/Goddard, Tomwang112/Getty

How long do you think [it will be] before climate change makes the largest impact to our daily life? – Adeline, age 13

Hi, Adeline,
When and how severely climate change impacts our daily lives depends on the people and the place. Climate change affects health, and those most at risk are the very young, the very old, and those with limited economic resources. For example, a city with lots of buildings but only a few green areas is called an **urban heat island**.

The U.S. averages six heat waves per year, up from two per year in the 1960s.

Global temperature has been increasing, and heat waves in these heat islands are becoming more severe. An elderly person living there without air conditioning has a serious health impact from climate change today.

In addition, it's predicted that by 2050, climate change will severely affect where farmers can grow food. Water access is a concern, since climate change is expected to reduce spring snow. But coastal areas have rising water levels and flooding.

Fortunately, as the effects are getting easier to see, many people are taking climate change more seriously. Federal agencies in the U.S. are making plans to address the most significant risks. And kids like you can help. You can conserve water and energy at home, and you can help environmental groups in your area. – Steve

BACK IN TIME

Dr. Nancy Grace Roman (1925–2018) was an American astronomer and the first female executive at NASA. She managed what became the Hubble Space Telescope. A telescope named for her will launch in the mid-2020s to study mysteries including:

D_R_ _N_RG_ and D_R_ M_TT_R

STEVE SCOTTI is *Brilliant Star*'s STEM Education Advisor and a Distinguished Research Associate at NASA Langley Research Center in Virginia, U.S. His background is in developing lighter, stronger materials and structures for aircraft and spacecraft. Watching the first astronaut launched into space inspired his interest in space exploration.

ON THE WEB

In our Space Ace video interviews, meet two amazing astronauts!

LELAND MELVIN was a pro football player and a NASA astronaut. When he went to space, it changed his perspective forever.

PEGGY WHITSON was a NASA astronaut and the first female commander of the International Space Station. She broke other records, too.

Check out both videos on Dr. Scotti's STEM Station at **brilliantstarmagazine.org/themes/DrScotti**

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