

Challenges | **Observe**

Observation is critical to gathering the scientific and technical knowledge needed to take action. Space-based technologies, especially Earth-observing satellites, have given us a greater understanding of Earth and allowed us to probe into the depths of space. Challenges in this category will ask you to devise tools that make observation data more accessible for use by scientists, decision-makers, and the public.

A One Health Approach

Air pollution is a major global environmental health risk, causing an estimated seven million deaths across the globe annually. Your challenge is to take an interdisciplinary approach, using both Earth science and health science, and integrate different types of datasets and applications to study the effects of air pollution.

Scanning for Lifeforms

This challenge addresses a pressing global need to track change in biological diversity, which is threatened by human-driven environmental change. Use space agency data to develop innovative ways to detect biological diversity on Earth, track and predict changes over time, and communicate that information to scientists and society.

Hey! What Are You Looking At?

The High Energy Astrophysics Science Archive Research Center (HEASARC) and the Canadian Astronomy Data Center (CADC) archive space agencies' data from missions studying electromagnetic radiation from extremely energetic cosmic phenomena (e.g., gravitational wave detections, gamma ray bursts, and supernovae). Your challenge is to create a visualization tool that can help people interested in these phenomena to access the data quickly and easily.

Home Planet at Your Fingertips

Develop a user-friendly application or tool to discover, visualize, and analyze NASA Earth data for monitoring our home planet.

Challenges | **Inform**

To make good decisions, we all must be well informed. NASA, CSA, CNES, JAXA, and ESA not only gather space-based data, but they also compile archival data and share analysis and results with policy makers, scientists, and/or the broader community. This challenge category asks you to look at space agency data with fresh eyes. Come up with effective ways for engaging others about scientific and historical information.

What Is Our Carbon Footprint?

Your challenge is to identify local sources of carbon emissions and/or estimate amounts of carbon emissions for different human activities to aid scientists in mapping carbon sources and sinks. How can you inform decisions to adapt to the consequences of a changing world and aid policy makers in making plans for the future?

Automated Detection of Hazards

Countless phenomena such as floods, fires, and algae blooms routinely impact ecosystems, economies, and human safety. Your challenge is to use satellite data to create a machine learning model that detects a specific phenomenon and build an interface that not only displays the detected phenomenon, but also layers it alongside ancillary data to help researchers and decision-makers better understand its impacts and scope.

Mission to Planet Earth: A Digital History

NASA's activities in space have brought new knowledge of the Earth, inspiring new ways of thinking about humanity and the planet. However, many people aren't aware that NASA studies the Earth in addition to other planets. Your challenge is to tell stories of NASA's Earth science enterprise using interactive digital tools. This will test your technical skills and your ability to think like a historian or educator.

Challenges | **Sustain**

Advances in space exploration and Earth science have revealed the importance of building a sustainable future. What actions can we take to sustain our home planet, so that it is livable for future generations? And how can we sustain human life in the harsh conditions of space?

Planet, With People

Your challenge is to build on the Human Planet Initiative of the Group on Earth Observations to apply new methods for mapping attributes of human populations. How can Human Planet data from NASA and other sources be used to improve or update maps or other information important to a problem that concerns you? Design or create a tool or service to accomplish this.

Sleep Shift Scheduling To

Sleep loss and fatigue may lead to reduced performance and an increased risk to safety during many activities, including spaceflight. Your challenge is to develop an operational sleep shift scheduling tool that provides autonomous customization of a schedule for sleep, exercise, and nutrition to manage fatigue

Challenges | **Create**

Creation lies at the heart of change. Whether it's artwork, hardware, or a new technology, challenges in this category will ask you to imagine, build, and create awareness.

Virtual Planetary Exploration

Your challenge is to create interactive 3D models of equipment (e.g., planetary geology tools) that future space explorers can use for activities like exploring a planetary surface.

Putting the 'Art' in Artem

Your challenge is to create an artistic work to communicate, inform, or inspire others about humanity's road to Mars. Your art may be in any form, including (but not limited to): drawing, painting, sculpture, computer generated 2D or 3D, music, film, music video, written or spoken word, dance, and textile.

Let's Connect

For bigger spacecraft capable of executing bigger missions, some of the assembly may be done in space. Your challenge is to design a simple approach that enables components to be assembled in space.

Breakthrough

Faster-than-light travel is the key to humanity's dreams of inter-galactic space travel. Your challenge is to create an app, tool, game, or other interactive application that showcases both existing, as well as next generation/theoretical, breakthrough spacecraft propulsion in an engaging way.

Challenges | **Confront**

From natural disasters to social and economic inequality, there comes a time when we must confront the problems we detect. Pick a challenge in this category to tackle a

Better Together

Your challenge is to create a tool, app, or resource that helps close a gap that causes people to experience inequality. This combination of humanity and technology should eliminate or lessen a systemic issue and educate the user so they can grow.

Spot That Fire V3.0

Recent wildfires worldwide have demonstrated the importance of rapid wildfire detection, mitigation, and community impact assessment analysis. Your challenge is to develop and/or augment an existing application to detect, predict, and assess the economic impacts from actual or potential wildfires by leveraging high-frequency data from a new generation of geostationary satellites, data from polar-orbiting environmental satellites, and other open-source datasets.

A Flood of Ideas

Your challenge is to develop a new methodology or algorithm that leverages Earth observation and critical infrastructure datasets to estimate damages to infrastructure caused by flooding. Make a measurable impact on the resilience of nations by helping the Earth observations community contribute to the United Nations' primary effort to reduce disaster risk!

Challenges | **Connect**

Connection empowers us to take action together. Challenges in this category will ask you to examine methods for communicating with one another, and to analyze the complex networks of people and ideas that contribute to space agency missions on Earth and in space.

Can You Hear Me Now?

Human missions to Mars are moving from the realm of science fiction to science fact. Your challenge is to design an interactive application to explore the challenge of communicating with astronauts on Mars from Earth.

Orbital Sky

A huge number of satellites in Earth's orbit support our day-to-day life on the ground. Your challenge is to develop a method to improve public knowledge of these satellites, with an eye towards driving user engagement, enthusiasm, and exploration.

Space Exploration in Your Backyard

The work of space exploration (and the societal benefits it brings) permeates every location and facet of society. Your challenge is to create a visual representation of the breadth of the space sector's influence, showing the network of organizations and locations associated with the work of space exploration.

Data Discovery for Earth Science

Websites like the NASA Earth Observatory showcase the many uses of satellite data to highlight interesting natural events. International partner instruments on NASA satellites such as Japan's ASTER instrument and Canada's MOPITT instrument, both onboard the Terra satellite, are also included as part of the Observatory. This challenge will ask you to devise a tool or technique to guide users to relevant datasets to study specific events.