2025-2026

NASA NATIONAL STUDENT CHALLENGE

ROADS FROM EARTH TO VENUS

WWW.NWESSP.ORG

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About NESSP & Contact Information

About NESSP

Funded by NASA's Science Mission Directorate, the Northwest Earth and Space Sciences Pathways (NESSP) brings NASA science to K-12 students throughout the Pacific Northwest. NESSP's (pronounced "NESPy") goals are to strengthen science, technology, engineering, and math (STEM) education region-wide and to serve as a bridge into other NASA experiences for educators and students.

Contact NESSP

NESSP is headquartered at Central Washington University in Ellensburg, Washington.

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Informational videos, tutorials, and recordings of live-streamed events:
www.youtube.com/nwessp

We also want to see NESSP in action! Share videos or photos of your experience on **Facebook and Instagram** (@nwessp). We also invite you to use our Challenge hashtag #ROADSEarth2Venus.

Disclaimer statement:
"The material contained in this document is based upon work supported by a National Aeronautics and Space Administration (NASA) grant or cooperative agreement. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of NASA."

About the ROADS Challenge

About ROADS

Our Rover Observation and Discoveries in Space (ROADS) program provides a framework for students to explore STEM concepts through hands-on activities. Inspired by real NASA projects, ROADS guides students through space-related missions. Each year the program is updated to address new science and engineering challenges and to explore different bodies in the solar system.

The ROADS framework includes educator Professional Development Workshops, an academic year National Student Challenge, a standards-aligned Companion Course, and summer Mini-Missions. Most students and educators choose to participate in the academic year National Student Challenge which is described in this manual along with the Companion Course.

About the ROADS National Student Challenge

For the 2026 ROADS from Earth to Venus National Student Challenge, we have developed eight Mission Objectives (MOs) inspired by NASA missions that explore carbon cycles, atmospheres, remote sensing, and rover data collection. Teams from Arizona, Idaho, Montana, Oregon, Texas, Washington, and Utah will document their progress in a Mission Development Log (MDL) and showcase their materials to NESSP at a regional Hub event.

The ROADS National Student Challenge is an excellent team-based, hands-on project for students, suitable for in-class group work, school robotics, programming, or other club activities, as well as Scout troops and community organizations. For more information about the ROADS from Earth to Venus National Student Challenge, visit nwessp.org/challenge/roads_from_earth_to_venus.

Mission Advisor and Team Information

Mission Advisors residing in Arizona, Idaho, Montana, Oregon, Texas, Washington, or Utah who have participated in any previous Artemis ROADS I, II, III Challenge or completed the ROADS from Earth to Venus Professional Development Workshop are eligible to lead a Challenge team.

The Mission Advisor is the adult who will guide the team. This person could be a classroom teacher, advisor for an extracurricular club, Scout Leader or any responsible adult from the community. It's the Mission Advisor's responsibility to manage all communications and documentation between NESSP and the team including team registration and information updates.

Challenge Teams are classified into one of three divisions based on the age of their oldest team member at the time of registration.

Division	Maximum Age
Upper Elementary	11 years old
Middle School	14 years old
High School	18 years old

*If needed, teams can be consolidated during the Challenge. NESSP will reclassify the division of the newly consolidated team based on the age of the oldest team member. New team members, who have not been on an existing ROADS from Earth to Venus team, cannot be added after Team Registration closes on Feb 13, 2026.

How to Register a Challenge Team

A ROADS National Student Challenge Team consists of a group of 3-6 students in grades 3 through 12 residing in Arizona, Idaho, Montana, Oregon, Texas, Washington, or Utah working under the direct supervision of an adult Mission Advisor. Team members work together to complete the Challenge MOs. Team members must be enrolled in primary or secondary school or be under the age of 18 at the time of registration to participate. Teams with students in multiple grades should complete the MO Deliverables of the highest grade level within the team. Mission Advisors can register and mentor more than one team.

How to lead a ROADS from Earth to Venus National Student Challenge Team

1. Log in to your ROADS Educator account to complete the application form, provide or update your organization, confirm your organization's Authorized Official Representative (AOR), and contract information. See the FAQ for more details about this year's Challenge requirements.
2. NESSP will send a Standard Agreement contract to your AOR for electronic signature via DocuSign.
3. Once the agreement is digitally signed, Mission Advisors can log back in to their Educator Profile to register teams and request supplies.
4. Update your team's progress via the Educator Account portal.

Required Information

All Mission Advisors must provide the name, gender, ethnicity, age, and upload signed CWU Risk and Release forms for each team member, including themselves, via the ROADS Educator Account portal nwessp.org/challenge/roads_from_earth_to_venus during the Checkpoint 1 submission window of January 30 - February 13, 2026.

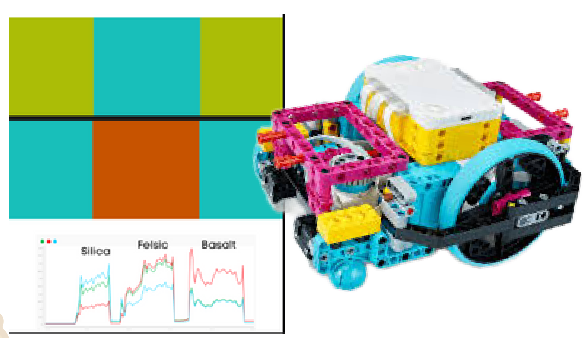
Challenge Supplies

Mission Advisors can mentor more than one team. In order to support as many teams as possible, Mission Advisors are limited to requesting equipment loans for a maximum of three teams. Supplies are available on a first come, first served basis, while supplies last. Please note that some resources are expected to be shared, regardless of the number of team members on a team or the number of teams a Mission Advisor mentors.

Mission Advisors who have received equipment loans for a previous Challenge or PD, such as a LEGO Spike, LEGO EV3, or STEAM4Space Mission Patches are expected to use those supplies in this year's Challenge. Requests for duplicate supplies or supplies in excess of the number of teams cannot be honored.

MO-1 ROADS from Earth to Venus Loterîa

MO-5 Aeropod and accesories



MO-6 LEGO Spike & Data Collection Areas

Challenge Schedule

November 14, 2025
Team Application Opens

November 21, 2025
Team Registration and Supply Request Opens

January 14, 2026
Team Application Closes

January 30, 2026
Checkpoint 1 Opens

February 13, 2026
Checkpoint 1 Closes

February 21, 2026
Checkpoint 2 Opens

March 13, 2026
Checkpoint 2 Closes

April - May 2026
Regional HUB Events

May 29, 2026
Final MDL Submission

Region	Hub Location	Event Date
Texas	University of Texas Center for Space Research	Saturday, April 18, 2026
Northern Idaho	University of Idaho at Moscow	Saturday April 18, 2026
Montana	Montana State University	Tuesday, April 21, 2026
Arizona	Fort Tuthill County Park, Flagstaff	Saturday, April 25, 2026
Southern Idaho & Utah	Herrett Center at the College of Southern Idaho	Saturday, May 2, 2026
Washington & Oregon	Central Washington University at Ellensburg	Saturday, May 2, 2026

How to Complete the Challenge

Once a team is registered for the Challenge, they can begin working on the MOs in any order. The Mission Advisor should help guide the team and submit the team's results at each Checkpoint by the due dates to ensure their work is recognized.

Checkpoint 1 is **required** as it collects the Risk and Release forms and student information needed for recognition.

Checkpoint 2 is mandatory for all teams who would like to apply to attend their regional Hub event.

Final Submission is encouraged for all teams. Recognition will be provided regardless of whether the team completes all eight MOs.

In-Person Hub Events

Teams in states where NESSP has a partner organization are encouraged during their Checkpoint 2 submission to apply to attend a regional Hub Event. Space is limited at each Hub Event and invitations will be extended to teams by the regional Hub Coordinators.

All regional Hub events will take place in April or May 2026. The dates and times are listed in the table on the previous page. Additional information will be available during Mission Advisor Support Session 2 on Feb 26, 2026.

Hub events give students the opportunity to present their work to NESSP personnel, university experts, and other Challenge teams. Student teams can complete MO-8 either at a regional Hub event (MO-8a) or their location (MO-8b). In either case, teams must submit their MDL via upload by May 29, 2026.

About the Companion Course

The ROADS from Earth to Venus Companion Course is designed to support each Challenge MO by providing classroom-ready Next Generation Science Standards (NGSS) aligned lessons. Teams are not obligated to complete any part of the Companion Course, however Mission Advisors may find the lessons valuable extensions or supplements to the Challenge's MOs.

Educators can learn more about the ROADS from Earth to Venus Companion Course and view previous Companion Courses materials at nwessp.org/companion-course-repository.

Alignment of Companion Course Lessons and Challenge Mission Objectives

Companion Course Lesson	Unit	Student Challenge Mission Objective
1	Understanding the Mission	MO-1: Documenting Your Mission
2		MO-2: Building a Strong Project Team
3	Understanding the Earth and Venus	MO-3: Modeling Moving Carbon
4		MO-4: Investigating Atmospheres
5	Exploring Venus	MO-5: Capturing Data from Afar
6		MO-6: ROV-ing for Detailed Data
7	Bringing the Mission Home	MO-7: Envisioning Your Role
8		MO-8: Reflecting on and Presenting Your Mission

Mission Objectives Summary

MO-1: Documenting Your Mission
A Mission Development Log (MDL) is the summary of your mission. Using your preferred methods of recording information (e.g. photos, diagrams, maps, typing, writing), document what you planned to do, what you actually did, and what you learned from the things that went right AND wrong. All members in the team should contribute!

MO-2: Building a Strong Project Team
A mission patch is an important symbol of any NASA mission, reflecting the team, object of study, spacecraft, mission goals, or a combination! How will you represent your mission and crew with images and symbols?

MO-3: Modeling Moving Carbon
Carbon is the basis of all known life--and of this mission objective! After exploring two complex models of Earth's carbon cycle, your team will use your knowledge to construct a carbon cycle for your local area and for Venus.

MO-4: Investigating Atmospheres
Why do planets have such different atmospheres, and why are those differences important? In this MO, you will plan and carry out investigations to answer this question, then use your knowledge to compare Earth and Venus.

MO-5: Capturing Data from Afar
It's smart to have a plan before you go somewhere new, but how do we learn about places, like Venus, where humans have never been? In this MO, you will learn how to capture and interpret images from afar to help guide detailed exploration later.

MO-6: ROV-ing for Detailed Data
NASA instruments that reach the surface of Venus won't survive long in the harsh conditions. In this MO, you will race your rover against the clock to collect as much color sensor data as you can.

MO-7: Envisioning Your Role
Teamwork makes the dream work, and this is especially true at NASA. While astronauts get a lot of attention, it takes hundreds of other roles all working together to complete a successful NASA Mission. In this MO, each team member will tell us about their dream role at NASA.

MO-8: Reflecting on and Presenting Your Mission
IT'S GO TIME! Your team has modeled and tested its mission to Venus, and now it is time to share your findings. Put the finishing touches on your MDL and present your work. Can you convince NASA that you're ready to launch?

Documenting Your Mission

Summary

When NASA has many people working on a complex project over a long time, how do they stay organized and recognize everyone's contributions? Through documentation! In this activity, all team members will learn about the ROADS from Earth to Venus Mission Objectives (MOs) and identify their own "funds of knowledge" that will help them achieve these goals. Each student will keep track of their work in a Science & Engineering Notebook (SEN). Then, teams will come together to select evidence (such as photos, diagrams, maps, typed notes, or handwritten entries) for each MO and compile it into one Mission Development Log (MDL) for the team.

Materials Needed

- Science and Engineering Notebook (any notebook or binder should work)
- Digital access to the Mission Development Log (MDL) template

Resources from Companion Course Lesson 1:

- Engage Section: Resources to learn more about Venus.
- Explore Section: A fun Lotería card game in English and Spanish to help teams learn more about Venus.
- Explain Section: A guided activity to introduce the Challenge's MOs and identify students' relevant funds of knowledge.
- Elaborate Section: Guided activities to teach students about the Science & Engineering Notebooks (SEN) and an introduction to the Challenge Mission Development Log (MDL).

Additional Resources:

- Companion Course Lesson 1: Documenting Your Mission
- MO one-pager
- Mission Development Log (MDL) Template
- Funds of Knowledge Worksheet
- Past MDL Examples

Getting up to Speed

To learn more about the history of NASA and how NASA documents its work and accomplishments, check out the resources in the Getting up to Speed with ROADS from Earth to Venus document.

Mission Guidance

For this MO, teams should begin by learning about previous and planned missions to Venus. You can do this by browsing NASA's Venus Exploration website, watching Venus YouTube videos, reading an astrobiology graphic novel, and even playing a game of Lotería.

Team members should document their work, including what they have learned about NASA's missions to Venus, in their own Science & Engineering Notebook (SEN). The SEN will also be used to keep records of scientific investigations, initial and final engineering designs, successes, and failures—anything the team needs to record as they complete their mission! Documentation and evidence of their work can take many forms. This may include written work (in the language they feel most comfortable using), storytelling (audio and video recordings), art (sketches, paintings, models), diagrams, data tables, and more.

Teams will not submit all of the documentation recorded in their SENs to NESSP. Instead, team members will work together to select the most relevant information from their SENs and tailor it to tell the story of their mission in a team Mission Development Log (MDL). In other words, they will demonstrate how they met the Mission Objective Deliverables. An MDL Google Slides template is provided, along with instructions on modifying the template in multiple formats. Teams can assign a lead to document the team's work for each MO in the MDL. However, all team members should contribute to compiling the MDL and take turns being the lead documentarian.

A fun way to have students learn about the Challenge is through an Earth and Venus-themed Lotería. Loterîa is a well-known game from Mexico similar to Bingo. Download the game and learn how to play in the Companion Course Lesson 1 Explore Section.

Students and their families possess a wealth of knowledge, skills, and resources from their homes and cultural activities. We refer to these as 'funds of knowledge.' Team members are strongly encouraged to utilize their funds of knowledge during the Challenge and to document them in their MDL. For assistance in identifying each team member's funds of knowledge, refer to the Elaborate section in the associated Companion Course lesson.

Deliverables

At the end of the Challenge, teams will only send a Mission Development Log (MDL) to NESSP which summarizes what they did for each MO. The end of each MO lists the "Deliverables" that must be included in the MDL. For MO-1, the 'Deliverables' list explains what each team needs to know to start their MDL.

MO-1: What must be in your Mission Development Log (MDL)?

Every MDL must:
• Use the MDL template.
• Include title/slide page with
   ◦ Team name
   ◦ Team members' names
• Include a short team member biography and a completed "Funds of Knowledge" table.
• Describe the grade-band appropriate deliverables for each Mission Objective completed.
• Be 50 slides or less (including the green MO direction slides, see template for details).

Building a Strong Project Team

Summary

A mission patch is an important symbol of any NASA mission, reflecting the team, object of study, spacecraft, mission goals, or a combination! How will you represent your mission and crew with images and symbols?

Materials Needed	Resources from Companion Course Lesson 2:
• Art supplies, if creating the missions patch by hand OR • A computer and art or graphic design software, if creating the patches digitally	• Engage Section: Prompts to help students explore the shapes and images that are significant to them. • Explore Section: Slides and links with examples and explanations of mission patches from NASA and NESSP to inspire students.
	Additional Resources:
	• Companion Course Lesson 2: Building a Strong Project Team • Local and Cultural Art Forms to Inspire Your Mission Patch

Getting up to Speed

Since 1965, NASA teams have been working together to design patches for their missions. These patches usually show the mission's name and number, the names of the crew members, and pictures that represent something important about the mission or the team. Creating these patches helps the team feel united and gives them something to remember their mission by forever.

To learn more about NASA mission patches, check out the resources in the Getting up to Speed with ROADS from Earth to Venus document.

Mission Guidance

Teams are encouraged to get creative and design a mission patch representing themselves, their community, and their mission for the ROADS Challenge. The Companion Course has resources that can help teams identify and incorporate images and text that are relevant to both the mission and to themselves and their community. Use the format (drawing, computer graphic, hand-crafted) that works best for you.

Local and Cultural Relevance

Looking for inspiration based on your local culture or traditions? Check out this Padlet of local and traditional art forms!

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SENs). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objectives and summarizes their results. NESSP provides an MDL Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

MO-2 What must be in your Mission Development Log (MDL)?

Every MDL must include:

- A clear photograph of hand-drawn or other hand-crafted mission patch in jpg or png format. Computer-generated mission patches should be no smaller than 500×500 pixels.
- At least one paragraph describing the mission patch, addressing the following questions:
  - What is your team's name and why did you choose it?
  - Why did you choose the images and words that you chose?
  - How does the design represent the mission?
  - How does the design represent the team and/or the team's community?

NOTE: Mission patches submitted to NESSP and/or social media cannot include copyrighted materials or likenesses of individuals without their consent. The use of copyrighted images may prevent NESSP from posting the team's mission patch on social media or other materials.

Modeling Moving Carbon

Summary

Carbon is the basis of all known life–and of this Mission Objective! Carbon is present in all living things on Earth, and it is also in the air, the water, and even many kinds of rocks! Every minute of every day, some of Earth's carbon is moving around and changing form. Sound complicated? It is! After exploring two complex models of Earth's carbon cycle, your team will use your knowledge to construct a carbon cycle for your local area and for Venus.

Materials Needed

For the fructose model

- Baggies
- Bingo chips (3 colors)
- Printed Fructose card

For the Carbon Cycle Game (physical version)

- Printed materials (Station cards, handouts, etc)
- Dice (1 per student)

Resources from Companion Course Lesson 3:

- **Explore Section:** Carbon Cycle Game and Fructose Model activity — available in both online and physical/kinesthetic formats (recommended).
- **Explain Section**: Examples of local carbon cycle models.
- **Elaborate Section:** Articles and videos about Venus that will support students as they create their Venus carbon cycle games.

Additional Resources:

- Companion Course Lesson 3: Modeling Moving Carbon
- How to play the Carbon Cycle Game
- How to do the Fructose Model Activity

Getting up to Speed

Earth's carbon cycle is complex and involves the hydrosphere (water), atmosphere (air), geosphere (rocks and soil), and biosphere (living things). Carbon moves between several reservoirs and changes form (solid, liquid, and gas). A carbon reservoir is a place where carbon is stored. For example, carbon is stored in the bodies of all living things.

This is why you might have heard the phrase “carbon-based life forms” in Sci-Fi movies. Carbon is also stored in other reservoirs that you might not expect, including in soil, rocks, and water.

To learn more about carbon, check out the resources in the Getting up to Speed with ROADS from Earth to Venus document.

Mission Guidance

First, teams will play a carbon cycle game and build a fructose model to learn about the overall carbon cycle on Earth, including the important processes involving the fructose compound. These activities will help teams understand how the carbon cycle works on Earth and why carbon moves and changes the way it does.

Next, teams will show what they have learned by creating new resources. Middle school teams will make a place-based carbon cycle model that shows how carbon moves and changes in their own community. This model should label reservoirs such as lakes, plants, or soil, include processes such as photosynthesis or combustion, and show the role of human activities. Upper elementary teams will create a set of 6–10 story cards that tell the story of how carbon moves and changes in their local environment.

Venus also has a carbon cycle, but it is different from Earth’s in many ways. Every team will investigate the carbon cycle on Venus and design a Venus Carbon Cycle Game. Using the Earth Carbon Cycle Game as a starting point, you will adapt it to show how carbon might move and be stored on Venus. Your game should include station cards, processes, and an explanation of the choices you made.

Throughout this work, teams should make their ideas clear by using diagrams, maps, cards, writing, or other visuals so the team’s work can be shared and understood.

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SENs). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objective and summarizes their results. NESSP provides an MDL Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

There are two deliverables for this MO. The first deliverable (place-based carbon cycle) includes a different option (carbon cycle story cards) for Grades 3-5. The second deliverable for all grade levels is a Carbon Cycle game for Venus. The deliverables are detailed below.

MO-3 What must be in your Mission Development Log (MDL)?

- **Place-based carbon cycle (1 per team, required for Middle and High School; optional for Grades 3–5, see below):** Create a visual representation of a place-based local carbon cycle. Not all elements of the whole Earth's carbon cycle will be present. (For example, unless you live near an ocean, you will not include this on your model.) This representation might be an annotated map, a flow chart, an infographic, or any other labeled visual representation that helps to answer these questions:
  - What area does your model represent, how large is it, and how did you decide on that area for your model?
  - Represent and label all reservoirs (lakes, rivers, clouds, etc.) and water cycle processes (evaporation, runoff, etc.).
  - What **reservoirs** in the carbon cycle are present in your community? (Examples: ocean, plants, etc.) Label them.
  - What **processes** from the carbon cycle are likely taking place in this area, whether you can see them or not? (Examples: photosynthesis, volcanoes, etc.) Represent and label them.
  - How are **human activities** involved in your local carbon cycle? How are human activities causing carbon to move and change? Represent and label this on your model.
  - For the **reservoirs** in your model, are there some where carbon might be stored (that is, "get stuck") for a long time? Are there some where carbon is likely to move out quickly? Represent this on your model.

- **Carbon Cycle Story Card Set (1 per team or 1 per student; this option is for Grades 3–5 only):** Instead of creating a place-based carbon cycle, your team will make a carbon story using a sequence of cards. Use the card set and example in Lesson 3 (Engage and Explain) as a model, but your story should show carbon moving and changing in new ways. You can use also ideas from the Carbon Cycle Game in the Explore section of Lesson 3.
  - This card set should:
    - Have a short title that shows what your carbon story is about and connects to a local place.
    - Include 6 to 10 cards arranged in order to tell a story of how carbon moves and changes.
    - Show carbon moving to a new reservoir at least two times and changing form at least once (solid, liquid, or gas).
    - Include a written or audio explanation of what is happening in your story.

MO-3 What must be in your Mission Development Log (MDL)? Cont...

- **Venus Carbon Cycle Game and Justification (1 per team, all grades): Venus Carbon Cycle Game and Justification (1 per team, all grades):** Use the Carbon Cycle Game for Earth as inspiration to create a game that represents the carbon cycle on Venus.
  - Your game should include:
    - Station cards that represent carbon reservoirs and show where carbon is stored on Venus.
    - On each station card, show processes or actions that can move carbon on Venus from one reservoir to another.
  - Teams should also include the following in their MDL:
    - A justification for the changes made to the Earth Carbon Cycle Game that led to your completed Venus Carbon Cycle Game. This can be a narrative explanation or a series of bullet points.
    - A note about any parts of the Venus carbon cycle you were unsure about or where you had to make assumptions.

Mission Objective 4

Investigating Atmospheres

Summary

The greenhouse effect plays a crucial role in the atmospheres of Venus, Earth, and Mars. In this MO, teams will investigate the greenhouse effect using hands-on experiments, models, and simulations. Students will explore how factors such as atmospheric composition, surface material, cloud cover, and water vapor influence planetary temperatures. Then, they will use the evidence collected for MO-3 and MO-4 to make a claim with evidence about why the Earth and Venus are so different now.

Materials Needed	Resources from Companion Course Lesson 4:
• Thermometers or temperature probes • Large (1-2 liter) plastic bottles or other sealable clear glass or plastic containers (2 per team) • Light source (such as a grow bulb or sunlight outdoors)	• Explore Section: Scaffolding tips and a template to help students plan and carry out their greenhouse experiment. • Explain and Elaborate Section: Teacher tips and student-facing templates for making claims from evidence from an experiment.
• **Some additional materials will depend on the testable question that your students chose. See Companion Course Lesson 4 for ideas.**	• Companion Course Lesson 4: Investigating Atmospheres

Getting up to Speed

NASA missions have been studying the greenhouse effect on Venus, Earth, and Mars for decades. Probes like Venus Express and Pioneer Venus revealed how Venus's thick CO_2 atmosphere traps heat, making it the hottest planet in the solar system. Meanwhile, the Curiosity Rover and Perseverance Rover are investigating how Mars lost its once-thicker atmosphere, leaving it cold and dry. On Earth, satellites like OCO-2 and Aqua monitor greenhouse gases and climate changes in real time. Future missions, including VERITAS and DAVINCI, will explore Venus's atmosphere and surface to uncover how its runaway greenhouse effect developed.

See the Getting up to Speed with ROADS from Earth to Venus document to learn more about the greenhouse effect and how NASA is studying it.

Mission Guidance

In this Mission Objective, teams will design and carry out experiments to better understand the greenhouse effect, which is key to studying the atmospheres of Venus, Earth, and Mars.

First, teams will consider the surface temperatures on the inner planets and discuss the factors that might affect those temperatures. They will then design a hands-on experiment to test how different factors influence temperature on simulated planets. Using clear, sealed containers, they will create small test environments and change one variable at a time, such as the amount of carbon dioxide, water vapor, surface color, or cloud cover. As they work, teams will record temperature changes to see how each factor affects heat trapping. They will also document their experiment with drawings, labeled photos, and data tables or graphs. Resources in the Companion Course lesson will help students develop and refine their ideas.

Next, teams will make a claim about why Earth and Venus are so different today, even though they were once very similar. To support their claim, they will use evidence from their own experiment as well as from activities and resources in Lessons 3 and 4 or MO-3 and MO-4. Younger students will focus on one cause and support it with three pieces of evidence, while middle and high school students will identify multiple causes, provide evidence for each, and explain their relative importance. For every piece of evidence, teams will write at least one sentence showing how it supports their claim.

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SENs). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objective and summarize their results. NESSP provides an MDL Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

MO-4 What must be in your Mission Development Log (MDL)?

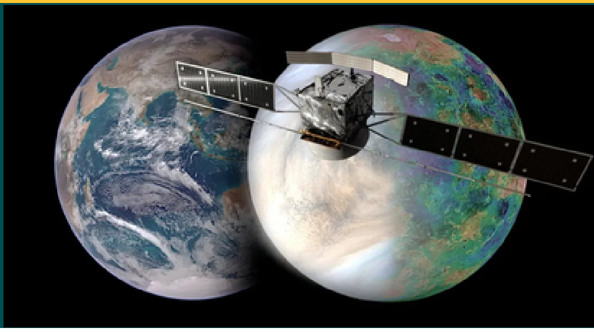
Every MDL must include:

1. **Description of the Investigation**
   - Describe the experiment by drawing or taking a picture of the experiment set-up and identifying the independent, dependent, and controlled variables.
   - Describe the frequency of measurements and when measurements were taken.
   - Include at least three photographs of the experiment in progress. Photos should be dated and labeled with a description of what they show.
   - Include the experimental data in table or graphical form.

2. **A Claim with Evidence**
   - **Claim:** Make a clear claim about why Earth and Venus are so different now despite being very similar in the past.
   - **Evidence:** You can use evidence from the activities and resources in Lessons 3 and 4 or from other reliable sources.
     - Grades 3 to 5: Choose one main cause and support it with at least three pieces of evidence.
     - Middle School: Choose at least three important causes and support each one with at least two pieces of evidence.
     - High School: Choose at least three important causes, explain how important each one is, and support each cause with at least two pieces of evidence.
   - **Explanation:** For every piece of evidence you use, write at least one sentence that explains how that evidence supports your claim.

Mission Objective 5

Capturing Data from Afar



Summary

It’s smart to have a plan before you go somewhere new, but how do we learn about places, like Venus, where humans have never been? Venus’s extreme environment makes direct exploration challenging, so scientists mostly learn about its surface by taking images and gathering other data from space. In this MO, you will learn how to capture and interpret images from afar to help guide detailed exploration later. Your team will model NASA’s remote sensing techniques using kites equipped with imaging tools to collect and analyze data of the Earth’s surface—just like the proposed VERITAS mission to Venus.

Materials Needed

- Computer
- Graph paper
- Colored pencils

Available from NESSP:

- Gloves for kite pilot
- Carabiner
- Delta kite with string
- Aeropod from AEROKATS project
- Mini-camera and micro SD cards

Resources from Companion Course Lesson 5:

- Explore Section: An introductory activity where students take images and observe how the field of view and spatial resolution change.
- Explain Section: Slides, worksheets, and example calculations that help students understand camera resolution, spatial resolution, and field of view.
- Elaborate Section: Guidance on how to use the AEROKATS Field Operations Manual to prepare for a remote sensing mission.
- Evaluate Section: Guidance on how to conduct an in-depth analysis of still images taken with the Aeropod, including how to import data into the AEROKATS Mission Mapper.

Additional Resources:

- Companion Course Lesson 5: Capturing Data from Afar
- AEROKATS Field Operations Manual
- AEROKATS Field Operations Website and Videos
- AEROKATS Project
- AEROKATS Manual Image Classification
- AEROKATS Manual Image Classification Video
- AEROKATS Mission Mapper
- AEROKATS Mission Mapper Video
- AEROKATS Capturing an image from a video with VLC

Getting up to Speed

Venus is often called Earth's "twin," but don't let that fool you! The surface of Venus is a hostile, extreme world hidden beneath thick clouds of carbon dioxide. With surface temperatures hot enough to melt lead and crushing atmospheric pressure, landing a spacecraft on Venus is incredibly difficult. Instead, scientists use remote sensing technologies, like radar imaging and aerial probes, to study the planet from above. NASA's Magellan mission mapped nearly 98% of Venus's surface using radar, revealing vast volcanic plains, mountains, and deep craters. Now, upcoming missions like VERITAS and DAVINCI will take a closer look, using advanced radar and atmospheric probes to uncover Venus's secrets.

You can learn more about past and upcoming missions to Venus and remote sensing techniques in the Getting up to Speed with ROADS from Earth to Venus document.

Mission Guidance

In this mission objective, teams will step into the role of NASA scientists using remote sensing tools to explore and map surface features, starting right here on Earth. Just like NASA uses orbiters, drones, balloons, and airplanes to study Earth and planets like Venus, teams will use a kite-mounted Aeropod imaging system to collect aerial photos. The goal is to see how altitude affects the detail and area captured in an image, and how scientists turn these images into usable maps and scientific observations.

Teams will begin with a hands-on camera investigation, photographing a small target such as a playing card from different distances. This will show how image detail changes with distance, helping teams understand spatial resolution and field of view—what can and cannot be seen from far away.

Next, teams will prepare for a flight mission using an Aeropod and kite. Following the AREN Field Operations Manual, they will review safety steps, assign team roles, and plan how to collect their data. Then they will launch the Aeropod and record aerial video of their site, completing the Flight Data Sheet as they go.

Back in the classroom, teams will extract still images, outline features such as roads, trees, or water, and classify them using graph paper. With this data they will create an annotated "Classified Image" and at least one graph showing the area of each feature. They will also reflect on what the aerial view revealed that they could not see from the ground and how it connects to the way NASA studies other worlds.

Teams ready for more advanced analysis can calculate spatial resolution and field of view by comparing known object sizes in the images. Sample examples are provided in the Companion Course.

Finally, teams will upload their images, graphs, and data to the AEROKATS Mission Mapper. They will also assemble their work into a Mission Development Log (MDL) that includes images from different heights, a short explanation of spatial resolution and field of view (with simple calculations), their completed Flight Data Sheet, their annotated image and graphs, and their Mission ID from the Mapper. Teams should also include extra images, notes from multiple flights, and a short reflection on what they observed, challenges they faced, and what they would do differently next time.

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SENs). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objective and summarizes their results. NESSP provides an MDL Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

MO-5 What must be in your Mission Development Log (MDL)?

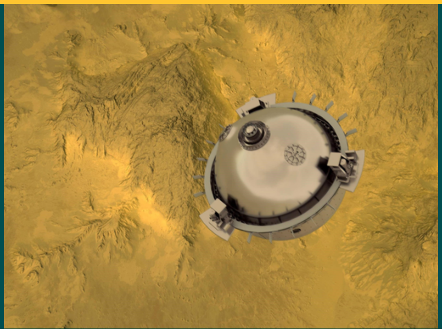
Every MDL must include:

- Selected images taken at different heights or distances, demonstrating how spatial resolution changes with altitude
- A brief explanation of Field of View (FOV) and spatial resolution, including simple calculations using the camera specs
- An image of the completed Flight Data Sheet from the AEROKATS Flight Operations Manual.
- A copy of their original, classified image, and any graphs they made quantifying the area covered by each type of terrain.
- The Mission ID for identifying their entry into the AEROKATS Mission Mapper.
- *Optional*: Additional images or notes showing how the scene changed over time, if multiple flights or observations were conducted

Students should also include a reflective narrative or summary that describes:

- What they successfully observed and mapped.
- What challenges they faced during the flight or analysis process, and how planetary scientists might overcome similar limitations.
- What they would change or improve if they conducted a second Aeropod mission.

ROV-ing for Detailed Data



Summary

NASA instruments that reach the surface of Venus won't survive long in the harsh conditions. In this MO, you will race your rover against the clock to collect as much color sensor data as you can. Your team will use a programmable robot with a color sensor to simulate the DAVINCI probe's descent through Venus's atmosphere. You will collect data and make conclusions about the surface composition through color sensor data collection.

Materials Needed

- Lego SPIKE Robot or Lego Mindstorm robot
- Laptop or tablet with software installed
- Printed color samples
- Double layer corrugated cardboard, foam board, or similar material for ramps
- Books or other materials to prop up the ramps
- Data collection key

Resources from Companion Course Lesson 5:

- Explain Section: Pseudo Code Matching Cards, Slides, and Videos to introduce building and programming LEGO SPIKE robots
- Elaborate Section: Instructions on building the rover course.

Additional Resources:

- Companion Course Lesson 6: ROV-ing for Detailed Data
- Lego SPIKE Quick Start
- Video demonstrating the rover course setup
- Rover course layout and dimensions
- Color samples to place on the robotics course and RBG key
- Plotting RGB data with the LEGO SPIKE

Getting up to Speed

Venus is full of harsh conditions that currently prevent us from sending humans on a mission there. Instead, we plan on sending specially designed spacecraft to collect data during a short period of time before it is affected by the extreme surface temperatures.

To understand more about these types of data collection, check out the resources in the Getting up to Speed with ROADS from Earth to Venus document.

Mission Guidance

In this mission, teams will design and program a rover to simulate the quick descent and data collection of the DAVINCI probe. On its hour-long journey through the atmosphere, the real DAVINCI probe will take thousands of measurements and capture up-close images of the surface as soon as it passes below the clouds. Because the probe only has a short period of time to collect data before it lands, your rover mission also has a strict time limit to mirror this Challenge.

The mission has two main goals. First, teams will program their rover and color sensor to collect as much data as possible from the course within a 5-minute time limit. Second, teams will analyze the RGB values collected and compare them to the provided key to identify different rock compositions.

The Earth-to-Venus robotics course should be built in a 150 cm x 150 cm area. It includes three ramps leading to a shared platform, three data collection areas, and a starting point. Ramp measurements and the position of all elements are included in the provided instructions. Color samples will be placed over the shaded regions on the course layout.

For Grades 3–5 or students new to robotics, we recommend using samples with only one color per area. For Grades 6–8, use samples with two colors per area. For Grades 9–12, use samples with three colors per area. Teams will use the rover's color sensor to record accurate RGB values from the color samples in each data collection area.

Before beginning, teams should download the necessary software, review the rover parts and sensors, and practice programming basics. For those new to robotics, helpful tips can be found in the Explore section of Lesson 6 in the Companion Course.

Because the course includes both upward and downward ramps, rovers must adapt their movement to different slopes while navigating the terrain. Each team will have 5 minutes to run their rover and collect data, followed by another 5 minutes to match their results to the provided key. Remember, the rover must be programmed to move and make decisions independently—no remote control allowed.

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SENs). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objective and summarizes their results. NESSP provides an MDL Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

MO-6 What must be in your Mission Development Log (MDL)?
Every MDL must include: • A brief report on how much color data was collected and how many minutes it took. • An export of the RGB data from the most successful run, shown in both plot form and table form. • Conclusions about rock composition based on the comparison between the RGB plot and the provided key.

Mission Objective 7

Envisioning Your Role

Summary

Teamwork makes the dream work, and this is especially true at NASA. While astronauts get a lot of attention, it takes hundreds of other roles all working together to complete a successful NASA mission. In this MO, each team member will tell us about their dream role at NASA.

Materials Needed

- Access to a computer
- Art supplies (or graphic design software)
- Graphic novel templates (optional)
- Video recording devices, if choosing the video interview option

Resources from Companion Course Lesson 7:

- Engage Section: NASA-related job descriptions for middle and high school. Storybook biographies for elementary.
- Explain Section: Graphic novel planning sheets and templates.
- Extend Section: Worksheet to help plan out video information and script.

Additional Resources:

- Companion Course Lesson 7: Envisioning Your Role
- Career Connection Catalog

Mission Guidance

Have you ever wondered what it’s like to work for NASA? In this mission, your team will explore different careers related to the ROADS from Earth to Venus Mission Objectives, imagining yourself in one of these roles in the future.

Start by exploring career options using the Career Catalog from Lesson 7 of the Companion Course. You can also use other resources to learn about more NASA careers. Each team member should pick one career that matches their interests and values—one they'd like to explore further.

For the chosen career, investigate:

- What the daily tasks are like.
- The type of education needed.
- Other skills or knowledge you could bring from your community, family, hobbies, or interests.
- Salary and benefits, such as whether people in this job get to travel to interesting places.

Once you understand the role, imagine yourself in that career in the future. Think about:

- Where you went to school.
- How old you were when you got the job.
- Where you live and work now.
- What missions or projects you've worked on at NASA.

After envisioning your future role, your team can work together or individually to tell your story. You can do this through a graphic novel, a role-play video interview, or both. Use resources from Lesson 7, like templates and planning worksheets, to help create your story and understand how to build a plot with a dramatic arc.

Local and Cultural Relevance

Students should come up with examples of how their community could benefit from the career skills of their future role. For example, in a video interview a future engineer might have the following be part of their story, "As a communications engineer, I learned how NASA uses antennas to connect and communicate with satellites. I used these skills to set up a dish network, providing faster and more reliable internet at my community's public library." You can see more examples in the Elaborate section of the Lesson 7 in the Companion Course.

Deliverables

As they work, teams should keep track of their results in their Science and Engineering Notebooks (SEN). At the end of the Challenge, teams will be asked to submit a Mission Development Log (MDL) to NESSP that shows how the students worked through the Mission Objective and summarizes their results. NESSP provides a Mission Development Log Template to help guide what teams should include in their MDL. Please see MO-1 for guidelines on the format and length of the MDL.

MO-7 What must be in your Mission Development Log (MDL)?

Every MDL must include:

- Either graphic novel pages or video interviews (see the details below) to describe each team member's future role at NASA. The team should decide together whether to make a graphic novel or video interviews.
- If the team chooses to create a graphic novel, they can either write one story that includes all the career roles, or each team member can create their own separate graphic novel.
- Each team member must include at least one example of how they could help their community by using the skills they learned for their future role. They may also choose to describe how a skill they learned from their community could be useful in their future career.

Graphic Novel Page Guidelines

Create part of a graphic novel that shows "future you" working at your dream job at NASA. If you decide to do this as a team, show how the various roles you choose will work together.

Be sure to include:

- Job title(s)
- The characters using their job skills to identify and/or solve a problem for NASA

Inspiration: "First Woman" graphic novels

Length requirements:

- Individual team member novels: 1 page
- Combined team novels: Minimum 1 page, maximum 3 pages

MO-7 What must be in your Mission Development Log (MDL)?

Video Interview Guidelines

Pretend that you are working in your dream NASA career. Record a video where someone interviews you about your job at NASA.

Be sure to include:
- Job title
- What a typical day looks like and what skills they use
- Steps they took to get a job a NASA

Inspiration:
- Career Highlight: Planetary Scientist
- Meet Martha | NIRCam Instrument Scientist Behind NASA's James Webb Space Telescope
- NASA Test Pilot: Day in the Life

Length requirements:
- Individual team member interviews: 2:30 minutes max
- Combined teams interviews: 5 minutes max

Reflecting on and Presenting Your Mission

Summary

What went great, and what could have been better? Reflect on your work and summarize it in your MDL. While all teams will submit their final MDL electronically, there are two options for completing this MO: **MO-8a is for teams that attend an in-person Hub event** and MO-8b is for teams that cannot attend.

Materials Needed

- Kite, Aeropod, and images from MO-5
- Robot and course from MO-6
- Electronic access to MDL
- Tri-fold board and poster making supplies

Resources from Companion Course Lesson 8:

- Engage, Explore, and Elaborate Sections: Guidance to help team members reflect on their work and summarize the MOs in the team's MDL.
- Evaluate: Guidance to help students evaluate their own work and the work of their peers with a Mission Review Rubric.

Additional Resources:

- Companion Course Lesson 8: Reflecting on and Presenting Your Mission
- MDL Template

Mission Guidance

IT'S GO TIME! Your team has modeled and tested its mission to Venus, and now it is time to share your findings. Put the finishing touches on your MDL and present your work. Can you convince NASA that you're ready to launch? Students will do a final demonstration of MO-5 and MO-6 and create a tri-fold board for another MO of their choice.

In-person Hub events will be held across the Pacific Northwest and beyond. Find dates and details on page 7 and the [Challenge website](). Teams should complete MO-2, MO-5, MO-6, and at least one other MO (MO-3, MO-4, or MO-7) before attending, so they are prepared to complete the following activities.

Mission Objective In-Person Hub (MO-2/MO-7, MO-3, or MO-4)

The in-person Hub gives each team the opportunity to highlight an area of the Challenge where they did well. Teams should prepare a tri-fold (maximum size 36" by 48") to present on one or more of the MOs:

- MO-4 (Investigating Atmospheres)
- MO-2 (Building a Strong Project Team) and MO-7 (Envisioning Your Role)
- MO-3 (Modeling Moving Carbon)

Regardless of which MO your team chooses, the tri-fold board should contain:

- The team name, team members' names, and mission patch
- The number and title of the MO or MOs featured on the board
- Text, photos, drawings, data, artifacts (experimental set-ups or prototypes), and other information to summarize the team's work. Use the MO Deliverables as a guide for the board's content.

All team members should be prepared to answer questions about the MO or MOs on their board.

Demonstration of ROV-ing for Detailed Data (MO-6)

Teams will demonstrate that their rover can navigate the Earth-to-Venus robot course and collect data from all three data collection points. First, teams will run their robot with a color sensor to gather as much data as possible within a 5-minute time limit. Next, they will have 5 minutes to analyze the RGB values collected and identify the types of rocks they observed by comparing their data to the provided key of rock compositions.

Demonstration of Capturing Data From Afar (MO-5)

First, teams will showcase their new expertise in remote sensing data collection by demonstrating safe procedures for launching, collecting data, and retrieving a kite with an Aeropod attached. If wind conditions are favorable, this can be done outside. If the weather is not appropriate, teams may instead demonstrate and explain their procedures indoors without actually launching the kite.

Next, teams will present and describe data from a previous Aeropod flight. They should show their original classified image and any graphs they created to quantify the area covered by each type of terrain. Teams will then describe what they observed and mapped in their image, the challenges they faced during the flight or analysis process, and how planetary scientists might address similar limitations. Finally, they should explain what they would change or improve if they conducted a second Aeropod mission.
If teams collected multiple images over time, they may also describe any changes they observed.

Surprise Teamwork Challenge

NASA scientist and engineers need to collaborate, develop new strategies, and master new skills when planning and executing a mission. In-person Hub events will include surprise challenges to test each teams teamwork and collaboration abilities.

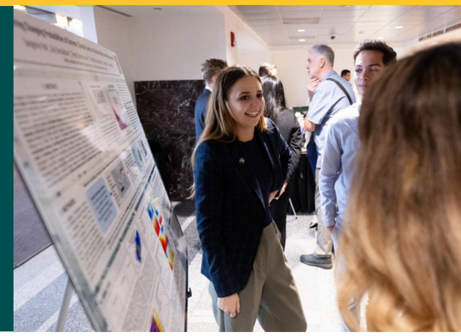
Deliverables

This is your final MO! It's time to wrap up your mission by summarizing your work on all Mission Objectives into a complete and final Mission Development Log (MDL). Remember, the MDL must address the "Deliverables" in each MO.

What must be in your Mission Development Log (MDL)?

The MDL must:
- Have a title slide with the team name, team member's names, and the mission patch.
- Include a completed Table of Contents slide Include the deliverables for each Mission Objective that the team completed
- Be 50 slides or less (including the green Mission Objective direction slides, see Template in MO-1)
- Include a completed copy of the "Mission Review Rubric."

Reflecting on and Presenting Your Mission



Summary

What went great, and what could have been better? Reflect on your work and summarize it in your MDL. While all teams will submit their final MDL electronically, there are two options for completing this MO: MO-8a is for teams that attend an in-person Hub event and **MO-8b is for teams that cannot attend.**

<table>
<tr><th>Materials Needed</th><th>Resources from Companion Course Lesson 8:</th></tr>
<tr><td rowspan="3">Kite, Aeropod, and images from MO-5
Robot and course from MO-6
Electronic access to MDL
Tri-fold board and poster making supplies</td><td>Engage, Explore, and Elaborate Sections: Guidance to help team members reflect on their work and summarize the MOs in the team's MDL.
Evaluate: Guidance to help students evaluate their own work and the work of their peers with a Mission Review Rubric.</td></tr>
<tr><th>Additional Resources:</th></tr>
<tr><td>Companion Course Lesson 8: Reflecting on and Presenting Your Mission
MDL Template</td></tr>
</table>

Mission Guidance

IT'S GO TIME! Your team has modeled and tested its mission, and now it's time to launch. Teams not attending an in-person Hub event will demonstrate their "final mission" by including two videos to highlight MO-5 (Capturing Data from Afar) and MO-6 (ROV-ing for Detailed Data) at the same time they submit their final Mission Development Log (MDL) electronically.

Video Demonstration of ROV-ing for Detailed Data (MO-5)

Teams should submit one video that first demonstrates their safe procedures for launching, collecting data with, and retrieving a kite equipped with an Aeropod. This can be filmed outdoors if wind conditions are favorable or demonstrated indoors without launching if weather does not permit. The video should also present data from an Aeropod flight, including the team's classified image and any graphs used to quantify terrain types. Teams should briefly describe what they observed and mapped, the challenges they encountered during flight or analysis, how planetary scientists might address similar limitations, and what they would change or improve in a future Aeropod mission. If teams collected multiple images over time, they may also mention any changes they observed. The submitted video should be less than five minutes long.

Video Demonstration of ROV-ing for Detailed Data (MO-6)

Teams should submit a video that shows their rover navigating the Earth to Venus robot course and collecting data from all three data collection points. First, the video should show the rover collecting as much data as possible within a five minute time limit. Next, teams should describe how they analyzed the RGB values they collected and how they identified the types of rocks by comparing their data to the provided key of rock compositions. The submitted video should be less than seven minutes long.

(Optional) Explore ways to showcase additional MOs in your region

Teams can explore other options for showcasing their work in this Challenge in their region. For example, teams can showcase their project at a local science or engineering fair. Explore the list below to find one near you:

- Top 10 Science Fairs for High School
- ISEF Science Fairs
- Science Fair Directory
- National American Indian Science & Engineering Fair

Teams can also present their work at a family STEM night, Parent/Teacher Conferences, or other school gatherings.

Deliverables

This is your final MO! It's time to wrap up your mission by summarizing your work on all Mission Objectives into a complete and final Mission Development Log (MDL). Remember, the MDL must address the "Deliverables" in each MO.

What must be in your Mission Development Log (MDL)?
The MDL must: • Have a title slide with the team name, team member's names, and the mission patch. • Include a completed Table of Contents slide Include the deliverables for each Mission Objective that the team completed • Be 50 slides or less (including the green Mission Objective direction slides, see Template in MO-1) • Include a completed copy of the "Mission Review Rubric." Teams may also upload or provide a link to their MO-5 and MO-6 videos at the same time they submit their final MDL. The uploaded videos must: • Be two files or a links to YouTube videos (one for each MO) • Be less than 5 minutes long (MO-5) or 7 minutes long (MO-6) • Only show the faces of students who have complete the NASA Media Release Form (see MDL template)

Acronyms

Acronym	Word/Phrase	Definition/Description
CC	Companion Course	The Companion Course supports formal educators and others completing the NESSP Student Challenge. Lesson plans and units support the Mission Objectives. Educators can do the Student Challenge, the Companion Course, or both.
CRP	Culturally Relevant Pedagogy	Culturally Relevant Pedagogy (CRP) is about teaching the students in front of you. This requires that teachers get to know their students and develop meaningful relationships with them while engaging in the students communities.
CSP	Culturally Sustaining Pedagogy	Culturally Sustaining Pedagogy seeks to perpetuate and foster--to sustain--linguistic, literate, and cultural pluralism as part of the democratic project of schooling. The term culturally sustaining requires pedagogies be more than responsive to the cultural experiences and practices of our students. It requires that we support young people in sustaining the cultural and linguistic competence of their communities while simultaneously offering access to the dominant culture. Culturally Sustaining Pedagogy has the explicit goal of supporting multilingualism and multiculturalism in perspective and practice.
CWU	Central Washington University	CWU is the home of NESSP HQ. Dr. Snowden is the project lead and is a professor at CWU.
FoK	Funds of Knowledge	Funds of Knowledge are collections of knowledge based on cultural practices that are a part of families’ inner culture, work experience, or their daily routine. It is the knowledge, skills, and strengths that students and their family members have because of their roles in their families, communities, and culture.

Table of Acronyms

Acronym	Word/Phrase	Definition/Description
MA	Mission Advisor	The Mission Advisor is the adult who will guide the team. This person could be a classroom teacher, the advisor for an extracurricular club, a Scout leader, or any responsible adult from the community. The Mission Advisor is responsible for managing all communications between NESSP and the team, including team registration and submitting results. Teams may have up to two Mission Advisors.
MDL	Mission Development Log	The Mission Development Log is a concise summary that contains the required deliverables for MO. All team members should contribute. The team's work is submitted at the end of the Challenge in one MDL per team. Challenge Teams are required to complete an MDL and submit it electronically.
MO	Mission Objective	Specific tasks that students participating in the Student Challenge complete.
NASA	National Aeronautics and Space Administration	The National Aeronautics and Space Administration is a U.S. government agency responsible for science and technology related to air and space.
NESSP	Northwest Earth and Space Sciences Pathways	NASA-funded educational partnership centered at Central Washington University but involving many partners in the Pacific Northwest.
NGSS	Next Generation Science Standards	A set of science (and engineering) in standards adopted by many states starting in 2013.
ROADS	Rover Observation and Discoveries in Space	This is the framework for the annual NESSP Student Challenge. Each year, a NASA mission is used as the inspiration for this nationwide and Companion Course.

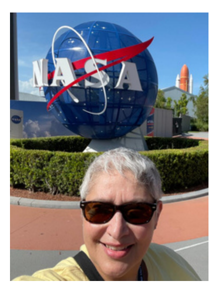
Table of Acronyms

Acronym	Word/Phrase	Definition/Description
ROV	Remote Operated Vehicle	An ROV is an unoccupied, highly maneuverable robot or machine operated by a human used to explore distant terrains, surfaces, or locations.
SEN	Science and Engineering Notebook	Students track their individual work in a Science and Engineering Notebook and summarize their MO deliverables in their Mission Development Log (MDL). The Science and Engineering Notebook contains everything students do, whereas the MDL is a concise summary that contains the required deliverables for MO.
SEP	Science and Engineering Practices	Science and Engineering Practices are among the “three dimensions” of the NGSS. They describe what it means for students to “do” science or engineering.

NESSP HQ Mission Control

Central Washington University is the home of NESSP HQ where you’ll find Director Darci Snowden, Program Manager Deanna Marshall, Project Coordinator Mary Levin, Admin Assistant Anita Mishina and Student Assistants, Abbi Beirens, May Elise, Lana Terry and Evan Wold working to create engaging and captivating ROADS programming for educators and students.



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NORTHWEST EARTH AND SPACE SCIENCES PATHWAYS

ROADS FROM EARTH TO VENUS

2025 - 2026

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NASA SCIENCE ACTIVATION

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