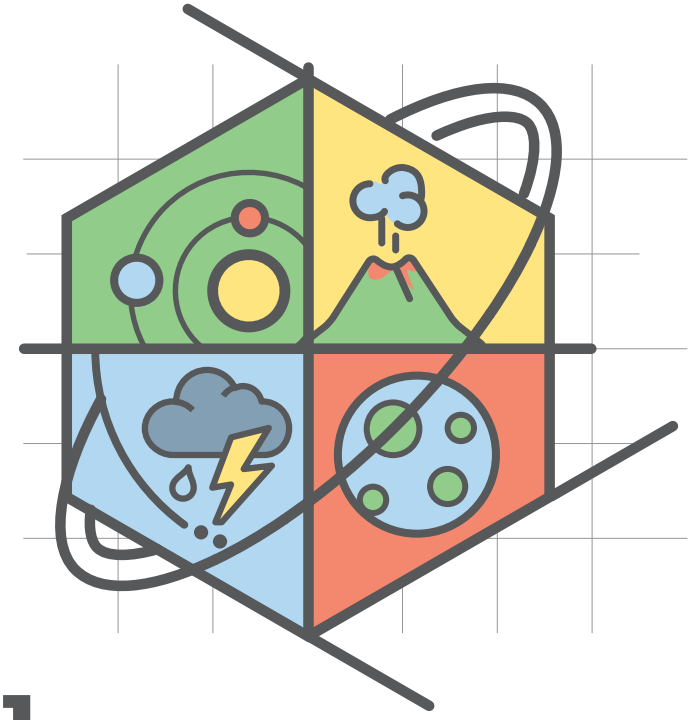

Becoming Protectors of the Earth

5th Grade STEM Storyline to support the Earth & Sun FOSS kit

STEM

8.4.21

ABOUT THIS UNIT

In this 5th grade STEM Storyline Unit focused around Climate Justice, we present students with the idea of environmental stewardship and restoration. Students learn from communities and activists who are working to protect the Earth against negative human impacts. We believe that a part of STEM literacy is the ability for students to be aware of and think critically about the ways in which we are protecting or disturbing the natural world. We hope to use this unit to amplify the voices of Youth Activists of Color and support your 5th graders in developing their own voices as leaders in their community. The unit culminates with students presenting their learning to their community in order to expand their community's understanding of environmental stewardship.

This unit also contains links to online resources created by other organizations which may use a different license. Please make sure that you understand the terms of use of third-party resources before reusing them. Prior to publishing this unit of study, we have reviewed the content of this unit to ensure that all materials are in accordance with creative commons regulations. If you notice that a part of this unit infringes another's copyright, please contact us.

A digital copy of this document is available on the STEM Materials Center website at:
https://www.stemmaterials.org/protectorsofearth

ATTRIBUTION

This unit is a result of a collaborative effort between Educational Service District 112 and educators and specialists from other school districts and agencies.

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STEM
Science
Technology
Engineering
Math

A program of Educational Service District 112 supporting Next Generation Science Standards

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OSPI

CLIME TIME
CLIMATE SCIENCE LEARNING

UNIT OVERVIEW

Please use this unit overview to aid in your planning. All the teacher support materials (slides, handouts, etc) are located in this google drive: http://bit.ly/protectorsoftheearth. Please feel free to comment on documents on the drive if you notice errors that need to be fixed. It is recommended that you make a copy of the google drive materials onto your own drive account so you can edit and adapt as you wish. To do this, click "file" and "make a copy." This will create a copy in your drive that you can edit to fit your needs or to share with your students on the Google platform.

Please note that the sequence of FOSS activities in this storyline unit differs from the way that the FOSS teacher guide presents these investigations. For alignment with NGSS and to create an integrated STEM-based learning experience for your students, it is recommended that you use this storyline unit instead of closely following the sequence of the FOSS guide. The outline below can help in your planning. Please note that each session is intended to take a class period of 30-45 minutes.

LESSON 1: Becoming protectors of the Earth *pg. 6*

In this lesson, students will be introduced to the idea of becoming stewards of the Earth. Students will think about what it means to be a protector of the Earth and will think about what more they must learn in order to conserve and restore the environment.

Session	Materials Needed	Page
1. Protecting the Earth	• Teacher slides • Markers • Chart paper • Post-it notes	**7**
2. You matter	• Teacher slides	**8**

LESSON 2: Where in the galaxy are we?! *pg. 10*

In this lesson, students will explore our place in the universe by learning about the Earth and its location in the solar system and in the galaxy. Students will better understand the way that celestial objects are located in relation to the Earth and the affect that they have on Earth's processes. The lesson will culminate with the students writing a statement to describe the uniqueness of the Earth and the need for planetary stewardship.

Session	Materials Needed	Page
1. Our beautiful Earth	• Teacher slides	**11**
2. Where are we?	• Teacher slides • Outdoor space	**12**
3. Shadow shifting (FOSS Investigation 1: *The Sun*)	• Teacher slides • Outdoor space • Weather that has enough sunshine to create shadows • Piece of paper & clipboard • Pencils • Shadow challenges • Chalk • (FOSS) OR this template	**13**
4. Quick-think model about shadows	• Teacher slides	**14**
5. The known universe	• Teacher slides • Paper, markers	**15**

UNIT OVERVIEW (cont.)

LESSON 2 (cont.)

Session	Materials Needed	Page
6. Solar system superheroes!	• Teacher slides • Markers, colored pencils • Large paper to draw superhero	**17**
7. FOSS Investigation 2 ***Part 5: Stars***	• 1 lamp (clip on) • 1 lightbulb • Earth globe (on a stand) • Projection system	**18**
8. Stars, colors, and brightness	• Teacher slides • Making Sense of the HR Diagram Handout • Tweet Template (one tweet per student)	**19**
9. Protecting or escaping?	• Teacher slides	**21**

LESSON 3: Air and the Earth *pg. 23*

In this lesson, students will use investigations to learn more about the way that the Earth is affected by changes in air, water, and land which have an impact on our weather and climate.

Session	Materials Needed	Page
1. Air and humans-do we make a difference?	• Teacher slides	**24**
2. The greenhouse effect	• Teacher slides • Blank paper for models • Colored pencils, markers	**25**
3-4. FOSS Investigation 3 ***Part 1: The Air Around Us***	• Syringes • Flexible tube • Binder clips • Electronic scale (optional) • Projection system • Computer with internet access to show videos	**26**
5. Carbon dioxide in the Earth's atmosphere	• Teacher slides • Article about carbon dioxide in the atmosphere • Greenhouse models created by students during Session 2	**27**
6-8. FOSS Investigation 3 ***Part 3: Local Weather***	• FOSS Material list included in lesson	**28**
9. Difference between climate and weather	• Teacher slides	**29**
10. Stories for the Climate Crisis Mixer (from Zinn Education Project)	• Teacher slides • Stories from the Climate Crisis: A Mixer • Student identity cards (in lesson) • Climate Mixer Reflection	**30**

UNIT OVERVIEW (cont.)

LESSON 4: The living Earth *pg. 32*

In this lesson, students will create a model to show how the Earth's systems interact. Students will work with expert groups to more deeply understand one Earth system and will help their Earth model team in creating a model of the systems of the Earth. Students will apply their understanding to interpret interactions they see in their local setting. Students will also apply their understanding to interpret the problem being faced by youth activists across the country.

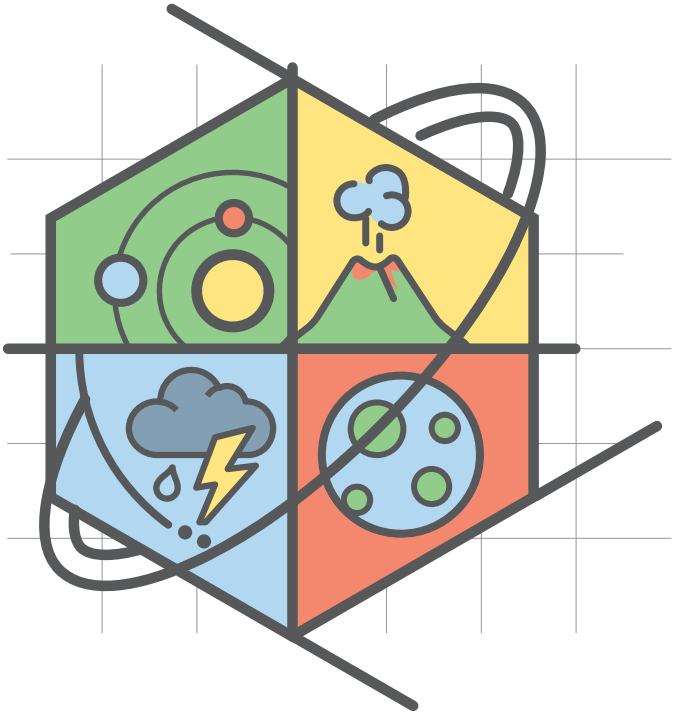
Session	Materials Needed		Page
1. What's the Earth made of?	• Teacher slides • Large piece of blank paper	• Markers/colored pencils	**33**
2. Launching into *Expert Groups*	• Teacher slides	• Earth's Spheres Team Expert Notes	**34**
3. *Expert Groups* continue to research their spheres	• Teacher slides	• Earth's Spheres Team Expert Notes • My Nasa Data.Gov	**35**
4. Earth model teams meet back	• Teacher slides	• Students' notes • Earth models	**36**
5. Nature walk—how do Earth's spheres interact?	• Teacher slides • Outdoor space to make observations	• Pencil, clipboard • OR Earth's Spheres interact template	**37**
6. Climate stories and interacting spheres	• Teacher slides • Access to ClimateStories.org	• Climate Stories and Interacting Spheres Thinking Template	**38**

LESSON 5: Imagining a brighter future *pg. 40*

In this lesson, students will work with another (different) expert group team to study one aspect of the climate change phenomenon or human-related negative impact to the Earth's systems. Teams will study specific instances of activism that relate to the problem they are learning more about. Then, teams will create a public-facing product to share their learning, highlight the efforts of activism that is happening, and share some recommendations that they learned from their study.

Session	Materials Needed		Page
1. Rise: From one island to another	• Teacher slides		**42**
Research sessions—as much time as your students need (~1 week)	• Teacher slides		**43**
Single session: Who is our audience?	• Teacher slides		**44**
Production sessions—as much time as your students need (~1 week)	• Teacher slides	• Other materials as needed by groups	**45**
Final sessions: Sharing the learning	• Teacher slides • Event venue	• Students' projects and accompanying equipment	**47**

LESSON 1: Becoming protectors of the Earth



STRATEGY: ENGAGE

In this lesson, students will be introduced to the idea of becoming stewards of the Earth. Students will think about what it means to be a protector of the Earth and will think about what more they must learn in order to conserve and restore the environment.

STEM

SESSION 1:
Protecting the Earth

Warm-up

Show students the video of Jessica and Sammy Matsaw (linked in teacher slides) from the Shoshone-Bannock Nation. This unit is focusing on reducing human impact to the land and waters across the world. Please feel free to replace video with content that may be particularly more relevant to your students at a local scale. You may also choose to show more than one video.

After the video, present students with the following questions and give each student a small stack of post-it to jot down their ideas. Ask students to only write one thought on each post-it. Each student must contribute a response to each prompt. If teaching virtually, an application like Padlet or Google Jamboard can be used for students to share ideas there.

Ask students to respond to the following questions independently:

- What do you notice about the problem that Jessica and Sammy are working to solve?
- What do you wonder about the problem?
- What do you already know about the problem?

Materials Needed

- Teacher slides
- Chart paper
- Post-it notes
- Markers

Main activity: Scientists' Circle

Facilitate a discussion where students are able to share their thinking. It is important that each and every student be given an opportunity to contribute to the conversation, even if it is to express agreement with something that a peer said.

1. Have students sit in a circle. Have three charts at the front, labeled "notice, "wonder," and "know."
2. Start by asking, "can someone please share something they noticed about the problem?" As the student shares, ask them for their post-it and post it to a piece of chart paper that says "Notice" on it. Ask other students to share similar "noticings" or to share something different that they noticed. Go around until each student has had a chance to share a thought.
3. Then, ask students to share things that they wonder about the problem. Similar to the previous step, have one student start and go around the circle until all students have shared.
4. Ask students to share things that they know, these are things that they already knew walking into the room this morning. This is knowledge that they have from their previous life experiences/learning.
5. Thank students for their effort in thinking about the problem.

Present the driving question of the unit: ***How can we learn to be better protectors of the Earth?***

Wrap-up

"Need to Know" Team Brainstorm: Have students work in small teams to brainstorm further. What are some more things we need to know before we can answer the question? Add to the "wonder" chart and explain to students that they will learn to become protectors of the Earth during this project.

SESSION 2:
You matter

Main activity

Have students reconnect with the driving question: ***How can we learn to be better protectors of the Earth?***

Explain that in this project, not only will we be learning about different things related to the Earth and humans, but we will be sharing out our learning with an audience outside the class. Ask students, "why is it important for you to be able to share what you're learning with somebody other than me (the teacher) and your classmates?" Allow students time to think about this.

Read the "You Matter Manifesto" to students (Angela Maiers, 2011) which is linked on teacher slides. After each line, ask students to repeat as a class. This affirmation is intended to help students feel that they have power and influence to make a change to solve problems in their world. It is an opportunity for you to shift the deficit or fixed-mindsets that students may have internalized over their years of schooling. Assure students that you believe that each and every one of them matters.

Materials Needed

Teacher slides

How Lesson 1 Supports Next Generation Science Standards

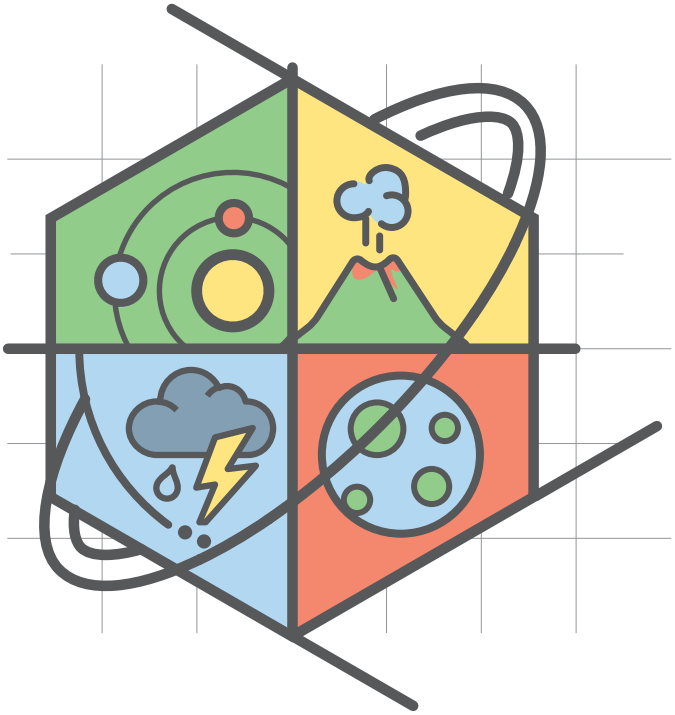
NGSS Standard:

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

5-ESS3-1 EARTH AND HUMAN ACTIVITY: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science & Engineering Practices	*Disciplinary Core Ideas*	*Crosscutting Concepts*
Asking questions and defining problems Obtaining, Evaluating, and Communicating Information	ESS3.C: Human Impacts on Earth Systems • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	Systems and systems models Energy and matter Cause and Effect Stability and change

LESSON 2: Where in the galaxy are we?!



STRATEGY: EXPLORE

In this lesson, students will explore our place in the universe by learning about the Earth and its location in the solar system and in the galaxy. Students will better understand the way that celestial objects are located in relation to the Earth and the affect that they have on Earth's processes. The lesson will culminate with the students writing a statement to describe the uniqueness of the Earth and the need for planetary stewardship.

STEM

SESSION 1:
Our beautiful Earth

Warm-up

Show students a video of the Earth. Any video showing the wonder of our planet will suffice for this intro session.

Materials Needed
Teacher slides

Main activity

Ask students how this video made them feel. Why is the Earth special? Give time to encourage students share their thoughts and ideas. Invite students to revisit the driving question: ***How can we learn to be better protectors of the Earth?***

Wrap-up

Ask students to think about their noticings and wonderings. Are there other planets out there that are like our Earth? What do they think?

SESSION 2:
Where are we?

Warm-up

Ask students, where in the universe are we? Ask students to think about where the planet earth is located. What do they know about other cosmic bodies that are around us? Students may talk about planets and the sun. Make sure as many students as possible have a chance to share their ideas. If time permits, it may be a good idea to give each student a post-it to write one idea which can then be shared in a whole-group circle. At this point, affirm students' ideas and resist the temptation to correct misconceptions.

Main activity

Take students outside for a quick Field STEM observation. If it is a pleasant day and there is a dry grassy area available, have students lie down on the grass facing up to look up at the sky. What do they see when they look up? (Sun, clouds, possibly the Moon?) Have students share their thoughts with a partner. Have students share thoughts out-loud. If students did not notice the sun, ask them "why is it daylight right now and not night time?" Consider having students simply sit/stand and observe if you don't have a nice grassy area.

Come back in the classroom and explain, now we'll imagine that we've fast-forwarded till night time. Show students an image of the night sky using this slides show. Then, show them the videos on the slides presentation time-lapses of the night sky. A time-lapse is a video that combines pictures taken over a longer period of time (a few hours). Ask them to quietly make observations. Pause a minute into the video and ask students what they see. They will notice that the stars appear to move in the sky. Ask them what else they noticed about the stars. What do they notice about sizes, shapes, brightness, colors of the stars? Write down students' ideas and assure them we will revisit our place in the cosmos as we move through this lesson.

Wrap-up

Ask students to share what final thoughts and questions they have. What are they curious about?

Materials Needed

Teacher slides

Outdoor space

SESSION 3: Shadow shifting (FOSS Investigation 1: *The Sun*)

Access your Teacher Guide for the FOSS: Earth and Sun Module. On page 100 starts the "Shadow Shifting" Activity. In this lesson, students will go outside and investigate the way that their shadow behaves. Please see FOSS guide for detailed instructions. Condensed/ adapted lesson plan is included below:

Warm-up

Ask students: "If we go outside, will you have a shadow? Why or why not? What is a shadow? Do you have a shadow all the time? Why?

Main activity

Students explore the nature of shadows in an outdoor space. It will be easier to see shadows on pavement. The following is the list of "Shadow Challenges" presented in the FOSS guide:

- Can you use your shadow hand to touch your shadow head?
- Can you use your real hand to touch your shadow head?
- Can you make your shadow very small?
- Can you separate yourself from your shadow?
- Can you touch your partner's shadow knee with your shadow hand?
- Can you make your shadow disappear?
- Can you make your shadow shake hands with someone else's shadow?
- Can you play shadow tag? Don't let another person step on your shadow.

Wrap-up

Ask students, what did you observe about the way that your shadow behaved? What was strange to you and what was predictable?

Extension (if time allows)

Create a shadow stick or shadow person to track how shadows change over the span of the day.

1. Put a stick in the ground, or have a person stand on a designated spot (be sure to mark the spot)
2. Every 1-2 hours starting from the morning through the afternoon, go outside and trace the shadow of the stick (or person). If tracking the shadow of a person, make sure to track the shadow of the same person.
3. See how the shadow changed from the morning, to noon, to afternoon.
4. Discuss observations.

Materials Needed

- Teacher slides
- Outdoor space
- Weather that has enough sunshine to create shadows
- Piece of paper & clipboard
- Pencils
- Shadow challenges
- Chalk
- (FOSS) OR this template

SESSION 4:
Quick-think model about shadows

Warm-up

Now that we investigated a little about how our shadows behaved, let's try to identify some patterns on how shadows would change over time. Watch this time-lapse video of a shadow changing over the span of a day. What do you notice about the shadow? How does it change throughout the day?

Main activity

Ask students to work in their team to draw a model showing how the shadow changed throughout the day. Students might include information about the shape, angle and length of the shadow. Next, students will try to create a graph to show how the length of the shadow changed over time during the day. If students need support with how to think about the x and y axis graph, pause and do this graphing activity together.

Wrap-up

Invite students to summarize what they noticed about the shadow and to share what they might want to investigate on their own in their daily lives concerning shadows. What are they curious about?

Materials Needed

Teacher slides

SESSION 5:
The known universe

Warm-up

Explain to students that today, we will continue to gain an understanding of our place in the universe. Ask students to each draw a quick sketch after thinking about the following question: Where are we located in the Universe?

Materials Needed

Teacher slides

Paper, markers

Main activity

Show them the video titled "The Known Universe" on this slide show. Explain that this is a simulation created by scientists to show our place in the Universe. A simulation is an interactive model created to show us how things appear to act in the Universe. Pause every 20 seconds or so to ask them what they see is happening.

» At about 2:00 minutes, the view will start to move away from the solar system. Ask students, what seems to be happening to the way the sun looks? (it is getting smaller and less bright).

Team-model: Have students revisit the model they drew. How would they change it based on the information that they just saw from the video simulation? Have students work in their team to discuss their models, discuss the video, and then come up with a Team Consensus Model which incorporates the ideas of team members into one model. Ask teams to select one **communications manager** to share their model.

Wrap-up/group conversation

Have each team's communication model share their model with the whole group. This can be done in a whole-group circle. After groups have presented, ask if there were similarities between the models that different groups came up with. What similarities are there between the models? What differences are there?

OPTIONAL SESSIONS:
FOSS Investigation 2

Part 2: How Big and How Far?

Access your Teacher Guide for the FOSS: Earth and Sun Module. On page 180 starts the "How big and how far?" activity. In this lesson, students will create a model of the earth, sun and moon using an Earth Globe, and a white polystyrene ball. Please see FOSS guide for detailed instructions. This is an optional lesson since NGSS standards do not have students calculate sizes and distances between the Earth, Sun and the Moon.

Part 3: Phases of the Moon

In this optional session, students analyze moon observations and talk about chances of the phases of the moon. Since this is not a focus on NGSS standards for this grade level, this session is optional. If your students have a particular interest in the topic, please integrate the lesson at this point in the unit.

Part 4: The Solar System

In this FOSS lesson, students work in groups to organize solar system cards in order of proximity to the Sun. Since the activity is not incredibly engaging or thought-provoking, an alternate activity is suggested as a next session where students work in teams to research their favorite planet and locate it in relation to the Earth and Sun.

Materials Needed

Part 2:

- Earth Globe
- White Polystyrene balls
- Slim straws
- Meter tape

Part 3:

- Moon Calendar
- Moon Phase Posters
- Lamp (clip on)
- Light bulb
- Projection system

Part 4:

- Chart Paper
- Earth Globe
- Plastic ball
- String (2 meters)
- Computer
- Projection system

SESSION 6:
Solar system superheroes

Warm-up

Show students the images of all the planets and the sun. Ask them what they know about them. Then show students this video. They will be assigned to one planet (and one group will be assigned to the sun) and will become experts on their celestial body. Then, they will design a superhero that has some traits that relate with the planet/star! In this way, they'll be helping their classmates learn about how the planets are different. Allow students to pick a planet that interests them and to work in teams of three. Try to make sure each planet is represented. You may want to skip the Earth, since the next lesson in the unit goes into depth about the Earth. **The website that students will be exploring is linked in the teacher slides.**

Materials Needed

Teacher slides

Large paper to draw superhero

Markers, colored pencils

Main activity/solar system expert teams

Once students have decided which celestial body they will focus on, have them do the following:

- Research: What are some things that are special about your planet (or star)?
- Superhero Brainstorming: What traits might your superhero have?
- Draw and write about your hero: Draw a picture and label their special powers. How are their special powers like the planet (or star) they represent?
- Present: Have each group share about their planetary hero. As teams share their heroes, tape them up on the board in the correct sequence in relation to the sun and other planets.

Wrap-up/group conversation

Ask students to share one new fact they learned with a group member. Ask students which planet or star intrigues them the most and which one they might want to learn more about. Ask students to share with a partner as the lesson wraps up.

SESSION 7:
FOSS investigation 2 *Part 5: Stars*

Access your Teacher Guide for the FOSS: Earth and Sun Module. On page 214 starts the "Stars" Activity. In this lesson, students will learn about telescopes, constellations, why stars appear to move in the sky, and why certain stars are seen during certain times of the year. Please access your FOSS teacher guide for a detailed version of the lesson.

Materials Needed

1 lamp (clip on)
1 lightbulb
Earth globe (on a stand)
Projection system

SESSION 8:
Stars, colors, and brightness

Warm-up

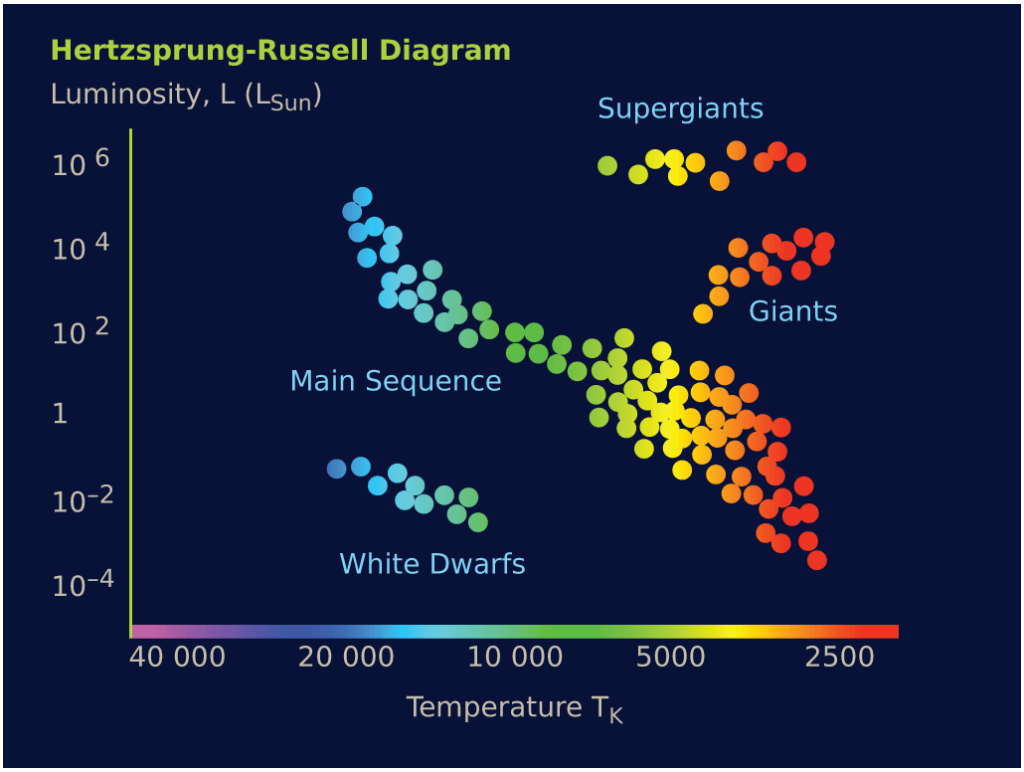
Reshare the image shared in a previous session showing a night sky with a variety of star shapes, colors, and brightness. Ask students to share things they notice about differences between the starts and cosmic bodies. Ask students: why are stars so different from each other?

Main activity: HR diagrams

Show students the Hertzsprung-Russell Diagram. Providing them with a color version to look at on their device is ideal. Ask teams to make sense of the diagram and answer the following questions using their Making Sense of the HR Diagram Handout.

This is a diagram showing stars:

1. What information can you understand from the diagram? *Hint: look at the label on the X axis (Temperature) and the label on the Y axis (Luminosity)
2. How does the temperature (how hot something is) affect the color of the star?
3. How does the temperature of the star affect the luminosity, or brightness of a star?



Materials Needed

- Teacher slides
- Making Sense of the HR Diagram Handout
- Tweet Template (one tweet per student)

SESSION 8 (cont.)

Wrap-up

Once students have wrapped up their ideas, have them revisit the question: why are stars so different from each other? Have each student write a hallway tweet answering the question. I suggest that you create a space somewhere outside the classroom where students can post their tweets (perhaps outside in the hallway). Although most students at this age are not old enough to have a social media account, it is helpful to show students that these platforms can be used to share information and ideas. The idea of a tweet is that it must be short and concise. Ask students to post their tweets on the tweet-board in the hallway for their peers in the building to see. Students will have to create a "twitter handle" which is the @ symbol, followed by their first and/or last name. This, along with students' thinking templates can serve as formative assessments HR diagram.

SESSION 9:
Protecting or escaping?

Warm-up

Ask students to think about the learning that they've experienced the past few weeks. What have they learned about the Earth's place in the Universe? In the galaxy? In the Solar System? Ask students what is the closest Star to us and why is it important?

Reconnect students with the driving question: ***How can we learn to be better protectors of the Earth?***

Materials Needed

Teacher slides

Main activity

Show students the video by Xiye (pronounced "she-ay") Bastida-Patrick (Otomi-Toltec Climate Justice Activist) about re-imagining the future of the Earth. What is Xiye trying to explain to us? How does her video make you feel?

Small team discussions: Give students the following prompt and ask them to discuss how they would respond:

> Your neighbors and you were playing basketball outside. You told them how excited you were to learn about the Earth but how you are concerned about how everyone will be affected by Climate Change if we do not do something about it. Your neighbor's brother, who is a teenager says, "Ah, I wouldn't even be worried about it. If we mess up the Earth, we'll just move to Mars or another planet that's out there." Using what you've learned so far, what would you explain to them? With your team, plan a short response that is under 1 minute long. Please write it down and designate a PR Manager to share with the class.

Wrap-up

Have each team's PR Manager share their team's short speech.

How Lesson 2 Supports Next Generation Science Standards

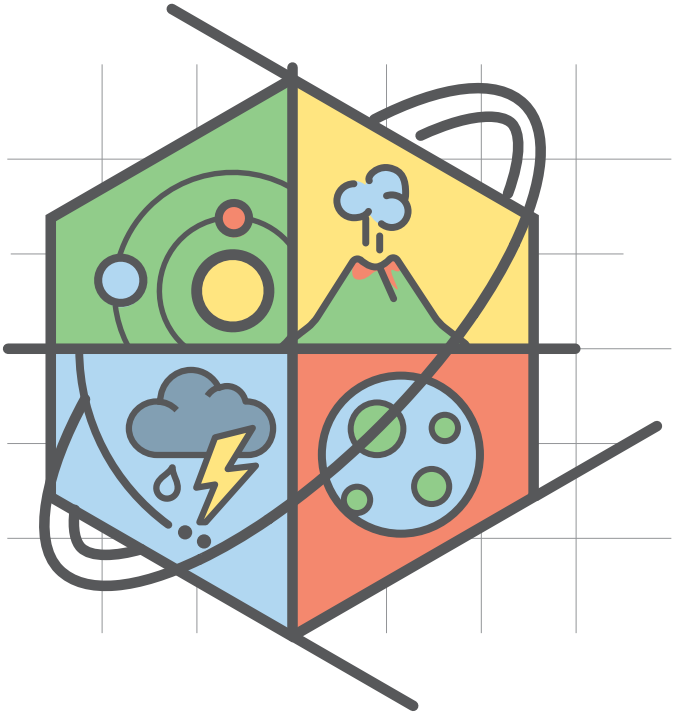
NGSS Standards:

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

5-ESS3-1 EARTH AND HUMAN ACTIVITY: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

5-ESS3-2 EARTH'S PLACE IN THE UNIVERSE: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Science & Engineering Practices	*Disciplinary Core Ideas*	*Crosscutting Concepts*
Asking questions and defining problems Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Using mathematics and computational thinking Developing and using models Engaging in argument from Evidence	ESS1.A: The Universe and its Stars • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1) ESS1.B: Earth and the Solar System • The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)	Systems and systems models Cause and Effect Scale, proportion, and quantity Stability and change Patterns



LESSON 3: Air and the Earth

STRATEGY: EXPLAIN

In this lesson, students will use investigations to learn more about the way that the Earth is affected by changes in air, water, and land which have an impact on our weather and climate.

STEM

SESSION 1:
Air and humans—do we make a difference?

Warm-up

Ask students, is air important to living things like us? Why or why not? What are your thoughts on this? Allow students to share with a partner and to share out with the whole group.

Materials Needed

Teacher slides

Main activity

Using the teacher slides, show students the video of Climate Activist **Maxine Jimenez** talking about how pollution and heat waves have affected her community in Los Angeles.

Allow students to share what they notice, wonder, and relate to in Maxine's story. Is there pollution of this kind in their community? Why do some communities have to deal with more pollution than others? Is it fair that some people live in environments that are becoming more and more polluted than others?

Note on Access and Equity: Depending on your group of students, they may or may not be able to relate to Maxine's experience. If you live in an urban or suburban setting where air pollution can be a problem, encourage students to see similarities between their experience and Maxine's. In this way, Maxine is helping us create a **mirror** through which we can relate to our own lives. If your community is located in a suburban or rural area with less air pollution, invite students to look through a **window** and see the realities of people who live in more urbanized areas.

Wrap-up

Invite students to take another look at their driving question. What do they feel they still need to learn more about in order to protect the air on the earth? Why is important to protect the air around the Earth?

SESSION 2:
The greenhouse effect

Warm-up

Ask students if they know what a greenhouse is? Do they have a family member who has a greenhouse? Have they ever seen one? Use the teacher slides to show students a picture of a greenhouse.

Materials Needed

- Teacher slides
- Blank paper for models
- Colored pencils, markers

Main activity (in teams)

Ask students how greenhouses are helpful to us. Share the video(s) of the Greenhouse Effect with students. After students have watched the video(s), ask them, why is this phenomenon called the "greenhouse effect?" Ask students to work in teams to create a drawing that shows how the Greenhouse Effect on Earth is similar to how we use a greenhouse to grow plants. Students can create a drawing on a plain piece of white paper or draw in digital form. Ask them to use words, images, arrows, etc. to describe their thoughts and create the model. A scientific model is a drawing or 3D explanation of how something works in nature.

Greenhouse model gallery walk

Post teams' models around the classroom and have students do a gallery walk to take a look at each others' models. Have students use the reflection/exit-ticket to talk about the similarities they noticed between the models that their team came up with and the models created by other teams. Be sure to save students' models, as they will be improving them later.

SESSIONS 3-4: FOSS Investigation 3
Part 1: The Air Around Us

Access your Teacher Guide for the FOSS: Earth and Sun Module. On page 231 starts Investigation 3: Earth's Atmosphere. Part 2 (The Atmosphere) is optional since we have provided other activities which focus around the idea of a changing atmosphere. Below is a summary of activities 1 & 3 in the FOSS guide and how they can be connected with our STEM Storyline. Please access teacher guide for a more detailed lesson plan.

Materials Needed

- Projection system
- Computer with internet access to show videos
- Syringes
- Flexible tube
- Binder clips
- Electronic scale (optional)

Main activity

Students will investigate the properties of air by conducting experiments that show that air takes up space and has mass. **Matter** has mass and occupies space. By engaging in these experiments, students learn that air has matter. Understanding that air has matter will be an essential idea that helps students understand that the atmosphere consists of matter and that changes in the type of matter in the atmosphere (due to increased Carbon Dioxide in the atmosphere) will lead to changes in the Earth's systems. Please use FOSS teacher guide to implement lesson.

After students have experienced how air does have mass and takes up space, ask students the following questions that allow them to connect to the storyline:

- We were talking about the Greenhouse Effect, is the air in the sky matter? What do you think the air in the sky is made of? Does it take up space? Does it have mass? What do you think?

Wrap-up

Allow teams to take a look at the initial models they created about the Greenhouse Effect and the Earth. Ask them to add to or modify their model based on the new information they discovered in this FOSS investigation. Ask teams to share what they added/changed or how this FOSS investigation helped them better understand the Greenhouse Effect.

SESSION 5:
Carbon dioxide in the Earth's atmosphere

Warm-up

Use teacher slides to show students the graph of the gases in the Earth's atmosphere. Ask students to make observations:

- Which gas makes up most of the atmosphere?
- Which gases are less present in the atmosphere?

Main activity

Show students the NOAA video of data on the Carbon Dioxide levels in the atmosphere over time. Ask students to look at the graph and ask them to think about the following in teams:

- What is the graph showing? What variables are on the two axes? (Year and CO2 level)
- What do you notice about the line that shows how the CO2 level is changing?

Team reading: Have students work in teams to read the Newsela article titled, "A global problem: Carbon Dioxide levels in atmosphere hit record high." Use reading strategies that align with strategies that your students respond well to during their ELA instruction.

Wrap-up

Allow teams to take a look at the initial models they created about the Greenhouse Effect and the Earth. Ask them to add to or modify their model based on the new information they found about changing atmosphere composition. What questions do they have?

Materials Needed

Teacher slides

Article about carbon dioxide in the atmosphere

Greenhouse models created by students during Session 2

SESSION 6-8: FOSS Investigation 3
Part 3: Local Weather

Students will act as meteorologists and will create a weather report through measuring temperature, humidity, air pressure and wind direction. Students will monitor weather conditions for several days and will discuss patterns in weather changes (or stability) over time.

This is a great lesson that can be implemented using the FOSS guide on page 266.

Materials Needed

- Sticky notes
- Scissors
- FOSS Notebook Sheet 15 "Weather Data"
- Thermometers (two per group)
- For whole class:
- Digital weather station
- Compass on base
- Hole punch
- Index card
- Scissors
- Tape
- Jumbo straw
- Superjumbo straws
- Screwdriver (optional)
- Projection system
- Computer with internet
- Local weather report

SESSION 9:
Difference between climate and weather

Warm-up

Ask students, when we were practicing being meteorologists, what type of information were we collecting which showed us what the weather was?

Materials Needed
Teacher slides

Main activity

Show students the videos which talk about the difference between weather and climate. Ask students to talk with their teams:

- ***What is the difference between weather and climate?***

Have students work in teams to come up with a "tweet" to share their answer to the question "what is the difference between weather and climate?"

Wrap-up

Have students post up their tweets around the room to share with their classmates. Allow teams to write responses and give feedback.

SESSION 10: Stories for the Climate Crisis Mixer (from Zinn Education Project, approx. 45-60 minutes)

This is a fun and rigorous activity created by Bill Bigelow as a part of the Zinn Education Project. The lesson can be downloaded by creating an account at Zinn Education Project and accessing this link.

Materials Needed

- Teacher slides
- Stories from the Climate Crisis: A Mixer
- Student identity cards (in lesson)
- Climate Mixer Reflection

Lesson summary

1. Students are assigned a person and are given a short summary of who this person is and how they are being affected or how they will be affected by climate change. *If you feel that your students will do better working in pairs or small groups, give them time to read a character description together before the actual mixer.* Provide students with the "character" description in advance so they have time to read, highlight, underline, and mentally summarize who their individual is. Give them time to re-read before the session

2. Mixer: Facilitate a "mixer" where students go around the classroom and talk to another peer while staying "in character." A sheet is provided with questions that can spur conversation. Ask students to use their normal talking voices and accents as they represent their character as stereotypic acting can be offensive and disrespectful to the characters who are represented.

3. After students have met several individuals, ask them to return to their desks and write briefly about their experience. Who did they meet, what situations did they hear about? What surprised them? Did anyone make you angry (who?)? Did you hear about any situations that gave you hope? This Reflection Template can be used.

Wrap-up

Discuss reflections with students. What have they learned about the Climate Change Crisis? What are things they still need to know? How can they connect with the driving question? What have they learned, what more do they need to learn? What questions have been answered? What questions are still there?

How Lesson 3 Supports Next Generation Science Standards

NGSS Standards:

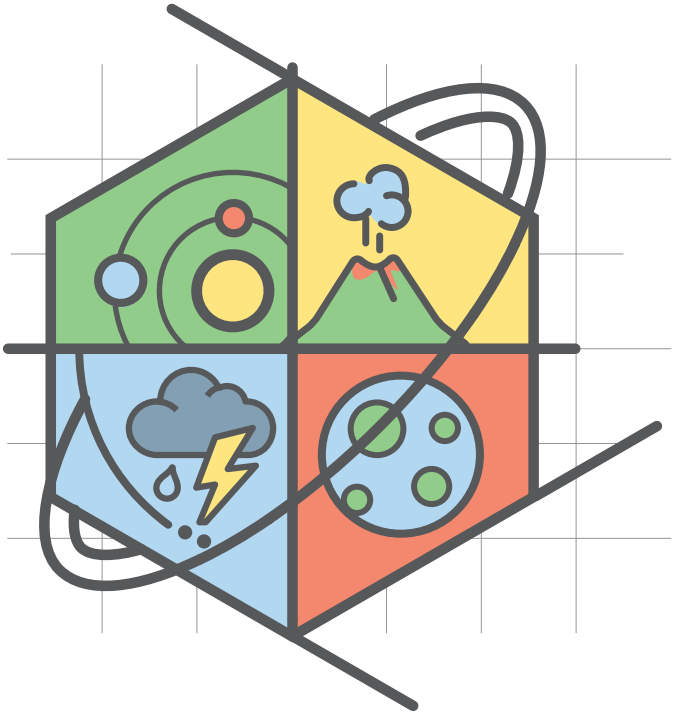
The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

5-ESS2 1 EARTH'S SYSTEMS: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1 EARTH AND HUMAN ACTIVITY: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science & Engineering Practices	*Disciplinary Core Ideas*	*Crosscutting Concepts*
Asking questions and defining problems Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Using mathematics and computational thinking Developing and using models Engaging in argument from Evidence Planning and carrying out investigations	ESS2.A: Earth Materials and Systems • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.	Systems and systems models Cause and Effect Stability and change Patterns Energy and Matter

LESSON 4: The living Earth



STRATEGY: EXPLAIN

In this lesson, students will create a model to show how the Earth's Systems interact. Students will work with expert groups to more deeply understand one Earth System and will help their Earth Model team in creating a model of the systems of the Earth. Students will apply their understanding to interpret interactions they see in their local setting. Students will also apply their understanding to interpret the problem being faced by youth activists across the country.

STEM

SESSION 1:
What's the Earth made of?

Warm-up

Show students a picture of the earth (use teacher slides) and ask students to reflect quietly to themselves about what they see and to write down their ideas for a few minutes.

Main activity

Have students work in teams of four to create a model of the Earth using the prompt below. This is their initial model and errors are welcome. Students will return to this model and make improvements after working with their expert groups. Again, errors are good at this point?

Work with your team (of four) to draw a model/diagram to answer the question: "What is the Earth made of?" and give teams at least ten minutes to create a model.

Ask teams to include the following:

- Include images
- Include words and arrows to label your thinking
- Use colors if you have time

Wrap-up

Have each team pair up with another team and talk about what they included in their model. Ask students to provide each other with positive feedback (things they appreciated about the other team's model) and some questions (what are some wonderings you have about the ideas presented by the other team?).

Materials Needed

Teacher slides

Large piece of blank paper

Markers/colored pencils

SESSION 2:
Launching into *Expert Groups*

Warm-up

Have students meet back with their Earth model teams from Session 1 and have them decide which *Expert Group* each member will join. There will be four *Expert Groups* (Biosphere, Atmosphere, Geosphere, and Hydrosphere), and their team must have a representative at each. At the end of the *Expert Group* Round, teammates will return to their Earth model teams and use their expertise on a specific earth sphere to help their team modify/optimize their Earth models.

Materials Needed

- Teacher slides
- Earth's Spheres Team Expert Notes

Main activity/discussion

Expert Groups explore some videos and draw and write their ideas on the research templates.

What important information did they learn from the video? Have teams use their *Expert Group* Research Templates as a guide to help them collect information. Ask students to finish the first page of their template.

Wrap-up

Have students team up with a classmate outside their expert team and share in a few sentences, what is a part of their Earth sphere?

SESSION 3: *Expert Groups* continue to research their spheres

Warm-up

Have *Expert Teams* get back together and to conduct a group self-reflection on their current progress. Based on their Research Notes Template, what information have they found and what have they yet to find? Remind students that their responsibility on their expert teams is to learn enough to be able to teach their Earth model teams. Provide students with the checklist on the teacher slide if they need help getting started.

Checklist:

- Can each of us describe what our Earth sphere is?
- What are some examples of our Earth sphere?
- What are a few ways that our Earth sphere interacts with other spheres?

Main activity/discussion

Have students visit MY NASA Data.gov which has lots of written information about the Earth's spheres. Students can also browse some data to delve more deeply into information about their sphere, or just browse to collect a general understanding of their sphere. Ask students to make sure that they have the understanding they will need to be able to support their Earth Model teams in the next session.

Wrap-up

Have each team write a "tweet" and share a short definition of their Earth sphere to post on the board.

Materials Needed

Teacher slides

Earth's Spheres Team Expert Notes

My Nasa Data.Gov

SESSION 4:
Earth model teams meet back

Warm-up

Give students time to meet back with their Earth model teams. Make sure students have their research materials and their original Earth models. Teams will be working to improve their Earth models.

Main activity/discussion

Ask experts to share what they learned about their sphere. Where is their sphere represented in the team's Earth Model? Where is it not represented? Can the model be revised to more accurately show the Earth's spheres? (OR do we have to start over on our model?) Does your model show any ways that the spheres interact? Ask students to include at least two examples of the spheres interacting.

Wrap-up

Facilitate a gallery walk where teams can take a look at each others' models. Provide students time to give each other positive feedback about their models (a few blank papers can be taped under each model so viewers can make positive comments). Commend students on their excellent work in becoming experts and supporting their team in building a deeper understanding of the Earth's spheres.

Materials Needed

Teacher slides
Students' notes
Earth models

SESSION 5: Nature walk—how do Earth's spheres interact?

Warm-up (5 min)

Explain to students that today, we will be going outside for a fieldwork session where we will try to find examples of the ways that Earth's spheres are interacting around us. Quickly re-visit tweets from a few sessions ago to review the definitions for the Earth's different spheres.

Main activity (20 min)

Take students outdoors to a space where they can observe some living things and elements (school yard, garden, or any outdoor space, really). Provide students with a piece of paper to write/sketch what they observe and ask them to work with their Earth model teams. You can also provide them with the Interacting Spheres template to help them categorize their observations through the lens of interacting Earth spheres.

Wrap-up

Have students come back inside and work with their teams to make sense of the interactions they saw. Project the "Earth's Spheres Interact at our School" slide and have each team contribute a few examples they found of the spheres interacting. Which spheres were interacting and why? Allow a representative of each team to write their example on the board in addition to making an arrow showing the different spheres involved.

Materials Needed

Teacher slides

Outdoor space to make observations

Pencil, clipboard

OR Earth's Spheres interact template

SESSION 6:
Climate stories and interacting spheres

Warm-up

Share with students that our deepening understanding of how the Earth's systems work and interact is important if we are to answer our driving question: ***How can we learn to be better protectors of our planet?***

Main activity

Have students work in the Earth model teams to watch the story of a young climate activist in the United States. The *Our Climate Future* website has a map of the U.S. with linked story videos of youth activists around the country who are highlighting climate issues that involve the Earth's systems. Give teams time to watch the video and rewatch it if needed. Ask students to fill out a reflection of the video as a team. The reflection includes a diagram of the problem with a reflection on what can be learned from the problem.

Prompt 1: Draw a diagram showing the problem, or a part of the problem described by your climate activist in the video. Where do you see evidence of an interaction with the Earth's spheres? Biosphere, Geosphere, Atmosphere, Hydrosphere.

Prompt 2: Did the climate activist talk about something they are doing to help change the effects of the problem on people, plants or animals? Did you learn something that you can share?

Wrap-up/learn & share circle

Have each team share the name of the climate activist whose video they watched and to share some things they learned from the video.

Materials Needed

Teacher slides

Access to ClimateStories.org

Climate Stories and Interacting Spheres Thinking Template

How Lesson 4 Supports Next Generation Science Standards

NGSS Standards:

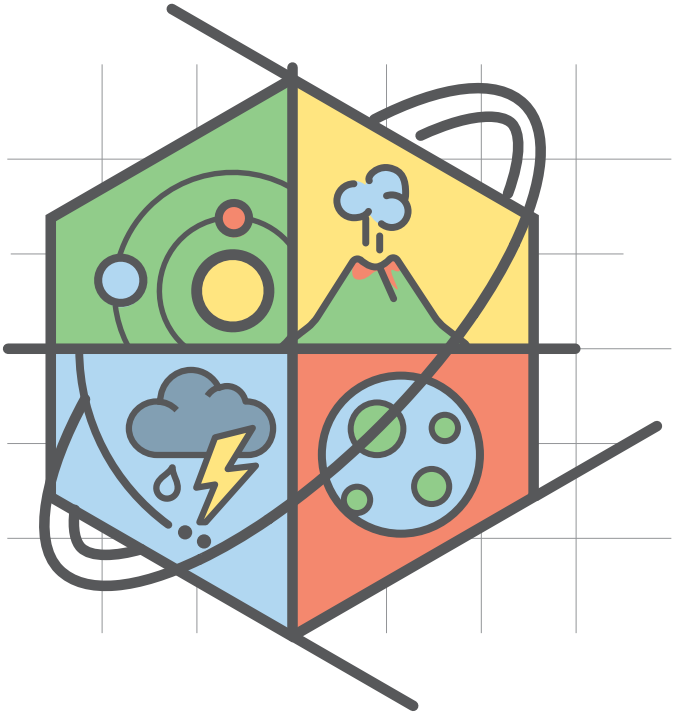
The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

5-ESS2 1 EARTH'S SYSTEMS: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1 EARTH AND HUMAN ACTIVITY: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science & Engineering Practices	*Disciplinary Core Ideas*	*Crosscutting Concepts*
Asking questions and defining problems Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Using mathematics and computational thinking Developing and using models Engaging in argument from Evidence Planning and carrying out investigations	ESS2.A: Earth Materials and Systems • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. ESS3.C: Human Impacts on Earth Systems • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	Systems and systems models Cause and Effect Stability and change Patterns Energy and Matter

LESSON 5: Imagining a brighter future



STRATEGY: EVALUATE

In this lesson, students will work with another (different) *Expert Group* team to study one aspect of the climate change phenomenon or human-related negative impact to the Earth's systems. Teams will study specific instances of activism that relate to the problem they are learning more about. Then, teams will create a public-facing product to share their learning, highlight the efforts of activism that is happening, and share some recommendations that they learned from their study.

INTRO:
Teacher ideas for the final product

In this final lesson, students will work with expert teams to develop a final product that will be shared with an audience other than the class and teacher. A public product can look very different based on the intended audience, and I encourage you to choose the format that best fits the interests and needs of your students. Perhaps their writing could use improvement and you'd like them to write essays which will be shared on a class website? Maybe your students enjoy using technology and would want to create videos or podcasts to share what they've learned? Maybe you'd like them to work on their speaking and presenting skills and they will put on a symposium for the community to learn about Earth Stewardship? Or perhaps this is an excellent time to leverage students' diverse interests and allow them to choose which format they would like to create a message for a public audience? Below I've brainstormed some ideas for final products that may be helpful to you:

- **Film Screening:** each expert group will create a segment that will tackle a specific aspect of Climate Justice. Their videos can be strung together and shared with the community in a "Climate Justice Screening Event." This will involve writing a script based on evidence and scientific ideas, filming, and (possibly) editing.
- **Podcasts:** expert groups can create podcasts where they discuss the issue they are learning about in an informal conversation that is audio recorded. They will have to write discussion points and an outline of what they want to talk about before.
- **Digital or print media:** Students can create an informational handout, infographic, pamphlet, etc. Students have to write content for their product, find/create images, put them together in an impactful way, and publish. Digital media can be shared online via social media by the district and/or local activist organizations.
- **Letters and Essays:** Letters and essays can be composed to share with a public audience in order to bring awareness and drive change.
- **Student choice:** It can be exciting to ask students who they'd like to share their learning with and ask them which format they would like to use. Students may have interests and talents (music, dance, poetry, art) that can help them create a powerful public product to share with their audience.

SESSION 1:
Rise: From one island to another

Warm-up

Kathy and Aka are climate activists and poets who are using their voice to spread the word about the impacts of climate change on their homelands. They are using their voice to make a positive change in the world. Show students the video poem by poets Kathy Jetnīl-Kijinerand (a writer and performer of Marshall Islander ancestry) and Aka Niviâna (Inuk writer and climate activist).

Materials Needed

Teacher slides

Main activity

Have students discuss these prompts with a partner. Smaller groups may be better here so students can share their thoughts and the impact of Kathy and Aka's Message:

- What did you learn from the video/poem that you didn't already know?
- How did Kathy and Aka's message make you feel?
- How are Kathy and Aka using their voice and their poetry?
- How are Kathy and Aka using their voice to make a positive change in the world?
- How did their message inspire you?

Wrap-up

Ask teams to share any of their conversation that they'd like to with the whole group. Create a space for students to share their thoughts and appreciation for these youth activists.

RESEARCH SESSIONS:
As much time as your students need (~1 week)

Warm-up

Explain to students that in order to become better protectors of the environment, we will each join an "Expert Activist Team" and will focus on one area of Earth stewardship. The areas are listed below and are linked to google drive folders with some resources that students can explore as they begin to dig into the issue. Have students think about which team they want to join. It is up to you to decide how many students will be in each group and how many groups there will be. It is not necessary to cover all topics and it is also possible for more than one team to cover the same topic. Provide flexibility but ask your students to focus on that one topic for their final product. If you or your students have additional interests, please feel free to add additional expert groups.

Forest

How are forests being affected by humans and how can we learn to protect them?

Water

What problems do some communities face in accessing freshwater?

Land

Why are droughts happening and who do they affect?

Materials Needed

Teacher slides

SINGLE SESSION:
Who is our audience?

Warm-up

Explain to students that now that they are in their expert teams, they will start thinking about a product to share with the world. In order to do that well, we have to decide who exactly our audience will be.

Materials Needed

Teacher slides

Main activity

Guide students through a process of discussing the following questions in their teams and ask teams to share out their thoughts after each discussion point. As the teacher, take notes of students' ideas and try to help students build consensus.

- Who is our audience? Adults? Other kids our age? Kids older than us?
- What message would we like to share with them? Remember the driving question: ***How can we learn to be better protectors of The Earth?***
- How can we help people learn best? How do we learn best?
- Ask students what they might want to create in order to help spread the word.

Wrap-up

Go over the main points that the class brought up and let students know that they will be working with an expert group to think more deeply about one problem related to climate justice.

PRODUCTION SESSIONS:
As much time as your students need (~1 week)

Give students several sessions over the span of several weeks to create their final product. The structure below can aid in students' development of material. These sessions will look different based on the type of public product students decided to create and the degree of student choice you feel comfortable with allowing for the final product.

Materials Needed

Teacher slides

Other materials as needed by groups

Really Answer the Driving Question: Remind students that they should be answering the driving question: ***How can we learn to be better protects of the Earth?***

1. How does the information you found on your topic answer your question?
2. Which people or communities did you learn about and learn from?
3. What do other people need to know about your topic so they can learn to be better protectors of the Earth?

Coach your students: Circulate the classroom and check-in with teams to ensure that they have the right amount of information they need to be successful, provide support to teams who need it.

Planning your public product:

1. Who is your targeted audience?
2. How will you share your message with this audience?
3. What will you teach the audience about being protectors of the Earth?
4. On your team, who will do what? How are jobs being balanced so everyone is helping to complete the mission?
5. What materials do we need to gather?
6. Is our plan realistic considering how much time we have to prepare?

Coach your students: Circulate the classroom and check-in with teams to ensure that the public product they are planning is realistic and appropriate for the audience. Check with teams to see if the workload is being distributed evenly.

Create the final product:

Create your materials and constantly check:

- Is your work presentable to your audience?
- How might you improve your materials or your message to help people understand how important the issue is?
- Are you on time? How much time do you need to finish?
- How are you highlighting the activism of people who have been doing this work to protect their communities and the environment?

Coach your students: Circulate the classroom and check-in with teams to see if their work is progressing and if they need some support with adjusting their plan. Will teams finish on time? Is their product presentable? Recruit "consultants" from other teams to provide feedback about a certain aspect of the product in case there are things lacking (ex. if students are not creating an item that is visually appealing at all, maybe a representative

PRODUCTION SESSIONS (cont.)

from another team can provide some coaching).

Practicing with peers: Allow students to share their products with their classmates before things go live. Pair teams together and have each team share with another team and provide warm but helpful feedback.

Ask teams to help their partner teams with these ideas:

- Are the materials easy to understand? (too much or too little info?)
- Are they clear?
- Are they visually or auditorily engaging? (ex. How well will a poster with some pictures slapped on and illegible text engage an audience's attention?)
- How is the team sharing the perspective of people other than themselves who have been practicing Earth stewardship?

Get Ready for Launch: Explain to students exactly how and when their public product will launch and give students some extra time before then to get their materials refined.

Coach your students: Remind students how valuable and powerful their voices are and tell students that they are now 5th grade experts on their topic and should feel proud to share their knowledge with their community/audience!

FINAL SESSIONS:
Sharing the learning

Congratulate your students on their amazing work, and for the dedication they put into learning about how to become a better protector of the environment.

Put on a showcase, screening, or other event where students share their work with someone outside the class; invite administrators, teachers, other students, parents, etc. They have learned so much about environmental stewardship and will be excited to share their ideas. Depending on the type of public product they created, the format for this may vary.

STEM Fair: Students' projects are set up throughout auditorium/gym. Visitors circulate and students share their learning.

Student Film Screening: the teacher puts together students' videos into a showing and the community is invited to view. Students can even sell tickets to raise money for a climate justice activist group of their choice.

If students' products were visuals, students have take the time to make copies of and distribute (or post up) their visual materials around their school.

Please feel free to scale up or down based on your and your students' resources.

Congratulations to YOU for creating an experience where students developed their voice, practiced 21st century success skills, learned about marginalized communities and how they have engaged in activism, amplified the work of brilliant climate activists from around the world, and worked to make their world a more scientifically literate and informed place!

Materials Needed

Teacher slides

Event venue

Students' projects and accompanying equipment

How Lesson 5 Supports Next Generation Science Standards

NGSS Standards:

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

5-ESS2 1 EARTH'S SYSTEMS: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1 EARTH AND HUMAN ACTIVITY: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science & Engineering Practices	*Disciplinary Core Ideas*	*Crosscutting Concepts*
Asking questions and defining problems Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Constructing Explanations and Designing Solutions Developing and using models Engaging in argument from Evidence	ESS2.A: Earth Materials and Systems • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. ESS3.C: Human Impacts on Earth Systems • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	Systems and systems models Cause and Effect Stability and change Patterns Energy and Matter