JOURNEY THROUGH THE HELIOSPHERE COLORING BOOK

AN EDUCATOR'S GUIDE

Journey Through the Heliosphere: The Sun-Earth System in Color

An Educator's Guide

Educators can use the *Journey Through the Heliosphere* coloring book to spark curiosity and creativity while exploring the science of the Sun and its connection to life on Earth. Each page blends artistic expression with key **heliophysics concepts**, encouraging students to learn through both science and storytelling. This resource is aligned with the Framework for Heliophysics Education (FHE) and supported by the NASA Heliophysics Education Activation Team (HEAT), which helps educators bring Sun-Earth science into classrooms, informal learning spaces, and communities. Whether used to introduce a new topic, support hands-on learning, or inspire conversations about space and culture, this coloring book invites learners to see heliophysics through both scientific and artistic lenses. You can access digital, printable versions of the coloring pages and additional teaching resources at science.nasa.gov/learn/heat.

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About the *Journey Through the Heliosphere: The Sun-Earth System in Color* Book

The Sun is our closest star, and it plays a powerful role in shaping life on Earth. For thousands of years, people have looked to the sky to understand their place in the universe. Today, scientists called heliophysicists study the Sun's light, heat, and the constant stream of energy and particles it sends into space. This science, called **heliophysics**, helps us understand everything from Earth's climate and seasons to auroras, space weather, and how to keep astronauts and spacecraft safe. Learning about the Sun and its connection to the planets helps us better understand our home in the solar system and how we can explore beyond it.

Artists and scientists alike are inspired by the Sun. In art, light defines form, creates mood, and reveals texture to help bring ideas to life. In heliophysics, light helps scientists study the Sun, understand solar activity, and explore how our star shapes the space around Earth. By combining art and science, we can make the invisible visible, transform data into stories, and inspire deeper connection and curiosity about our place in the solar system.

In Alaska, the Sun shapes daily life, traditions, and ways of knowing. The state stretches from 51° to 71° North latitude, and this dramatically affects how sunlight is experienced there. In summer months, some Alaskans live with 24 hours of daylight, while in the heart of winter, the Sun does not rise at all for weeks. In the long winter nights, the aurora borealis often lights up the sky with a dazzling display created when energy from the Sun interacts with Earth's atmosphere. This natural wonder is a living example of heliophysics in action. Alaska is home to diverse Indigenous peoples and cultures, each with a unique language, perspective, and relationship to the Sun and sky, and each of which holds its own knowledge systems and names for the world. In this project, we showcase these cultures by including a small sampling of Alaska Native languages to honor the heritage of Alaska, the only Arctic state in the Nation. A map is provided to help explore where these languages are spoken and to recognize the deep, place-based knowledge that connects land, sky, and people. Many other heritage languages represent the citizens of this country. What corresponding words are used in your community or culture? You may wish to use those in place of the translations used here.

Acknowledgements
This work was conducted at the University of Alaska Fairbanks Geophysical Institute through a Cooperative Agreement with the NASA Goddard Space Flight Center. We acknowledge the Indigenous nations upon whose ancestral lands UAF and NASA GSFC campuses reside. In Fairbanks, our Troth Yeddha' Campus is located on the ancestral lands of the Dena people of the lower Tanana River, and NASA GSFC is located on the ancestral lands of the Piscataway people. Special thanks to the following Alaska Native language speakers for sharing their cultural knowledge for this book:

Alutiiq / Sugpiaq: Dehrich Isuwiq Chya, Spiridon Gguitka Ash
Central Yup'ik: Nalugalria Joevahnta Usugan-Weddington
Iñupiaq: Hannah Paniyavluk Loon, Nellie Nigruaġruk Cleveland, Ricky Qaagaġliq Ashby
Lower Koyukon Athabascan: Paul Mountain
Ten Kenaga' / Lower Tanana Athabascan: David Engles, Siri Tuttle
Ts'msyen / Sm'algyax: Marcella Se'iga Liimii Da Ts'm Ksyen Asicksik, Gyibaawm Laxha (David R. Boxley)
X̲aad ḱil / Haida: Kihl Gúul Jáad Emily Edenshaw-Chafin, 'Waats'asdiyei Joe Yates

Coloring Book Structure

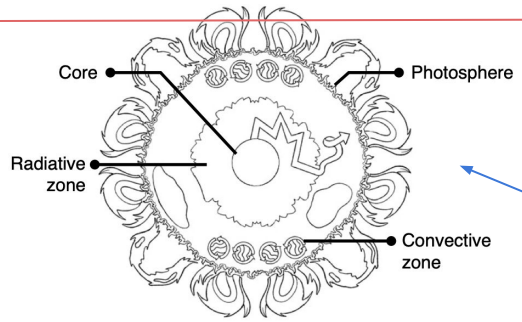
The Sun

The Sun is a giant ball of hot, glowing gas consisting of electrically charged particles called plasma that gives Earth light and energy. At its center is the **core**, where extreme pressure and temperature cause hydrogen atoms to fuse and release energy through a process called nuclear fusion. This energy moves outward through the **radiative zone**, where it slowly travels as radiation, bouncing around for thousands of years.

Next, it reaches the **convective zone**, where hot gases rise and cooler gases sink in a churning motion that helps move energy toward the surface.

The part of the Sun we can actually see is the **photosphere**, a glowing surface that sends sunlight to Earth. Beyond that is the outermost layer of the Sun's atmosphere, called the corona. It is usually hidden by the brightness of the photosphere, but is visible during a total solar eclipse.

The Sun becomes more and then less active over a repeating, roughly 11-year period called the solar cycle. When the Sun reaches solar maximum, there are many sunspots caused by its agitated magnetic field. This time is also when space weather is most common, with events like solar flares and Coronal Mass Ejections (CMEs) leading to the auroras here on Earth.



Speaking of the Heliosphere...

People have observed the Sun for millennia. The Sun influences all other objects in our solar system, and is the primary source of energy on Earth. The Sun is also integral to how Arctic peoples live their lives. What activities are dependent on the Sun where you live?

In the Alaska Upper Kobuk dialect of Iñupiaq, the word for *Sun* is **siqiñiq**. Scan the QR code to learn how to say siqiñiq in Iñupiaq.

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Scientific Explanation

Each coloring page is accompanied by scientific explanations and vocabulary. Use the glossary on pp 26-27 of the coloring book to learn more!

Scientific Illustration

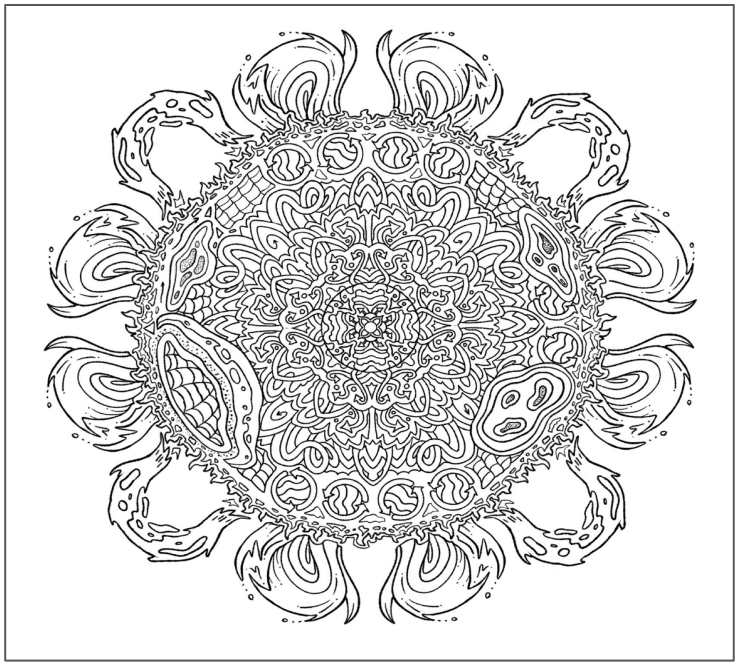
Label your coloring page with real science vocabulary!

Voices of Alaska

Discover how Alaskan Peoples relate to the Sun and lean Alaskan native languages!

Coloring Page

Explore the heliosphere through a rich blend of science, art, and culture!



Educational Standards

Next Generation Science Standards (NGSS)

Earth Space Science
ESS1 - Earth's Place in the Universe
ESS2 - Earth's Systems
ESS3 - Earth and Human Activity

Physical Science
PS1 - Matter and Interactions
PS2 - Motion and Stability: Forces and Interactions
PS3 - Energy
PS4 - Waves and Applications

Life Science Standards
LS1- From Molecules to Organisms
LS2 - Ecosystems
LS3 - Heredity
LS4 - Biological Evolution

ETS1 - Engineering and Design

National Core Art Standards (NCAS)

Visual Arts
VA:Cr - Creating
Cr1. Generate and conceptualize artistic ideas and work.
Cr2. Organize and develop artistic ideas and work.
Cr3. Refine and complete artistic work.

VA:Pr - Presenting
Pr4. Select, analyze, and interpret artistic work for presentation.
Pr5. Develop and refine artistic techniques and work for presentation.
Pr6. Convey meaning through the presentation of artistic work.

VA:Re - Responding
Re7. Perceive and analyze artistic work
Re8. Interpret intent and meaning in artistic work.
Re9. Apply criteria to evaluate artistic work.

VA:Cn - Connecting
Cn10. Synthesize and relate knowledge and personal experiences to make art.
Cn11. Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding

Alaska Standards for Culturally Responsive Schools (AKSCRS)

A: Culturally-knowledgeable students are well grounded in the **cultural heritage and traditions of their community**.

B: Culturally-knowledgeable students are able to **build on the knowledge and skills of the local cultural community** as a foundation from which to achieve personal and academic success throughout life.

C: Culturally-knowledgeable students are able to **actively participate in various cultural environments.**

D: Culturally-knowledgeable students are able to **engage effectively in learning activities that are based on traditional ways of knowing and learning.**

E: Culturally-knowledgeable students demonstrate an **awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.**

Classroom Activities

All concepts in the *Journey Through the Heliosphere* coloring book can be explored with students at multiple levels (recommended grades 5-12+).

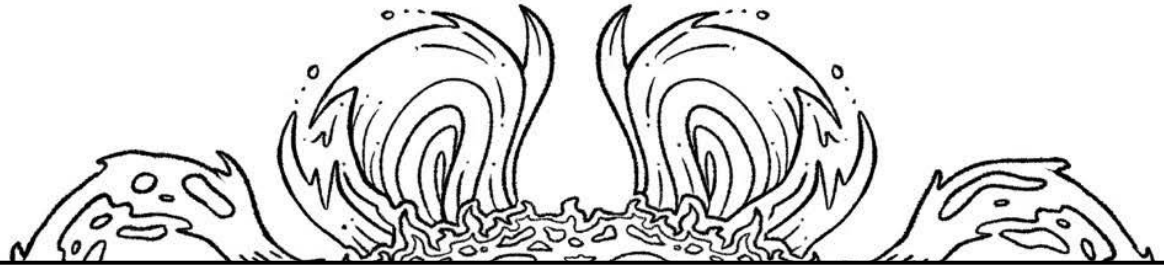
Below are some suggested activities and discussion points for using the coloring book in the classroom or other educational setting. Also included are the connections between the book's heliophysics topics and various educational standards, including the Next Generation Science Standards (NGSS), the National Art Core Standards (NCAS), and Alaska Standards for Culturally Responsive Schools (AKSCRS).

Learn more about how to incorporate heliophysics into existing curriculum and find more activities with the Framework for Heliophysics Education. This framework provides educators, scientists, and outreach professionals with a cohesive set of **Heliophysics Big Ideas** that align with NASA's heliophysics research and the Next Generation Science Standards (NGSS).

General Classroom Activities

Levels: All

- ➔ Encourage students to use the **Glossary** (pp 26-27), to help them make sense of the concepts as they explore the coloring pages.
- ➔ Have students use active reading strategies to explore the text in the **Scientific Explanation** which accompanies each coloring page. Have them use the same colors they plan to use on their coloring page to underline or circle key vocabulary and concepts in the text, demonstrating their understanding of the illustration through color-coding. For example, a student may choose orange for the Sun's core on the coloring page, and then use orange to underline the information about the core in the text (VA:Cr2.1, VA:Re7.2).
- ➔ Instruct students to add technical labels to their coloring page using the **Scientific Explanation,** **Glossary,** and the **Scientific Illustration** as guidance (VA:Cr2.3, VA:Cr3.1).
- ➔ Use the **Voices of Alaska [Speaking of the Heliosphere]** and the associated language pronunciation link to discuss how people around the world have unique connections to the Sun and how storytelling and science combine to form our modern understanding of how the Sun and Earth interact. Use this as a springboard to invite students of any background to share their experiences and connections to the Sun. See *Activities with Voices of Alaska* (pp. 7-25) for more activities that can be used to welcome a diversity of heritage languages and cultures (VA:Cn10.1, VA:Re8.1).
- ➔ **Jigsaw Concept Map:** Break students into small groups and have each group work on a different coloring page, using the suggested activities above. Then bring the class together to create a large-scale concept map using the coloring pages, adding vocabulary cards and yarn to show connections (VA:Cr2.1, VA:Pr5.1, VA:Re7.1).



Blending Science and Art

Activities by Level…

Grades K-5	**Ask** students how each of Earth's systems interacts with the Sun. Have them **draw** their own coloring page of an Earth system. Find more lessons about Earth's systems at https://mynasadata.larc.nasa.gov/ Check out this NASA animation of Earth's systems: https://svs.gsfc.nasa.gov/31365/
Middle School	Have students **investigate** how light travels and how energy is transferred through the radiation, convection, and conduction zones of the Sun. Have students **color code** the layers of the Sun on their coloring page. Find more activities about the Sun at https://spaceplace.nasa.gov/menu/sun/ Check out this NASA animation of how light travels outward from the Sun's core: https://svs.gsfc.nasa.gov/11537/
High School	**Discuss** nuclear processes inside the core of the Sun and the law of conservation of energy (HS-PS3,4). Ask students how they would **artistically represent** the process of nuclear fusion. Have students play a game about nuclear fusion here: https://spaceplace.nasa.gov/helios-game/en/ Check out this NASA animation of solar flows: https://svs.gsfc.nasa.gov/31400/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: How does the Sun's energy interact with each one of Earth's major systems (atmosphere, geosphere, biosphere, hydrosphere)?

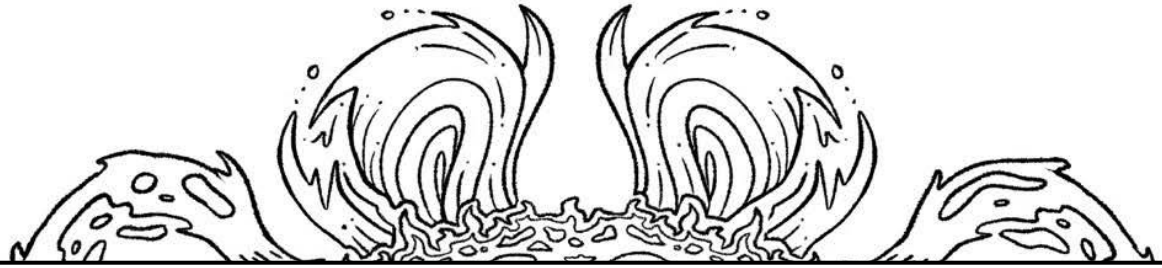
Middle School: How do solar panels work?

High School: How does the Sun make energy?

Heliophysics Big Idea 8: Energy from the Sun is created in the core and travels outward through the Sun and into the heliosphere.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• ESS2-1 • VA:Cr1	• MS-PS4-2 • MS-PS3-3 • VA:Re7	• HS-PS1-8 • HS-ESS1-6 • HS-PS3,4 • VA:Cr1



Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **Sun** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the Sun (AKSCRS A.3, B.2, C.3, D.1, D.3).
  - As an alternative, use the film, Kiuġuyat: The Northern Lights, found at http://culturalconnections.gi.alaska.edu to showcase Alaska Native culture and language.
- ★ Ask students to **reflect** on their own connection to the Sun. What traditions does their family follow around the cycles of the Sun? This may include enjoying a fireworks display in July. Is there a story that reminds them of this tradition? (AKSCRS A.2., E.1, E.4)
- ★ Have students **retell** their favorite story about the Sun through an artistic expression of their choice (AKSCRS B.2, D.4, E.8). This could be a drawing, presentation, poster, or zine; and could be created by an individual or as a class project (VA:Cr1.1).
- ★ Watch, learn and **perform** the Iñupiaq Welcome the Sun Dance (AKSCRS A.3, C.3, D.1, D.3) found at https://www.youtube.com/watch?v=q77Q7qRNVpc
- ★ Learn more about the **Iñupiaq** language here: https://www.uaf.edu/anlc/languages-move/inupiaq.php (AKSCRS B.2)

Speaking of the Heliopshere…

People have observed the Sun for millennia.

The Sun influences all other objects in our solar system, and is the primary source of energy on Earth. The Sun is also integral to how Arctic peoples live their lives. What activities are dependent on the Sun where you live?

In the Alaska Upper Kobuk dialect of Ifiupiaq, the word for Sun is siqiöiq. Scan the QR code to learn how to say **siqihiq** in Ihupiaq.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Moon Dog	Sun dog
Blue	Moonlight	"Sun dog when there is a full circle around it"
Earth	Morning star to the East	Sunlight, lit. "the Sun is shining"
Green	**Northern lights**	Sunny
Heat	Purple	Universe
"It is eclipsing"	Red	**Year**
Life	**Shadow**	
Light	Sky	
Living Creatures	**Star**	
Moon		

Blending Science and Art

Activities by Level…

Grades K-5	Did you know the Sun is magnetic! Ask students to **make observations** of the magnetic fields on the coloring page (size and shapes).Have students try this activity on exploring magnets: https://science.nasa.gov/learn/heat/resource/explore-magnets-activity/ Check out this NASA animation of the Sun's magnetic fields: https://svs.gsfc.nasa.gov/4124/
Middle School	Have students **compare** the properties of the magnetic fields of the Sun with Earth's. Students can demonstrate their understanding with a **graphic organizer** of their choice, for example a Venn diagram. Check out this animation of Earth's magnetosphere: https://svs.gsfc.nasa.gov/4663 (Compare to animation of the Sun, link in row above)
High School	**Ask** students how plasma generates an electromagnetic field and have them add a **diagram** of their understanding to the coloring page. Have students try these experiments with plasma: https://science.nasa.gov/learn/heat/resource/advanced-experiments-with-plasma/ Check out this video explaining the complexity of the Sun's magnetic field: https://svs.gsfc.nasa.gov/4124/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: What is the Sun made of?

Middle School: How do the magnetic fields of the Sun compare to the magnetic field of the Earth?

High School: What are the properties of plasma and how do those properties make the Sun a giant sphere of massive energy?

Heliophysics Big Idea 7: The Sun is made of churning plasma, causing the surface to be made of complex, tangled magnetic fields.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• PS2-3 • VA:Pr6	• MS-ESS2-1 • MS-PS2-5 • MS-PS1-4 • VA:Pr.6	• HS-PS1-3 • VA:Cr3

Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **atmosphere** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the Sun or aurora (AKSCRS B.2, D.1).
- ★ Ask students to **reflect** on how Earth's magnetic field relates to the aurora. What signs can you observe that Earth's magnetic field is deflecting charged particles? What other structures in nature serve similar functions? (AKSCRS A.2., E.1, E.4)
- ★ Have students **retell** the role of Earth's magnetic field through an artistic expression of their choice. This could be a drawing, presentation, poster, or zine; and could be created by an individual or as a class project (AKSCRS B.2, D.4, E.8).
- ★ Learn more about the **Haida** peoples and their language here: https://www.uaf.edu/anlc/languages-move/haida.php (AKSCRS B.2)

Speaking of the Heliopshere…

Without Earth's magnetosphere, the solar wind will strip away air molecules and erode our atmosphere. NASA scientists study Earth's atmosphere to better understand how the interaction between the solar wind and Earth's atmosphere affects the atmosphere's ability to protect us from the Sun

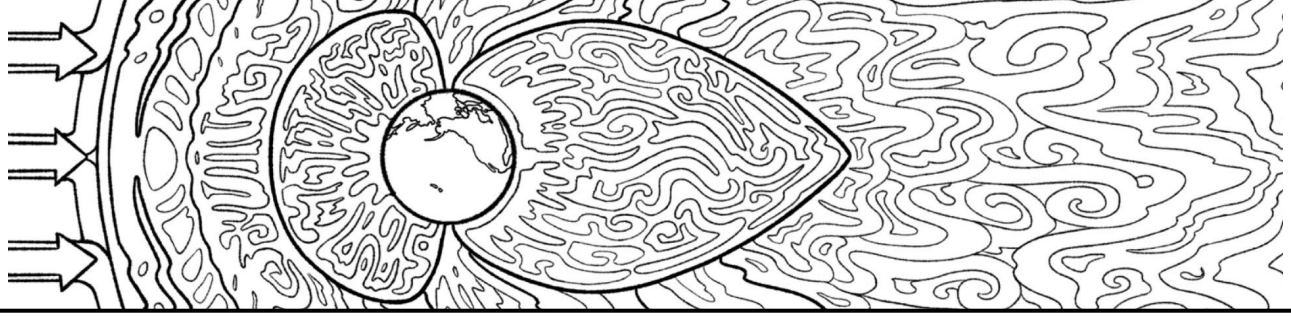
The Haida people use the word **sangäay** for atmosphere. use the QR code to learn how to say this and Other Sun-related words in Xaad Kil, the language of the Haida

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Moon
Aurora / **Northern**	Purple
Colors	Red
Earth	**Shadow**
Green	Sky
Heat	**Star**
Life	**Sun**
Light	Sunlight
	Year

Solar Wind
Pages 10-11



Educator's notes

Blending Science and Art

Activities by Level…

Grades K-5	As students color the page, have them **explain** how space isn't empty, using the elements on the coloring page as evidence. Point out that Earth's magnetosphere, along with the atmosphere, are important "force fields" for keeping Earth safe from the solar wind. Have students explore more about Earth's atmosphere here: https://spaceplace.nasa.gov/atmosphere/en/
Middle School	Ask students to **label** the magnetosphere on the coloring page and have them investigate why Mars doesn't have an atmosphere. Have them **draw** what they think the solar wind would look like hitting Mars. Find out more about how Mars lost its atmosphere here: https://svs.gsfc.nasa.gov/14846/ Explore how other solar system bodies respond to the solar wind with this infographic: https://science.nasa.gov/learn/heat/resource/solar-wind-across-our-solar-system-infographic/
High School	Have students **research** magnetic reconnection and have them **create** a coloring page showing the process. Find out more about magnetic reconnection throughout the solar system here: https://svs.gsfc.nasa.gov/20310/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: What is the heliosphere?

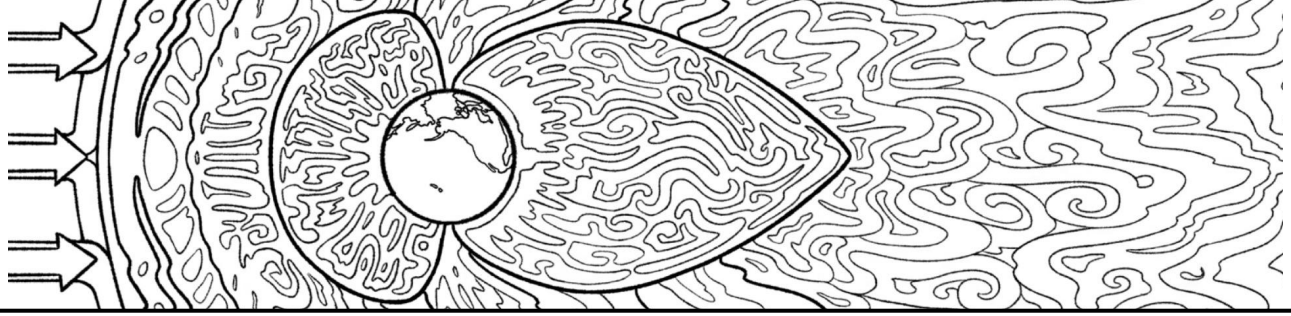
Middle School: How does the Sun create space weather on Earth?

High School: What is the difference between the space around the Sun (the heliosphere) and the interstellar medium (the space between stars?)

Heliophysics Big Idea 5 : The Sun defines the space around it, which is different from interstellar space.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-ESS2-1	• MS-ESS2-1 • VA:Cr2	• HS-PS2-5 • VA:Cr2



Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **particles** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the impacts of solar weather on their lives (AKSCRS B.2, D.1).
- ★ Ask students to **reflect** on how solar weather impacts their lives today and compare to their Elders' experiences (AKSCRS B.2, D.4, E.8).
- ★ Have students **retell** the interaction between solar wind and Earth's magnetic field through an artistic expression of their choice or introduce this activity: https://outreach.gi.alaska.edu/aurora-alive/matter-energy/solar-wind-among-planets (AKSCRS B.2, D.4, E.8)
- ★ Learn more about the **Alutiiq/Sugpiaq** language and here: https://www.uaf.edu/anlc/languages-move/alutiiq.php (AKSCRS B.2)

Speaking of the Heliopshere…

We cannot see the solar wind with our eyes, but people living in high latitudes can often see the effects of its presence. Charged particles in the solar wind cause beautiful auroras to occur in the night sky. Have you ever witnessed these phenomena that are caused by solar wind?

In Alaska's Alutiiq / Sugpiaq language, the word for particles is **pelut** (literally dust or ashes). To hear the word pelut and other Alutiiq / Sugpiaq words spoken, scan the QR code.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Colors	**Particle**, lit. "dust or ashes"	**Star - Southern style**
Green	Purple	**Sun**
Heat	Red	Sun dog, lit. "for there to be a sun dog"
Life	**Shadow**	Universe
Light	Sky	**Year**
Moon	Solar eclipse, lit. "the sun is dying"	
Moon dog, lit. "for there to be a moon dog"	**Star - Northern style**	
Northern Lights		

Blending Science and Art

Activities by Level…

Grades K-5	Have students **examine** NOAA's Aurora 30-minute Forecast to determine the probability of aurora in their area. Have them **draw** a map of their location in relation to the auroral oval they observe in the forecast. Find the Aurora Forecast here: https://www.swpc.noaa.gov/products/aurora-30-minute-forecast
Middle School	Have students i**nvestigate** what causes the different colors of the aurora. Have students **label** their coloring page with nitrogen and oxygen, using the scientific illustration as guidance. Start your investigation here: https://science.nasa.gov/sun/auroras/ Have students make a bracelet to show the elements in the atmosphere that cause aurora: https://science.nasa.gov/learn/heat/resource/make-an-aurora-bracelet-activity/
High School	Have students **investigate** an aurora called STEVE: https://www.youtube.com/watch?v=wRHwGD-is9U Ask them how STEVE is different from other aurora and have them **draw** a STEVE aurora, showing their understanding of the processes that cause auroral displays.

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: How does the Earth keep us safe from the harmful effects of the Sun (including radiation and space weather)?

Middle School: How does space weather impact my daily life?

High School: How do scientists predict space weather?

Heliophysics Big Idea 2 : The Sun is active and can impact technology on Earth via Space Weather.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-ESS2-1 • Va:Cr3	• MS-PS1-4 • VA:Re7	• HS-PS1-5 • VA:Cr2

Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **aurora** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the aurora. Stories from Alaskan Elders can be heard here: https://www.youtube.com/watch?v=QLaaVO6Wazw&list=PLvWvj5p1sZBO28M1N7J5i7_uFpjbfdgTg (AKSCRS B.2, D.1)
- ★ Have students **retell** their favorite traditional stories about the aurora through an artistic expression with oil pastels. See Activity 9 in the Kiuġiyaq/Kiuġuyat resource at https://culturalconnections.gi.alaska.edu/ (AKSCRS B.2, D.4, E.8).
- ★ Watch, learn, and perform the northern lights song from Elders Fannie Akpik and Laura Smith: https://culturalconnections.gi.alaska.edu/curriculum/kiuqiyaq-the-northern-lights-middle-school-guide/ (AKSCRS A.3, C.3, D.1, D.3)
- ★ Learn more about the **Iñupiaq** language here: https://www.uaf.edu/anlc/languages-move/inupiaq.php (AKSCRS B.2)

Speaking of the Heliopshere…

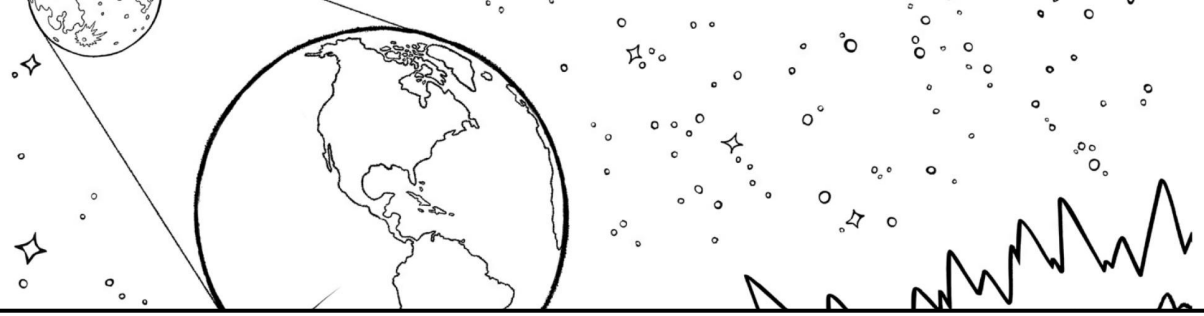
Alaska's geographic location in the Northern Hemisphere offers overhead views Of the aurora during long, dark, dear nights The Ifiupiaq and other Alaska Native groups have cultural stories that are handed down from one generation to the next through oral history, storytelling and songs. Have you heard any of these stories?

The Iñupiaq people use the word **kiuġuyat** for aurora, or Northern Lights. Scan the QR code to listen to this and other Iñupiaq words spoken by a Native speaker.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Moon Dog	**Sun**
Blue	Moonlight	Sun dog
Earth	Morning star to the	Sun dog when there is a
Green	East	full circle around it
Heat	**Northern lights**	Sunlight, lit. “the Sun is
“It is eclipsing”	Purple	shining”
Life	Red	Sunny
Light	**Shadow**	Universe
Living Creatures	Sky	**Year**
Moon	**Star**	



Blending Science and Art

Activities by Level…

Grades K-5	Have students add arrows to the coloring page to **show** the motion of the Moon around Earth and Earth around the Sun. Have students explore more eclipse basics and activities here: https://spaceplace.nasa.gov/eclipses/en/
Middle School	Have students **identify** the type of eclipse featured on the coloring page (lunar eclipse). Have them **label** the Moon, Earth, Sun, and the umbral shadow. Have them **create** a coloring page for a solar eclipse. Find out more about the different types of solar eclipses here: https://svs.gsfc.nasa.gov/5093/. Find more eclipse activities at this level at https://mynasadata.larc.nasa.gov/phenomenon/solar-eclipse
High School	Ask students to **research** why we don't have an eclipse every month and **create** an illustration to demonstrate their understanding. Use this video to help students begin their exploration: https://science.nasa.gov/resource/why-dont-we-have-a-solar-eclipse-every-month/
Grades 5-12+	The NASA spacecraft featured in the coloring page is the Parker Solar Probe. Have students **research** how this spacecraft was able to fly within 3.8 million miles of the surface of the Sun. Find an overview of the mission here: https://science.nasa.gov/mission/parker-solar-probe/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: What causes the changes we observe in the sky each day, month, and year, i.e. light, shadows, and positions of objects?

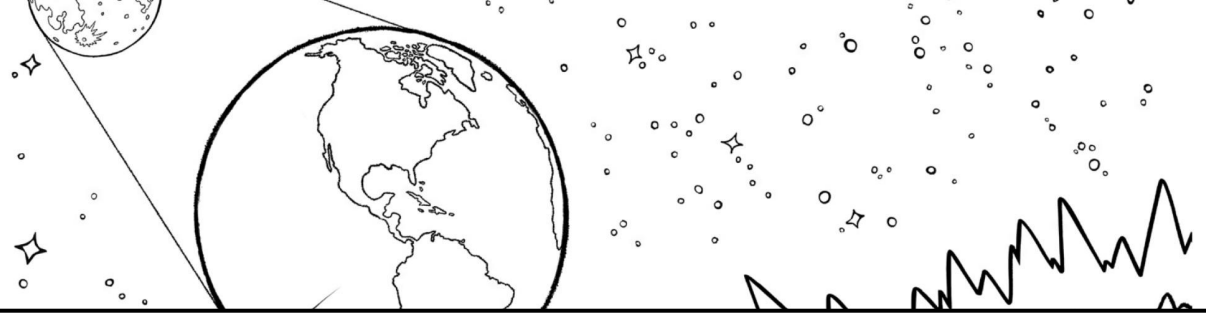
Middle School: How do gravitational forces in the Sun-Earth-Moon system cause seasons, eclipses, and lunar phases?

High School: Why don't we experience an eclipse each month?

Heliophysics Big Idea 1 : The Sun is really big and its gravity influences all objects in the solar system.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-ESS1-2 • VA:Cr3 • ETS-1	• MS-ESS1-1 • VACr3 • ETS-1	• HS-ESS1-4 • VA:Cr1 • ETS-1



Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **shadow** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about eclipses they witnessed. (AKSCRS B.2, D.1)
- ★ Ask students to **reflect** on their own connection to eclipses. What traditions does their family observe when an eclipse occurs? (AKSCRS A.2, E.1, E.4)
- ★ Have students **explore** their school or local library for books about historic eclipse events or historic records. Ask students to **retell** the eclipse stories they find to their classmates. (AKSCRS B.2, D.4, E.8).
- ★ Learn more about the **Koyukon** language here: https://www.uaf.edu/anlc/languages-move/koyukon.php

Speaking of the Heliopshere…

Solar eclipses are experienced less frequently in Alaska than at lower latitudes. This is because the Moon's **umbral shadow** rarely crosses the polar latitudes on Earth. Have you ever seen a solar eclipse? Where were you when you had that experience?

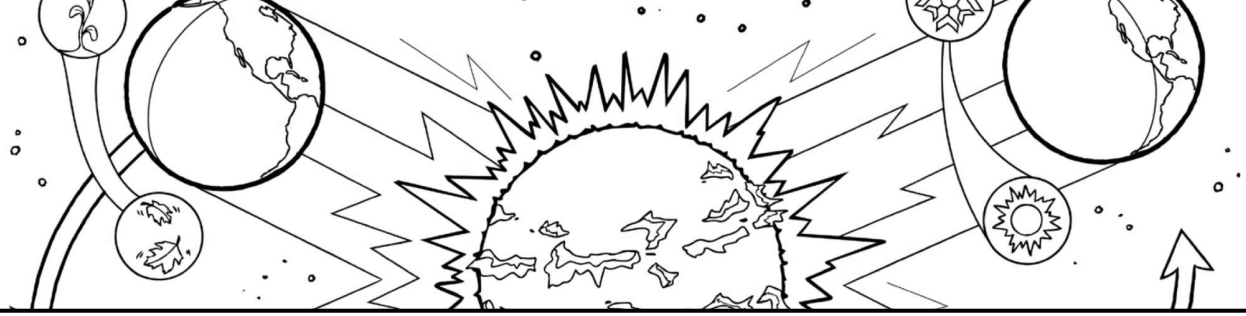
In the Interior Alaska village of Nulato, people use the Lower Koyukon Athabascan word **yeege'** for shadow. To hear the word yeege' and other Lower Koyukon Athabascan words spoken, scan the QR code.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Moon	Sun dog, lit. "there's something around the dog's neck"
Black	Moon dog	
Colors	**Northern lights**	Sunshine
Earth	Particles	"The weather is hot"
Eclipse, lit. "behind the sky"	Red	Universe
	Shadow	**Year**
Green	Sky	
Life	**Star**	
Light	**Sun**	

Seasons
Pages 16-17



Educator's notes

Blending Science and Art

Activities by Level…

Grades K-5	Instruct students to **label** the seasons on the coloring page, both on the Northern Hemisphere and Southern Hemisphere of each Earth. Then have them add illustrations of things from their favorite season. Explore more about Earth's seasons here: https://spaceplace.nasa.gov/seasons/en/
Middle School	Have students **label** the seasons on the coloring page and **draw** the tilted axis on each Earth on the coloring page. Explore more with interactives and lesson plans about Earth's energy budget and how Earth receives energy from the Sun: https://mynasadata.larc.nasa.gov/basic-page/earths-energy-budget
High School	Have students **research** the Milankovitch Cycles and have them identify the long term effects of these cycles on Earth's climate: https://science.nasa.gov/science-research/earth-science/milankovitch-orbital-cycles-and-their-role-in-earths-climate/ Have them choose one of the cycles and **create** a coloring page about it.

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: Where do you find invisible light?

Middle School: How does light travel?

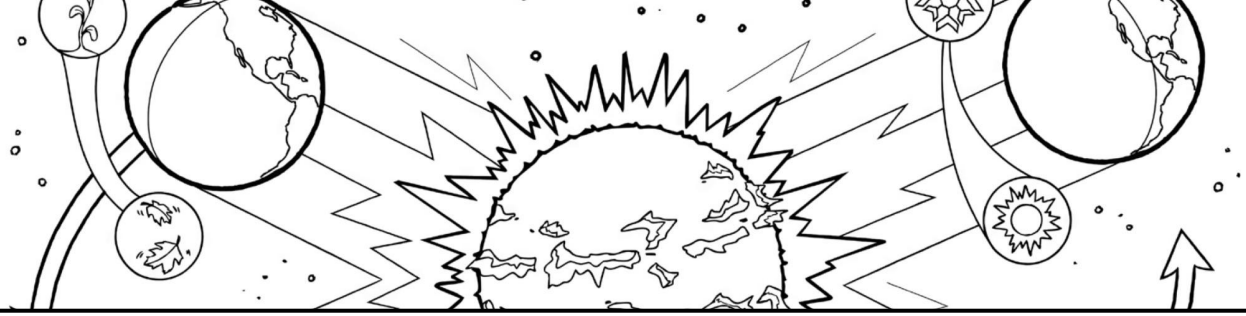
High School: How does light teach us about distant objects thousands of light years away?

Heliophysics Big Idea 6: The Sun is the primary light source in the solar system.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-ESS1-2 • VA:Cr3 • VA:Cr1	• MS-ESS-1 • VA:Cr3	• HS-ESS1-4 • VA:Cr2

Seasons
Pages 16-17



Educator's notes

Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **heat** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about seasonal changes. How are the seasons different or the same from when they were young? What do they do differently in each season? (AKSCRS B.2, D.1)
- ★ Ask students to **reflect** on their own connection to the changing seasons. What activities do they connect with each season? What activities are year round?
- ★ Have students **design** a season wheel that reflects their local season changes throughout a calendar year and the experiences shared by Elders or other culture-bearers.
- ★ Watch, learn and perform the Iñupiaq Welcome the Sun Dance found at https://www.youtube.com/watch?v=q77Q7qRNVpc
- ★ Learn more about the **Tanana** language here: https://www.uaf.edu/anlc/languages-move/tanana.php

Speaking of the Heliopshere…

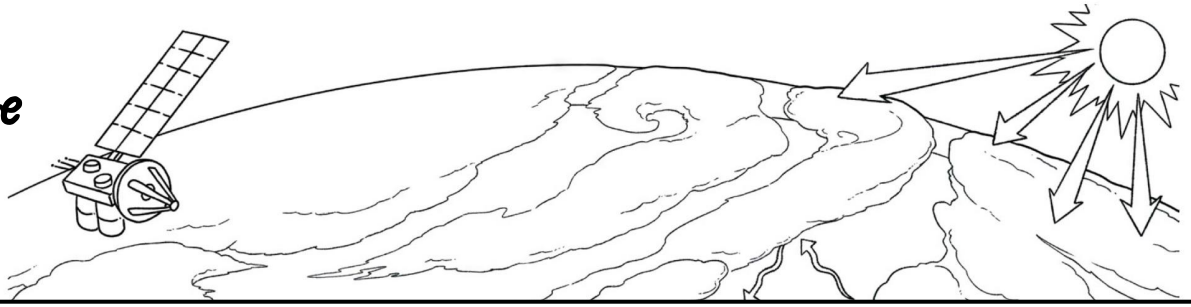
A year on Earth encompasses all four seasons. Each season has distinctive weather patterns. Depending upon where you are located on the Earth, seasonal weather pattems differ, and some seasons may last longer than others. Which is your favorite season of the year? What kind of weather do you experience during that season?

Lower Tanana Athabascans inhabita region of Alaska that enjoys heat from the Summer Sun, allowing many natural foods to be harvested. In their language, Ten Kenaga', the word **khwnadhel** means, "it is hot." Scan the QR code to hear its pronunciation

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Life	Sky
Aurora oval	**Light**	Solar wind
Earth	Moon	**Star**
Earth's magnetic field	**Northern lights**	**Sun**
	Particles	Sun dog
Eclipse	Purple	Sunlight
Green	Red	Universe
Heat	**Shadow**	



Blending Science and Art

Activities by Level…

Grades K-5	Have students **label** all of the sources of greenhouse gases on the coloring page (vehicles, factories, fires, etc.). Ask students to **identify** the true source of the greenhouse gases: what is driving the vehicles? Making the factories? Humans! Have students add humans to the coloring page **showing** their effect on the activities in the illustration. Try this activity on building greenhouse gas molecules with gumdrops: https://spaceplace.nasa.gov/gumdrops/en/
Middle School	Have students add arrows and labels to the coloring page to **demonstrate** their understanding of the greenhouse effect.Check out NASA Kids Climate page for more activities: https://science.nasa.gov/kids/earth/what-is-the-greenhouse-effect/
High School	Have students **apply** their understanding of a positive feedback loop to the greenhouse effect and add their explanation to the coloring page. Try this lesson plan on positive feedback loops and arctic albedo: https://mynasadata.larc.nasa.gov/lesson-plans/positive-feedback-arctic-albedo
Grades 5-12+	This visualization shows atmospheric carbon dioxide measurements from NOAA's Mauna Loa Observatory in coordination with Antarctic Ice Core measurements of carbon dioxide: https://svs.gsfc.nasa.gov/5447/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: How are weather and climate different?

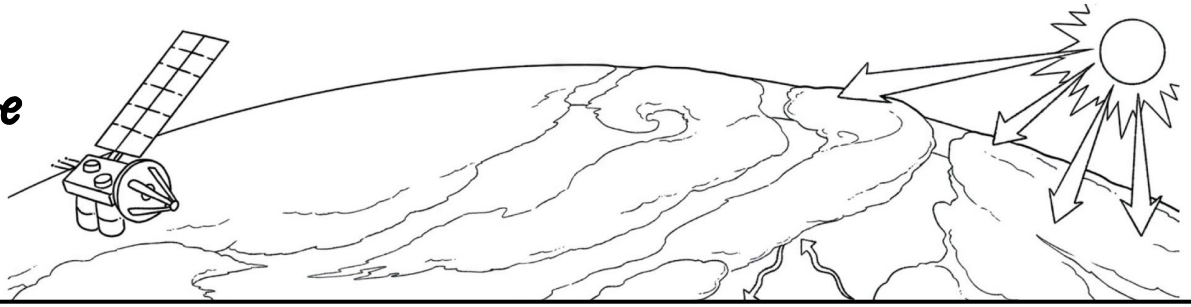
Middle School: Is the Sun getting hotter?

High School: How does the changing shape of the Earth's orbit over hundreds of thousands of years cause climate change?

Heliophysics Big Idea 3: The Sun's energy drives Earth's climate, but the climate is in a delicate balance and is changing due to human activity.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• ESS3 • VA:Cr3	• MS-ESS3-5 • VA:Cr3	• HS-ESS3-5 • VA:Cr3



Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **year** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the local climate and how they have adapted to thrive in it. (AKSCRS B.2, D.1)
- ★ Share the Climate and Our Way of Life film with your class and ask students to **reflect** on how their community has adapted to the climate. Has their climate changed over time? What features of the local climate impact their lives most? View the short film here: https://www.youtube.com/watch?v=SrdvYi7WkUQ&t=1s (AKSCRS A.5, A.6, B.3, D.4, E.2)
- ★ Have students choose a local plant or animal and **research** how its adaptations suit the local climate. What role does the organism play in its ecosystem? How important is this organism to their lives today? (AKSCRS B.2, C.1)
- ★ Learn more about the **Iñupiaq** language here: https://www.uaf.edu/anlc/languages-move/inupiaq.php (AKSCRS B.2)

Speaking of the Heliopshere…

The Sun drives Earth's complex climate system, which is characterized by long-term weather patterns. These weather patterns, such as temperature and precipitation, are Often grouped into categories described as tropical, dry, temperate, continental, and polar.

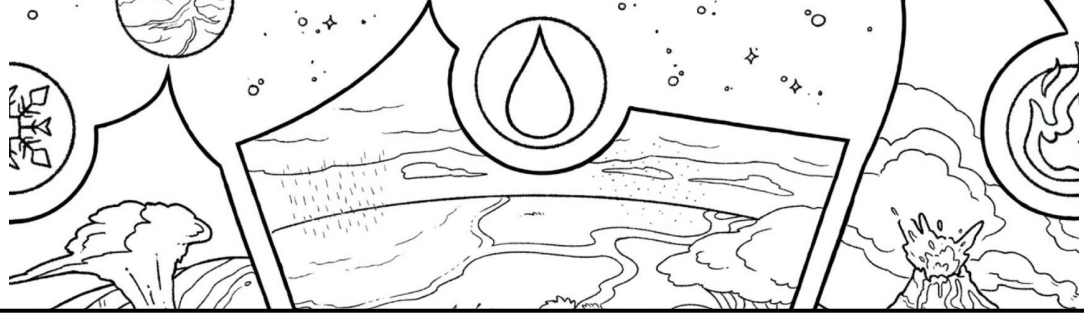
The läupiaq live in a polar climate where the year is dominated by a long winter season. Their word for year is **ukiuq**. Scan the QR code to hear its pronunciation.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Moonlight	Sun dog when there is a full circle around it
Blue	Morning star to the East	Sunlight, lit. "the Sun is shining"
Earth	**Northern lights**	Sunny
Green	Purple	Universe
Heat	Red	**Year**
"It is eclipsing"	**Shadow**	
Life	Sky	
Light	**Star**	
Living Creatures	**Sun**	
Moon	Sun dog	
Moon Dog		

Habitable Zone
Pages 20-21



Educator's notes

Blending Science and Art

Activities by Level…

Grades K-5	Have students **label** the Sun, Venus, Earth, and Mars on the coloring page. Ask students to **explain** why life doesn't exist on Mars and Venus. Have them start by exploring more about Mars and Venus at NASA Space Place: https://spaceplace.nasa.gov/all-about-mars/en/ https://spaceplace.nasa.gov/all-about-venus/en/
Middle School	Have students **research** more about how NASA finds exoplanets in the habitable zones around other stars. Point students to NASA's Exoplanet site to explore the 6000+ exoplanets discovered (Aug.2026) and use the Exoplanet Travel Bureau as inspiration for **creating** a coloring page of an exoplanet destination of their choice. https://science.nasa.gov/exoplanets/
High School	Have students **examine** the variables that make a planet habitable with this graphic: https://svs.gsfc.nasa.gov/13526/ Ask students to **create** a more scientific coloring page of what makes Earth habitable using the information from the graphic. *Extend:* The TRAPPIST-I star has 7 Earth-sized, rocky exoplanets orbiting it. Using Kepler's 3rd law students can determine which of the exoplanets in this star system are in the habitable zone: https://www.jpl.nasa.gov/edu/resources/lesson-plan/habitable-hunt-a-pi-in-the-sky-math-challenge/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: How can life exist on Earth?

Middle School: How does energy from the Sun support life on Earth?

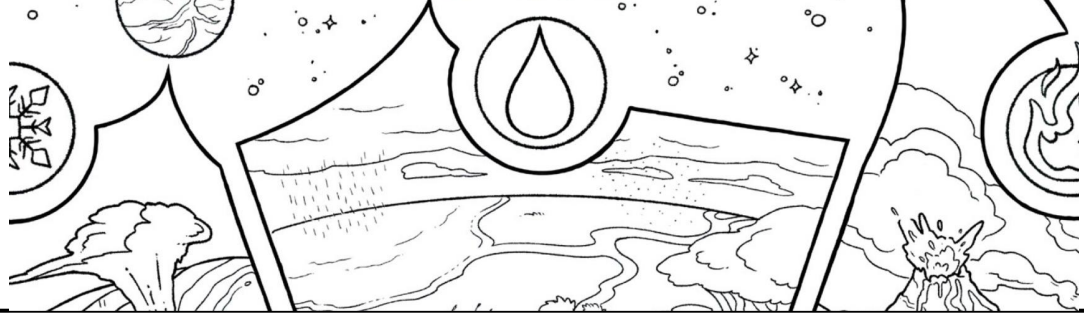
High School: Does life exist on other planets?

Heliophysics Big Idea 4: Life on Earth has evolved with complex diversity because of our location near the Sun. It is just right!

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-LS1-1 • VA:Cr3	• MS-LS1-5 • VA:Cr3	• HS-LS1-6 • HS-ESS1-4 • VA:Cr3

Habitable Zone
Pages 20-21



Educator's notes

Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **Earth** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about ecological succession. How does life emerge in your local community after a harsh weather event or fire? What forms of life emerge first? (AKSCRS B.2, D.1)
- ★ Ask students to **reflect** on their own connection to water sources in their community. What traditions does their family observe when near water? This may include camping by rivers or saving water for the garden. IS there a story that reminds them of this tradition? (AKSCRS A.2., E.1, E.4)
- ★ Have students **retell** their favorite story about water sources through an artistic expression of their choice. This could be a drawing, presentation, poster, or zine; and could be created by an individual or as a class project. (AKSCRS B.2, D.4, E.8).
- ★ Learn more about the **Ts'msyen (Tsimshian)** language here: https://www.uaf.edu/anlc/languages-move/tsimshian.php (AKSCRS B.2)

Speaking of the Heliopshere…

Earth sits comfortably in the habitable zone of our Sun. As a result, it is the only planet in the solar system with a temperature range that allows liquid water to exist in large quantities. This liquid water allows life to exist and flourish.

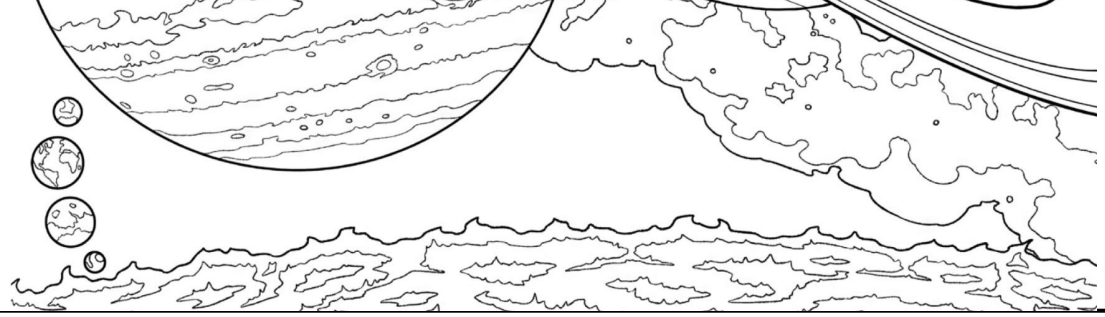
The Ts'msyen/Sm'algyax of the Alexander Archipelago rely on the Earth's water for life. In their language, Tsimsyen/Sm'algyax, Earth is called **ha'lidzog.** Scan the QR code to hear it spoken.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	**Light**	**Shadow**
Aurora oval	Moon	Sky
Colors	**Northern lights**	**Stars**
Earth	Particles	**Sun**
Green	Purple	**Year**
Heat	Red	

Solar System
Pages 22-23



Educator's notes

Blending Science and Art

Activities by Level…

Grades K-5	Have students **label** the planets on the coloring page. Ask students if this is the typical way they see the solar system drawn. What is different about this representation? Find more activities on exploring the solar system at: https://spaceplace.nasa.gov/menu/solar-system/
Middle School	This coloring page provides a good opportunity to **discuss** scale. While the planets do represent their relative size differentials (gas giants are big, rocky planets are small), it would be impossible to **draw** a true-to-scale drawing of the solar system. Have students create a large to-scale **model** of the solar system. Try this scale model for distance: https://www.jpl.nasa.gov/edu/resources/project/make-a-scale-solar-system/ Try this scale model for size: https://stereo-ssc.nascom.nasa.gov/classroom/scales.shtml
High School	Have students explore how the solar system formed: https://www.jpl.nasa.gov/edu/resources/project/model-how-the-solar-system-formed/ Ask them to create a coloring page showing the process.

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: What causes the changes we observe in the sky each day, month, and year, i.e. light, shadows, and positions of objects?

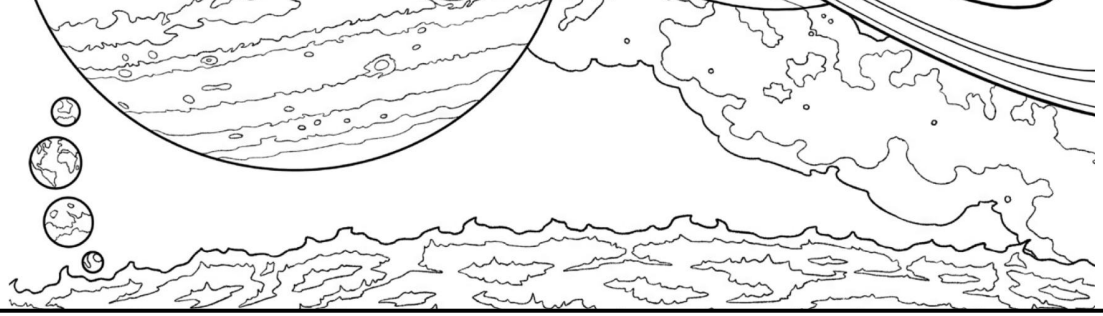
Middle School: How do gravitational forces in the Sun-Earth-Moon system cause seasons, eclipses, and lunar phases?

High School: Why don't we experience an eclipse each month?

Heliophysics Big Idea 1: The Sun is really big and its gravity influences all objects in the solar system.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• ESS1 • VA:Cr3	• MS-ESS1-3 • VA:Cr1	• HS-ESS1-4 • VA:Cr1



Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **star** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the stars. Are there local constellation shapes or stories they can share? (AKSCRS B.2, D.1)
- ★ Encourage students to observe their night sky and report back with their observations and experience. Ask students to **reflect** on their own connection to the stars. What traditions does their family follow with the night sky? This may include sky watching on a clear night or learning the constellations. Is there a story that reminds them of this tradition? (AKSCRS A.2., E.1, E.4)
- ★ Have students **map** and name their own constellation in the sky, then provide directions for how to find it by sight. How does this new constellation reflect their local community? (AKSCRS A.3, F.2, F.3)
- ★ Learn more about the **Lower Tanana Athabascan** language here: https://www.uaf.edu/anlc/languages-move/tanana.php (AKSCRS B.2)

Speaking of the Heliopshere…

Long before GPS was available, nomadic people in Alaska used light from the stars for navigation. These earliest observers of the stars noticed patterns and organized groups of stars as they seemed to travel consistently across the sky. What would you like to know about the Sun or other stars beyond the solar system?

The Ten Kenaga' / Lower Tanana Athabascan people use the word **sen'** for star. Scan the QR code to hear a Native Ten Kenaga' / Lower Tanana Athabascan language speaker say this word.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

Atmosphere	Life	Sky
Aurora oval	**Light**	Solar wind
Earth	Moon	**Star**
Earth's magnetic field	**Northern lights**	**Sun**
	Particles	Sun dog
Eclipse	Purple	Sunlight
Green	Red	Universe
Heat	**Shadow**	

Life Cycle of a Star
Pages 24-25

Educator's notes

Blending Science and Art

Activities by Level…

Grades K-5	Point out to students that even though our Sun looks like the biggest star in the sky, it is actually only a medium-sized star. There are stars a hundred times bigger than the Sun, but they look small because they are so far away. Use the scientific illustration on page 24 to **label** and highlight the life cycle of the Sun. Emphasize to students that the Sun will not go supernova and will not become a black hole; it is too small (**nebula, Sun, red giant, white dwarf**). Students still may be curious about black holes. Find out more here: https://spaceplace.nasa.gov/black-holes/en/
Middle School	The universe's stars range in brightness, size, color, and behavior. Have students **research** what type of star the Sun is and learn about other types of stars here: https://science.nasa.gov/universe/stars/types/ Ask students how they would **create** a coloring page showing the different types of stars.
High School	Have students **explore** how supernovae create elements and have students **create** their own coloring page of a supernova explosion. Have students try this activity on how stars make elements: https://nightsky.jpl.nasa.gov/news/383/

Guiding Questions…

Framework for Heliophysics Education

Grades K-5: How was the Sun born?

Middle School: What is the life cycle of stars?

High School: Do other stars behave similarly to the Sun?

Heliophysics Big Idea 9: Our Sun, like all stars, has a life cycle.

Overview of Standards Connections…

Grades K-5:	Middle School:	High School:
• 5-ESS1-1 • VA:Cr3	• MS-ESS1-1 • VA:Cr3	• HS-ESS1-3 • VA:Cr3

Life Cycle of a Star

Pages 24-25

Educator's notes

Blending Science and Language

Activities with Voices of Alaska…

- ★ Encourage students to **use the pronunciation guide** to learn one or more Alaska Native language words for **light** and to use the word(s) with classmates (AKSCRS A.3, D.1, D.3).
- ★ **Invite** one or more Elders or other culture-bearers to the classroom to share oral histories, dances, or art about the stars. How did they explain the different colored stars in the sky? What did they notice about different colored stars in the sky? (AKSCRS B.2, D.1)
- ★ Ask students to **reflect** on the life cycles of local organisms and compare them to the life cycle of a star. (AKSCRS A.2., E.1, E.4)
- ★ Learn more about the **Central Yup'ik** language here: https://www.uaf.edu/anlc/languages-move/centralakyupik.php (AKSCRS B.2)

Speaking of the Heliopshere…

For millennia, people on Earth, including the first people to inhabit its northern regions, have observed the stars Light emitted by stars provides all kinds Of information to observers. The color of light that a star emits helps astronomers understand where each star is in its life cycle. What colors are the stars you can see?

In the Central Yup'ik language, **tanqik** is the word used to mean light. Scan the QR code to listen to a Central Yup'ik language speaker say this word.

The Heliosphere in the Voices of Alaska

(The bolded words appear in the table of Alaskan Native languages on page 4 of the coloring book)

3+ Colors	Matter	Solar wind
Atmosphere	Moon	**Star**
Earth	**Northern Lights**	**Sun**
Environmental heat	One color	"The heat we feel"
Green	Purple	Universe
Life, lit. "animal life"	Red	
Life, lit. "human life"	**Shadow**	
Light	Sky	
Lunar eclipse, "the moon has died"	Solar eclipse, lit. "the Sun has died"	

Journey through the Heliosphere: Vocabulary Word Games

Find the Card

- ★ Divide into small groups. Each group will need a set of vocabulary cards. Spread the cards in front of you so that everyone in your group can see the picture side.
- ★ Listen as your teacher says an Alaska Native word aloud from one of the cards.
- ★ Work with your group to find and hold up the correct card

Teamwork

- ★ Divide your group into two teams. Each team will need a pencil and paper.
- ★ Shuffle the vocabulary cards and place them picture-side up in the middle of the table.
- ★ Work with your team to write down the Alaska Native language word/s for the card.
- ★ After both teams have written answers, turn the card over to check. Teams get 1 point
- ★ for the correct word.
- ★ Repeat until all cards are gone. The team with the most points wins.
- ★ Variation: Write down the matching English word also and get an extra point

Vocabulary *Swap*

- ★ Distribute one card to each person.
- ★ Practice the word on your card, then find a classmate. Teach them the word on your
- ★ card and learn the word on their card. Trade cards.
- ★ Find another classmate and repeat.

Vocabulary *Slap*

- ★ Select one student to serve as the “caller” for this game. That student should make a list
- ★ of Alaska Native language vocabulary words from the card on a separate sheet of paper.
- ★ The words can be found on the index cards students made or in the vocabulary card
- ★ template.
- ★ Place the cards in a circle, picture-side-up, in the middle of the playing area.
- ★ The caller should call out a word from their list. Everyone else should quickly and
- ★ CAREFULLY place their hand on the picture that they believe represents that word.
- ★ Turn over the card or cards that students selected to see who chose correctly. Each
- ★ student who placed his or her hand on the correct card earns a point.
- ★ Put the card(s) back in the circle and play again.
- ★ Play for a designated period of time. At the end of the time, the person with the most points wins.
- ★ Students should rotate who the “caller” is as they play

Act it Out

- ★ Shuffle the vocabulary cards and deal them out to each player. Keep your cards a secret!
- ★ Take turns acting out your cards using motions and sound effects, but no words.
- ★ Whoever guesses the Alaska Native language word first takes the card as a point.
- ★ The game is over after all cards have been acted out.
- ★ Optional: Add a timer to the mix! See if you can get your classmates to guess the word in 30 or 60 seconds

Journey through the Heliosphere: Alutiiq / Sugpiaq Vocabulary Card Template

maqaq heat	**tanqik** light	**qiuryat** Northern Lights	**pelut** particles
talineq shadow	**mit’aq (northern) / agyaq (southern)** star	**macaq** Sun	**uksuq** year

Journey through the Heliosphere: Central Yup’ik Vocabulary Card Template

ellarrlainaq atmosphere	**Nunarpak** Earth	**kiiq** (environmental) heat	**tanqik** light	**allrakuq** year
qiuryat Northern Lights	**tarenraq** shadow	**agyaq** star	**akerta** Sun	

Journey through the Heliosphere: Iñupiaq Vocabulary Card Template

siḷa atmosphere	**Nuna** Earth	**uunnaq** heat	**qaumaniq** light	**kiuġuyat** Northern Lights
taġġaq shadow	**uvluġiaq** star	**siqiñiq** Sun	**ukiuq** year	

Journey through the Heliosphere: Lower Koyukon Athabasca Vocabulary Card Template

yo atmosphere	**Nen’** Earth	**hʉnaalk’ʉh** heat (the weather is hot)	**yekkoyh** light	**yo yekkoyh** Northern Lights
k’eleye’ particles	**yeege’** shadow	**tloon’** star	**no’oy** Sun	**oghe** year

Journey through the Heliosphere: Ten Kenaga'/Lower Tanana Vocabulary Card Template

yok'et atmosphere	**Nen'** Earth	**khw na dheł** heat	**negholdrayh** light
khw chał ts'en' particles	**yik shadow sen'** star	**Sro** Sun	**yo ye koyh** Northern Lights

Journey through the Heliosphere: Ts’msyen/Sm’algyax Vocabulary Card Template

ha atmosphere	**Ha’lidzog** Earth	**gyemk** heat	**goy’pa/laawks** light	**gyemk** Sun
gisigwilgwelk Northern Lights	**k’aba ts’a’atiks** particles	**gano’ots’n** shadow	**bikbiyaals** star	**kóoł** year

Journey through the Heliosphere: Xaad Kíl/Haida Vocabulary Card Template

sangaáay atmosphere	**hlan-gwáay tlagáay** Earth	**k̲áwsda** heat	**g_adgáay** light	**hlats’ux̂** Northern Lights
x̲ánj shadow	**k’aayhlt’áa** star	**juuyáay** Sun	**tadáa** year	

Journey through the Heliosphere: Dinjii Zhuh K’yàa/Gwich’in Vocabulary Card Template

Nan Earth	**gwadhah** heat	**ch’aadrii** light	**yakaih** Northern Lights
są’ star	**shree** Sun	**ch’aadrii** light	