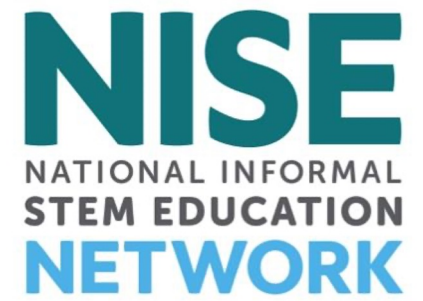


# NISE Net Online Workshop

Asteroids, Meteorites, NASA Missions & more!

Tuesday, February 14, 2023



## Today's Presenters:

**Dr. Paul Abell:** NASA Johnson Space Center's Chief Scientist for Small Body Exploration

**Dr. Nicole Lunning:** OSIRIS-REx Sample Curator and Antarctic Search for Meteorites (ANSMET) Explorer

**Paige Graff:** NASA Johnson Space Center's Astromaterials Science Engagement Specialist



## Welcome!

As we wait to get started with today's discussion, please:

**Introduce yourself!** Type your name, institution, and location into the Chat Box

**Questions?** Feel free to type your questions into the Chat Box at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

**Today's discussion will be recorded and shared on nisenet.org at: [nisenet.org/events/online-workshop](https://nisenet.org/events/online-workshop)**

# 2023 Online Workshops

Bubbling Up later this Year... 🤔

## Changing Brains - New Tools for Brain Awareness Week & Beyond

**Tuesday, March 14, 2023**

2pm-3pm Eastern / 11am-12pm Pacific

## Making Waves with Radio - New Ways to Engage Audiences with the Basics of Modern Communication & Navigation

**Tuesday, April 4, 2023**

2pm-3pm Eastern / 11am-12pm Pacific



**ONLINE  
WORKSHOPS**

Learn more at  
[nisenet.org/events](https://nisenet.org/events)

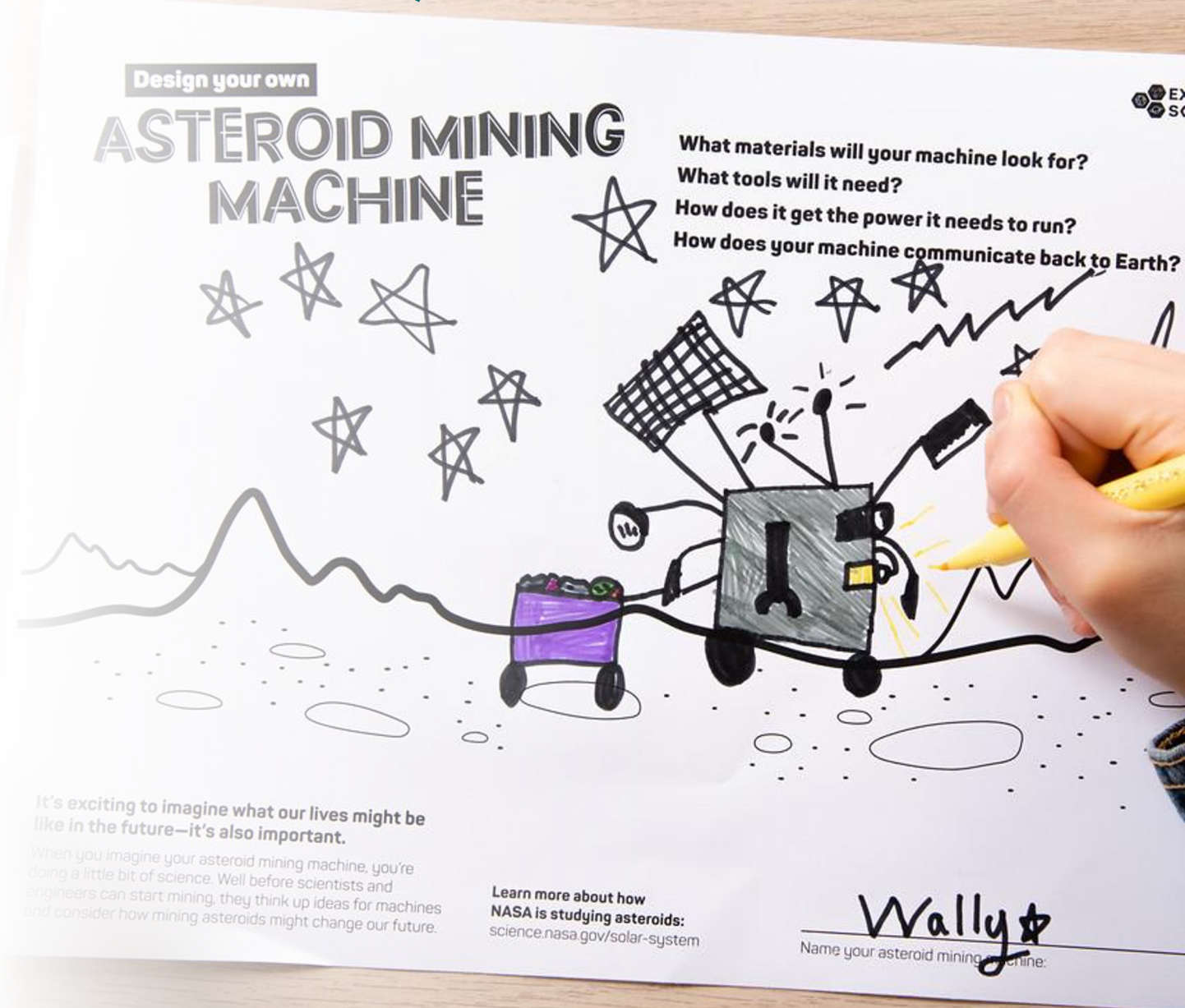




# Asteroids, Comets, Meteors, and Meteorites

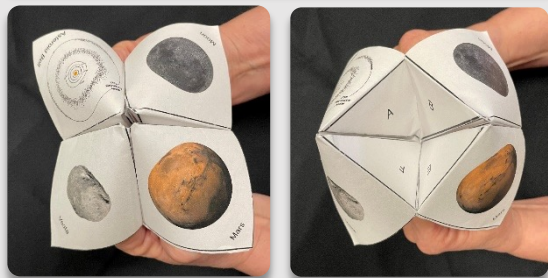
- Educational materials about asteroids, comets, meteors, and meteorites
- Resources for Asteroid Day, meteor showers, and other annual events
- Links to NASA missions such as Lucy, OSIRIS-Rex, Psyche, Double Asteroid Redirection Test (DART), and Near-Earth Asteroid Scout (NEA Scout)

[nisenet.org/asteroids](https://nisenet.org/asteroids)





# EDUCATOR RESOURCES

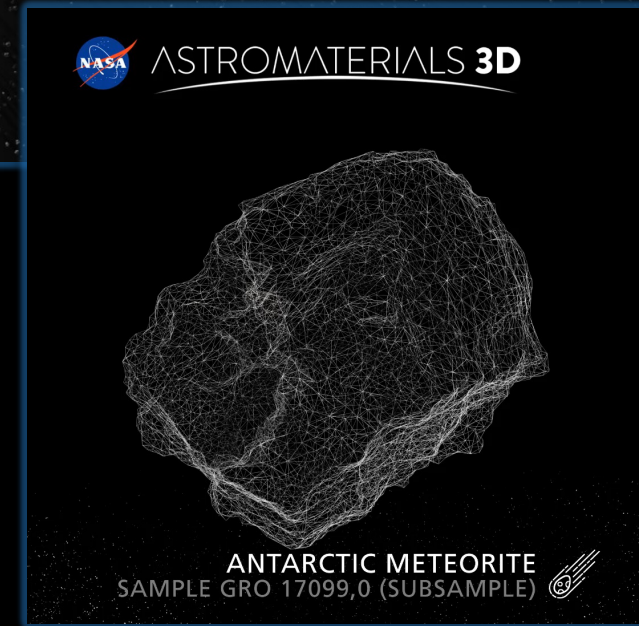
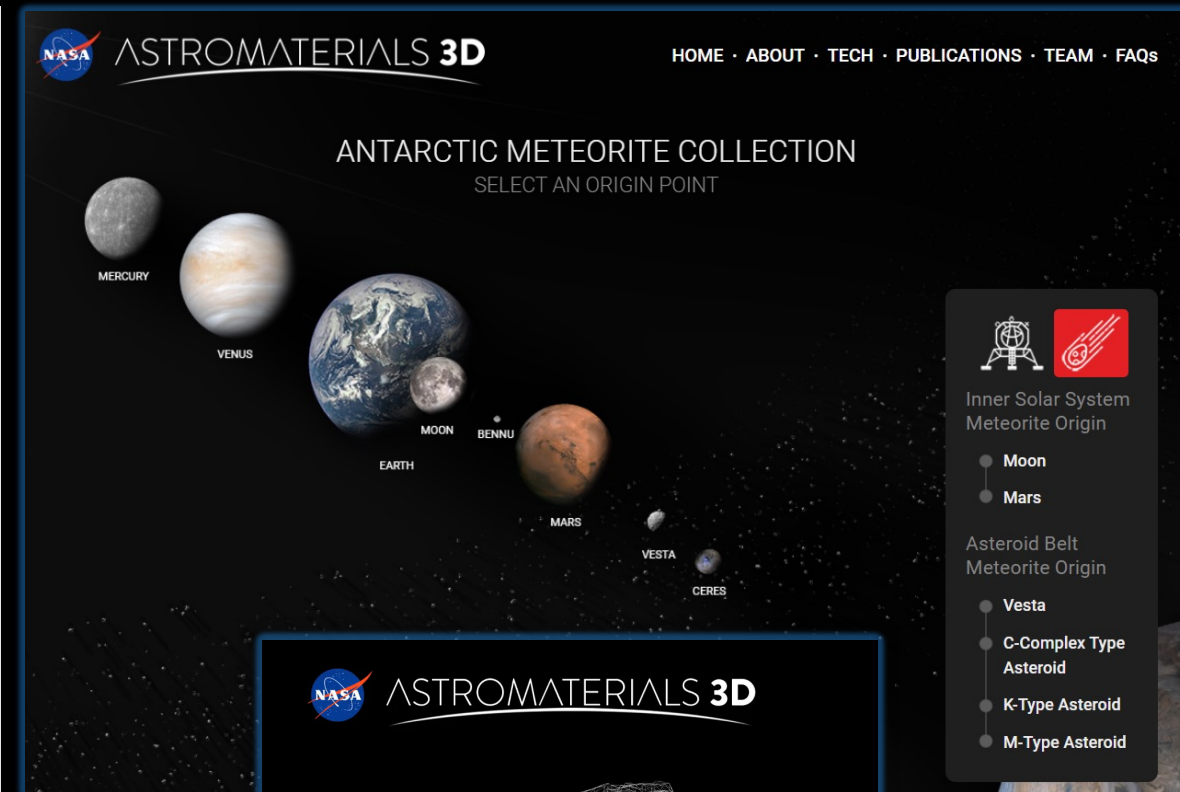


**LET'S DISCOVER NEW FRONTIERS!**  
NASA's New Frontiers and Discovery Sample Return Missions

MISSION NAME & PATCH	TARGET SOLAR SYSTEM OBJECT	MISSION SPACECRAFT	SAMPLE COLLECTOR	COLLECTED SAMPLES	DID YOU KNOW?
	<ul style="list-style-type: none"> <li>Visible "glowing" halo, tail, or jets.</li> <li>Icy, dusty body</li> </ul>	<ul style="list-style-type: none"> <li>Two parallel solar array panels.</li> <li>Has a tennis racquet-like collector.</li> </ul>	<ul style="list-style-type: none"> <li>Looks like a metal ice cube tray.</li> <li>Multiple bluish-colored rectangles.</li> </ul>	<ul style="list-style-type: none"> <li>Samples look like taplopes or long, linear tracks.</li> </ul>	Space is Dusty!
	<ul style="list-style-type: none"> <li>The main source of energy for Earth.</li> <li>Contains 99% of the matter in the solar system.</li> <li>Looks similar to a watch.</li> </ul>	<ul style="list-style-type: none"> <li>Two solar array panels and multiple circular collectors.</li> <li>Looks similar to a watch.</li> </ul>	<ul style="list-style-type: none"> <li>Looks like a honeycomb.</li> <li>Made of multiple shiny 6-sided (hexagonal) wafers of different colors.</li> </ul>	<ul style="list-style-type: none"> <li>Samples are broken water pieces with embedded solar wind.</li> </ul>	Salvaging the Science after a Hard Landing
	<ul style="list-style-type: none"> <li>A rocky body.</li> <li>This object is larger than the Empire State building.</li> <li>Looks like a bee or wasp.</li> </ul>	<ul style="list-style-type: none"> <li>Two squarish solar array panels.</li> <li>Looks like a bee or wasp.</li> </ul>	<ul style="list-style-type: none"> <li>Circular object at the end of a long "arm".</li> <li>Extends down from the bottom of the spacecraft.</li> </ul>	<ul style="list-style-type: none"> <li>Samples will be small rocks and dust.</li> </ul>	Bennu: Orbit and Relevance

WATCH THE GAMES BY TURN HOW THEY TURN DISCUSSION ABOVE.

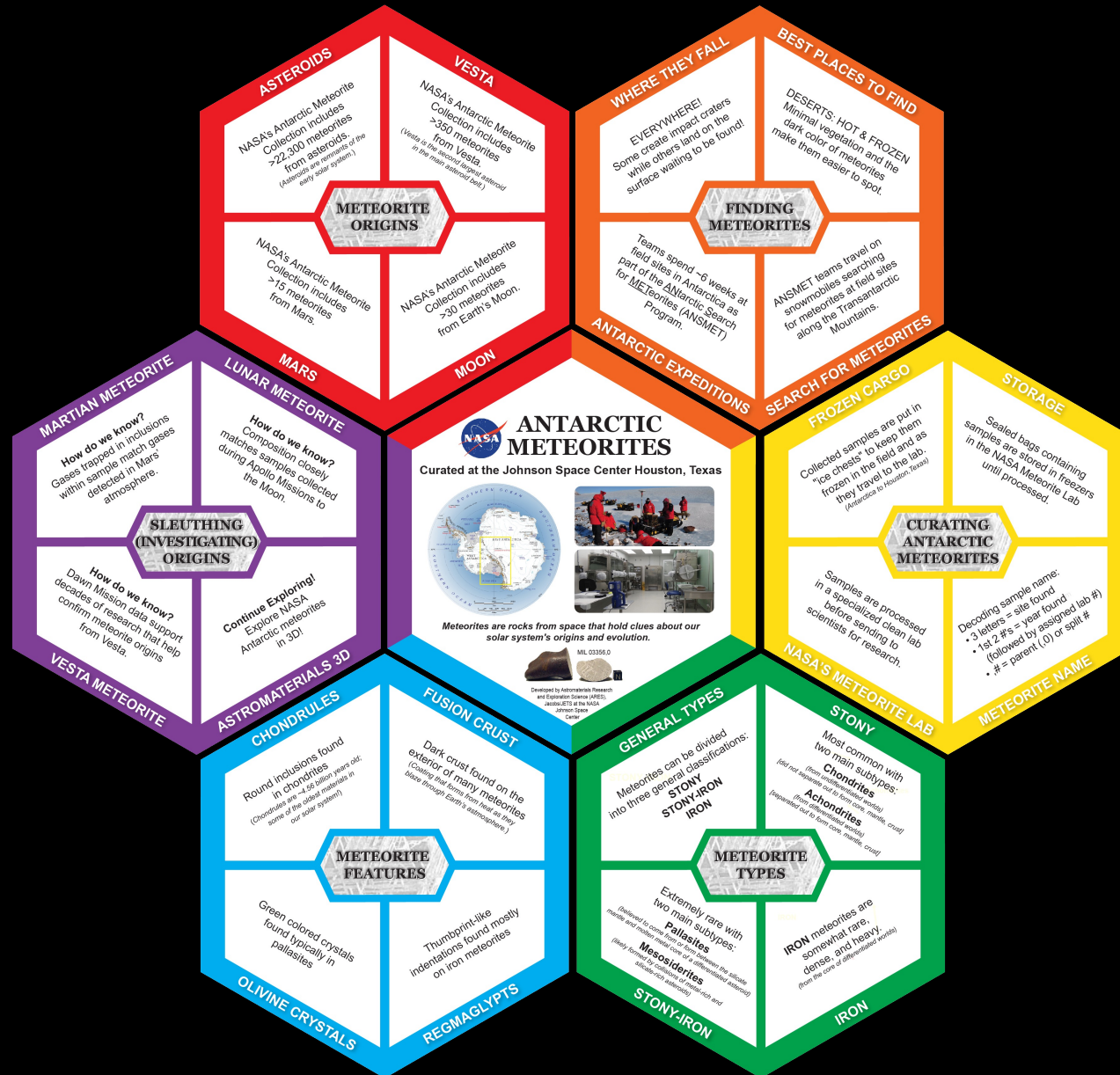
After learning details about the above sample return missions, consider designing your own future sample return mission!



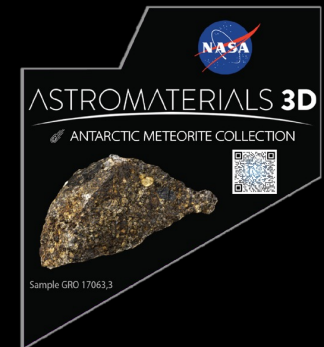
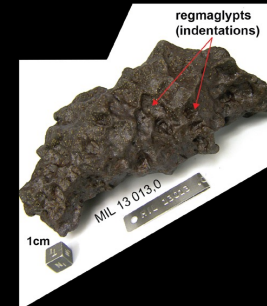
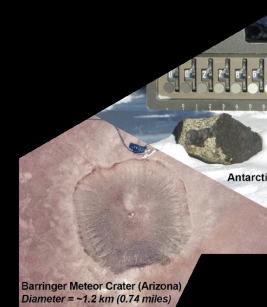
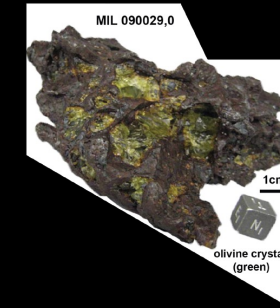
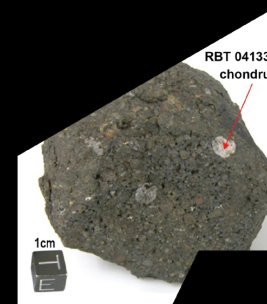
1. Meteorite Discovery Board
2. Chatterboxes
3. Career Hexagons
4. Let's Discovery New Frontiers



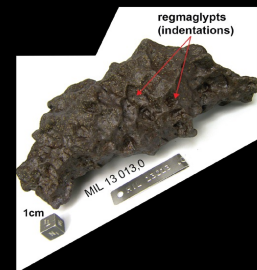
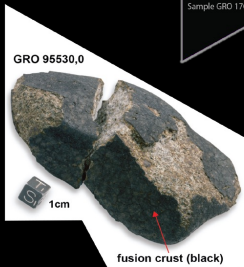
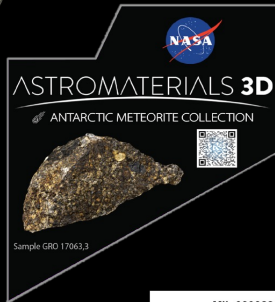
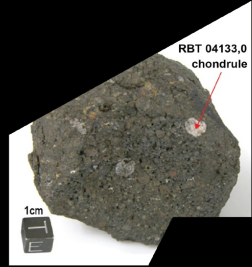
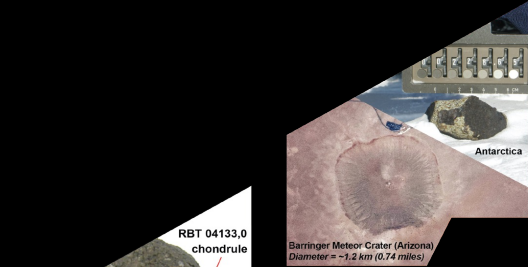
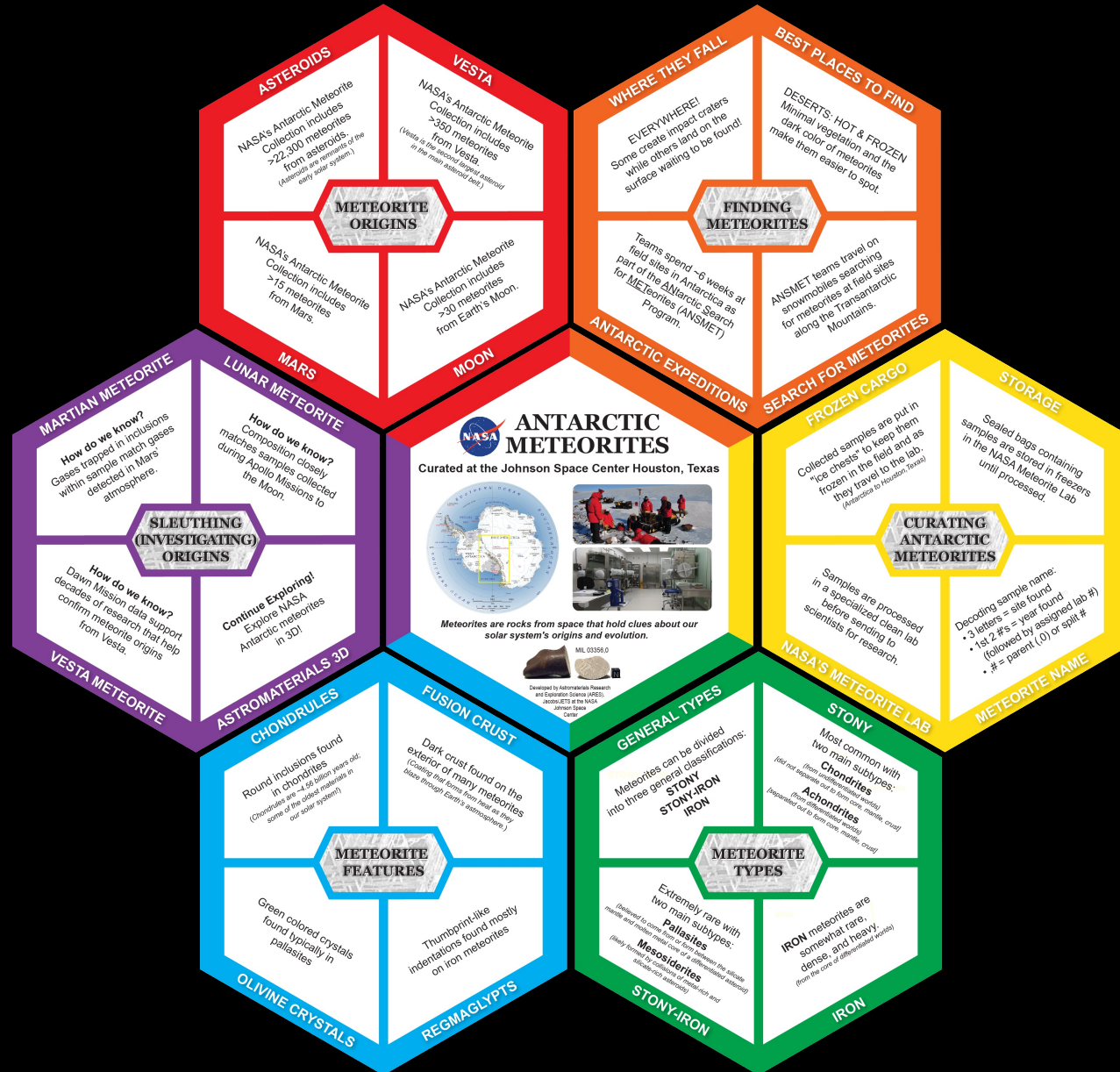
# METEORITE DISCOVERY BOARD



## Sample "puzzle" pieces





# METEORITE DISCOVERY BOARD






# METEORITE DISCOVERY BOARD

  
**ASTROMATERIALS 3D**  
ANTARCTIC METEORITE COLLECTION

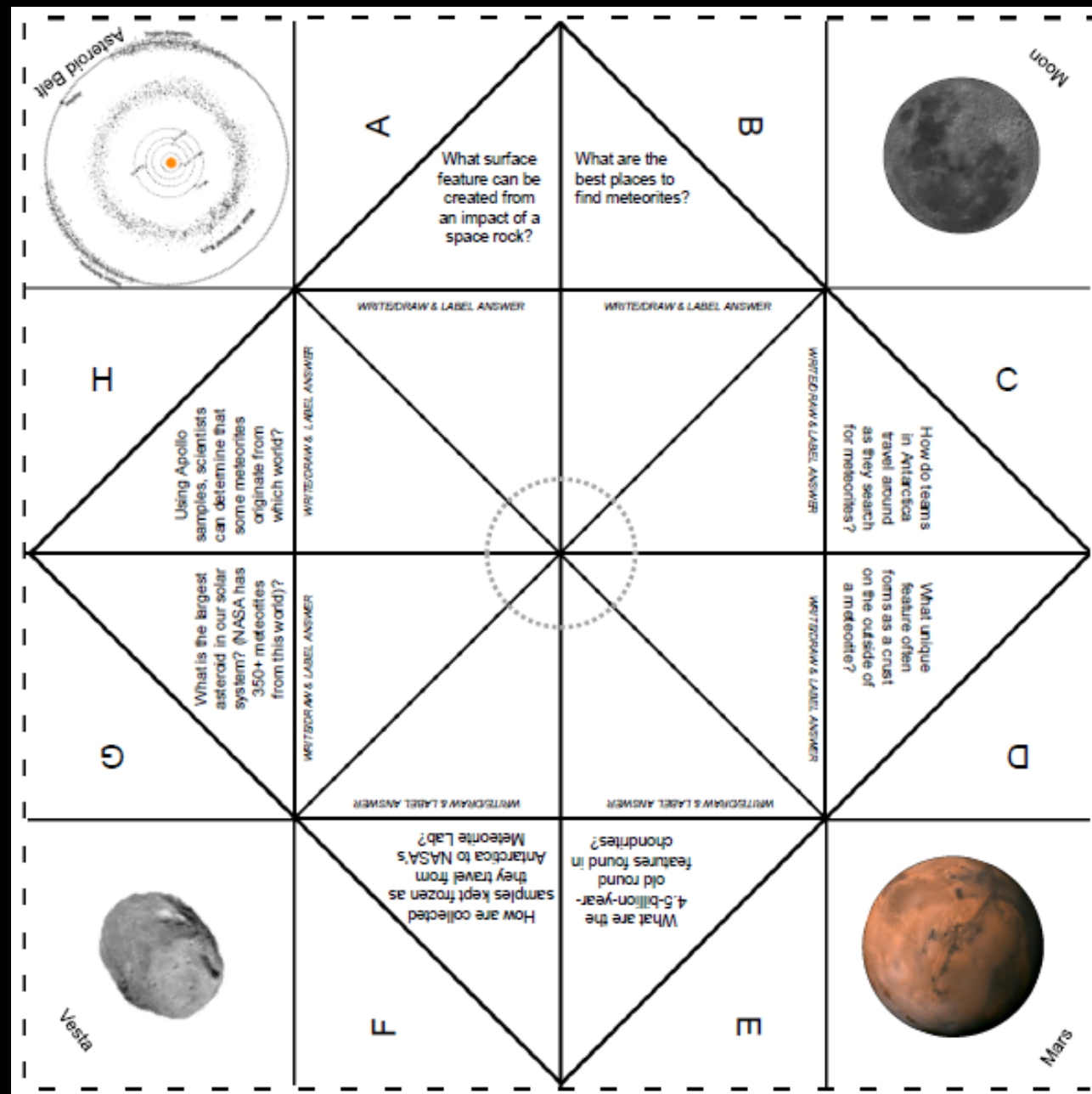


Sample GRO 17063,3





# CHATTERBOXES



## FILL OUT YOUR CHATTERBOX:

1. Read each question and draw and label your answer.
2. Assign each answer a number of points (1-8) within the dotted circle.

## FOLDING INSTRUCTIONS:

1. Print and cut around the outside border of the Chatterbox (square).
2. Fold the square in half, unfold, and in half again in the opposite direction.
3. Unfold the square. With the blank side up, fold each corner to the center (middle) of the square. You will have a smaller square.
4. Turn over and repeat step 3, creating an even smaller square.
5. Turn over so you can see the pictures.
6. Slide your thumb and your finger under the flap of 2 of the pictures and press the top corners together.
7. Slide your thumb and your finger under the flap of the other 2 pictures and press the top corners together.
8. All pictures should now be visible with top corners touching.

## CHATTERBOX CHALLENGE: 2 PEOPLE

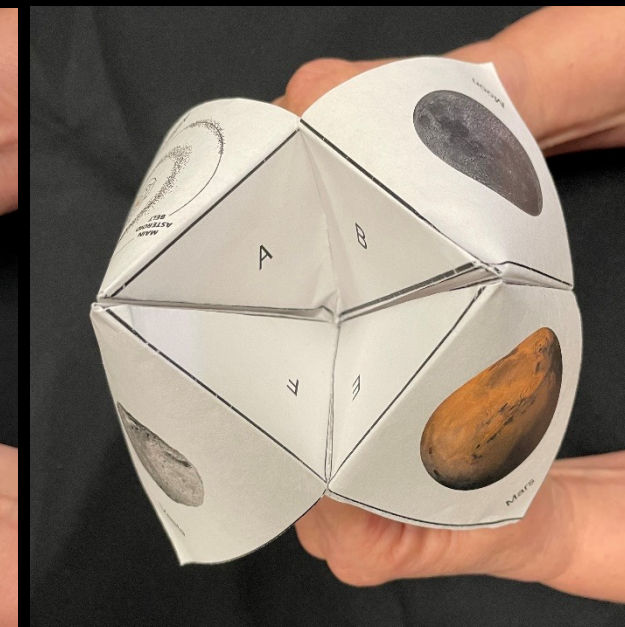
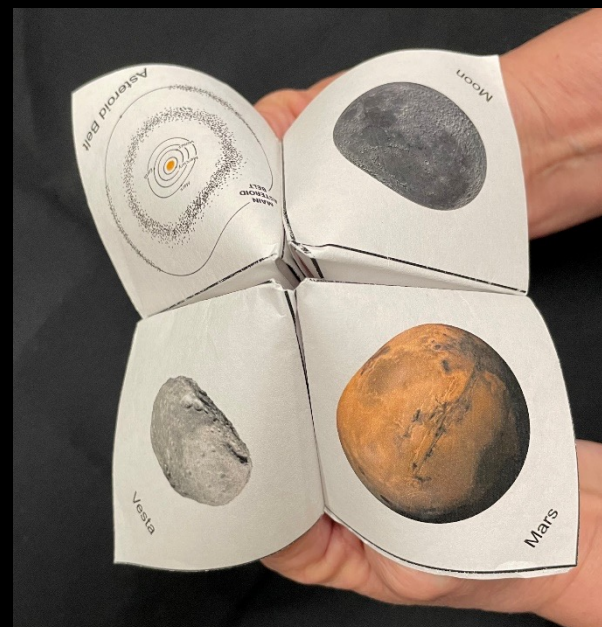
**STEP 1:** Person 1: Hold your completed Chatterbox. Person 2: Pick a solar system location. Person 1: Spell out and move the chatterbox according to the location chosen (for example: M – A – R – S)

**STEP 2:** Person 2: Pick a letter shown in the Chatterbox. Person 1: Count and move the Chatterbox according to the letter chosen.

**STEP 3:** Person 2: Pick a letter shown in the Chatterbox. Person 1: Read the question and see if Person 2 can answer correctly. If they do, they earn the number of points you assigned to that question. (Keep track of points earned.)

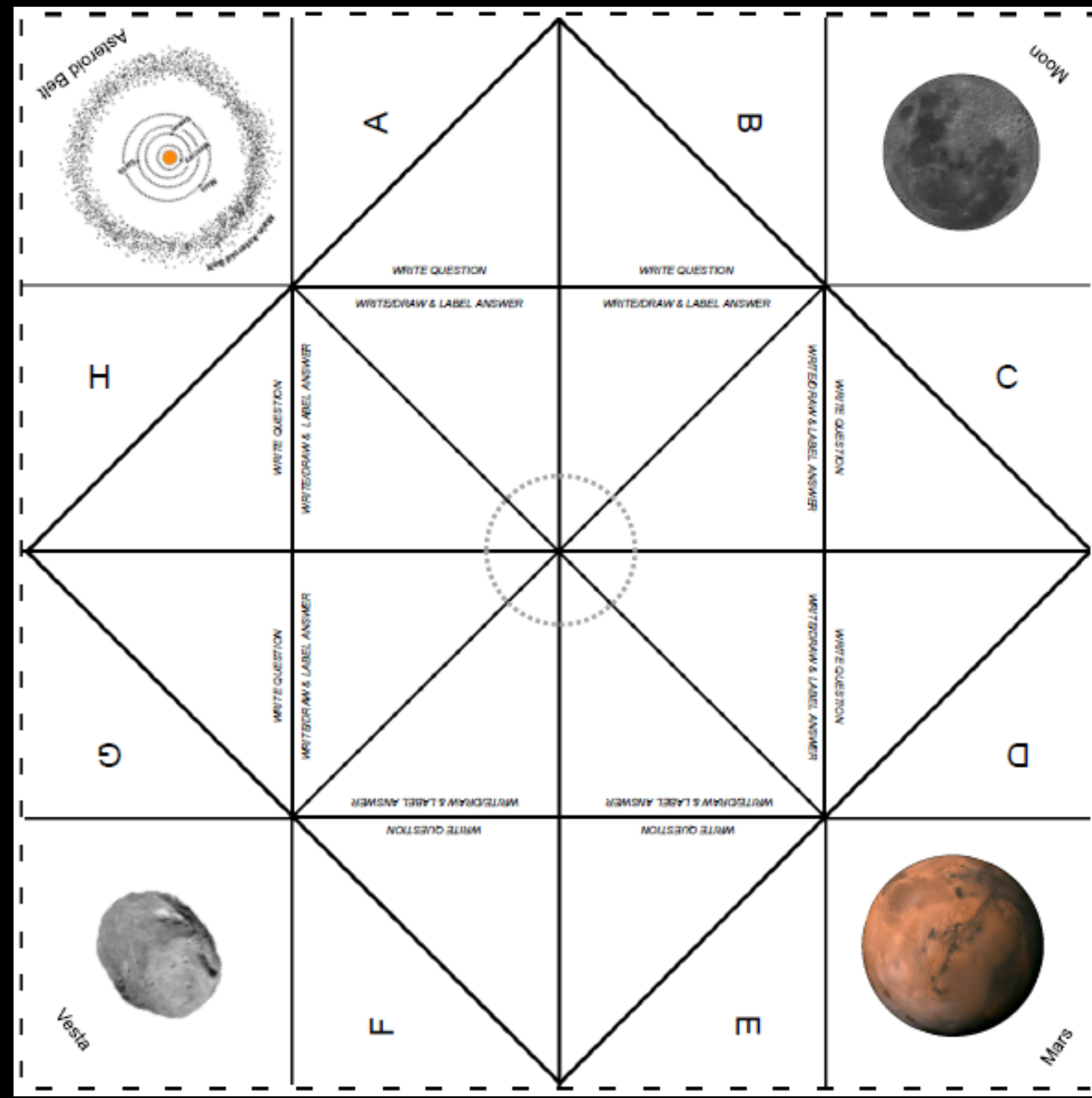
**STEP 4:** Change roles and complete steps 1 – 3. (Repeat 4 times - person must choose different question each time.)

**DETERMINING THE WINNER:** After completing the above steps 4 times, the person with the most points wins.





# CHATTERBOXES



## FILL OUT YOUR CHATTERBOX:

1. Write your own question and draw and label your answer.
2. Assign each answer a number of points (1-8) within the dotted circle.

## FOLDING INSTRUCTIONS:

1. Print and cut around the outside border of the Chatterbox (square).
2. Fold the square in half, unfold, and in half again in the opposite direction.
3. Unfold the square. With the blank side up, fold each corner to the center (middle) of the square. You will have a smaller square.
4. Turn over and repeat step 3, creating an even smaller square.
5. Turn over so you can see the pictures.
6. Slide your thumb and your finger under the flap of 2 of the pictures and press the top corners together.
7. Slide your thumb and your finger under the flap of the other 2 pictures and press the top corners together.
8. All pictures should now be visible with top corners touching.

## CHATTERBOX CHALLENGE: 2 PEOPLE

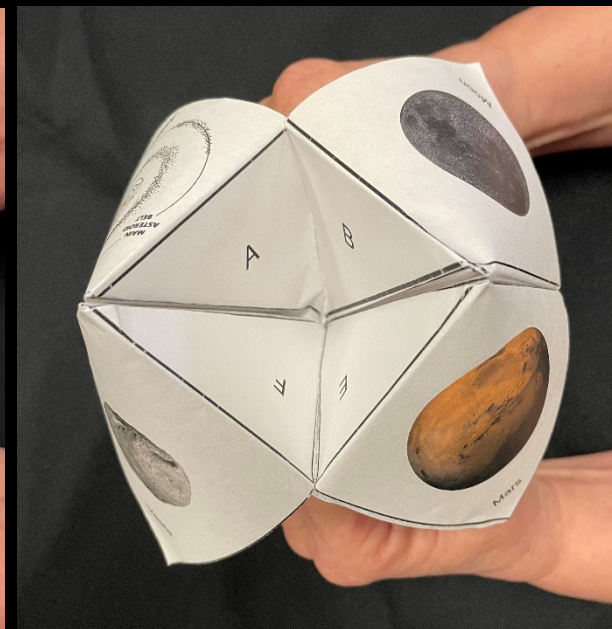
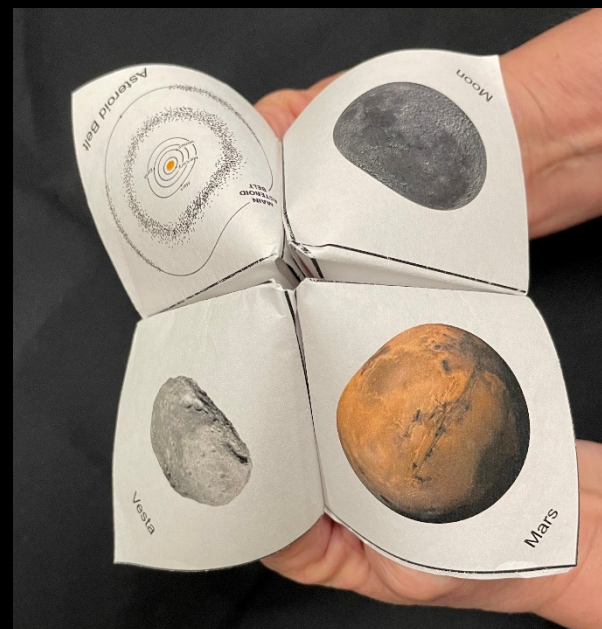
**STEP 1:** Person 1: Hold your completed Chatterbox. Person 2: Pick a solar system location. Person 1: Spell out and move the chatterbox according to the location chosen (for example: M – A – R – S)

**STEP 2:** Person 2: Pick a letter shown in the Chatterbox. Person 1: Count and move the Chatterbox according to the letter chosen.

**STEP 3:** Person 2: Pick a letter shown in the Chatterbox. Person 1: Read the question and see if Person 2 can answer correctly. If they do, they earn the number of points you assigned to that question. (Keep track of points earned.)

**STEP 4:** Change roles and complete steps 1 – 3. (Repeat 4 times - person must choose different question each time.)

**DETERMINING THE WINNER:** After completing the above steps 4 times, the person with the most points wins.





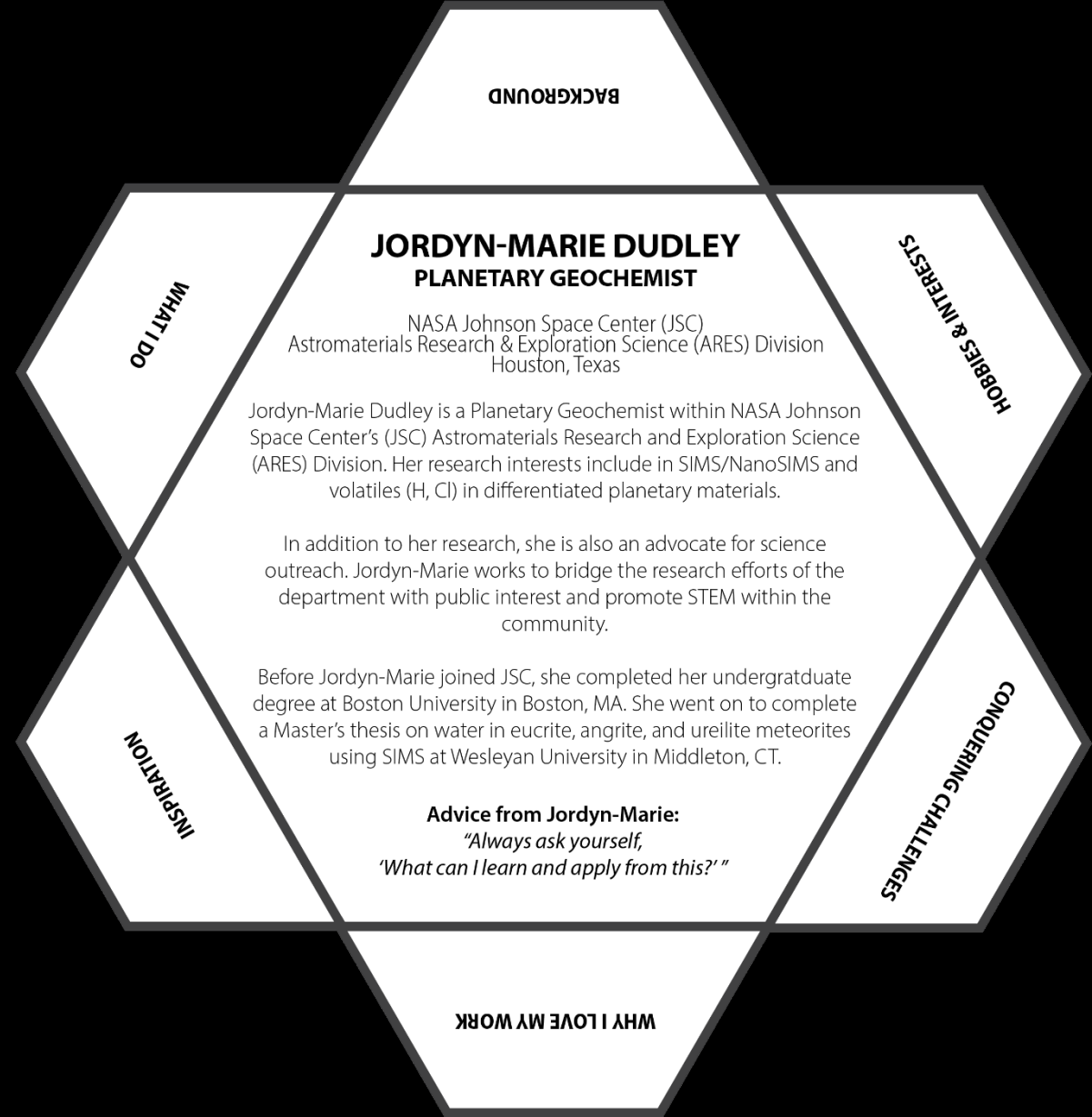
# METEORITE DISCOVERY BOARD ACTIVITY

*Highlighting diverse SMEs that work with meteorites*

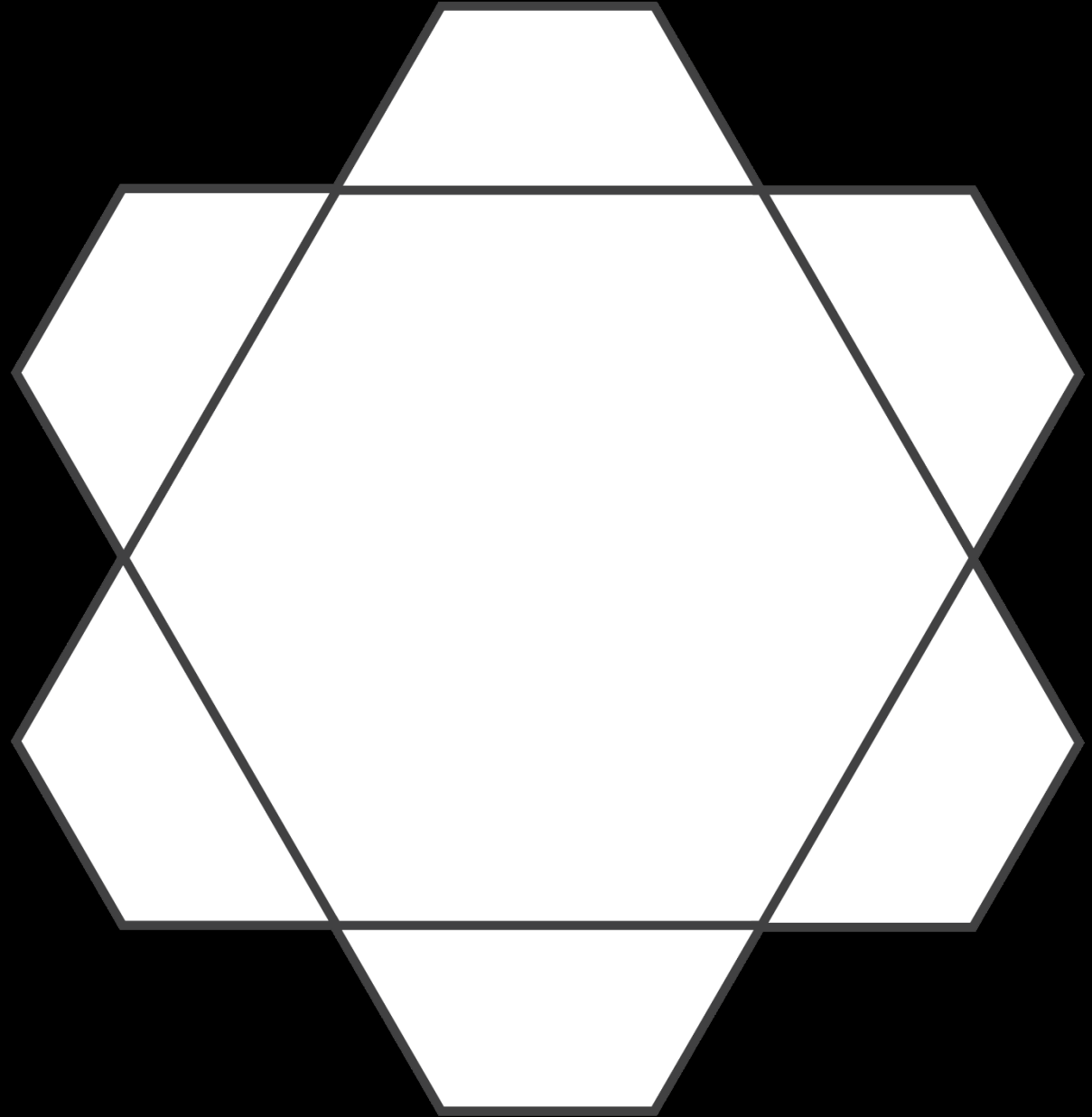
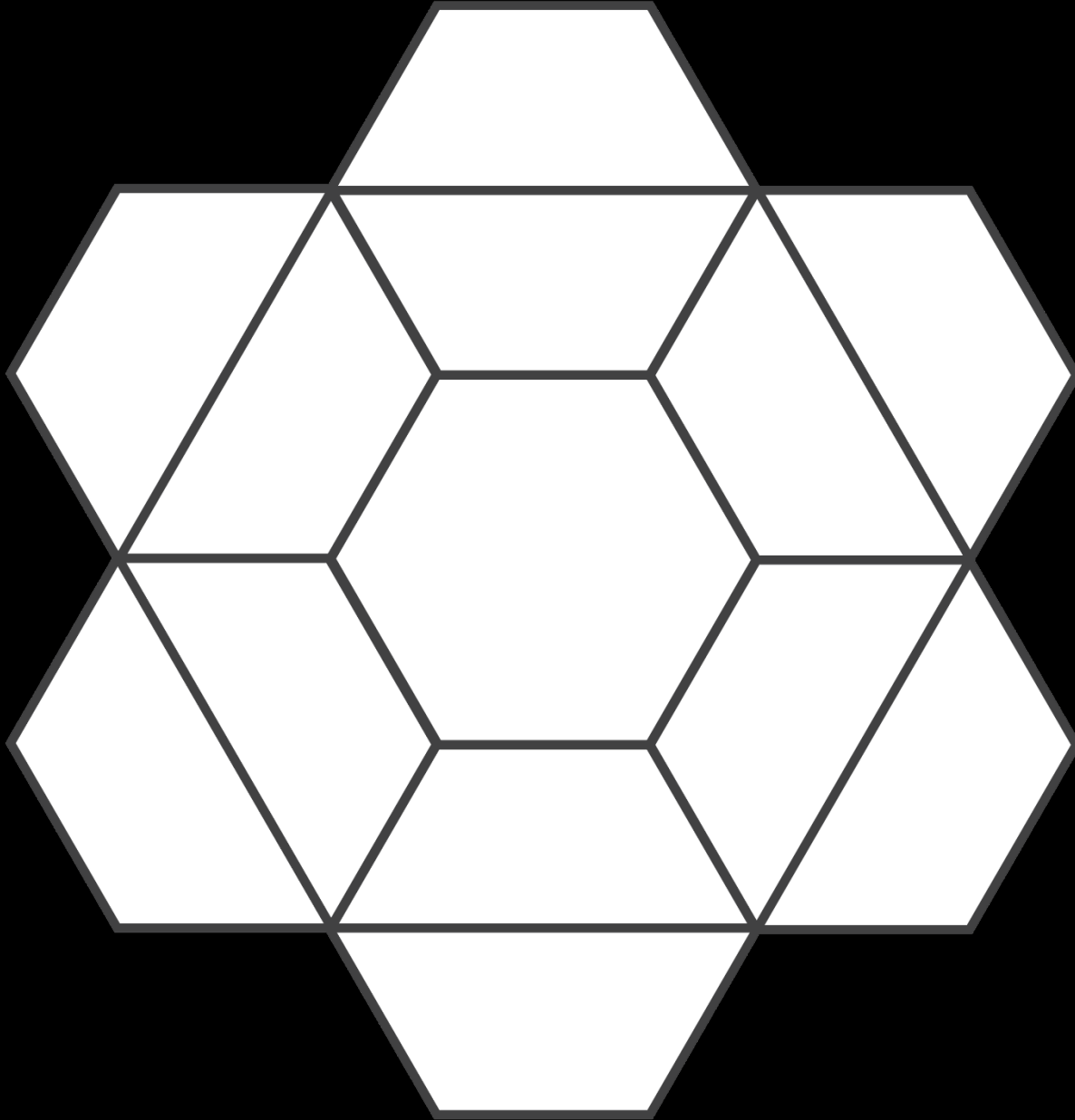




# CAREER HEXAGONS



# CAREER HEXAGONS (blank)





# CAREER HEXAGONS (for learners)

Describe your background

Sketch a picture highlighting your background

Describe your future career

Sketch a scene from your future career

Describe your inspiration

Sketch an image of your inspiration

Describe what excites you about this career

Sketch what makes this career exciting

Describe a challenge

Sketch yourself conquering this challenge

Describe your hobbies & interests

Sketch your hobbies & interests

MY BACKGROUND

NAME: \_\_\_\_\_

FUTURE CAREER: \_\_\_\_\_

WHERE I WOULD LIKE TO WORK: \_\_\_\_\_

STEPS THAT WILL HELP ME PURSUE THIS FUTURE CAREER:

MY HOBBIES & INTERESTS

CONQUERING CHALLENGES

MY INSPIRATION




ABOUT THIS CAREER

WHAT EXCITES ME

# LET'S DISCOVER NEW FRONTIERS!



## NASA's New Frontiers and Discovery Sample Return Missions

MISSION NAME & PATCH	TARGET SOLAR SYSTEM OBJECT	MISSION SPACECRAFT	SAMPLE COLLECTOR	COLLECTED SAMPLES	DID YOU KNOW?
	<ul style="list-style-type: none"> <li>➤ Visible "glowing" halo, tail, or jet(s).</li> <li>➤ Icy, dusty body.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Two parallel solar array panels.</li> <li>➤ Has a tennis racquet-like collector.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Looks like a metal ice cube tray.</li> <li>➤ Multiple bluish colored rectangles.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Samples look like tadpoles or long, linear tracks.</li> </ul>	Space is Dusty!
	<ul style="list-style-type: none"> <li>➤ The main source of energy for Earth.</li> <li>➤ Contains 99% of the matter in the solar system.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Two solar array panels and multiple circular collectors.</li> <li>➤ Looks similar to a watch.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Looks like a honeycomb.</li> <li>➤ Made of multiple shiny 6-sided (hexagonal) wafers of different colors.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Samples are broken wafer pieces with embedded solar wind.</li> </ul>	Salvaging the Science after a Hard Landing
	<ul style="list-style-type: none"> <li>➤ A rocky body.</li> <li>➤ This object is taller than the Empire State building.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Two squarish solar array panels.</li> <li>➤ Looks like a bee or wasp.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Circular object at the end of a long "arm".</li> <li>➤ Extends down from the bottom of the spacecraft.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Samples will be small rocks and dust.</li> </ul>	Bennu: Orbit and Relevance
<b>MATCH THE CARDS IN THIS ROW WITH THEIR DESCRIPTION ABOVE.</b>	<p><i>After learning details about the above sample return missions, consider designing your own future sample return mission!</i></p>				









# LET'S DISCOVER NEW FRONTIERS!

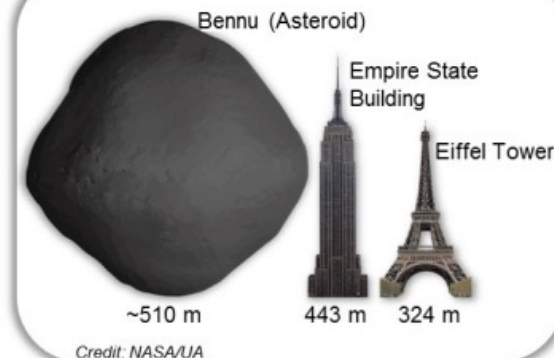


NASA's New Frontiers and Discovery Sample Return Missions

MISSION NAME & PATCH	TARGET SOLAR SYSTEM OBJECT	MISSION SPACECRAFT	SAMPLE COLLECTOR	COLLECTED SAMPLE
	<ul style="list-style-type: none"> <li>➤ Visible "glowing" halo, tail, or jet(s).</li> <li>➤ Icy, dusty body.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Two parallel solar array</li> </ul>	<ul style="list-style-type: none"> <li>➤ Looks like a metal ice</li> </ul>	
	<ul style="list-style-type: none"> <li>➤ The main source of energy for Earth.</li> <li>➤ Contains 99% of the matter in the solar system.</li> </ul>	 <p>Credit: SDO/AIA</p>		
	<ul style="list-style-type: none"> <li>➤ A rocky body.</li> <li>➤ This object is taller than the Empire State building.</li> </ul>			



Salvaging the Science



After learning details about the above sample return missions, consider designing your own future sample return mission.



# ASTROMATERIALS 3D

A virtual library for exploration and research of  
NASA's space rock collections



APOLLO LUNAR  
COLLECTION



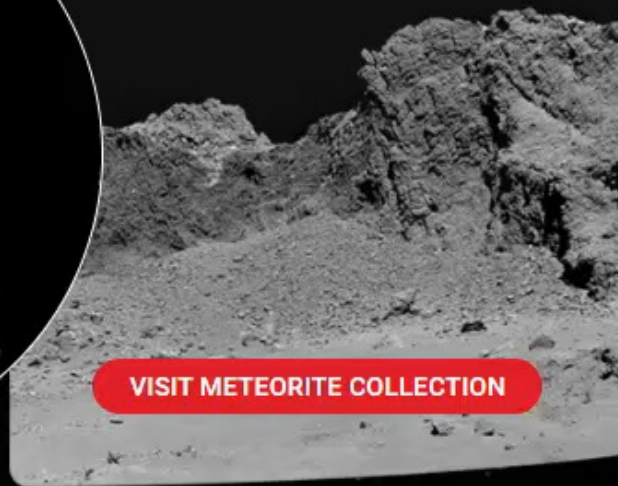
[VISIT APOLLO COLLECTION](#)



Sample LON 94102,37



ANTARCTIC METEORITE  
COLLECTION



[VISIT METEORITE COLLECTION](#)

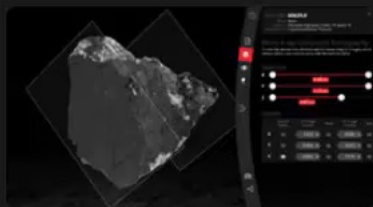




## ANTARCTIC METEORITE COLLECTION • VESTA

# GRO 17099,0 (Subsample)

### ASTROMATERIALS 3D EXPLORER



Web application includes:

- 360° mesh of exterior
- X-Ray CT imagery of interior
- Guides & measurements
- Sample analysis features

[OPEN THIS SAMPLE](#)

Sample GRO 17099,0 (Parent Sample)

Subsample GRO 17099,0 (Subsample)

## Every Rock Tells a Story

Antarctic Meteorite Sample GRO 17099 was collected by the ANSMET team in 2017 from the Grosvenor Mountains in the Transantarctic Range and has not been studied yet, leaving the

Origin  
Vesta

Collected



# DOWNLOAD AND PRINT YOUR OWN 3D MODEL!

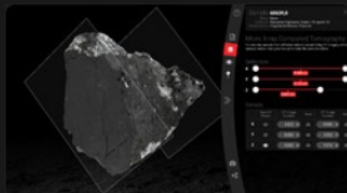
*Scroll down on sample  
page for details!*

## Download Data

### 3D Model

Download this sample's textured 3D model at two different mesh resolutions in OBJ format. The specific parameters of this sample's model can be found in the tables to the right. A more detailed description of these meshes is included within the ZIP file.

#### ASTROMATERIALS 3D EXPLORER



Web application includes:

- 360° mesh of exterior
- X-Ray CT imagery of interior
- Guides & measurements
- Sample analysis features

[OPEN THIS SAMPLE](#)

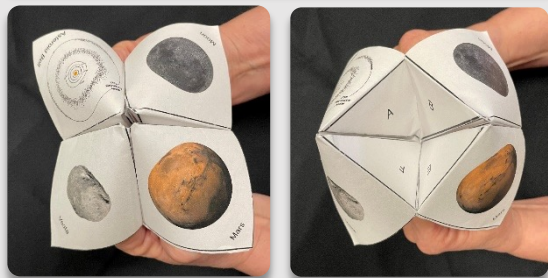
#### ANTARCTIC METEORITE COLLECTION · VESTA GRO 17099,0 (Subsample)

[Sample GRO 17099,0 \(Parent Sample\)](#)[Subsample GRO 17099,0 \(Subsample\)](#)

	Full Resolution	Low Resolution
Modeling Time	11 hours	
Faces	199,956	199,956
Vertices	99,978	99,978
Texture Resolution	2800 x 2800	2800 x 2800
Mesh File Size	72.7 MB	14 MB
	<a href="#">DOWNLOAD (.ZIP)</a>	<a href="#">DOWNLOAD (.ZIP)</a>



# EDUCATOR RESOURCES

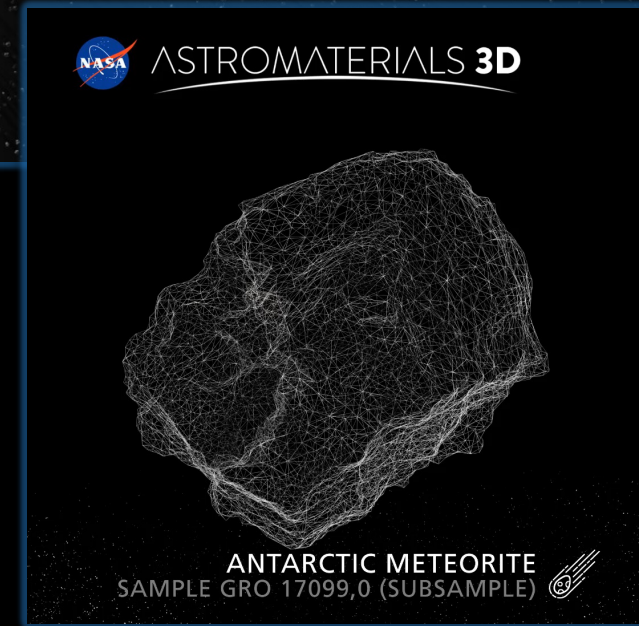
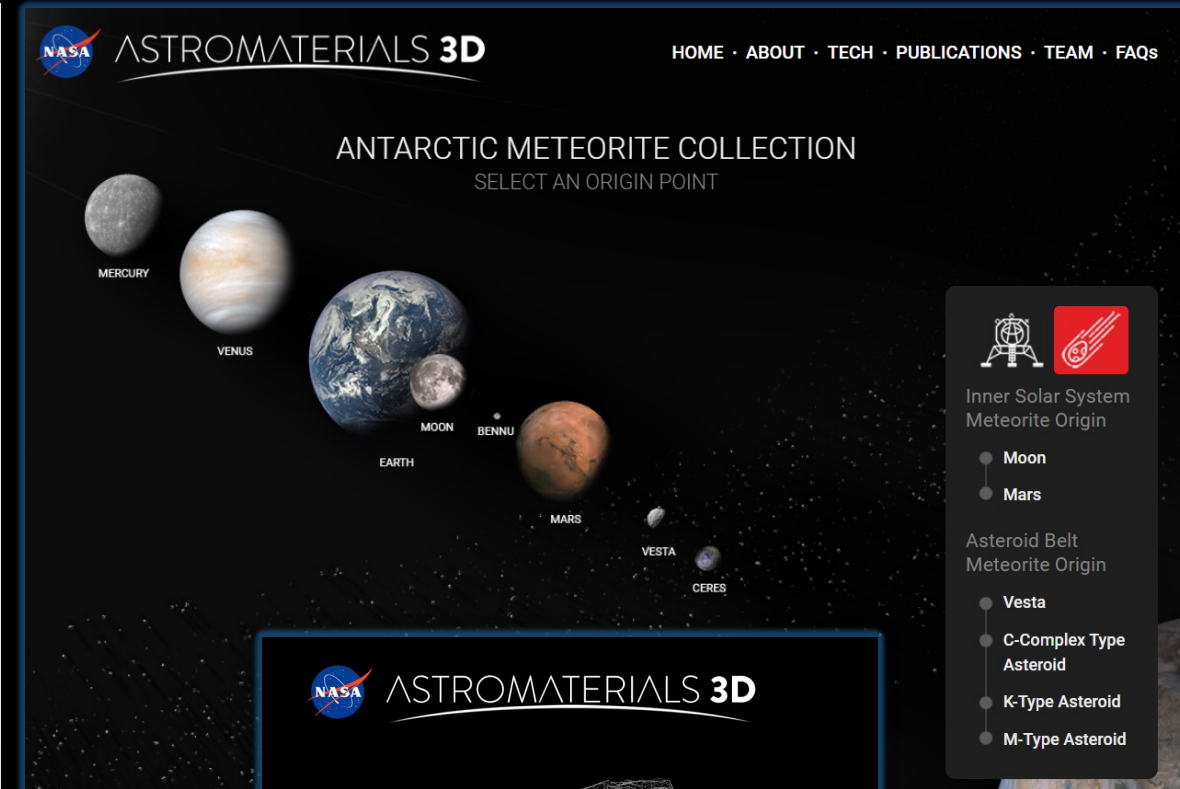


**LET'S DISCOVER NEW FRONTIERS!**  
NASA's New Frontiers and Discovery Sample Return Missions

MISSION NAME & PATCH	TARGET SOLAR SYSTEM OBJECT	MISSION SPACECRAFT	SAMPLE COLLECTOR	COLLECTED SAMPLES	DID YOU KNOW?
	<ul style="list-style-type: none"> <li>Visible "glowing" halo, tail, or jets.</li> <li>Icy, dusty body</li> </ul>	<ul style="list-style-type: none"> <li>Two parallel solar array panels.</li> <li>Has a tennis racquet-like collector.</li> </ul>	<ul style="list-style-type: none"> <li>Looks like a metal ice cube tray.</li> <li>Multiple bluish-colored rectangles.</li> </ul>	<ul style="list-style-type: none"> <li>Samples look like taplopes or long, linear tracks.</li> </ul>	Space is Dusty!
	<ul style="list-style-type: none"> <li>The main source of energy for Earth.</li> <li>Contains 99% of the matter in the solar system.</li> <li>Looks similar to a watch.</li> </ul>	<ul style="list-style-type: none"> <li>Two solar array panels and multiple circular collectors.</li> <li>Looks similar to a watch.</li> </ul>	<ul style="list-style-type: none"> <li>Looks like a honeycomb.</li> <li>Made of multiple shiny 6-sided (hexagonal) wafers of different colors.</li> </ul>	<ul style="list-style-type: none"> <li>Samples are broken water pieces with embedded solar wind.</li> </ul>	Salvaging the Science after a Hard Landing
	<ul style="list-style-type: none"> <li>A rocky body.</li> <li>This object is larger than the Empire State building.</li> <li>Looks like a bee or wasp.</li> </ul>	<ul style="list-style-type: none"> <li>Two squarish solar array panels.</li> <li>Looks like a bee or wasp.</li> </ul>	<ul style="list-style-type: none"> <li>Circular object at the end of a long "arm".</li> <li>Extends down from the bottom of the spacecraft.</li> </ul>	<ul style="list-style-type: none"> <li>Samples will be small rocks and dust.</li> </ul>	Bennu: Orbit and Relevance

WATCH THE GAMES BY TURN HOW THEY TURN DISCUSSION ABOVE

After learning details about the above sample return missions, consider designing your own future sample return mission!



1. Meteorite Discovery Board
2. Chatterboxes
3. Career Hexagons
4. Let's Discovery New Frontiers



# Get Involved!



Learn more and access the NISE Network's online digital resources:  
[nisenet.org](https://nisenet.org)



Subscribe to the monthly newsletter  
[nisenet.org/newsletter](https://nisenet.org/newsletter)

Follow NISE Net on social networking  
[nisenet.org/social](https://nisenet.org/social)





# 2023 Online Workshops

Looking to Future Events... 🐱

## Changing Brains - New Tools for Brain Awareness Week & Beyond

**Tuesday, March 14, 2023**

2pm-3pm Eastern / 11am-12pm Pacific

## Making Waves with Radio - New Ways to Engage Audiences with the Basics of Modern Communication & Navigation

**Tuesday, April 4, 2023**

2pm-3pm Eastern / 11am-12pm Pacific



**ONLINE  
WORKSHOPS**

Learn more at  
[nisenet.org/events](https://nisenet.org/events)





# Thank You

