

# The *Alien Earths* Traveling Exhibit

✦Electronic Guided Tour✦



1

Welcome to the Alien Earths traveling exhibit electronic guided tour. In the next 10 to 15 minutes, you will get an overview of the main areas and topics of the Alien Earths exhibit. We recommend you use this electronic guided tour along with the Alien Earths Science Background presentation also available on the Alien Earths website under Education. Let's get started...



Several key partners have contributed to making the Alien Earths exhibit possible and we acknowledge them here.

## **Welcome to the *Alien Earths Exhibit***



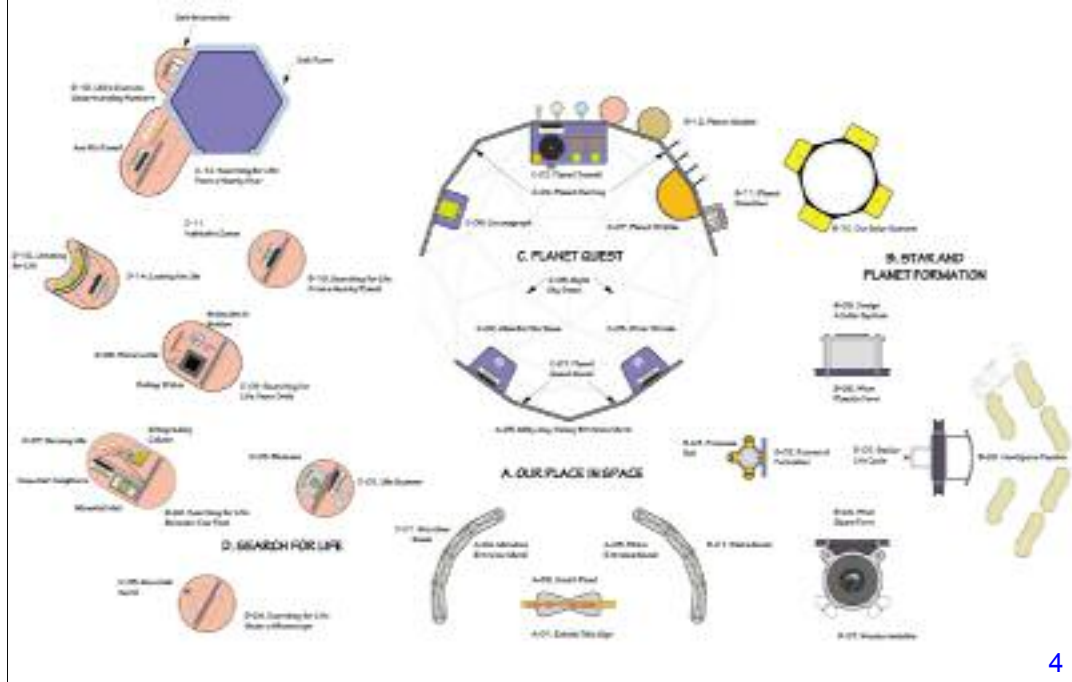
### ***EXHIBIT AREAS***

- ★ Our Place in Space (Powers of 10 display)      straight back
- ★ Star & Planet Formation                              to the right
- ★ Planet Quest    straight back
- ★ Search for Life    to the left

3

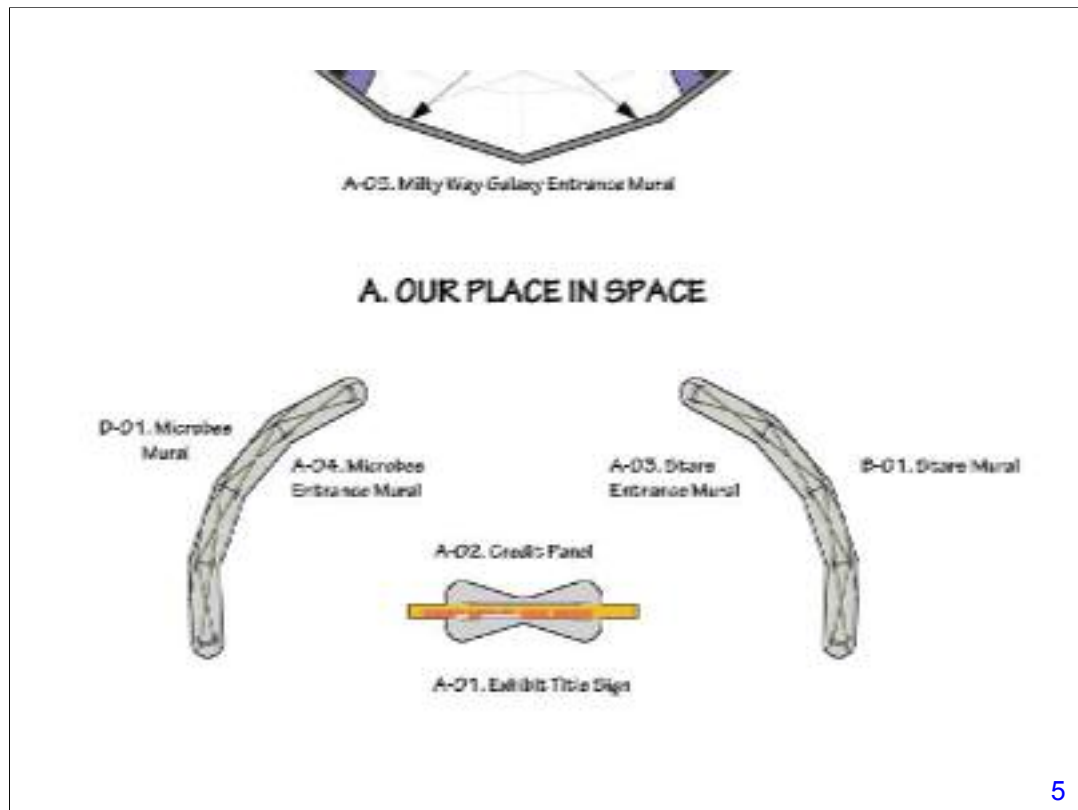
This is a view from the exhibit entrance. The exhibit is divided into four main areas: Our Place in Space, Star and Planet Formation, the PlanetQuest Area, and the Search for Life. In a typical set-up these areas are found where indicated here. However, be aware that set-ups at different host venues may vary.

## ***Alien Earths Floorplan (3,000 sq. ft) Major Exhibit Areas***



4

This overhead floor plan of the exhibit is a great tool to have for finding your way around – whether you're a museum tour guide or a visitor.



The best place to begin a tour of the exhibit is right up front with “Our Place in Space...”

# ***Our Place in Space***



## **Key Questions:**

- **What and where are we in the cosmos?**
- **Could there be other planets like Earth out there?**



6

What and where are in the Cosmos? Could there be other planets like Earth out there? These are the key questions for this area, located at the very front of the exhibit. Here, visitors can get their bearings on our actual circumstances as inhabitants of planet Earth.

# ***Our Place in Space***

## **The BIG IDEA**

Our search for life beyond Earth depends on our understanding of what and where we are in the grander scheme of things.



7

The big idea for Our Place in Space is that our search for life beyond Earth depends on our understanding of what and where we are in the grander scheme of things:

- Planet Earth is one of 9 planets around a star we call the Sun, which is the only star in our Solar System
- The Sun is only one of more than 100 billion stars in our galaxy, some of which have their own planets
- Our galaxy is only one of more than 100 billion galaxies in the Universe

These concepts are reinforced throughout the exhibit, this area features a “Powers of Ten” graphic. This is an excellent place to use the “Near and Far” and “Small and Large” floor activities, found under the educational activities of the Alien Earths website.

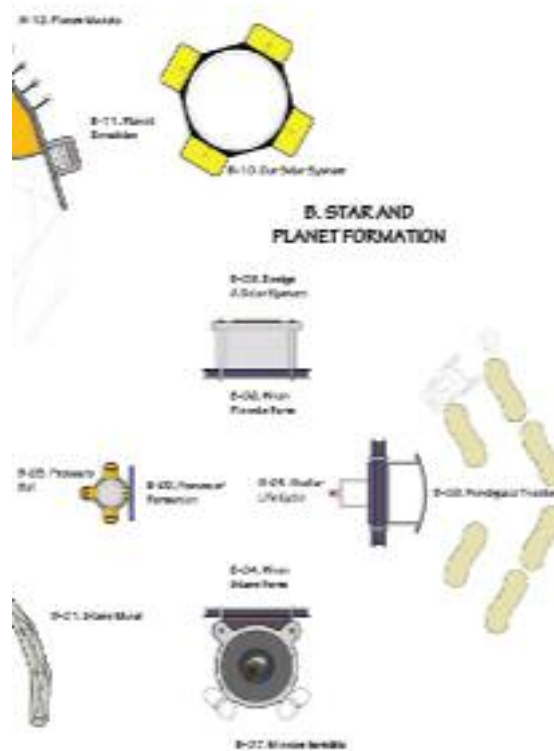
# ***Our Place in Space***



Directly behind the Entrance Sign, there is a wall-sized graphic depicting the “big picture” with a Powers of Ten display from atoms to galaxies - an excellent kick-off to any tour of the Alien Earths exhibit.



## Star and Planet Formation



Next we move on to Star and Planet Formation...

# ***Star & Planet Formation***



**Key Question:** Where do planets come from?

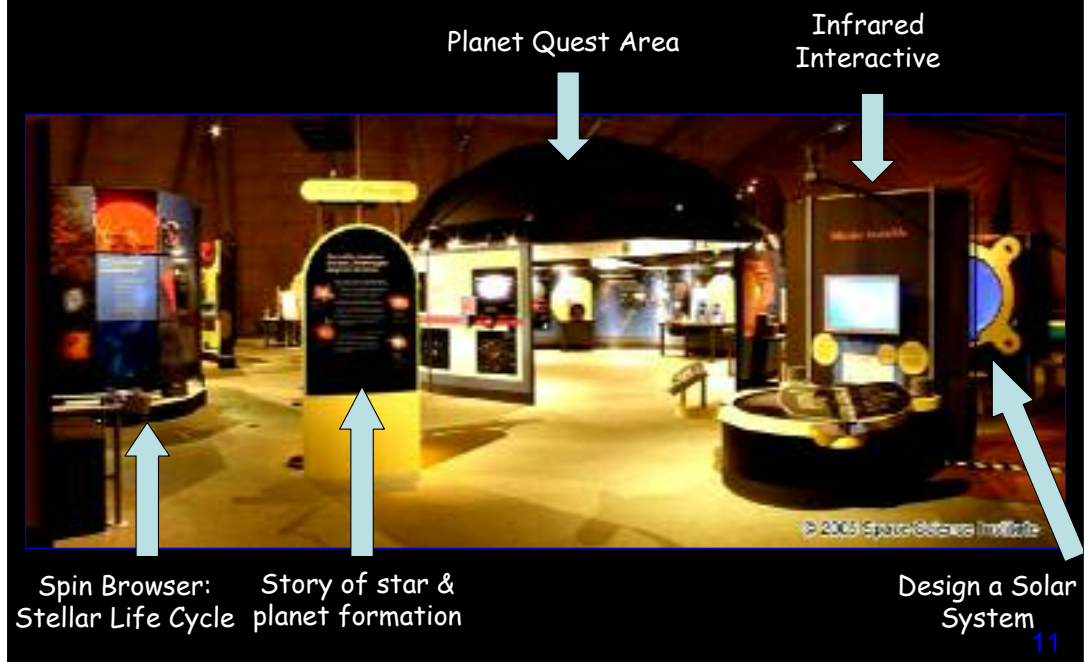
**BIG IDEA:** Planets sometimes form along with stars. Our search for life beyond our solar system requires us to know where and how.

10

Where do planets come from? This is the key question for the Star and Planet Formation area. The big idea here is that planets sometimes form along with stars out of the same swirling clouds of gas and dust. Our search for life beyond our solar system requires knowing where and how this occurs. Perhaps the best chance to find an alien Earth is to look around stars that are most like our sun.

# ***Star & Planet Formation***

Looking toward the Planet Quest Area



This is a view from the Star and Planet Formation areas looking towards the PlanetQuest area towards the center of the exhibit. The Star and Planet Formation area is rich with exciting interactives and science content.

# Star & Planet Formation

## Exciting Interactives!

**Design a Solar System:** Create and run your own virtual solar system!



**Mission Invisible:** Discover how infrared light lets astronomers see through interstellar clouds into star and planet forming regions in our galaxy.



**Pressure Ball:** Learn how gas and dust condense to ignite nuclear fusion in stars as you pump up the pressure in this “explosive” activity!

12

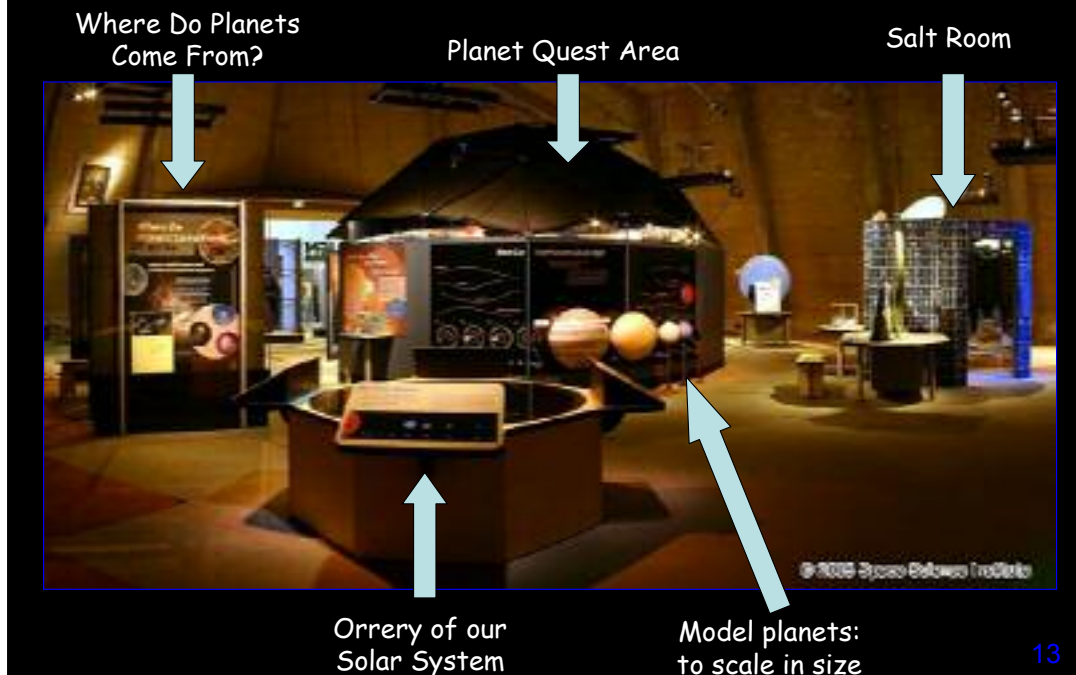
Three very popular interactives in the Star and Planet Formation area are Planet Families, the Infrared Table, and the Pressure Ball. In Planet Families you can design and run your own solar system on a giant computer touch-screen and learn about gravity, orbital motion, and the interactions of planets of different sizes including Earth-like planets.

The Infrared Table lets you literally see the unseen using a real infrared camera and large display monitor. Learn how astronomers can see right through massive clouds of gas and dust to detect star and planet forming regions in our galaxy.

The Pressure Ball lets up to three people pump together to simulate the enormous pressure needed to ignite gas and dust into stars.

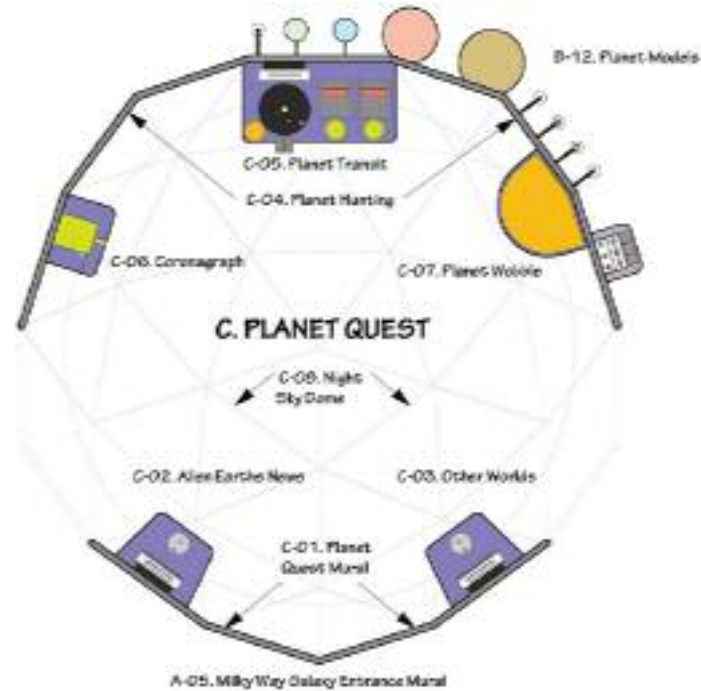
## ***Star & Planet Formation***

Looking from the back of the exhibit



Farther back from the entrance, the Star and Planet Formation area includes an Orrery of our solar system and scale models of the planets in our solar system.

## *Planet Quest Area*



14

Next we visit the Planet Quest area to learn about our search for planets around other stars, also known as “extrasolar” planets.

# **Planet Quest Area**

## **Key Questions:**

- Are there other planets outside our solar system where life could exist?
- How can we see them so far away?



## **The BIG IDEA:**

During the past decade, we have discovered over 150 planets around other stars. We find them using clever techniques by detecting how they affect their parent stars.

15

Are there other planets outside our solar system where life could exist? Could we see them so far away? These are the key questions for the Planet Quest area, which includes everything under the large center-piece dome of the exhibit.

The big idea is that for the first time in human history, we have detected planets orbiting distant stars. During the past decade, astronomers have discovered over 150 (and counting) of these extra-solar planets. We do not actually “see” these planets, but infer their presence using clever techniques to observe how they affect their parent stars.

So far, most of these planets are like the gas giant Jupiter rather than Earth, but there are new missions planned with the capabilities to detect Earth-sized worlds.



## ***Inside the Planet Quest Area***

Finding Planets Orbiting Distant Stars



Other Worlds

Alien Earths  
News... new  
planets being  
discovered

Coronagraph

Planet Transit

Planet Wobble

16

Inside the Planet Quest Dome, there are several interactives demonstrating the various techniques astronomers use to detect extrasolar planets, as well as current news about new planets being discovered.



# ***Planet Quest***

## **Exciting Interactives!**

**Planet Transit:** When a planet passes in front of a star, a tiny amount of light from the star is blocked. Explore how this helps us discover new planets with this hand-crank/photometer activity.



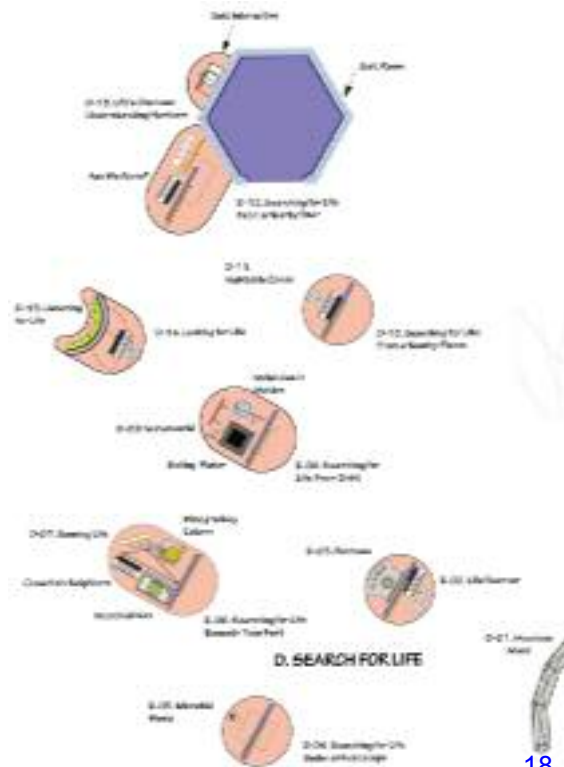
**Planet Wobble Activity:** Discover how a planet in orbit around a star causes the star to wobble slightly – another method used to find new planets.

17

The Planet Transit activity allows visitors to turn a crank to make a solar system move and use a photometer to see how light from a star can be dimmed from a passing planet.

The Planet Wobble activity demonstrates the wobbly motion of stars caused by massive planets orbiting close to them – another method used to find extra-solar planets.

## *Search for Life*



18

Finally, let's visit the "Search for Life" area...

# ***Search for Life***



## **Key Questions:**

- Could life exist on any planet?
- How would we find it?

19

Could life exist on any planet? How would we find it? These are the key questions for the Search for Life area.

# Search for Life

## BIG IDEAS:

Life changes the physical environment and knowledge of these changes determines how we look for life elsewhere.

Our search for life elsewhere begins with what we know about life on Earth. This is the science of astrobiology.

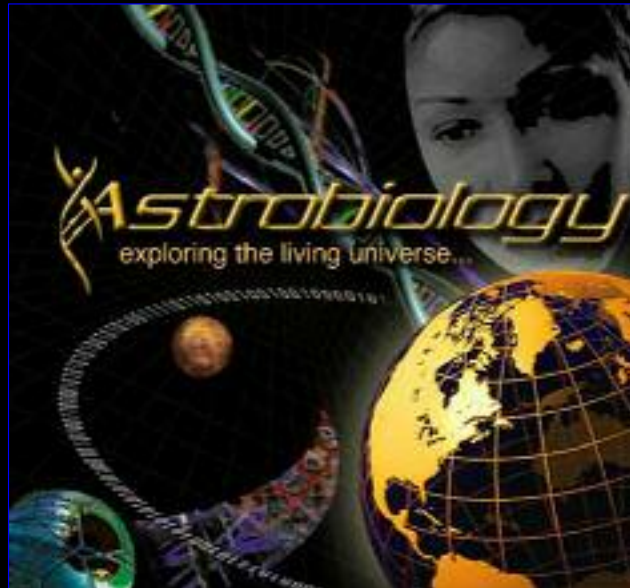


Image courtesy of NASA Ames Research Center and the NASA Astrobiology Institute

20

The big idea is that life changes the physical environment and knowledge of these changes determines how we look for life elsewhere. The search for life beyond Earth is informed by what we know about life on Earth.

# ***Search for Life***

## ***Exciting Interactives!***

### **Listening for Life**

Is there anyone out there? Learn how we are listening for intelligent alien signals from other worlds! Can you sort out the sounds from space?



### **Molecules in Motion**

Explore how and why states of matter change and how our search for life is linked to our search for liquid water.

### **Biomass**

Compare elements of Earth's biomass and discover that most of the life on Earth is microbes! Animals and humans make up only 1% of the life on Earth.

21

In the Search for Life area you can learn some basic biology about life here on Earth as well as how we are searching for life elsewhere. Listening for Life lets you listen to different kinds of signals and sounds from space. Can you pick out the intelligent one from the rest?

Water is an essential ingredient for life as we know it and it can exist on Earth due to our atmospheric pressure and warm temperatures. Find out how this works and explore states of matter with the Molecules in Motion activity and see why we are looking for water on other worlds in hopes of finding life.

In the Biomass activity you can discover what kinds of life are most abundant on Earth by weighing it! The results surprise most people but makes it clear why we may find alien microbes before we find alien aviators!

The Search for Life area is the best place to use the Diversity of Life facilitated card game, downloadable from the educational activities section of the Alien Earths website.

# Search for Life

## More Exciting Interactives!

### Microbial Mat

Discover what these real living microbes do when you change the amount of light falling on them!



### Are We Alone?

Use this computer to crunch the numbers and calculate the possibility of contacting intelligent aliens using the **Drake Equation!**



### Winogradsky Column

Explore how microbes in this jar coexist and separate into layers to suit their needs.

22

Explore real microbes in the exhibit and how they live. The Microbial Mat changes depending on how much light you shine on it! The Winogradsky Column contains naturally separated layers of different kinds of microbes. Here you can find out why.

Are We Alone? It's the main question of the exhibit, but are the chances of contacting intelligent aliens somewhere out there. Using the famous Drake Equation, here's your chance to crunch the numbers and discover the possibilities for yourself!

## Search for Life



The Salt Room demonstrates what 100 billion grains of salt would look like – the same number as stars in our Milky Way galaxy! Is there life out there?



This area also includes interactives showing how astronomers “count” stars.



The Mirrored Salt Room is a very popular component which demonstrates how big 100 billion really is! This room, if filled in completely with salt, would contain 100 billion grains of salt – the same as the number of stars in our Milky Way galaxy and as the number of galaxies in the Universe! Might there be life out there there? It may simply be a numbers game.



## Ready... Set... **EXPLORE!**



Enjoy your visit to the Alien Earths exhibit!

For more information on the science behind the exhibit, we highly recommend downloading the **Science Background Presentation** from the Alien Earths website under the education section.

Other great resources as well as virtual and in-person workshops are also available through the website.

Thank you for your kind attention.

24

We hope this tour helps you make the most of the Alien Earths exhibit. Remember, this tour just touches on the major themes and a few of the exciting interactives of the Alien Earths exhibit. There is much more to explore when you see it in person and by roaming the Alien Earths web site! Thank you for your kind attention.