ALIEN EARTHs
SEARCHING FOR PLANETS & LIFE AROUND DISTANT STARS
“Alien Earths” - Schedule

- Fabrication (July – December 2004)
- Exhibit Set-up (January 2005)
- Opening & “Shake-down” installation
  (Lawrence Hall of Science - February 2005)
- National Tour Begins (May 2005)
- Refurbish in Fall 2008
- Follow-On Tour begins in early 2009

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Key Partners

SETI Institute

Kepler
A Search For Habitable Planets

SPITZER
SPACE TELESCOPE

Navigator Program
In Search of New Worlds for NASA's Origins Theme

SPACE TELESCOPE SCIENCE INSTITUTE

NASA ASTROBIOLOGY INSTITUTE

Principal Funders:

NSF
NASA

Association of Science-Technology Centers
The Big Idea

We are on an amazing journey that may answer the age-old question of whether there is life elsewhere in the Universe.

Understanding life on Earth and studying the formation of stars and planets guide our search for habitable worlds beyond Earth.
The Science Behind the Exhibit

Are we alone?

Where did we come from?
Exhibit Areas

A. Our Place in Space
B. Star & Planet Formation
C. Planet Quest
D. Search for Life
Our Place in Space

“Portal on the Universe”
original painting
by Margot Weiss
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The Birth of Stars and Planets

“We humans, and all life on Earth, are intimately connected with the billion-year life cycles of the stars.”

Chris Churchill, astronomer

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Searching for Distant Planets

"Finding another Earth will be the single most exciting moment in all of human history."

Paul Levinson, science fiction writer

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The Search for Life

“There is no question that we live in an inhabited universe that has life all over it.”

George Wald, biologist
Alien Earths Prototypes
Alien Earths Prototypes
“Planet Families”

A solar system is like a family, a group of planets revolving around a star (Moons, comets and meteorites are also part of the family too). These planets form at about the same time from the huge cloud of gas and dust.

The star tries to hold the family together. But planets also pull on each other, sometimes leading to surprising results.

Use the pointing hand to...

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Education Program

- Training for Educators and Docents
- Product Development
- Web Resources
- Public Talks by Scientists
- Networking
MARSQUEST EVALUATION RESULTS
Where we need to improve

• “...we still struggled with how to interpret the exhibit. We struggled with trying to find a fit for our volunteer interpreters in that exhibit. We definitely struggled with trying to find good “wow” type props or activities that a volunteers interpreter can do in a short time.”

• “The suggestion that SSI shift from the traditional professional development workshop model to designing a professional development model that involves continued SSI support and teacher-teacher interaction is a challenge, even daunting. However, the benefits of a more productive professional development model would be far reaching.”
NEW “In-Exhibit” PRODUCTS TO MEET DIVERSE NEEDS

Mars "Placemat"

1-page handout - “teaser” for larger Family Guide - where to go for more

MARSQUEST SCAVENGER HUNT

Rove around to find the answers, just like me - Rocky Rover!

• Touches all main exhibit themes in short time
• Combines focused, interactive experiences with the engaging qualities of an “Easter-egg hunt” - “I found one!”

Short Demos for Docents
GOALS OF A TRAVELING EXHIBIT EDUCATION PROGRAM

• Support host sites in making the most of the exhibit’s presence via their education and outreach programming (e.g. Training, Products, & Networking)

• Extend and interpret exhibit content in a way that links to educational standards and to real-time research results in the science community.

• Devise strategies that help to integrate the exhibit themes and emphasize intended key messages.

• Leave a valuable legacy of capability, resources, and connections whose value is extended beyond the time of the exhibit’s visit. (e.g. New resources, New partners, New sustainable connections with NASA programs)
Alien Earths Floorplan (3,000 sq. ft)

C. Planet Quest

B. Star & Planet Formation

A. Our Place in Space

D. Search for Life
Where are the Distant Worlds?
January

The all-sky map represents the night sky as seen from approximately 35° north latitude at the following times:

9 p.m. standard time on January 1
8 p.m. standard time on January 15
7 p.m. standard time on January 31

To locate stars in the sky, hold the map above your head and orient it so that one of the four direction labels matches the direction you’re facing. The map will then represent what you see in the sky.

- 55 Cancri
- Upsilon Andromeda
- 51 Pegasus
- HD 38259 (Orion)
The Constellation of Orion
Visual Access to Abstract Concepts

- Betelgeuse - red giant
- HD 38529: Sun-like star, 2 planets detected
- Orion's Belt
- Orion Nebula - star forming region
- Bellatrix - blue giant
- Rigel - massive blue giant
WISE Ideas

For example:

- 3-D spacecraft visualization in computer kiosk or something else WISE-specific added to the exhibit itself (e.g. enhance or update the stellar evolution area with more info on perspectives on low-mass stars)
- Send scientists to host sites to give public talks.
- Contribute to the collection of the best resources available related to the exhibit’s content (e.g. specific web-based interactives, specific lesson plans, and so on). These will be linked the AE website & resource CD.
- Support the “Ask-an-Astronomer” plan for museum educators. Provide ideas for FAQs & Gee Whiz Facts.
- Support EPO events associated with exhibit content (e.g. family days, camp-ins, public talks, star parties, etc). Teacher workshops should only be provided to teachers with whom a follow-up connection can be maintained.
- Provide a host site with large quantities of “give-aways” as rewards for participation in educational programming (e.g. post-cards, bookmarks, stickers, with gee-whiz info and leads to more info)
- Visit the shakedown installation at Lawrence Hall of Science. Make observations & provide feedback. Provide new ideas for “in-exhibit” activities. What else?
Threads to Pull in Educational Effort

- **Physical & temporal scales** from microscopic to macroscopic and from human lifetimes to “lifetimes” of stars; Large & small number perspectives for stars & bacteria (most of Earth’s biomass is microbial);

- **Framework to give meaning to “extra-solar”**. Comparative solar systems: Searching for Earth-sized planets in Earth-like orbits around other Suns; Highly eccentric orbits & seasonal changes vs. habitability.

- **Seeing the “unseen”** (e.g. IR imaging through dust, detecting planets by their effects on the parent star, detecting presence of microbes)

- **Inference vs. direct evidence**: e.g. biosignatures in planetary atmospheres

- **Cosmos & me**: Connecting people to their cosmos. How life depends on stellar evolution. How human life depends on microbes. How what Earthlings can see & experience connects to more abstract concepts.

- **What life needs to get started and survive**: right universe, right galaxy, right star (habitable zone), right planet, right ingredients. Physics & chemistry is the same in the Universe (modulo dark matter & energy) - want to know about the biology. Drake equation framework of thought. Habitalility vs. Origins of Life.

- **How we search for life**: Chyba framing
  - In-situ investigations within our Solar System (Mars, Europa…)
  - Biosignatures in planetary atmospheres. Interplay of life & environment
  - Seeking Manifestations of technology (the SETI search)
  - Studies of Life on Earth to inform the search for life