National Aeronautics and Space Administration

NASA

YEAR OF THE SOLAR SYSTEM

Presentation to

Education and Public Outreach Committee of the NASA Advisory Council

Dr. James Green
Director, NASA Planetary Science

February 8, 2011

www.nasa.gov

Planetary Science Division's strategic approach to communications is to raise awareness, build excitement and make connections with the American public and other target audiences on upcoming planetary science activities and discoveries.

"The Year of the Solar System presents a unique opportunity for NASA to raise awareness in a way that allows everyone to better understand our Solar System and consequently planet Earth."

2011 SMD Events

● Launch

JANUARY

13 — NASM
Mars Program Update

FEBRUARY

14 — Stardust NExT
Mars Program Update

23 — Glory Launch ●

MARCH

18 — MESSENGER
Orbit Insertion

18 — New Horizons
Passes Uranus

APRIL

11 — STEREO
Full view of Sun

MAY

14 — JPL/GSFC
Open House

JUNE

14 — Aquarius Launch ●

JULY

13 — DAWN
Arrives at Vesta

AUGUST

5 — Juno Launch ●

SEPTEMBER

8 — GRAIL Launch ●

OCTOBER

14 — NPP Launch ●

NOVEMBER

25 — MSL Launch ●

DECEMBER

14 — SOFIA Highlight

The Environment We Are In

Historic time in planetary science is *now*

- There is a scientific revolution going on in planetary science
- Old theories giving way to new ideas and new knowledge

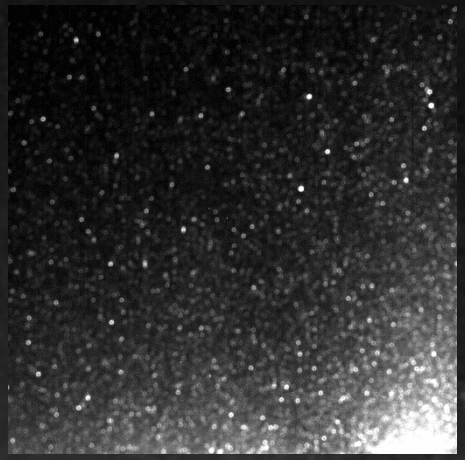
Discoveries are happening almost daily - this is not by accident

- We are reaping the benefits of our technology investments and missions
- NASA's Planetary Division has 16 operating missions and 6 in formulation/development

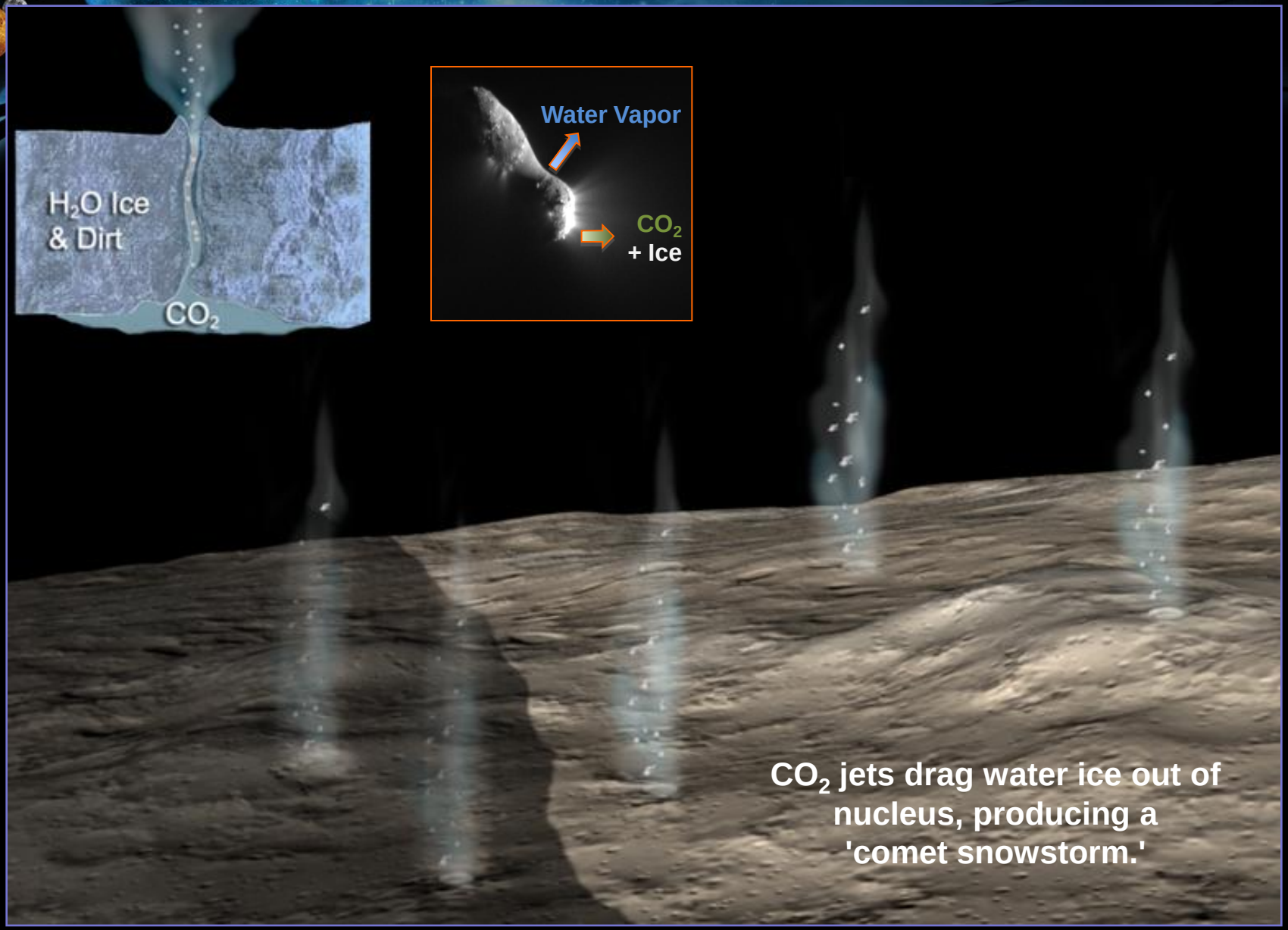
Recent examples:

- Cometary Science: Comet Hartley 2 encounter November 4, 2010
- Astrobiology: A microbe that has substituted Arsenic for Phosphorus in DNA structure. Announcement December 2, 2010

Comet Hartley 2

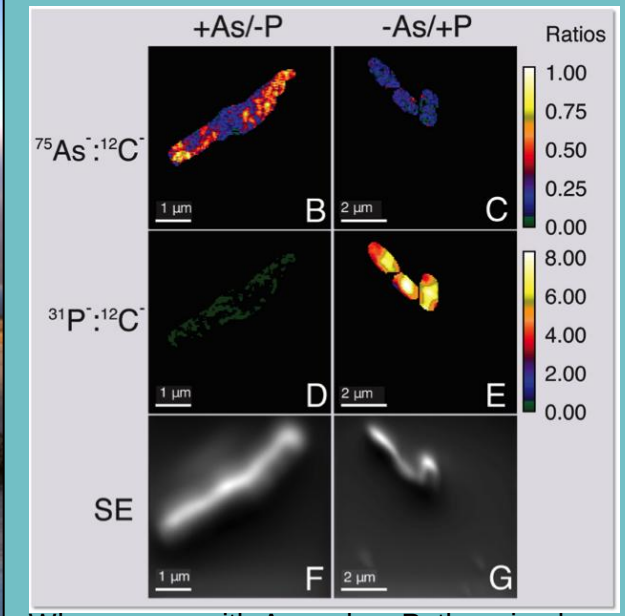


Hartley 2 - Ejection of the Snowballs

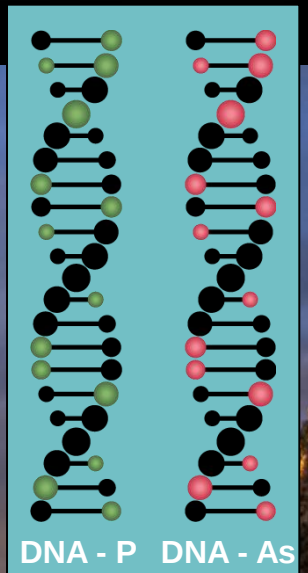


Reconsidering Life on Earth and Beyond
Bacteria That Use Arsenic Instead of Phosphorus

5 B	6 C	7 N	8 O	9 F
13 Al	14 Si	15 P	16 S	17 Cl
31 Ga	32 Ge	33 As	34 Se	35 Br



When grown with As and no P, the microbes had lots of As (panel B), little P (panel D) and was much larger (panel F) compared to cells grown on P and no As (panels C, E, and G, respectively).



This figure shows P in DNA (green, left), and a form of DNA with As replacing P (red, right)

The As-utilizing microbes were isolated from Mono Lake, a harsh environment in California with extremely high levels of As.

Year of the Solar System

So what is the Year of the Solar System all about?

- An organizing construct to better communicate with target audiences
- Raises awareness on current missions and discoveries and builds excitement on what is going to happen next
- Makes connections on “Why People Should Care”
- Web-based catalog of EPO materials

Theme: *New Worlds, New Discoveries*

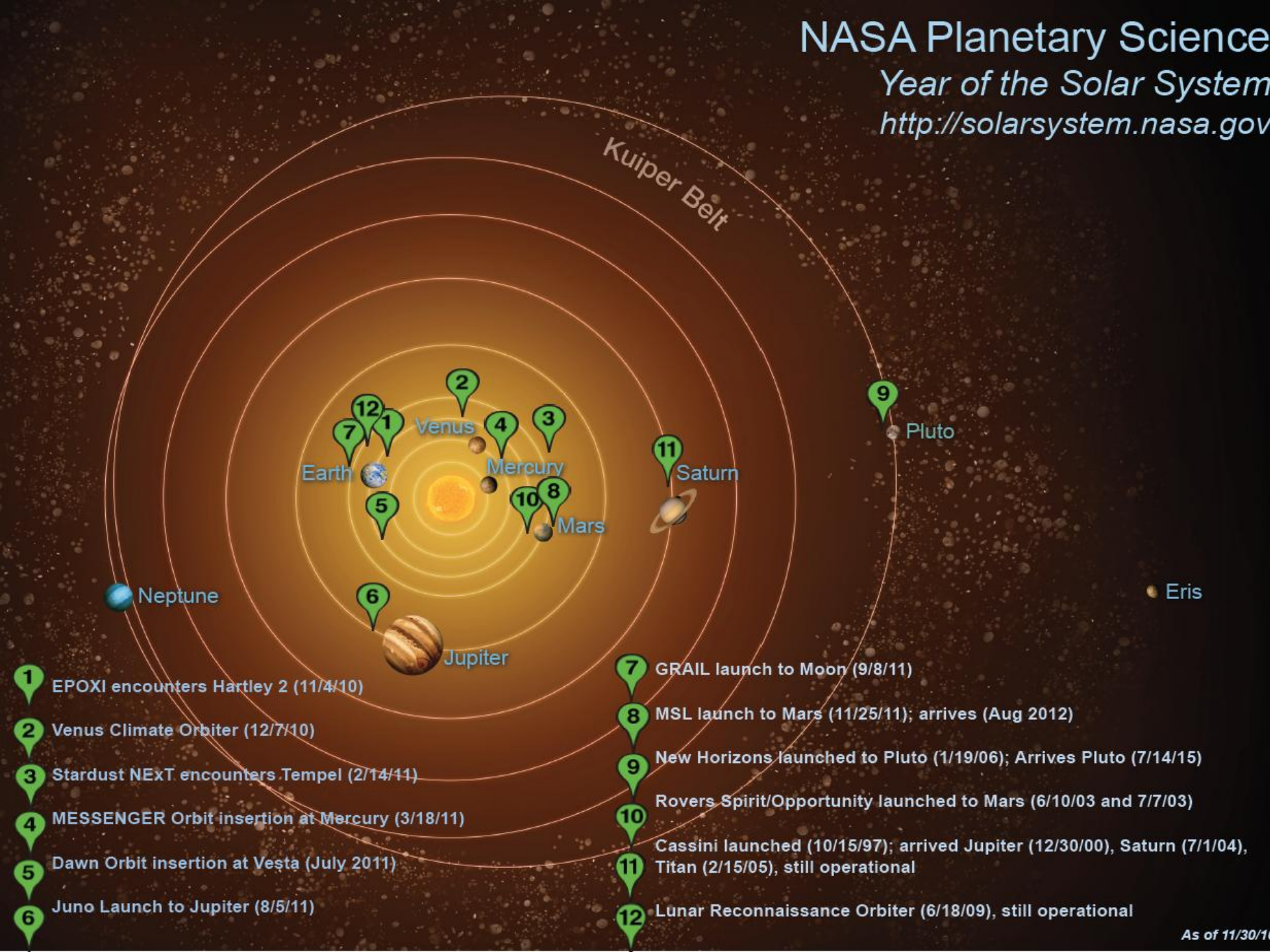
Kick-off: October 2010 through September 2012 (It’s a Martian year)

External Website: solarsystem.nasa.gov

NASA Planetary Science

Year of the Solar System

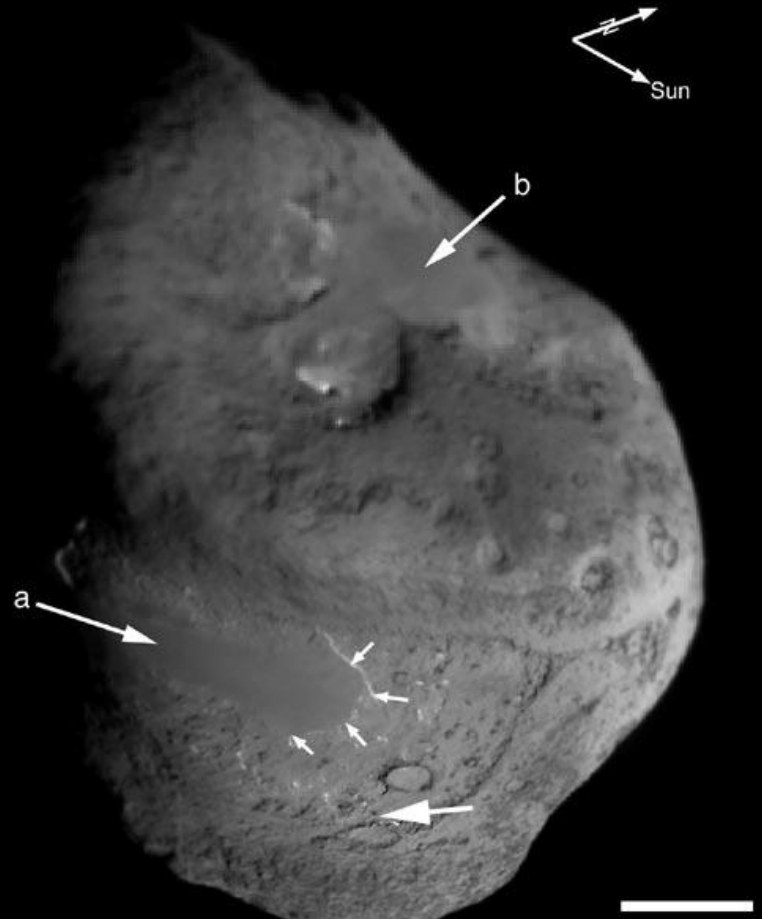
http://solarsystem.nasa.gov

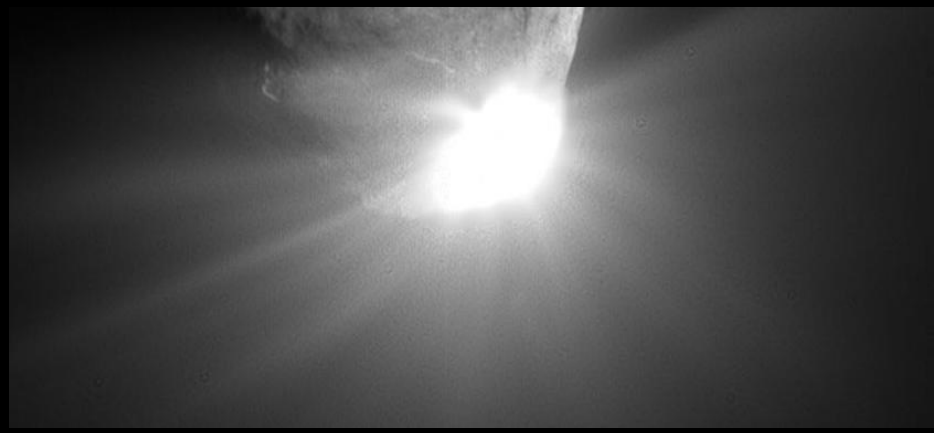


1. EPOXI encounters Hartley 2 (11/4/10)
2. Venus Climate Orbiter (12/7/10)
3. Stardust NExT encounters Tempel (2/14/11)
4. MESSENGER Orbit insertion at Mercury (3/18/11)
5. Dawn Orbit insertion at Vesta (July 2011)
6. Juno Launch to Jupiter (8/5/11)
7. GRAIL launch to Moon (9/8/11)
8. MSL launch to Mars (11/25/11); arrives (Aug 2012)
9. New Horizons launched to Pluto (1/19/06); Arrives Pluto (7/14/15)
10. Rovers Spirit/Opportunity launched to Mars (6/10/03 and 7/7/03)
11. Cassini launched (10/15/97); arrived Jupiter (12/30/00), Saturn (7/1/04), Titan (2/15/05), still operational
12. Lunar Reconnaissance Orbiter (6/18/09), still operational

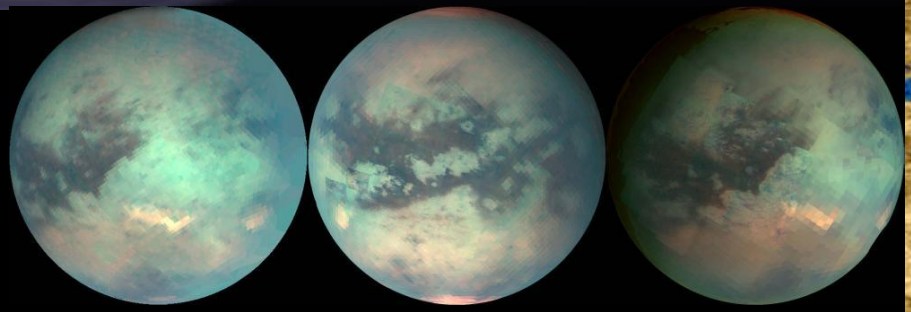
As of 11/30/1

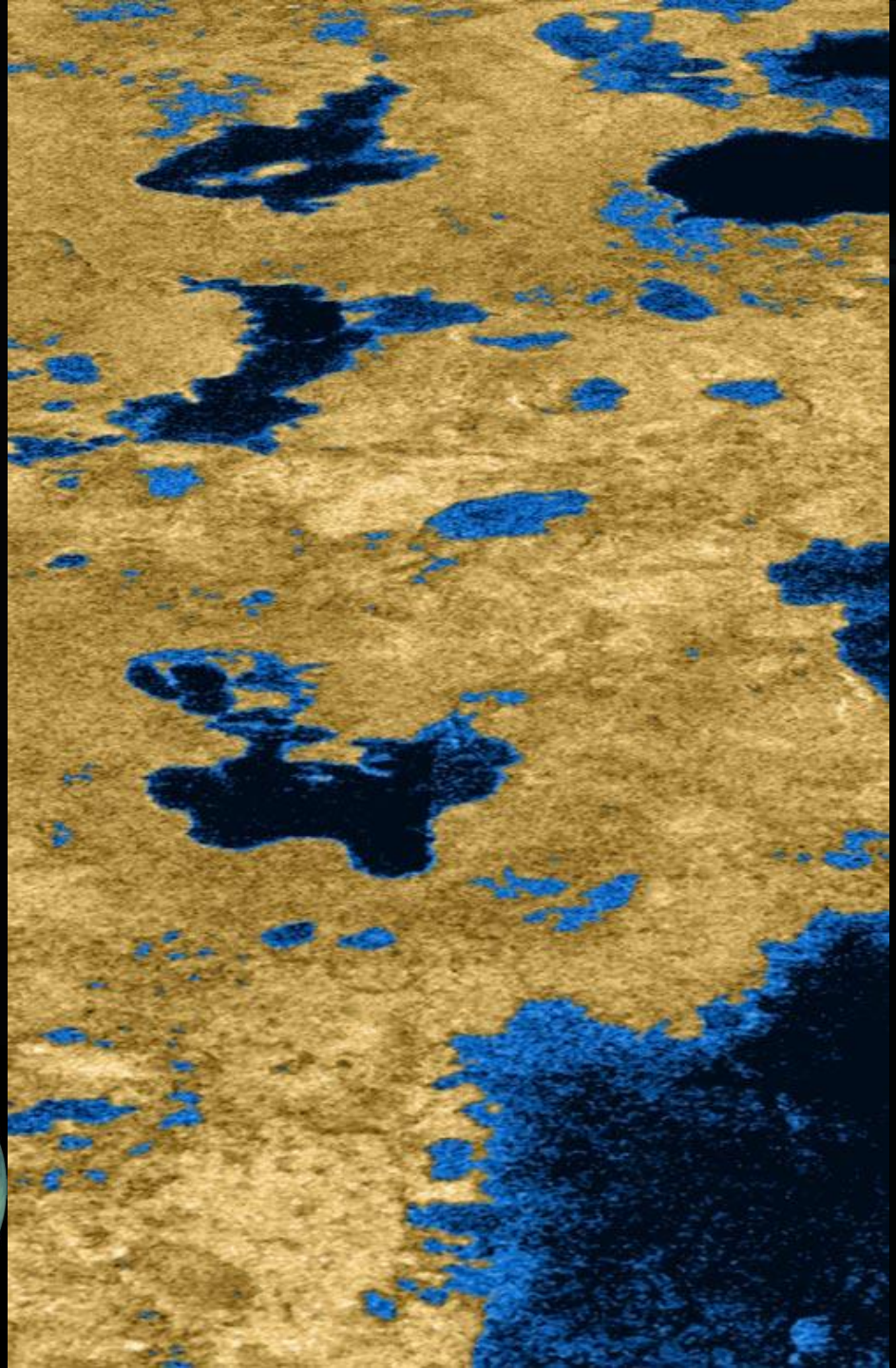
Comet Tempel 1 – Stardust NExT will re-encounter on February 14



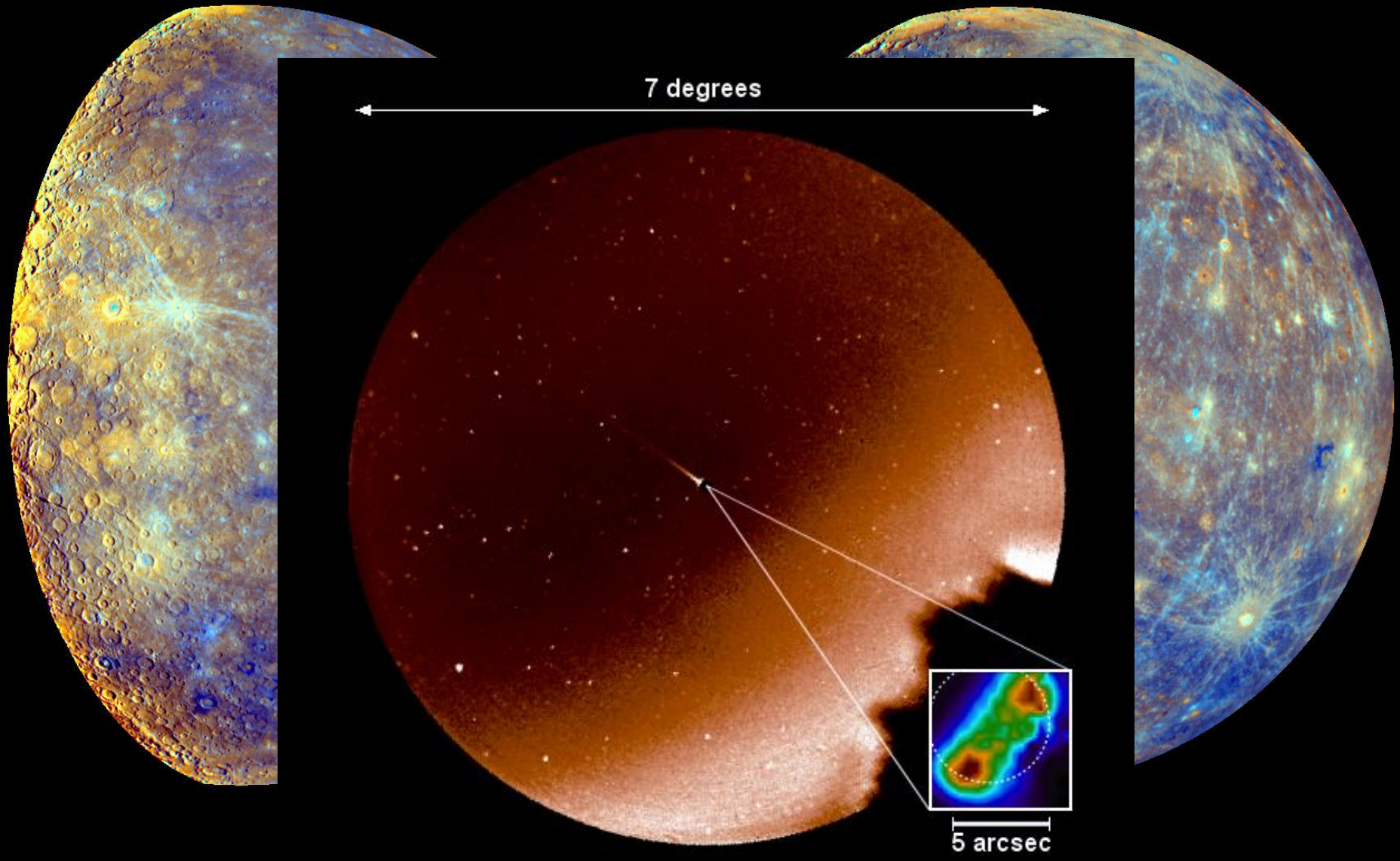


Saturn's Moon Titan





Mercury – MESSENGER March 17



Some Recent EPO Events

2010

***September 16 – LRO transfer to SMD**

- *September 10 -– 25th Anniversary of the First Comet Encounter, Newseum
- *September 18 – International Observe the Moon night
- *September 30 – Opening of Dulles Gateway Gallery
- *October 1 – Year of the Solar System EPO kick-off
- *October 3-8 – DPS, Pasadena CA
- *October 14 – 50th Anniversary of Astrobiology
- *October 23-24 – US Science and Engineering Festival
- *October 26 – Public release of Eyes on the Solar System multimedia web feature
- *October 27 – Library of Congress lecture by A. Davies on Volcanoes

***November 4 - EPOXI encounters Comet Hartley 2**

- *November 4 - TEDxNASA event @ Newport News, VA

*** November 19 - Launch of O/OREOS**

- *November 20 - TEDxYouth NASA event @ VASC and NASA Centers
- *December 2 – Astrobiology Announcement: Arsenic Organism

*** December 7- Venus Climate Orbiter (JAXA) at Venus (failed to get into orbit)**

- *December 7 – Colloquium @ Virginia Air and Space Center
- *December 13-17 – AGU

* Completed
Blue = Mission Events
White = StratComm Events

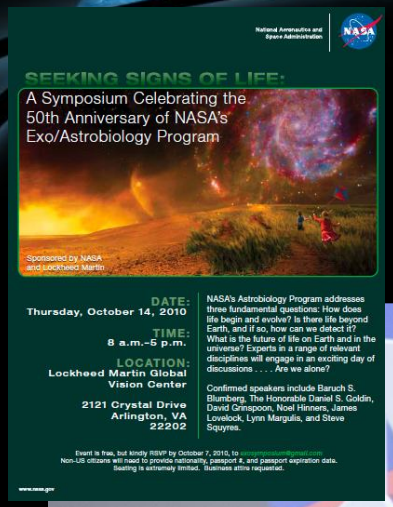
First Comet Encounter Outreach Event

Successful live event on 9/10/2010 at the Newseum, celebrating the 25th anniversary of the first Comet Encounter. Speakers included preeminent scientists in the field:

- Dr. Jim Green, Director, NASA Planetary Science Division
- Dr. Anita Cochran, Assistant Director, McDonald Observatory, The University of Texas at Austin
- Dr. Robert Farquhar, Executive for Space Exploration, KinetX, Inc.
- Dr. Michael A'Hearn, Principal Investigator, EPOXI Comet Encounter mission
- Dr. Joseph Veverka, Principal Investigator, Stardust NExT Comet Encounter mission

http://www.youtube.com/nasatelevision#p/u/201/YOT-Ij6bv9M

Exo/Astrobiology 50th Anniversary Symposium



Seeking Signs of Life: A Symposium Celebrating the 50th Anniversary of NASA's Exobiology Program occurred on Thursday, October 14, 2010, from 9 a.m. – 4 p.m. at the Lockheed Martin Global Vision Center in Arlington, Virginia.

The event was webcast via Livestream on

www.livestream.com/astrobiology50th

As of Feb 7, 2011, over 714,800 viewer minutes, up from 162K right after the event.

Dulles International Airport Gateway Gallery
BEYOND: Visions of our Solar System

Artist Michael Benson, left, talks with Dr. James Green, Director, Planetary Science, NASA Headquarters, as they stand in front of images of Mars during a preview of a photography exhibition at Washington Dulles International Airport, Thursday, Sept. 30, 2010, in Chantilly, Va. NASA and the Metropolitan Washington Airports Authority unveiled the exhibit where ticketed travelers can view space science discoveries and relish the beauty and majesty of our solar system. "NASA presents BEYOND: Visions of our Solar System" will be shown at Dulles' Gateway Gallery through March 31, 2011. Photo Credit: (NASA/Paul E. Alers)

Planetary Science

TEDx NASA
x = independently organized TED event

TED (Technology Entertainment Design) is a global set of conferences formed to disseminate "ideas worth spreading". Since June 2006, the talks have been offered for free viewing online at TED.com.

TEDx is a program that enables schools, businesses, libraries or just groups of friends to enjoy a TED-like experience with TEDx Events they themselves organize, design and host

(Right) Jim Green presented an overview of planetary science, “The Seven Wonders of the Solar System”, at the What Matters Next? TEDxNASA event on November 4 in Newport News, VA.

(Left) Jim Adams presented at the TEDxYouth@NASA event, Be Astronomical - An adventure in STEM and Self-Discovery!, on November 20 in Hampton, VA.

November 20, United Nations Universal Children’s Day, was chosen by the TED organizers to host multiple events for youth across the world in every time zone over this 24-hour period.

Mars Program Update

From "Follow the Water" to "Seeking Signs of Life"

livestream.com/mars and www.youtube.com/nasatelevision

A public forum was held at the National Air and Space Museum (NASM) on January 13, 2011, to evidence of water on Mars, current Mars missions and future Mars activities.

Three panels were moderated by Dr. John Grant (NASM Chair, Center of Earth and Planetary Studies):

1) Follow the Water: What Have We Found?
2) How Do We Do It? Status of Current Missions
3) Seeking Signs of Life: What Will the Future Bring?

Planetary Science Division panelists included Doug McCuistion, Michael Meyer and Mary Voytek. Other panel members included Jack Mustard (Brown University), Steve Squyers (Cornell University), Marcello Coradini (ESA) and Jennifer Eigenbrode (GSFC).

Standing room attendance at the event was over 200, including students from Stuart-Hopson Middle School and the Whittier Education Campus STEM School.

The event was carried live on NASA TV and on Livestream. As of February 7, Livestream reported over 103,900 viewer minutes, up from 22K after the event

Upcoming
Planetary Missions and Events

2011

*January 13 - Mars Program Update @ NASM

February 12-13 – SpaceUp Houston, LPI, Houston, TX

February 13 - Book signing "Jars to the Stars" at NASM

February 20 – AAAS "Meet the Scientist" C. Conley, Washington DC

February 14 - Stardust NExT encounters comet Tempel 1

Early March – Planetary Decadal Survey released

March 7-11 –LPSC, Woodlands, TX

March and April – Decadal Town Halls

March 10-13 – NSTA, San Francisco, CA

March 17 - MESSENGER orbit insertion at Mercury (9:45 pm Eastern)

April 27 – 30 – FIRST Robotics Championship, St. Louis MO

June 29 – 50th Anniversary of Nuclear Space Power

July - Dawn orbit insertion at asteroid Vesta

July TBD – Mars Day @ NASM

August 5 - Juno launch to Jupiter

September 8 - GRAIL launch to the Moon

November 25 - MSL launch to Mars

2012

Mid 2012 -- Mars Opportunity Rover gets to Endeavour Crater

Mid-year -- Dawn leaves Vesta starts on its journey to Ceres

August - MSL lands on Mars

* Completed
Blue = Mission Events
White = StratComm Events

New Worlds, New Discoveries to Be Shared

Planetary science events and discoveries will cast "space" activities in a positive light seen by the public

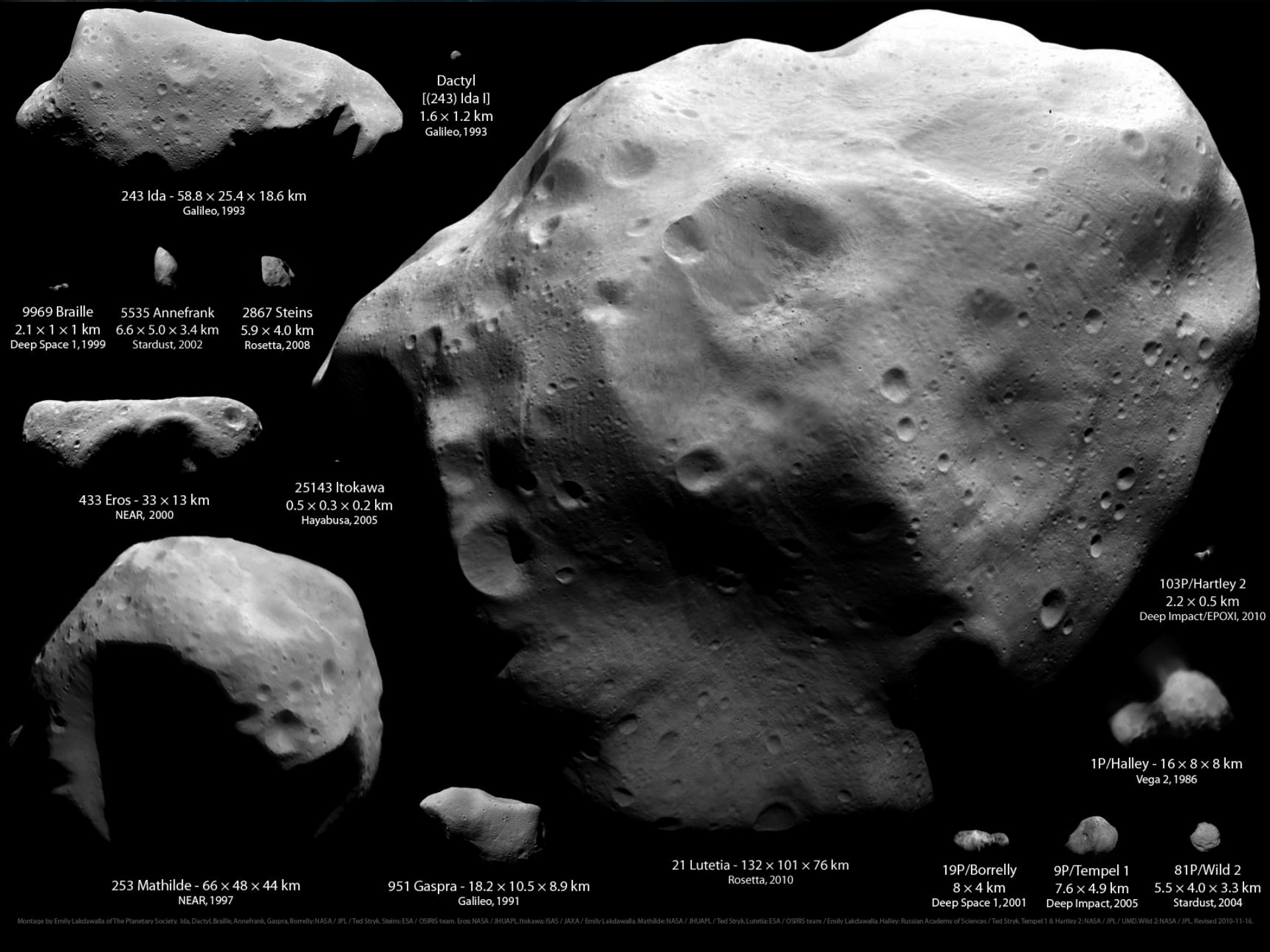
Our previous emphasis has been on Higher Ed and K-12

- Making great progress in these areas

We must learn to talk to the public in a way they can already relate to and go to where they go

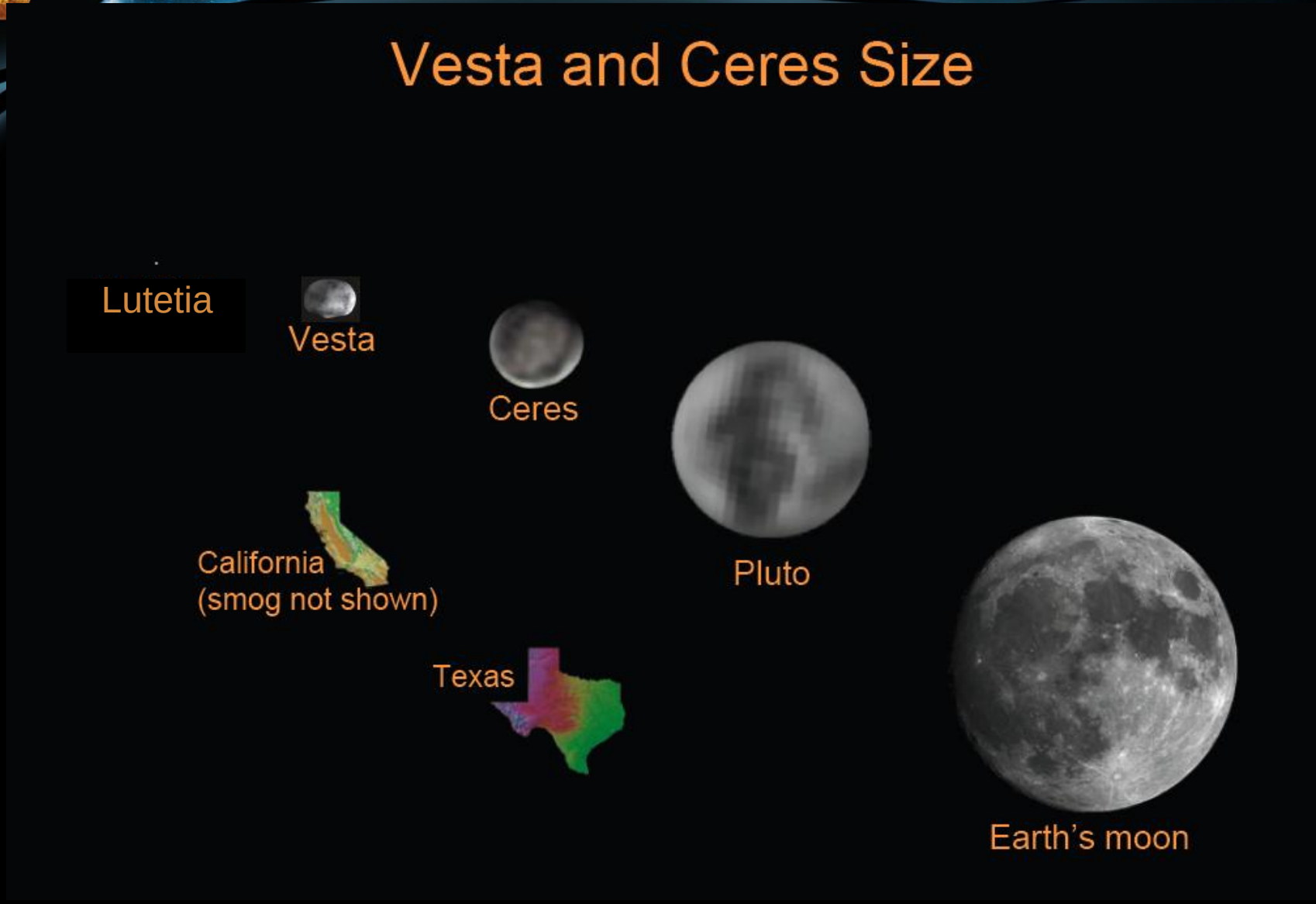
- Museums, science centers, libraries, etc…
- Raise awareness, build excitement, make connections

Some examples are:



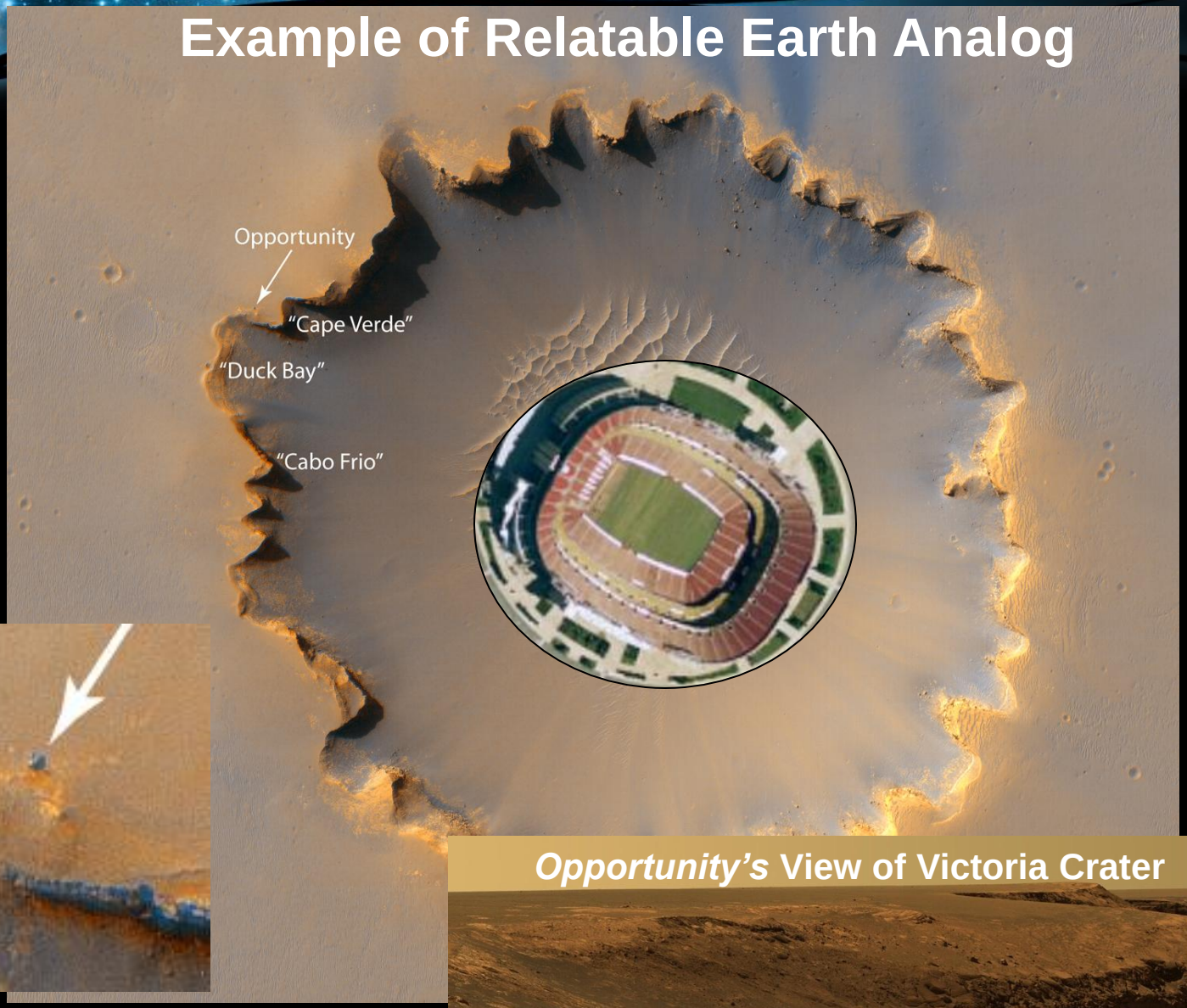
Montage by Emily Lakdawalla of The Planetary Society. Ida, Dactyl, Braille, Annefrank, Gaspra, Borrelly: NASA / JPL / Ted Stryk. Steins: ESA / OSIRIS team. Eros: NASA / JHUAPL. Itokawa: ISAS / JAXA / Emily Lakdawalla. Mathilde: NASA / JHUAPL / Ted Stryk. Lutetia: ESA / OSIRIS team / Emily Lakdawalla. Halley: Russian Academy of Sciences / Ted Stryk. Tempel 1 & Hartley 2: NASA / JPL / UMD. Wild 2: NASA / JPL. Revised 2010-11-16.

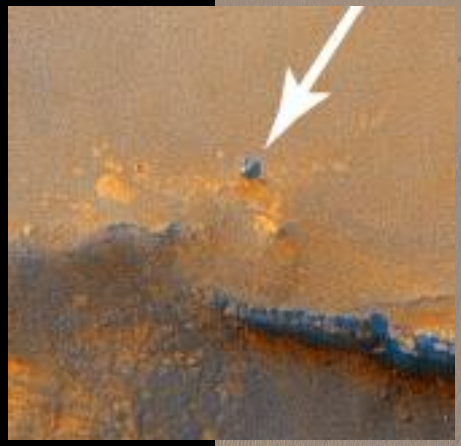
Dawn Gets in Orbit Around Vesta in July



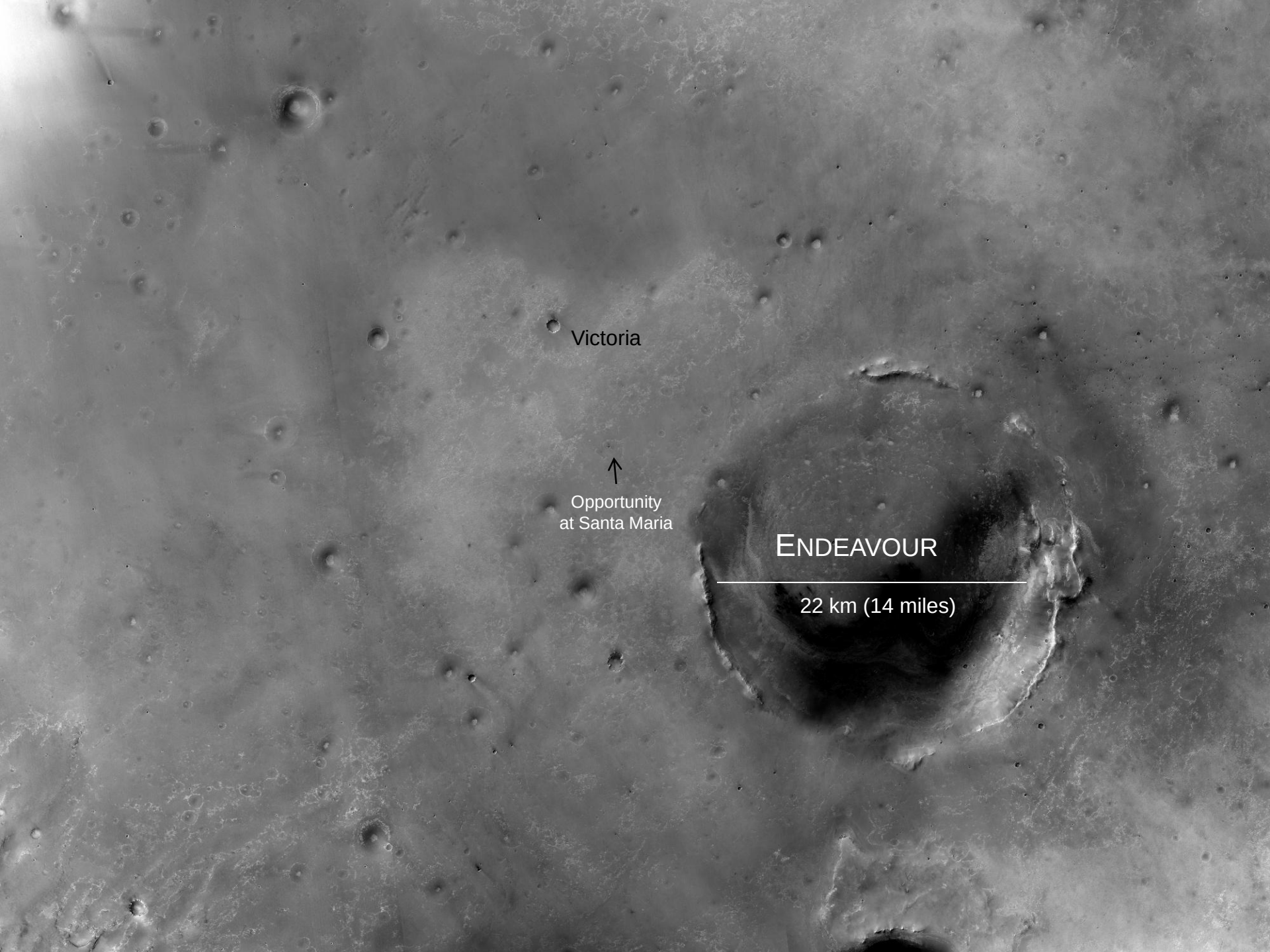
Mars Reconnaissance Orbiter's Image of Victoria Crater and Redskins Stadium

Example of Relatable Earth Analog

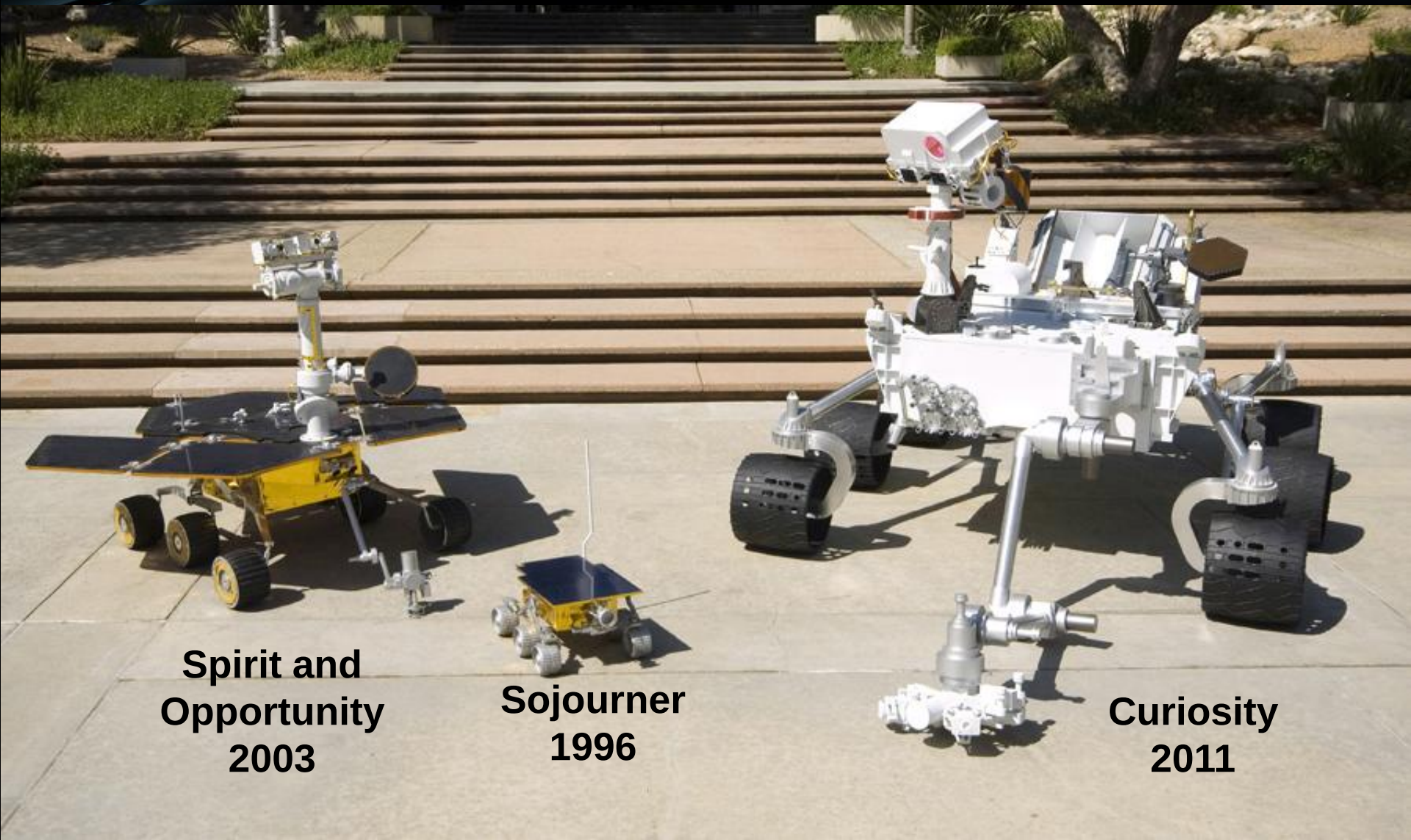




Opportunity's **View of Victoria Crater**


Victoria
Opportunity
at Santa Maria
ENDEAVOUR
22 km (14 miles)

Mars Family of Rovers

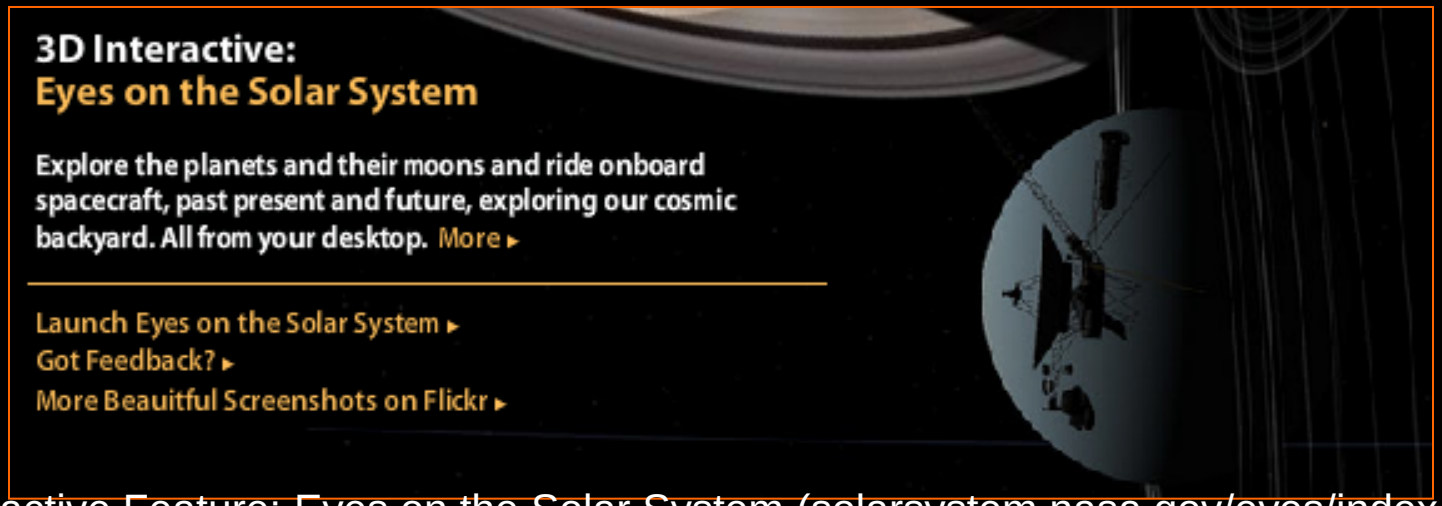


Curiosity Cam - http://www.ustream.tv/nasajpl

Solar System Webpage Updated

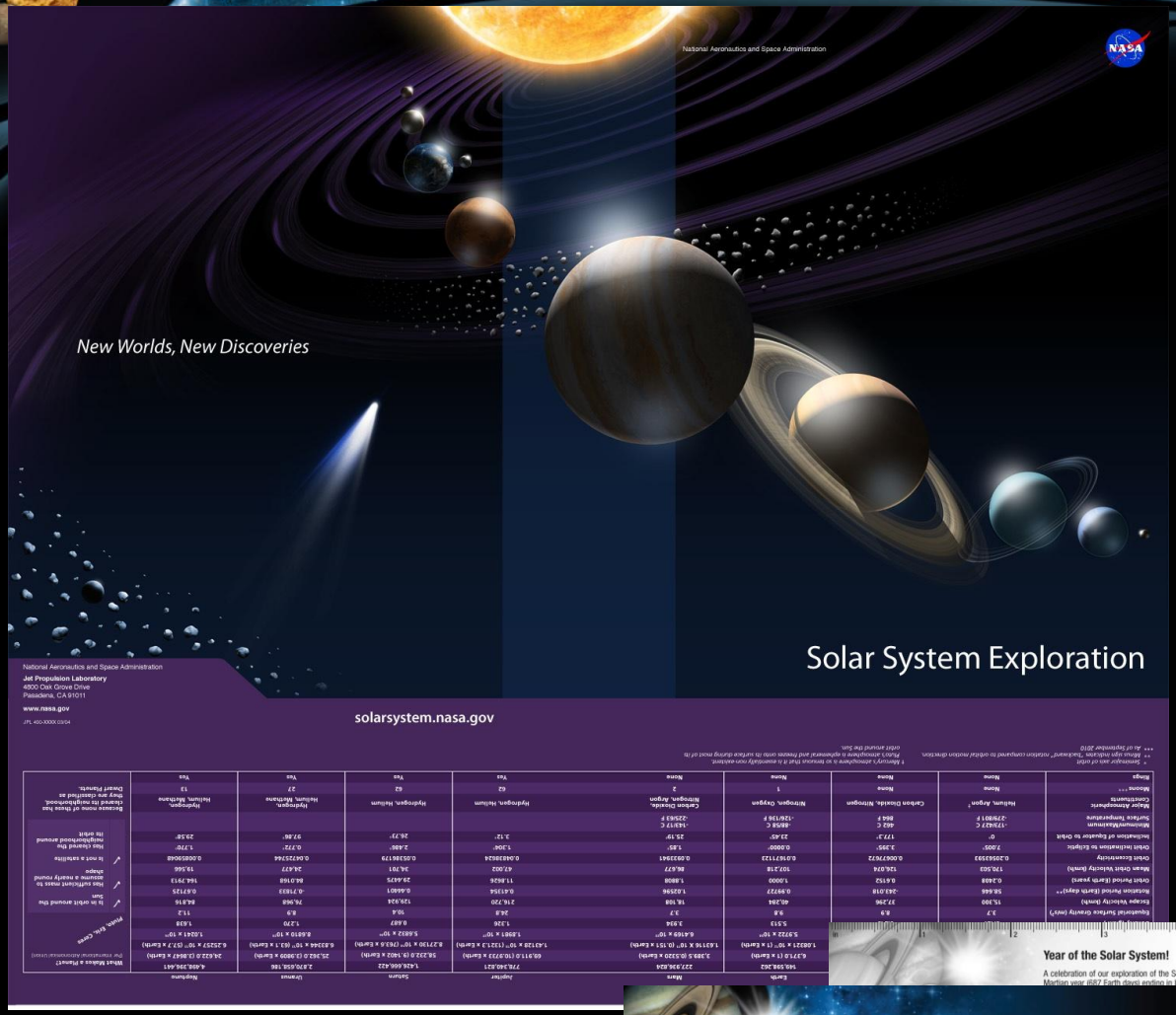
New Solar System Web Features

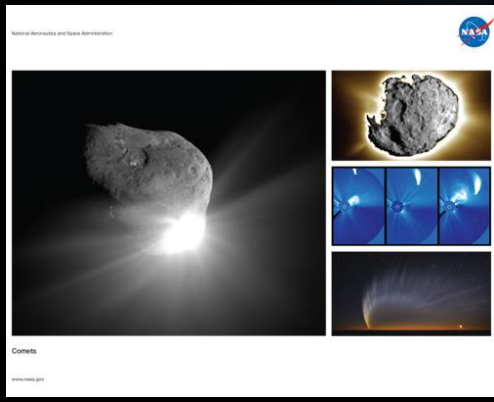
Division Director Column (solarsystem.nasa.gov/news/NWND.cfm)



Interactive Feature: Eyes on the Solar System (solarsystem.nasa.gov/eyes/index.html)

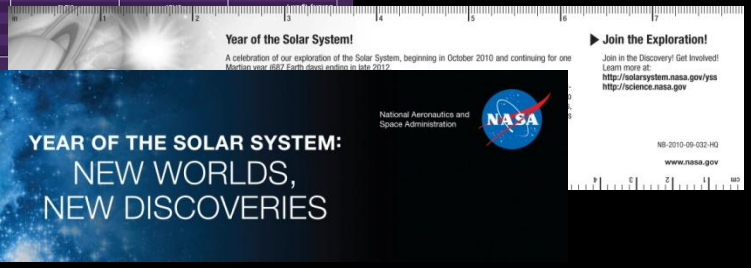
Examples of PSD Communication Materials





In addition to websites:

- Folders
- Bookmarks
- Free, downloadable Materials



PSD Events and Activities Matrix
Map to Metrics and Strategic Goals (to date)

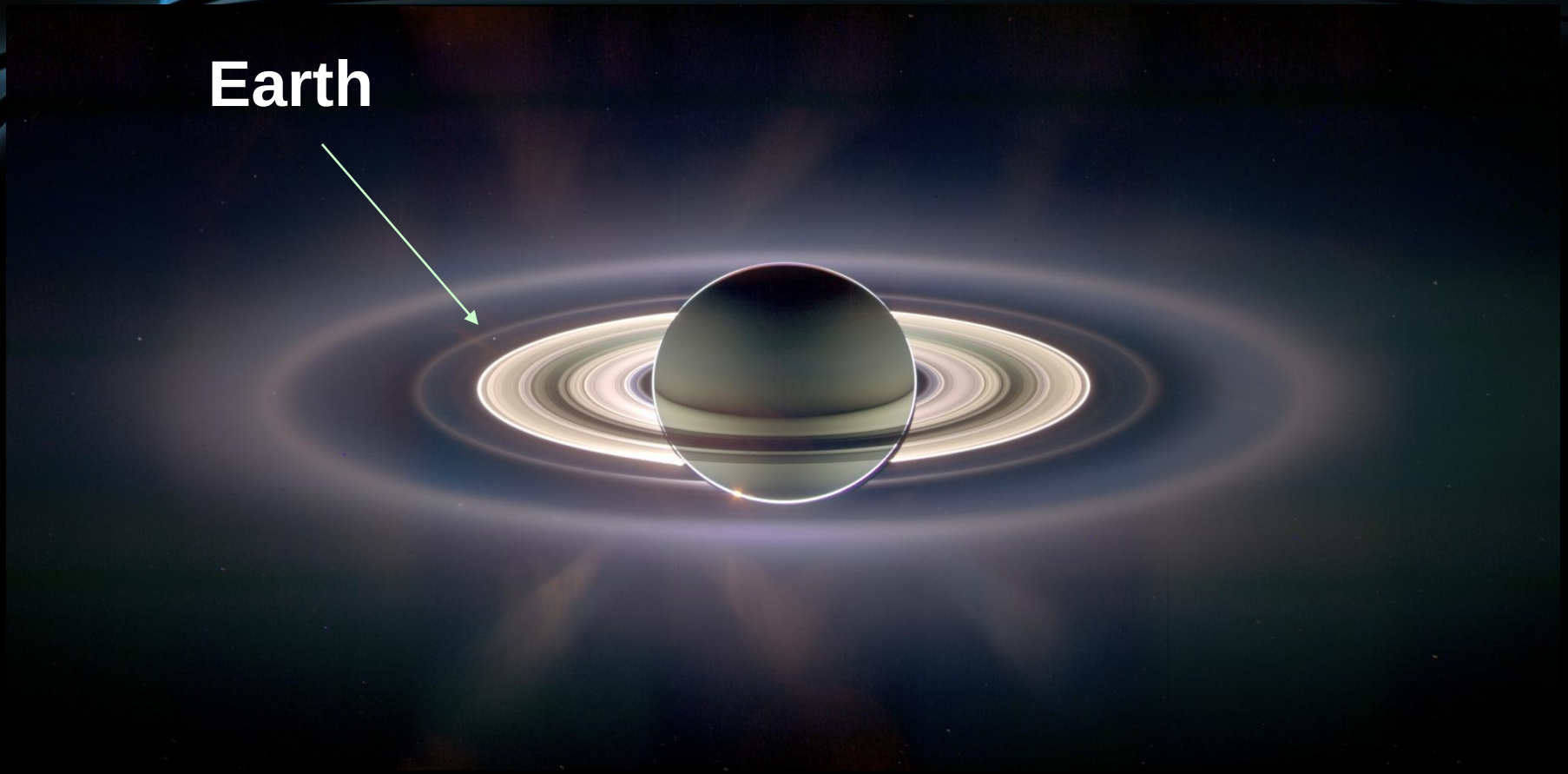
Event	Web Address	Audience	Metrics (as of 02/07/2011)	Relationship to Strategic Goal
PSD Event			TBD, if not shown	
September 10 — 25th Anniversary of the First Comet Encounter, Newseum	http://www.youtube.com/nasatelevision#p/u/201/YOT-Ij6bv9M	General Public, Science Community		6.4
September 18 – International Observe the Moon night	http://observethemoonnight.org/	General Public		6.2, 6.3, 6.4
September 30 – Opening of Dulles Gateway Gallery	http://www.beyondexhibition.net	Dulles Airport Travelers	10,000/day for 8 months	6.3, 6.4
October 1 – Year of the Solar System EPO kick-off	http://solarsystem.nasa.gov/yss	EPO, Scientists, General Public		6.1, 6.2, 6.3, 6.4
October 3-8 – DPS, Pasadena CA	http://dps.aas.org/meetings/2010/	Science Community, Early Career Scientists, Youth		6.1, 6.2,
October 14 – 50th Anniversary of Astrobiology	www.livestream.com/astrobiology50th	General Public, Science Community	714,800 viewer minutes, 140 attendees	6.2, 6.3, 6.4
October 23-24 – US Science and Engineering Festival	http://www.usasciencefestival.org/	General Public	500,000 total attendees	6.1, 6.2, 6.3, 6.4
October 26 – Public release of Eyes on the Solar System multimedia web feature	http://solarsystem.nasa.gov/eyes	Youth, General Public		6.2, 6.3, 6.4
October 27 – Library of Congress lecture by A. Davies on Volcanoes	http://www.loc.gov/today/cyberlc/feature_wdesc.php?rec=5088	General Public	75 attendees	6.4
November 4 - TEDxNASA event @ Newport News, VA	http://www.youtube.com/view_play_list?p=9D5893159145F866	General Public		6.2, 6.3, 6.4
November 20 - TEDxYouth NASA event @ VASC and NASA Centers	http://www.livestream.com/tedxyouthnasa	Youth	56,381 viewer minutes	6.2, 6.3, 6.4
December 2 – Astrobiology Announcement: Arsenic Organism	http://www.nasa.gov/topics/universe/features/astrobiology_toxic_chemical.html	General Public, Science Community		6.4
December 7 – Colloquium @ Virginia Air and Space Center	http://www.archive.org/details/Dr.JamesGreenVascPresentationCaptioned	General Public	350 attendees	6.4
December 13-17 – AGU	http://www.agu.org/meetings/fm10/	Science Community, Early Career Scientists, Youth	19,500 attendees	6.1, 6.2,
January 13 - Mars Program Update @ NASM	www.livestream.com/mars and www.youtube.com/nasatelevision	General Public, Youth	103,900 viewer minutes	6.2, 6.3, 6.4
February 12-13 – SpaceUp Houston, LPI, Houston, TX	http://spaceuphouston.org/	General Public, Young Adults		6.3, 6.4
February 13 - Book signing "Jars to the Stars" at NASM	http://www.nasm.si.edu/events/eventDetail.cfm?eventID=2734	General Public		6.4
February 20 – AAAS "Meet the Scientist" C. Conley, Washington DC	http://www.aaas.org/meetings/2011/program/fsd/	General Public, Science Community		6.4
PSD Activity				
External Communications	http://solarsystem.nasa.gov	General Public	Aver. 400,000 hits/month	6.1, 6.2, 6.3, 6.4
Internal Communications - Planetary Science Division	https://planetaryscience.nasa.gov/web/planetarysciencedivision	PSD Team		
Year of the Solar System	http://solarsystem.nasa.gov/yss	EPO, Scientists, General Public		6.1, 6.2, 6.3, 6.4
Eyes on Solar System Web-Based 3D Interactive	http://solarsystem.nasa.gov/eyes	Youth, General Public		6.2, 6.3, 6.4
Mars Rover - Curiosity Cam	http://www.ustream.tv/nasajpl	General Public	3.3 Million	6.3, 6.4
Executive Communications - Jim Green Column	http://solarsystem.nasa.gov/news/NWND.cfm	General Public, Science Community		6.4
NASA eClips - Solar System	http://www.nasa.gov/audience/foreducators/nasaeclips/search.html?terms="What%20is%20the%20solar%20system"&category=1000&disp=grid and http://www.youtube.com/user/NASAeClips	Youth (K-5), General Public	Aver. 30,000 hits/month for all videos	6.2, 6.4
NASA eClips - Astrobiology	http://www.youtube.com/user/NASAeClips#p/c/D7BEC5371B22BDD9/0/H2xaFLR0	Youth (9-12), General Public	Aver. 30,000 hits/month for all videos	6.2, 6.4

Challenge to Science Community: *Science Isn't Done Until it Shared*

Focused research states that having Scientists & Engineers meet face-to-face with people makes a significant impact on their thinking

Talk to 3 people – Your neighbors, friends, family community groups

- Don't underestimate the power of the "personal connection"
- Why should the public care?

What 3 things do you want the public to know about your mission or planetary activity?

Saturn