



# The EISD Newsletter



February 2016

## FROM THE DIRECTOR

Time seems to be passing very quickly these days. For me, that is usually a function of being busy, and we have been very busy in EISD. I will apologize, up front, for any specific individual or organizational accomplishment that isn't mentioned—if I highlighted them all this small paragraph would instead be large multiple-tens of pages. I am very proud of all of the work that we are doing and the leadership roles each of you are stepping up to.

Our strengths are most often seen when we engage broad sections of the community whether for anomaly investigations, technical integration, or collaborative efforts. When the EVA on January 15, 2016 ended early with Tim Kopra reporting water in his helmet, we were immediately involved and Ellen Ochoa looks to us for the integrated status of not only what happened, but what we are doing to ensure continuous EVA capability for ISS. We are seen as the go-to-guys for bringing different communities together, especially human exploration and science such as with the First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars that was held in late October 2015 directly influencing the Next Orbiter Science Analysis Group (NEX-SAG) formed to assess possible science objectives for the next multi-function next-generation Mars orbiter. We worked hard to make SpaceCom 2015 a successful opportunity to foster dialog across industries interested in space commerce. The event resulted in a total attendance exceeding 1700 (20% from non-aerospace affiliates), 23 countries represented, 37 states represented, more than 60 media representatives from around the world.

We provide excellence in all of our commitments and will continue to gain work and respect because we produce! We have an amazing team of talented employees that I am proud to be associated with. I am proud to have the opportunity to be your Acting Director,

*Eileen*

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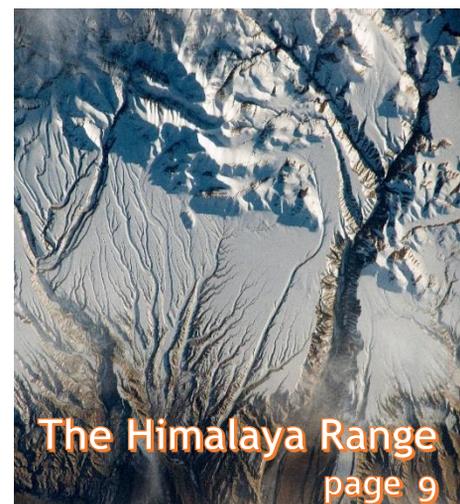
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## Congratulations

### Carl Sagan Memorial Award



Dr. Eileen Stansbery, the 2013 recipient of the Carl Sagan Memorial Award, was recently presented with a physical token of the honor here at JSC by Mr. Mark Craig and Center Director Ellen Ochoa. The honor is a joint award by the American Astronautical Society and The Planetary Society to an individual or group "who has demonstrated leadership in research or policies advancing exploration of the Cosmos."

### 2016 Federal Engineer of the Year, National Society of Professional Engineering

*Christopher Hansen, XX*

### Technical Briefing Award, Inventions and Contributions

*Ryan Whitley, XM*

### Stellar Award Early Career

*Jessie Buffington, XX*

*Sharon Thomas, XB*

### Space Flight Awareness

*Carla Burnett, XB*

### JSC Certificate of Appreciation

*Melissa Higgins, XI4*

### JSC Group Achievement Award

*Earth Science and Remote Sensing Team,*

For redesign of Gateway to Astronaut Photography of Earth website,

XI4 awardees- *Paige Graff, James Heydorn, Melissa Higgins, Janice Lee, William Stefanov, Michael Trenchard, Lisa Vanderbloemen, M. Justin Wilkinson*

*33rd IADC Meeting Organizing Committee,*

For planning and organization of the 33rd meeting of the Inter-Agency Space Debris Coordination (IADC),

XI awardees- *Phillip Anz-Meador, Eric Christiansen, Patricia Garza, J-C Liou, Mia Monroe, Lisa Pace, Debi Shoots, Merrell Skipper, Gene Stansbery*

*JSC Agreements Team*

For outstanding teamwork in establishing agreements in support of Agency mission objectives at JSC ; team members receiving this award were from multiple organizations across JSC

XI awardee- *John Gruener, XP awardee- Elizabeth Blome*

## EISD Technology Showcase

This December, the JSC Chief Technologist Office once again hosted some of the most innovative thinkers from across JSC and WSTF during the fourth annual Technology Showcase. This event provides Principal Investigators a venue to highlight their project developments and visions for NASA. The CTO sponsors the Technology Showcase (formerly known as Annual Tech & Tell Poster Session) to promote CIF and IR&D projects and ICA studies.

JSC's EISD divisions were represented for the second year with activities that complement our theme, "JSC's Technology Pathway to Mars."



Some of the most exciting moments of the Technology Showcase occur during the hour before and after the event when innovators from the engineering and science directorates mingle among the posters and exchange ideas with their peers. This air of collective enthusiasm even captures Senior Staff, members of the JSC Technology Community as well as our local industry partners.



*Center Director Ellen Ochoa discussing project findings with PCIP team.*

Each guest is invited to review projects, talk to Principal Investigators and their teams, then nominate their favorite project for the "People's Choice Award," for projects that best embody the spirit of innovation. Senior Staff members select the project that demonstrates the most potential for impacting JSC missions and future commercialization, advancing the state of the art, and demonstrating the influence of JSC 2.0. This highest level of recognition is known as the "Director's Choice Award."

## NASA: Bring Space to Your Business, Powered by Partnerships - NASA at SpaceCom 2015

In 2014, after nearly two years of discussion with a working group made up of stakeholders across the Houston region, the Greater Houston Convention and Visitors Bureau (GHCVB) hired the National Trade Production team to put together a proposal for a unique annual space conference in Houston. In furtherance of its mission to improve the economy of Houston by attracting conventions, the GHCVB approached JSC about collaborating on the space conference in order to fully capitalize on the third pillar of Houston's showcase industries, aerospace, which is a significant driver of the city's economy. In turn, the conference would provide NASA JSC a platform for its collaboration, innovation, commercialization, and utilization of ISS goals. In that vein, SpaceCom was conceptualized to bring together diverse stakeholders involved in the commercial development and utilization of space, with a focus on the application of space technologies, to revolutionize a broad spectrum of earth-based industries.

### Highlights from SpaceCom 2015

- Attendees representing 37 states and 23 countries, with delegations from the United Kingdom and Italy
- 100+ booths showcasing innovative and collaborative products and services
- More than 50 media representatives from around the world
- Opening remarks from Houston Mayor Annise Parker and JSC Director Ellen Ochoa, who served as the SpaceCom Advisory Board chair, a taped address from Sen. Ted Cruz, and two feeds from astronauts aboard the International Space Station
- First-ever Commercial Spaceport Summit with representatives from 14 international spaceports

SpaceCom was designed to be a catalyst for innovation and growth in the commercial development of space.



It was specifically engineered to highlight ways space technologies cut across five target industries (medical, energy, transportation, communications and advanced manufacturing); showcase examples of how business can exploit LEO and suborbital environments; accelerate the usage of the International Space Station National Laboratory; demonstrate why fostering close collaboration, partnerships and co-development on an international scale is so crucial; offer insights into the who and how to raise money for new ventures; and provide existing space companies access to new customers.

This 3 year collaborative effort to bring SpaceCom to life culminated in the inaugural event on November 17th at the George R. Brown Convention Center. More than 1,700 professionals representing the aerospace, financial, energy, medical, maritime, satellite communications and advanced manufacturing industries registered for the event.



- Keynotes from NASA Administrator Charles Bolden, Virgin Galactic CEO George Whitesides, Satellite Applications Catapult CEO Stuart Martin, Royal Dutch Shell CTO Yuri Sebregts, and author Chris

NASA had two booths at the event, and by far, the largest footprint on the show floor. The Destination Station mobile exhibit was there along with a main exhibit that showcased the technology and partnerships that were being developed by NASA.

In a "one NASA" approach, all of the NASA centers were invited to participate in the exhibit and most were represented at this conference.

Some of the unique items on display included Goddard's Visual Inspection Poseable Invertebrate Robot (VIPIR), Langley's Piezoelectric Energy Harvesters, KSC's Resource Prospector Mission and Regolith Environment Science and Oxygen and Lunar Volatile Extraction (RESOLVE) payload, and WSTF's Composite Overwrapped Pressure Vessel. JSC had many fine contributions to the exhibit as well, including the Extravehicular Mobility Unit (EMU) spacesuit, RFID tag technology, ISS Countermeasures demonstrations, the Orion Backshell Panel, and of course, the Modular Robotic Vehicle (MRV). EISD was well represented with the Evolvable Mars Campaign (EMC) Potential Surface Power Systems information with a mockup of the Small Fission Power System incorporating a cell phone charging station, NASA Extreme Environment Mission Operations (NEEMO) content, and Micro Meteoroid Debris Shield content.



*NASA Astronaut Thomas Marshburn was on hand to sign autographs and lend support to NASA's SpaceCom effort.*

# Asteroid Missions Decoded

*Asteroids are the hottest exploration topic of the moment, yet comprehensive information on asteroid missions is hard to find. The EISD Newsletter is on the case, offering this overview of asteroid missions and EISD's role in each mission.*

## What Are Asteroids?

Did you know that the first asteroid to be discovered was Ceres in 1801, the same planetary body currently under examination by the [Dawn spacecraft](#)? Asteroids are minor planets that are predominantly located in the main asteroid belt situated between the orbits of Mars and Jupiter. However, some asteroids have orbits that take them inside the orbit of Mars and very close to the Earth. An asteroid in this category is referred to as a Near-Earth Asteroid (NEA). Comets can also have orbits that take them well inside the inner Solar System and these are called Near-Earth Comets (NECs).

Sometimes it is hard to tell the difference between an asteroid and a comet (especially if the comet is not surrounded by gas and dust, which gives it a tail). These objects can look very similar to our ground-based telescopes, but can be very different in their physical characteristics.

In this case, any planetary object (comet or asteroid) that comes within 1.3 Astronomical Units (AU) from the Sun is referred to as a Near-Earth Object (NEO). There are no strict sizing rules for what makes an asteroid an asteroid. Ceres is the biggest asteroid in the Solar System and is about the size of Texas. There are asteroids the size of cities and many others as small as houses. Sometimes the label of "meteoroid" (anything less than about 1 meter diameter) is applied.

## Why Are NEOs a Big Deal Now?

We are in an age that brings NEO exploration into the realm of possibilities, making them attractive exploration targets to enhance our understanding of all planetary bodies and the origins of the solar system. EISD's ARES Division curates and studies astromaterials samples from several NEOs - asteroid material from the [Hayabusa mission](#), comet dust from the [Stardust mission](#), as well as meteorites that can be traced to NEO sources. There are also several other missions that are either enroute or about to launch that will return additional NEO samples for EISD to enhance our knowledge base.

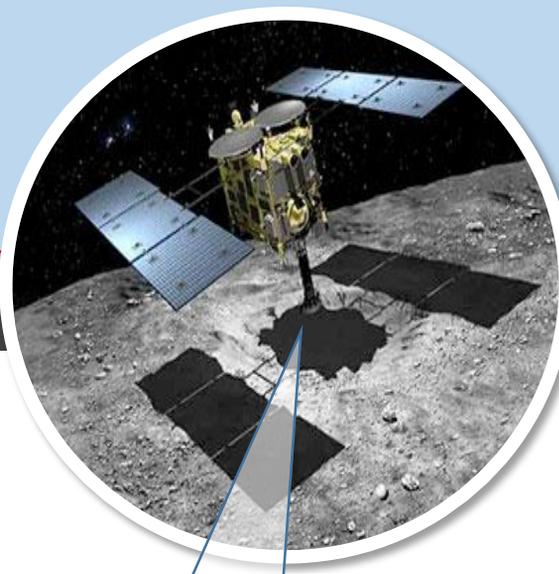
On a more practical level, NEO missions serve as a proving ground for technologies needed for human missions to more distant planets (e.g., Mars) as well as helping us identify deep space environmental dangers for those human explorers. NEO missions also enhance the development of planetary defense capabilities through demonstration of trajectory deflection techniques, which may be required to avert an asteroid impact with the Earth.

## Hayabusa 2

[Hayabusa \(trans. \*Peregrine Falcon\*\) 2](#), a JAXA mission, launched in 2014 and is scheduled to arrive at Asteroid Ryugu in 2018. This asteroid is approximately 1000 meters in diameter is believed to be rich in volatiles or organics.

Hayabusa 2's mission, in addition to remote mapping/sensing, will deliver a lot of bang for the buck, literally. The spacecraft will direct an impactor at the surface to reveal subsurface material for examination. It will also put three hopping rovers on the surface in addition to a lander.

Hayabusa 2 will return three samples of Asteroid Ryugu to Earth in 2020. Samples from this mission will be curated and studied by JAXA and EISD. Several EISD scientists are key Hayabusa 2 team members who've been involved with the mission for several years.



*Hayabusa 2 positioned over Asteroid Ryugu to deploy impactor to create a new crater, revealing subsurface material.*

## OSIRIS-REx

The [Origin's Spectral Interpretation Resource Identification Security Regolith Explorer \(OSIRIS-REx\)](#), perhaps the longest NASA acronym on record, is a NASA New Frontiers mission that will launch in 2016 and arrive at Asteroid Bennu in 2018. Bennu is roughly 500 meters in diameter and is believed to contain materials present when our Solar System was formed. Pristine carbonaceous material at this asteroid make it a galactic time capsule.

After approximately 1.5 years of mapping and sensing, OSIRIS-REx will gradually approach the surface of Bennu and extend a robotic arm to gather sample material. Those samples will return to Earth in 2023 and will be curated and studied by EISD. As with Hayabusa 2, EISD has strong representation on the science team.



*OSIRIS-REx with sample arm extended. Prior to close approach the arrays are put into a Y-config to minimize dust collection that could impede power production.*

## NEA Scout

[Near Earth Asteroid \(NEA\) Scout](#) is a controllable 6U CubeSat that will be deployed during EM-1, the uncrewed Orion/SLS mission slated for 2018. NEA Scout will image a yet-to-be-selected asteroid target in the 1 to 100 meter size range. This imagery will help close the knowledge gap on these smaller NEAs which are difficult to study with remote sensing assets.

## AIDA

The [Asteroid Impact & Deflection Assessment \(AIDA\)](#) is a proposed international collaboration that includes NASA. It will test asteroid deflection by a spacecraft kinetic impact as well as the application of an array of instruments to scientifically characterize the asteroid itself. This mission could launch in 2020 to meet with proposed target Asteroid Didymos during its closest approach in 2022.

## ARM

The Asteroid Redirect Mission (ARM) is the source of a lot of the asteroid buzz. It is a proposed NASA mission comprised of three segments – 1) **Identification:** The application of ground and space-based assets to detect and characterize candidate target asteroids. 2) **Redirection:** A launch in ~2020 of the Asteroid Redirect Robotic Mission (ARRM) to retrieve a boulder from the target asteroid and return it to cis-lunar space. 3) **Exploration:** The launch of a crew via Orion/SLS to rendezvous with that the ARRM spacecraft to study the boulder and return samples of the boulder. This segment is referred to as the Asteroid Redirect Crewed Mission (ARCM).



*A concept for boulder retrieval during ARM.*

*Notional boulder examination and sampling during ARM..*

## ARM is First to Fully Utilize EISD

EISD inherited most of its asteroid mission relationships through the offices that came together to form the directorate. ARM will be the first to have EISD's full suite of talent from the beginning - mission integration, costing studies, mission concept leadership, asteroid target selection, EVA planning, sample curation, and sample studies. And true to its charter, EISD will ensure that ARM is leveraged in all possible ways to lay the groundwork for subsequent missions.

Joe Gard leads the ARM mission concept work in EISD out of the EMPO, building variations of a core ARM concept that can be adapted to proposed broader exploration roadmaps that are under review. For example - he has versions of the mission with a habitation module and also without, and he has variations depending on number of crew. For all

*Continued on page 9*

## Exploration Zone Workshop: A First on Many Levels

The First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars was held in Houston in late October 2015. The key part of the event's title is "Exploration Zone", as this was the first meeting to assess Martian locations as destinations for humans to live, work, and explore, as well as assessing them as landing sites.

The workshop proposed and evaluated potential sites based upon the Evolvable Mars Campaign (EMC) model for exploration which uses a single surface site that will be visited by multiple crews, with pressurized rovers allowing ventures from the base site of ~ 100 km. Scientific criteria for each proposed site were evaluated along with the ability for the locations to sustain explorers for extended periods.

Larry Toups of EMPO and Paul Niles of ARES, helped design the event to address the sustainability aspect, ensuring that workshop membership included mission operations experts, mission architecture engineers, and in-situ resource utilization (ISRU) specialists to supplement planetary science expertise. Organizationally, NASA was broadly represented with participants from JSC center leadership, EISD, HEOMD, SMD, and STMD.

Doug Archer, an EISD member of the Curiosity science team found the event to be groundbreaking in its application of recently acquired knowledge of Mars, "This was exciting because it was the first time we've been able to competently talk about exploration zones.



*Participants of the Workshop  
at the Lunar and Planetary Institute in Houston*

Thanks to the HiRISE camera on the Mars Reconnaissance Orbiter spacecraft, we now have a good idea of what many features look like at the meter scale and have information about slopes, traversability, etc. We also have an indication of compositional information based on orbital spectroscopy from another instrument on MRO."

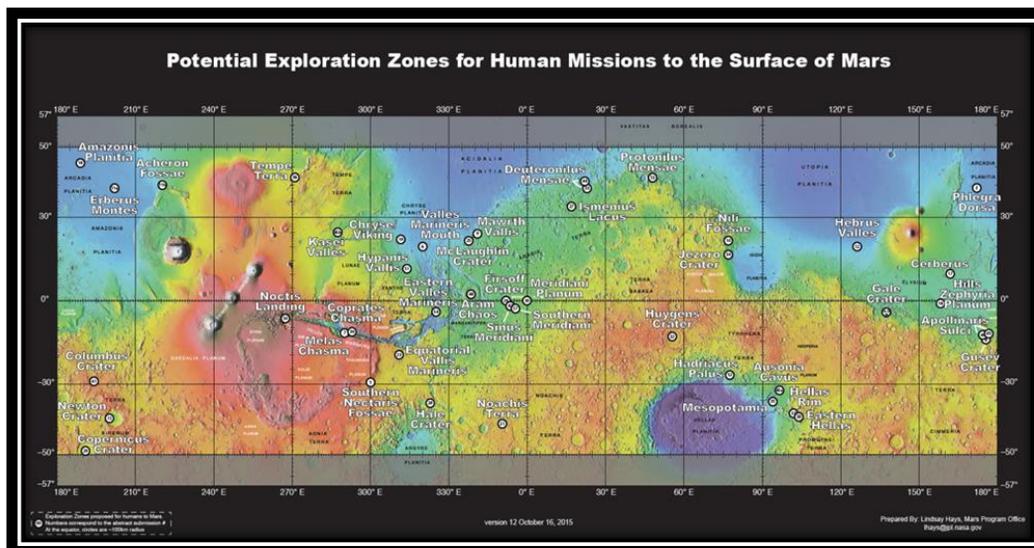
Conference attendees also included experts from the mining industry who shared their perspective about ISRU-related topics.

Those experts noted that while ISRU infrastructural needs for Martian habitation have not been specifically studied within their industry, they feel they can probably be addressed through adaptation of existing resource extraction techniques.

Videos of workshop proceedings are available online:



<https://www.youtube.com/playlist?list=PLQ7WzZtg-qMBAKEHnfoTR3vPtMSnoM-D>



Doug concluded, "There is still much work to do given the reliance upon ISRU for long-term, sustainable exploration, especially the ability to extract the most basic resource, H<sub>2</sub>O, but this forum got the right mix of people together to identify and discuss the issue. Now we just need to get to work solving the problem."

Locations evaluated by the workshop can be viewed on sizable map at <http://www.nasa.gov/sites/default/files/atoms/files/exploration-zone-map-v10.pdf>

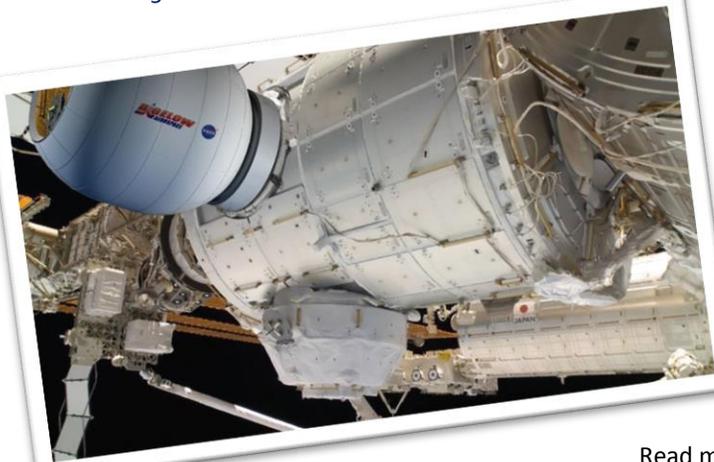
## Latest with BEAM



*Photo of BEAM work at KSC SSPF*

The Bigelow Expandable Activity Module (BEAM) is an expandable habitat technology demonstration on the International Space Station (ISS) scheduled to launch on the eighth SpaceX Commercial Resupply Service mission (SpX-8). After being attached to the Tranquility Node using the station's robotic Canadarm2, it will be filled with air to expand it for a two-year test period in which astronauts aboard the space station will conduct a series of tests to validate overall performance and capability of expandable habitats.

The BEAM Project completed ground processing and integration of the BEAM at the KSC Space Station Processing Facility and the SpaceX Payload Processing Facility in the Cape Canaveral Air Force Station. Over 11 days, NASA, Bigelow Aerospace, SpaceX and Boeing personnel completed grapple fixture modifications, contamination inspections, microbial sampling, electrical and sensor checkouts, filling and leak checks of all 8 internal air tanks, installation of NASA Standard Initiators in restraint strap pyro cutters and of passive Flight Support Equipment (FSE) trunnions (interface with active FSE in Dragon Trunk), final photogrammetry of the flight-ready BEAM, common berthing mechanism seal inspections, and integration with the Dragon Trunk.



*Graphics of BEAM on ISS Node 3*



*Photo of BEAM in Dragon Trunk (red circle indicates failed actuator)*

After the successful ground processing of the BEAM payload and integration into the Dragon Trunk at the SpaceX Payload Processing Facility in November, SpaceX discovered corrosion on their FSE that latches BEAM into the Trunk. When SpaceX opened three of the six latches for corrosion cleaning, one of the actuators failed, breaking the piston rod end. Post failure inspection revealed cracks at the base of threads machined into the piston rod end of the failed actuator as well as two other actuators. SpaceX quickly redesigned the FSE actuators with stainless steel replacing aluminum in the pistons, improved rod end threading, and modified actuation to increase piston backpressure for slower opening.

In parallel, SpaceX is performing a root cause analysis and estimating/bounding shock loads that BEAM may have experienced during the actuator failure. Initial inspection indicated no debris struck BEAM. Bigelow Aerospace and JSC/ES personnel then completed de-integration from the trunk and inspection the last week of December.

BEAM is ready for re-integration with the Trunk as soon as SpaceX completes acceptance and qualification testing of the new FSE actuators to support the SpX-8 launch. Launch is currently scheduled no earlier than late February or March, followed by inflation and crew ingress beginning the 2-year mission on Node 3.

Read more about BEAM and the Mission Highlights here:

<http://www.nasa.gov/content/bigelow-expandable-activity-module>

## ARES Rocks!

On November 13, the Astromaterials Research and Exploration Science Division (ARES) hosted an open house for EISD. The event, designated ARES Rocks!, focused on the division's role as caretaker of the nation's astromaterial collections and its leadership in planetary research.



*Doug Archer provides an overview of the Mars, Moon, Meteorites Evolved Gas Analysis (M<sub>3</sub>EGA) Lab and his work as member of the Curiosity science team.*

Lab tours showcased ARES scientists who provided insights into research and mission support. Several tour stops included hands-on demonstrations, which complemented special displays in the Building 31 lobby that included astromaterials from the Moon, Mars and Vesta, as well as astronaut tools for conducting surface exploration and sampling.

One of the realities of an ARES open house is the impracticality of suiting up every visitor for suited tours of curation facilities. As an alternative, a special drawing was held for four suited tour slots in the Lunar Curation Lab.

Entrance into the drawing required visitors to successfully complete a scavenger hunt for exploration trivia sprinkled throughout the open house. ARES is hoping to hold a similar event next year that is open to all of JSC.

See you there!



*Bridget McInturff, left, explains the astromaterials display while Ann Kascak (back) demonstrates sample handling with a vintage lunar glovebox.*



SpaceX CEO Elon Musk sadly didn't make it to the Open House, but did visit ARES on January 11. Here he holds an Apollo 11 sample at the Lunar Curation Lab with Mars Curator Francis McCubbin (left) and Lunar Curator Ryan Zeigler (right).



*Daniel Zapata, an LD/Program Analyst based in X14 was one of four open house attendees to win a suited Lunar Curation Lab tour.*



During survival training Cindy Evans (near rafters) practices the use of prusik knots in the unlikely case that a crevasse rescue is necessary.

## ANSMET 2015-16 Field Season Status

Cindy Evans of ARES spent the holidays collecting meteorites in Antarctica. Cindy is one of eight members of the 2015-16 Antarctic Search for Meteorite (ANSMET) expedition. The team blog <http://caslabs.case.edu/ansmet/> reveals that they have been very successful with meteorite collection which will continue through January.

Cindy Evans (right) and tent-mate Ellen Crapster-Pregont.



## ARM First to Fully Utilize EISD *Continued from page 5*

of the concepts, Joe ensures adaptability to accommodate ARM evolution as well as serve future missions.

"We don't want any component or technique to be unique to ARM. We want our spacecraft elements, equipment, and mission techniques to be adaptable to future missions, so that ARM serves as a proving ground for human exploration as well as an opportunity to gain more insight into asteroids."

"This is especially important for the EVA concepts that I work with Jesse Buffington of EMO, so that we have an efficient, therefore affordable, suit and tool inventory."

EISD's Paul Abell and Marc Fries supported ARM's Formulation Assessment and Support Team (FAST), a two month NASA effort to address high-priority questions posed by the ARM engineering team that will help fine tune mission requirements. FAST also developed a set of candidate scientific investigations in the areas planetary science, planetary defense, astroidal resources, in-situ resource utilization (ISRU), and capability/technology demonstrations.

In addition to ensuring exploitation of ARM as a proving ground, Paul, who also serves as ARM Deputy Investigator, ensures we are looking at an even bigger picture, "Asteroid targets under consideration for ARM can help us understand how astrobiological and H<sub>2</sub>O materials may have come to Earth and influenced its evolution."

Acting director Eileen Stansbery notes that collectively, EISD expertise will be key to ARM development and it will be a building block for our support to future planetary missions, "Having the combination of all of these functions within a single organization; taking these areas of expertise and molding exploration ideas and plans; having employees working together that are fluent in three different languages: engineering, operations, and science; provides a unique strength to paint a complete picture of exploration using the entire palette."

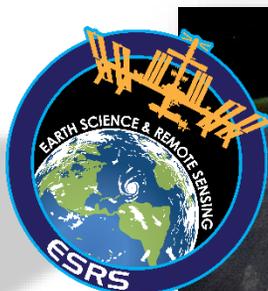
## ISS Top 15 Earth Images of 2015

EISD's Earth Sciences and Remote Sensing (ESRS) team released its final picks for 2015's top fifteen images of Earth captured by ISS astronauts with handheld cameras. The breathtaking selections generated a healthy dose of media interest as seen at this popular news site:

[http://www.huffingtonpost.com/entry/nasa-earth-photos-](http://www.huffingtonpost.com/entry/nasa-earth-photos-2015_56840ad8e4b0b958f65af56b)

[2015\\_56840ad8e4b0b958f65af56b](http://www.huffingtonpost.com/entry/nasa-earth-photos-2015_56840ad8e4b0b958f65af56b). Our newsletter cover features pick number six, an oblique view of the Himalaya range in China near the Indian border. Featured here is pick number 15 with a view looking North across Pakistan's Indus River valley. Security lights (orange tone) mark the border between Pakistan and India, making it one of the few places on Earth that a political boundary can be seen at night.

The India-Pakistan border at night (orange line of lights). ESRS just released its new logo.



## Upcoming Events

**CDR for Space Debris Sensor (SDS)**  
February 5

**ESM CDR Kickoff**  
February 6

**UN Committee on the Peaceful Uses of Outer Space (COPUOS)**  
Vienna, Austria  
February 15-25

**Inter-Agency Space Debris Coordination Committee (IADC)**  
Oxford, UK  
February 29-March 4

**Lunar and Planetary Science Conference (LPSC)**  
The Woodlands, TX  
March 21-25

## 2015 Technology Showcase Awardees

### People's Choice Winner:

Catherine McLeod – RadWorks Project / ISS REM-to-BIRD-to-HERA

### People's Choice Runner-Up:

Aaron Burton – Biomolecule Sequencer: A 2x2015 Class-1E project

### Senior Staff Director's Choice Award Winner:

Andrea Hanson – Mini Biometric Sensor with Health Risk Assessment

### Senior Staff Director's Choice Runner-Up:

Jonathan Rogers – RoboGlove: Initial Work Toward a Robotically Assisted EVA Glove



PIs are able to share project information and even demonstrate how some work.

## Announcements



Henry Jaasma models his "Space Trash" costume. Henry is a member of a Houston robotics team with other third and fourth graders, whose latest competition is focusing on the reduction, reuse, and recycling of various types of trash. His team chose "space trash" as their theme, with Henry's costume serving the showmanship element. Jack Bacon, representing the Orbital Debris Program Office, will be visiting with the team to inspire their work.



This full moon stamp will be issued at the price of \$1.20 and can be used to mail a one-ounce letter to any country to which First-Class Mail International service is available.



New 2016 stamps include an image of Pluto and the New Horizons spacecraft. The Pluto stamps are of special significance to NASA and the New Horizons team, which placed a 29-cent 1991 "Pluto: Not Yet Explored" stamp on board the spacecraft. Check out the backstory: <http://www.nasa.gov/feature/postal-service-honors-nasa-planetary-discoveries-with-2016-stamps>



EISD welcomes new members of the exploration family, Emerson and Eliana, born on December 15, 2015 to Aja and Philip Harris. Philip supports the Exploration Development and Integration Office.

Have a newsletter idea or suggestion?

Email [wendy.l.watkins@nasa.gov](mailto:wendy.l.watkins@nasa.gov)

To view past EISD Newsletters:

[August 2015](#) [October 2015](#)