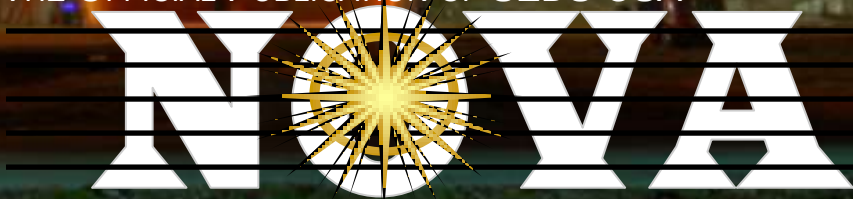


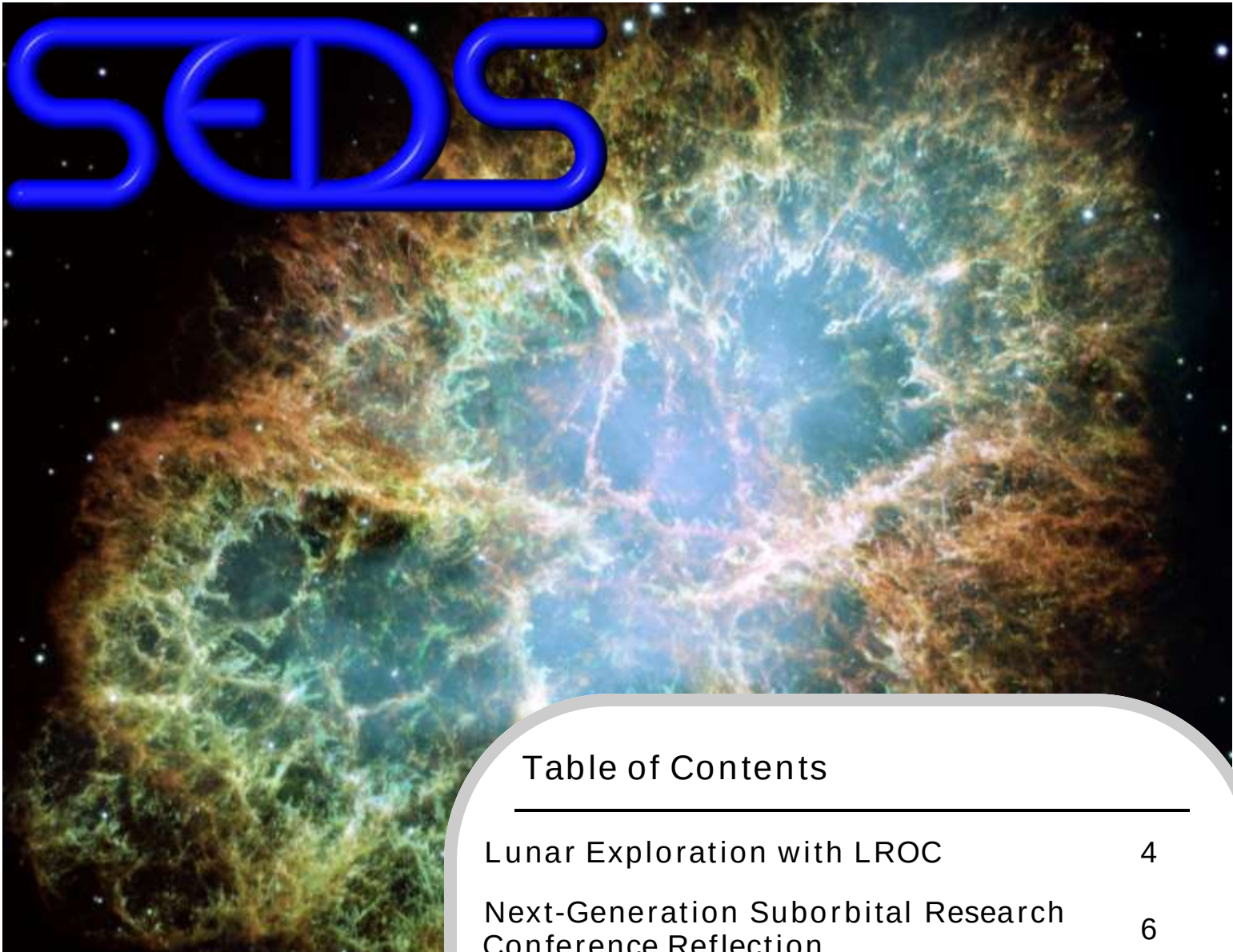
SEDS

1st Quarter 2010



THE OFFICIAL PUBLICATION OF SEDS-USA





Front Page: Falcon 9, a product of years of research and development by the dedicated team at SpaceX, stands tall on the pad preparing for its inaugural launch. Image credit: SpaceX

*Above: The majestic supernova remnant the Crab Nebula. Discovered by French astronomer **Charles Messier**, it's documented as M1, the first item in the well known Messier Catalog, hosted in part by SEDS.*

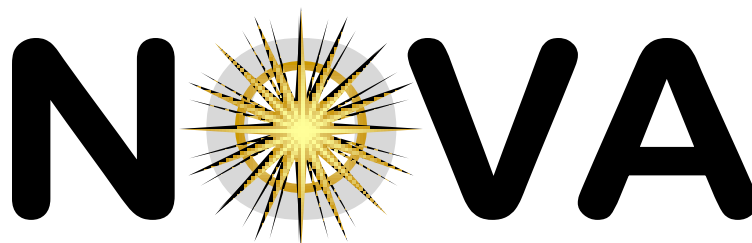


Image credit:
NASA



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Fellow space enthusiasts,

President Obama's proposed NASA budget has generated unprecedented debate within the space industry. In recent history, no space policy decision has generated a similar level of discussion and debate. This controversy represents an unprecedented opportunity for student organizations to reach out to their communities.

In response to the budget, SEDS chapters across the country organized debates and informational panels at their local universities. These sessions serve to educate SEDS members, industry professionals, and members of the general public about what this budget will mean for space exploration if passed. Armed with this knowledge, attendees can now make an informed decision to support or oppose the new budget.

I would encourage every SEDS chapter to arrange a similar budget debate at your local school. These events can give you positive exposure in your home department and university community. The public is bombarded with interest groups making sweeping statements about the budget. Informed, balanced debates hosted by student organizations with no vested interests can attract a sizeable audience and have a significant impact!

Outside the budget front, SEDS National is working to restore connections between SEDS-USA and our sister organizations across the world. In the coming months, look for NOVA exchange articles written by our colleagues in UKSEDS and other countries. Students frequently criticize our governments for not working closer with other countries in space exploration. It is therefore appropriate SEDS set an example by working closely with our international siblings.

The National Space Society national conference, ISDC 2010, is quickly approaching. As with last year, SEDS is working with NSS to provide unique opportunities for SEDS members at the conference such as private speaker sessions, networking events, and more! The time to start planning your chapter's trip to ISDC is NOW! With a \$40 student registration rate, and rooms for \$115 or less a night (regardless the number of students you cram in the room), this is an affordable, educational opportunity for your chapter. More info at <http://isdc.nss.org/2010/>

Clear skies,

Joshua V. Nelson

Chairman, SEDS-USA Board of Directors



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Lunar Exploration with LROC

By: Frank Centinello, fjcent3@mit.edu, with assistance from the LROC staff: Joe Barnett, Kristen Paris, Veronica Anne Zabala-Aliberto

It is 5 am at your apartment. A cell phone is blaring that it just received a text message. Not *your* cell phone, but the phone you're required to carry because you are on the Lunar Reconnaissance Orbiter Camera (LROC) operations team. The LROC phone is alerting you that one of LROC's computers at the science operations center (SOC), has just crashed. Your day on operations is starting much earlier than you had hoped.

By 5:15, you're sitting on console, looking at telemetry coming down from the battery of cameras that make up LROC: two narrow-angle cameras (NACs), and a wide-angle camera (WAC). The temperatures, voltages, currents, and storage space left on the orbiter are nominal, so you turn your attention to your ground-based computer problems. Just then, LROC's principal investigator, Mark Robinson, calls to let you know he got the same text you did, and is on his way into work.

This is often how a day of operations began for LROC personnel during the commissioning phase of the mission, which lasted for sixty days, starting on June 18, 2009, with the launch of the Lunar Reconnaissance Orbiter (LRO). As a former member of the LROC operations team, I can say that adrenaline kicks in from various aspects of working on a space mission: the spirit of your coworkers, the thrill of discovery, and the intensity of working with a spacecraft, to name a few.

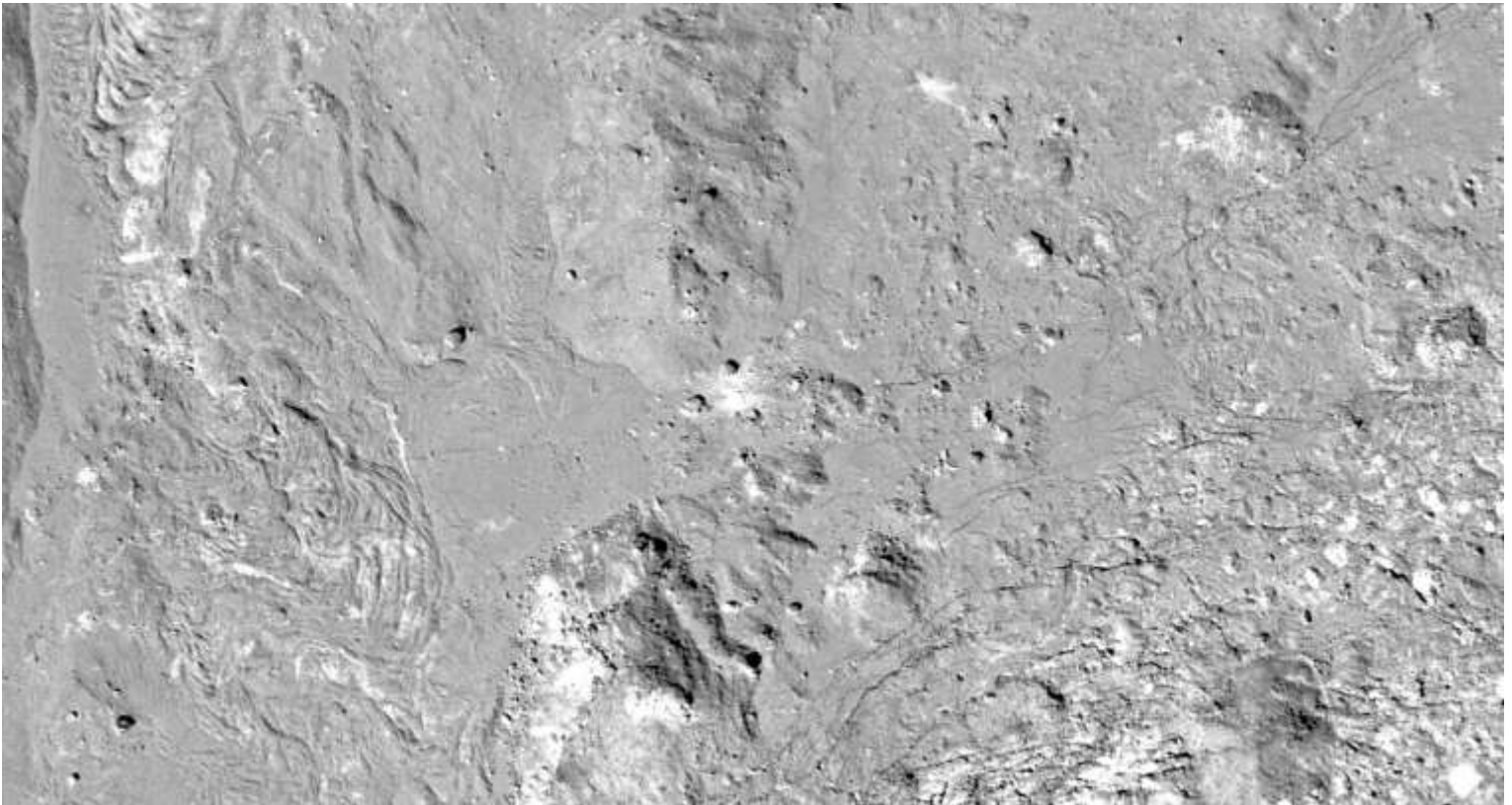


Figure 1 Giordano Bruno impact melts.

Since the commissioning phase of the mission, LRO has entered its science orbit, which keeps it at an altitude of roughly 50 km. There, the NACs have a resolution of about 30 cm/pixel, and the WAC has a resolution of 100 m/pixel. Using the NACs, we're able to resolve features on the surface which we've never seen before, such as the lava flows of Giordano Bruno crater. It is hypothesized that the Giordano Bruno impact was actually observed during the 10th century.

At LROC, opening this NAC file was exciting because flows this young are extremely rare on the Moon. This was a site that had never been observed this close, at this resolution before. Julie Stopar of the LROC operations staff opened the image, and told one or two people nearby. Before long, twenty people were crowded around her monitor, and more were on their way.

Discoveries often take place this way at the LROC SOC, when people get to see the fruits of their efforts as they participate in observing features or phenomena for the first time ever. It was like this when I was sitting at the Uplink 1 station, and we opened the first LROC image of the Apollo 17 landing site, and again with the floor of Tycho crater, one of the most volatile scenes I saw during my time at LROC.

Since the cameras have been powered on, LROC has downlinked 88,522 NAC images, and 46,649 WAC images (at the time this article was finished). So far, this dataset takes up 7.6 terabytes! The NACs are providing a up-close look at a surface only seen before by astronauts. Using the WAC, we're building a global base morphological map and charting deposits of lunar mineralogy. The Moon, which humanity has gazed at for millennia, is increasingly visible to us as a new world every day, thanks to LROC.

Explore LROC's images at: <http://lroc.sese.asu.edu/>



Above: Frank Centinello Skyping in for a webcam tour of the LROC operating room in 2009.

Masten Space Systems SEDS Opportunity

Masten Space Systems has offered SEDS a great opportunity. They are giving us the opportunity to fly a payload on board one of their craft. Right now, we are looking to get an idea of the interest level from chapters to see if they have any sort of project or payload to fly. The specifications are 20kg weight, must be integrated on the craft, be self-contained, and not use 900 MHz transmission range. If your chapter is interested and/or has any questions, please contact chair@seds.org.

- Rick Hanton, SEDS-USA Director of Chapter Expansion

You can't be an astronaut when you grow up... but you might still work in space!

By: Ryan L. Kobrick

The future of human spaceflight with NASA is a bit fuzzy with recent announcements to cut the Constellation program. Limited flights of the Shuttle fleet remain, and even with an extended lifetime of the International Space Station (ISS), there are limited seats available for the traditional astronaut. What does this mean for your future? It means that you may not be able to go through the rigorous selection process to one day live in Houston with the hopes of flying within a decade of training and service. At the Next-Generation Suborbital Researchers Conference (NSRC) in Boulder, CO held the 18-20 of February 2010, a new future of spaceflight started to unfold. It's a world where passengers and research payloads would fly together and cross not just the Karman Line (100 km altitude) but a new threshold for what is possible in space activity, 'a Bonanza at 100 km'.

Southwest Research Institute's Alan Stern described how twelve participants were the first class at the National AeroSpace Training and Research (NASTAR) Center, receiving training that was highlighted by flying suborbital flight profiles in NASTAR's centrifuge at up to 6 g's and spending time in an altitude chamber. Through this initiative, more and more participants will become Suborbital Payload Specialists (SPS) flying Research & Education Missions (REM) in the so-called "ignorsphere" (poorly understood atmospheric region that includes mesosphere and upper stratosphere). If suborbital flights can become as routine as a nominal Zero-G weekend, then SPS astronauts could be flying parabolas weekly, maybe daily. A typical parabola will last 30 seconds, just enough time to feel your stomach sink, but a suborbital flight could last 4-10 minutes, yielding significant time to study the transition zones of gravity unloading and loading of systems.

Working in space could be around the corner, using the traditional astronaut model combined with the Zero-G coach and newly forming SPS pool. Companies may form their own selection process and training requirements. If NASA can buy vehicles to conduct a mission, then they certainly can purchase commercial astronauts, with their own unique acronym. Unless the vehicle is certified through NASA human rating requirements, then they will not fly their own specialists who are funded via taxpayers. The Department of Transportation does not have a room filled with highway repair persons waiting to fix roads on the opposite side of the country. This is how YOU may work in space. The emerging companies building human-rated systems will need pilots, maintenance gurus, science minded technicians, and the occasional plumber to fix all the connections on the ISS. This shift might completely change the way NASA conducts business. Instead of designing and building rockets, they would buy rides as needed. The questions are how big a shift will they allow, and will they evolve from NACA to NASA to something new?



NSRC Press Conference: Left to Right: M.N. Sirangelo (Commercial Spaceflight Federation), S.P. Worden (NASA Ames Research Center), M. Mealling (Masten Space Systems), S.A. Stern (Southwest Research Institute), J. Greason (XCOR Aerospace), and S. Attenorouh (Virgin Galactic).



David Masten from Masten Space Systems presenting 2nd place plaque in the Student Proposal Competition to CUSEDS President Laura Stiles

At the NSRC, NASA Deputy Administrator Lori Garver announced that the CRuSR (Commercial Reusable Suborbital Research) Program has a proposed budget increase from \$2.5 million to \$15 million. In the same way that NASA invested \$500 million in the COTS (Commercial Orbital Transportation Services) Program, CRuSR may play a vital role to increase the number of space travelers. For example, CRuSR would fly payloads from universities, possibly with students to attend to the experiments the same way NASA has supported parabolic flight campaigns. Students will always be more adventurous and accepting of risk, allowing them opportunities to fly. Alan Stern remarked, "I'm not sure how these vehicles will fly, but I might send my graduate student." But keep in mind that former astronauts have already been extensively medically tested and trained for spaceflight, so they may flood the market first for SPS jobs. Rick Searfoss's career is an example of how a Shuttle commander can now get behind the stick of new experimental flight-testing with XCOR Aerospace.

A key component of the NSRC was hearing from the suborbital (and orbital) providers about the potential payloads they were preparing to interface with. These presentations were complemented by research presentations on "what can be done in five minutes".

Instead of regurgitating the numerous experiments in the ignorosphere on upper atmosphere research, life science monitoring, and external payload space-rating certifications, I encourage readers to visit the Lunar Planetary Institute's website and read abstracts from the 300 participants that have been posted: <http://www.lpi.usra.edu/meetings/nsrc2010/>. The providers at the conference included Blue Origin (their first public conference), Masten Space Systems, NASA Launch Services Program with Special Aerospace Services and United Launch Alliance's External Payload Carrier (XPC), Space Exploration Technologies (SpaceX), Virgin Galactic, and XCOR Aerospace.

The flexibility of this industry will depend on launch site locations, flight licensing, flight profile design, and of course money, otherwise it would not be a commercial endeavor. The synergy between the commercial market and university research has already begun, with Masten Space Systems announcing at the NSRC that they will fly the winner of the Student Proposal Competition on a suborbital profile within the next year. Next's year's NSRC will be at University of Central Florida, and I'm predicting that if there is another student competition, SEDS-UCF will make sure there are lots of proposals submitted with the hopes of winning the second flight opportunity. (SEDS-UCF, start working on your volunteers now for NSRC-2!)

One other presentation that might interest the future commercial astronauts (I am not particularly inspired by NASA's term, "Spaceflight Participant") was by Elizabeth Wallace, about My-Astronaut.org. Her concept includes having hero astronauts that you could vote and donate funds towards their potential spaceflight. This opens another potential path to the stars, not necessarily via the American Idol model, but through community service and dedication to the industry.

Universities with parabolic experience may have an advantage in opportunities to adapt parabolic experiments that can be conducted in a full suborbital profile. My advice would be to get involved in a parabolic flight campaign now and automate as many functions as possible, but try to leave one button to push or dial to adjust so that you can justify riding along with your experiment!

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Ryan L. Kobrick is a Ph.D. Candidate at the University of Colorado at Boulder (CU-Boulder) in Aerospace Engineering Sciences researching lunar dust abrasion funded by NASA's Graduate Student Researchers Program. Ryan's space CV includes three internships/contracts at the X PRIZE Foundation, four two-week Mars simulations at the Mars Desert Research Station, and a 100-day Mars simulation at the Flashline Mars Arctic Research Station with a crew of seven. Ryan is the Program Manager on the 2010 Yuri's Night Global Executive, a member of the Executive Advisory Committee for the CU-Boulder chapter of the Students for the Exploration and Development of Space (CUSEDs), and is the Director of Research & Development for the "We Want Our Future" initiative. Opinions expressed in this article are the opinions of the author and do not represent those of CU-Boulder, CUSEDs, or NASA. For more information please visit: www.RyInSpace.com and RyInSpace on Twitter



CUSEDs Advisory Committee Member Ryan L. Kobrick with Virgin Galactic model of VSS (Virgin Space Ship) Enterprise (a.k.a. SpaceShipTwo)

An Optimistic Future

By Dina Cavicchia

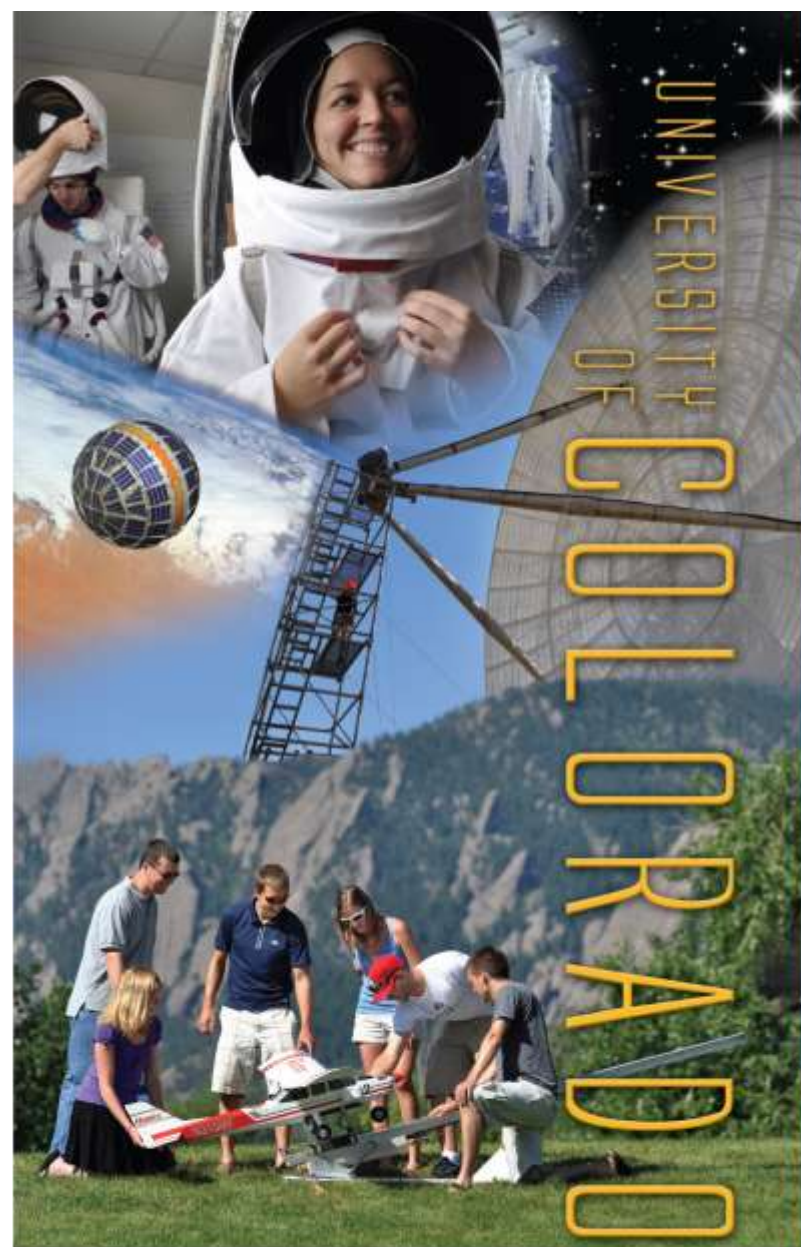
It's not every day that an astronaut lands on the University of Central Florida campus. Yet on February 19th, four-time Shuttle astronaut Bob Cabana gave an intriguing presentation concerning the past and present of NASA. As the current Director of Kennedy Space Center, Cabana serves as one of the leading authority in today's space community. SEDS-UCF proudly sponsored this event as the keynote address for UCF's Engineering Week 2010. This speech proved to be hopeful and inspiring as Dr. Cabana highlighted his views on the future of NASA.

The presentation came in the midst of budget cuts and controversy, with NASA facing unforeseen setbacks including the cancellation of Project Constellation. Despite such dilemmas within the space community, Cabana's tone concerning the events remained optimistic. He proposed that technology and information used for Constellation would be not go to waste, but rather integrated and utilized for future NASA endeavors. Although we will not have a manned launch vehicle in the years to come, the future of NASA remains bright. Full utilization of the International Space Station is a key goal for the future. The Station will remain in operation until 2015, with a likely extension of service until 2020. Cabana stressed that Americans will still have a presence in the ISS operations, with the United States sending astronauts to Station through our Russian partners. Cabana highlighted that this period in NASA history will be a time of collaboration and cooperation with Russia. Another key point was the promotion of NewSpace projects. He spoke highly and optimistically of NewSpace companies and their progress towards manned spaceflight, especially SpaceX and the Falcon 9 assembly launch scheduled for March 22. Cabana stated that NASA will continue manned spaceflight in due time, with Mars serving as a future goal.

The experiences of an astronaut are truly unique. Cabana relayed stories of his early days as a test pilot prior to his NASA career. He detailed his duties as the Pilot of two Shuttle missions and later as two time Commander. The most memorable part of his reflection was his awe—even he was in awe of the view from space and the feeling of seeing the Earth from the outside, a feeling that more people need to experience. As one may imagine, the former astronaut stressed the importance of hard work and determination, significant qualities for both idealists and engineers alike. Cabana expressed that Kennedy Space Center is currently looking for young people to lead the future of NASA, as such young prospects may breathe new life and perspective into the space program. His presentation was inspiring and brought hope to many distraught space enthusiasts. He is a truly dynamic speaker and motivated leader for Kennedy Space Center. If you would like to watch his presentation at UCF, log on to the SEDS-UCF website at <http://mmae.ucf.edu/seds!>



Above: SEDS-UCF members posing for a group photo with Bob Cabana. Image courtesy of SEDS-UCF



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SEDS ALUMNI SPOTLIGHT

Name: Eric Dahlstrom

SEDS Branches: University of Maryland (known as “Maryland Alliance for Space Colonization” before it became a SEDS chapter)

Degree:
 BA Physics, University of North Carolina (1979)
 MS Astronomy, University of Maryland (1984)
 Astronautical engineering studies, The George Washington University
 Certificate in Space Studies, International Space University (1991)



What are you doing, where?

I recently moved to Mountain View, California, to work as Director of Curriculum at Singularity University (singularityu.org) and also serve as Technical Liaison for Odyssey Moon Ventures (odysseymoon.com) at NASA Ames Research Park. I continue to work with SEDS founders Peter Diamandis and Bob Richards through Singularity University, focusing on accelerating technologies, and Odyssey Moon, preparing commercial lunar missions. Over the years I have remained involved in International Space University, where I was chair of space physical sciences for the last two summers.

Out of all the *annual* space conferences or events you have attended, which one would you suggest the most to current SEDS members? Why?

As a student, I took advantage of student discounts to attend many conferences and sample different subjects. Our chapter would also volunteer at aerospace conferences. These days I think the NSS conferences offer a good mix of activities. But I always liked SEDS-sponsored events run by students.

In what ways did your involvement with SEDS help you follow your dreams?

SEDS helped both in terms of inspiration and in practical terms that have lasted decades. SEDS discussions made me aware of current space activities and future possibilities, and the different types of people needed for space projects. Learning the technical aspects of space projects at SEDS led directly to getting a job in space station design and working for the NASA Langley advanced projects office. Organizing events for SEDS was (mostly) fun, and also helped me to try new things and gradually expand my level of comfort. We made plenty of mistakes in SEDS events. (For example, if there are more people on stage than in the audience - this might indicate a problem with advertising.) The lessons we learned paid off in later SEDS projects, and helped me consult on managing large projects later on. The main benefit of participating in the formation of SEDS, and later watching my friends start ISU, was to learn the power of individuals to create new organizations that changed people's lives. With SEDS you can attract resources to a good idea, and do amazing things.

What is one fun/crazy/memorable SEDS event or memory which you will always remember?

Maybe some stories should stay quiet another few decades. (Such as ‘The moon rock in the dorm room’, ‘Can we have the ATS-6 spacecraft?’, or ‘A midnight visit to the Shuttle simulator’ – and the ‘thumbs-up’ photo.) I recall sitting on boxes in Todd Hawley’s basement on a conference call with the board of directors of Intelsat, trying to convince them to let us use the excess capacity of their communication satellites. It almost worked. But when that project did not work, Todd, Peter, and Bob started work on the next item on the agenda.. creating an International Space University. My best memories of SEDS are when we felt only limited by our imagination.

Help SEDS get a free sponsorship and support High School innovation!

This month the Conrad Foundation will be accepting votes for the best high school student innovation of 2010. As an added bonus, the organization with the most votes submitted will become a Conrad Award sponsor free! This is a cool way for SEDS to gain some easy publicity, and to help out high school students at the same time!

What you need to do:

- Between March 29th and April 9th go to: www.conradawards.org
- Click “Vote”
- Fill out your voting ballot.
- Under “Affiliate Organizations” select “SEDS”
- Submit your vote.



The Conrad Innovation Awards were established in memory of NASA astronaut Pete Conrad, pictured above during Gemini 5 water egress training. Photo courtesy of NASA

The votes do not need to come from your chapter! Get your friends to vote on behalf of SEDS as well!

Clear skies

Joshua Nelson

Chairman, SEDS-USA

Know an outstanding SEDS Alumni from your chapter who is currently involved in the Space Industry? E-mail publications@sed.org to suggest next issue's



Who Shapes the Future of Human Spaceflight?

Earlier this year, the entire space industry in the United States erupted in excitement. President Barack Obama released his proposed budget for NASA's Fiscal Year 2011. It was met with both warm welcome and a lot of opposition. Some of the highlights of the budget include a major increase to NASA's



funding, given through an increase of \$6 billion. On the other hand, another part of the budget calls for the immediate cancellation of NASA's Constellation program. This would effectively end NASA's manned spaceflight capability. On the other face of the coin is a plan for NASA to donate large amounts of money to the commercial space industry so that they can lift humans to space. With Constellation gone, man's return to the Moon and beyond could be delayed for a very long time. Congress is still out on the proposed budget, and many people are on both sides of the conflict. You have time to help influence the decision, and with many opportunities out there to get your opinion into the minds of the decision makers, why wouldn't you get involved?

- David Holewka, Director of Publications

Above: NASA's Constellation Program logo. Image Credit: NASA

Follow History's Example

By BILL NELSON

In his 1986 Challenger address to a mourning nation, President Ronald Reagan noted that we as Americans are accustomed to wonders.

In his words, "It's hard to dazzle us."

That certainly was true then, and it's true now. Even still, one thing always seems to amaze us - and has done for five decades now, even in times of tragedy.

It's our nation's space program.

JFK. The Mercury Seven astronauts. "Godspeed, John Glenn." Gemini. Apollo 13. Man on the moon. Space shuttle. Challenger. Hubble. Columbia. Mars rovers.

America's exploration of space has greatly advanced the cause of science and has done much to improve life on Earth.

It's the reason we have Global Positioning Systems, special firefighter equipment, satellites that track climate change and hurricanes, airbags, and health care devices such as kidney machines and heart ultrasound equipment, and Lasik surgery.

The space program has created scores of companies and hundreds of thousands of jobs - jobs we need, especially in Florida.

NASA also has enabled America to have the most advanced satellite technology for national security purposes.

Countless young Americans have been inspired to pursue careers in science, technology and engineering, helping the United States remain a global leader in these fields.

Simply put, we all have reaped a harvest of gains from space exploration.

Last month, President Barack Obama released his plan for the space program - a blueprint that some say sharply revises NASA's mission. A colleague in the U.S. Senate called it the beginning of a "death march for U.S. human space flight."

I wouldn't say that. But I did tell the White House something in the plan has to change. I held a hearing Feb. 24 to see whether Congress can rescue parts of the Ares rocket program. And reportedly NASA is preparing an alternative to the president's plan to scrap the Constellation program

The president's budget for NASA emphasizes low-Earth orbit and accelerates commercial space exploration. But the plan doesn't provide a backup if commercial rockets fail.

If the administration doesn't push for NASA to develop a big rocket to take us out of low-Earth orbit to explore the heavens, then we're going to fall behind China and Russia. That's something I don't think will sit well with Americans.

I also told the White House we can't do this on the cheap.

As President John F. Kennedy said, opening the vistas of space brings high cost and grave danger. But, he said, "This country was not built by those who waited and rested and wished to look behind them."

Now is not the time to rest on our laurels. Nor is it the time to debate again whether humans should explore new frontiers.

We would do well, instead, to recall our own early history.

Two hundred and seven years ago, President Thomas Jefferson sent a secret message to Congress asking for \$2,500 to fund the Lewis and Clark expedition. He knew the request would be controversial and left it out of his State of the Union. But he requested the money nonetheless and sent Meriwether Lewis and William Clark to explore the uncharted West.

It may seem trivial now, but the expedition that ended up costing a then-whopping \$38,722 was an investment that changed the face and future of America.

Today, it's our turn to follow history's example and to provide the resources that will carry us into a new era of discovery.

The author is Florida's senior U.S. senator who flew on the space shuttle in 1986. A version of this column first appeared in The Tampa Tribune.

Thoughts on the New Budget

There's been much sound and fury over the recent FY 2011 budget proposal the White House released on Monday, all over the board in opinion. Some, like the Space Frontier Foundation and most of those sympathetic to commercial spaceflight, support it vigorously. Others, many here in Texas it seems, have been bemoaning it as the death of NASA and American human spaceflight. My opinion is that this budget, if it is passed more or less intact by Congress, is the best thing to happen to NASA since Project Apollo. I'd like to lay out a few of the reasons why I'm positive about the budget, and why I think the objections to it are flawed.

What this budget does is fundamentally change the way NASA does business with its aerospace contractors. NASA will no longer be handing industry cost-plus contracts to develop new launch vehicles and spacecraft that do little different from current systems. Constellation was entirely cost-plus and everything in work for the program so far (Ares I and Orion, that is) had no fundamentally new technology in it. This is the worst of both worlds, having all the expense and development time of clean-sheet technology and all the limitations of current spacecraft and launch vehicles. Switching to a fixed-price commercial procurement system radically alters this dynamic. No money will be paid without the achievement of tangible results. This is a winner for resupply of the ISS and it will be a winner for crew transport. The technology development and commercial acquisition mandated by the new budget places NASA in an excellent position to carry the burden of developing game-changing technology while leveraging the private sector to reduce the cost of spaceflight. This is a necessary step if we want to truly establish an enduring human presence in space.

Now for the criticisms of the budget. There are a number of silly headlines making the rounds. NASA's budget is being increased, not cut. American human spaceflight is alive and well, and if anything will occur more frequently under Obama's plan than under Constellation. It will probably not take longer for a return to the Moon under this plan than it would have under Constellation. Of all things, a willingness to engage the private sector in exploration and encourage commerce in spaceflight is not anti-American, or anti-capitalist, or communist, or fascist, or whatever buzzword the kids are using against Obama these days, no matter how much you dislike him. Perhaps the loudest complaint I've heard is that Obama is shutting down American human spaceflight, ceding the enterprise to the Chinese, the robots, or no one. American astronauts will be flying to the ISS on American spacecraft as soon as SpaceX, Boeing, Orbital, Blue Origin, or someone else gets them operational. The most reasonable projections of Orion showed it entering service in 2017. I'm very confident that commercial human spaceflight will be available by 2017 or sooner, and at much lower cost. Safety will not be compromised either. If anything, a fatal accident would be even more damning to a private company than to NASA, since the company's competitors will be glad to step in and offer a more reliable service. In short, NASA has little to lose and much to gain under the new budget.

In the final analysis, whether or not you think the new NASA budget is a good thing comes down to what you think human spaceflight should be about in the first place. If you think human spaceflight is about exploring and understanding the worlds of the universe in a way impossible with robots, expanding intelligence beyond Earth's atmosphere, finally answering the question of whether there is alien life in the solar system, and bringing the ability to experience spaceflight to anyone who wishes to have it, it's a good thing. It's good because human spaceflight will no longer be the domain of only a few choice astronauts a year, but of a thriving commerce in low Earth orbit. It's good because NASA will be free to develop the tools we'll need to travel to the Moon and beyond. This budget enables widespread human spaceflight in a way never before attempted and makes now a thrilling time to be a part of space exploration.

- Grant Atkinson, SEDS-USA Director of Chapter Affairs

*NOTE: The views expressed in these articles are not the view of the SEDS organization. They are the opinions and thoughts of those who wrote the articles, and in no way reflect the position of SEDS-USA.



Above: SpaceX's Falcon 9 performing its static fire test on Saturday, March 13. SpaceX hopes to perform their first launch of Falcon 9 within a couple of months. Image credit: SpaceX

ASX Toronto Reflection

By Carl Javier

The Symposium was to start at 6:30 pm EST, but surprisingly people were still standing in line outside the University of Toronto's Convocation Hall. One could think that the hall was getting full. In the line were attendees of a variety of age groups. Surprisingly a large amount of attendees were students from high school and middle school, accompanied by their parents or teachers.

The first person up to speak was supposed to be Professor Sara Seager from the Massachusetts Institute of Technology. Unfortunately she was unable to bring presence, but was substituted by Ivan Semeniuk from the University of Toronto. Mr. Semeniuk's opening speech reminded everyone of humanity's need to continue space exploration. There's a great need to understand the living connection between molecular arrangements of organisms and how the smallest forms of life, micro-organisms, result from them. Similar to that humans need to make the connection between our human existence on a terrestrial scale and our existence in the universe as a whole.

Dr. Firouz Naderi continued to inspire the attendees with videos of planetary exploration vehicles, and reminded everyone of the great feeling of joy that we as explorers have after a successful voyaging endeavor. One particular exploration that Naderi reminded us of was the landing of Spirit and Opportunity rovers on Mars. The exhilaration after each landing success is something that future explorers should look forward to. This should remind students that hard work can be paid off with simple emotional satisfaction of accomplishment.

The Chandrayaan Lunar program was one Dr. Narendra Bhandari's topics and how it will be continued by the Indian Space Research Organization with Chandrayaan II, which will land a rover on the lunar surface. Following his speech was Dr. Peter Schultz from Brown University. He gave a great deal of information about the major activities researchers made prior to the Lunar Crater Observation and Sensing Satellite (LCROSS). From the selection of the Cabeus crater as the target crash site to how tests were made to carry out the project, the attendees were awed by the videos Dr. Schultz displayed. The end of Dr. Schulz's presentation became the most exciting as he revealed the video that had never been disclosed to the press: LCROSS's High Definition video of the lunar impact plume.

Overall, the Toronto ASX Symposium reminded us all of the many reasons why we need to continue space exploration, and if not at a steady pace, boost our efforts in understanding the worlds outside of our planet. We humans need to understand the connections between life on Earth and the existence of life outside of it. When explorations fail, we weep, but the greatest feeling from our explorations is from the success we've made after we've learned the lessons from our past failures. Exploration of our universe should not end, as discoveries from LCROSS reminds us, our goals such as finding enough water to sustain life on the moon are just around the corner.

The Search for Another Earth

By Blythe Guvenen

1 March 2010

Regardless of who is consulted with respect to the hunt for extrasolar planets, and no matter how much they insist that their body of work is solely for pure research, one thing is most likely all-involving in their minds: the goal of finding an Earth somewhere beyond our own solar system, quietly humming in orbit around a distant star. To be sure, the day that such a planet is confirmed would be one of celebration, curiosity, and upheaval. The questions it answers and raises will be discussed long into the foreseeable future, as will the implications it holds for our species. However, what much of the population – and perhaps even some in the scientific community – doesn't realize is that this day is closer than any of us would have ever thought.

Prior to the 1990's, several astronomers were convinced that planets should be a common occurrence in the cosmos, our own typical star having its own family of eight planets, four dwarf planets, and countless other worldlets. It all began a decade and a half ago when a research team announced the very first confirmed exoplanet around a main-sequence star. The University of Geneva published the findings, a gas giant planet whose parent star was 51 Pegasi, which instantly sparked much public interest and ignited a race of sorts to survey other stars for planets as instruments and detection methods were refined.

Initially, astronomers were only discovering a few – a handful at best – planets per year. As we entered the new millennium, that number grew considerably each year until present day, where in the year of 2009 alone there were upwards of 100 planets found and catalogued. When graphed, the trend is almost exponential in nature. So far, about 430 exoplanets have been discovered and confirmed. To reflect, that's 430 new worlds out there, waiting for our eyes to sharpen to tell us more about what is possible, how planetary systems form, and perhaps where our solar system falls in the plethora of solar



Above: Kepler on the stand in Cape Canaveral being fueled up. Kepler is the pioneering space craft in the search for extrasolar planets. Image credit: NASA

system types (an entirely new branch of astronomy in and of itself). Another trend to take note of is that as our telescopes grow and our techniques hone, the size of planet we can detect is shrinking further and further down. Mainstream news was made once again in 2007 with the announcement of Gliese 581-c, a terrestrial planet not only about five earth masses, but also in the “Goldilocks Zone”, a donut of space around a star where the temperature is clement for water to stay liquid for most of the time, not too hot nor too cold. Although this works on the assumption that water must be present for such a “super-Earth” to be habitable, it was a great stride in sensitivity of detection methods and once again piqued the interest of astrobiologists and planet hunters everywhere.

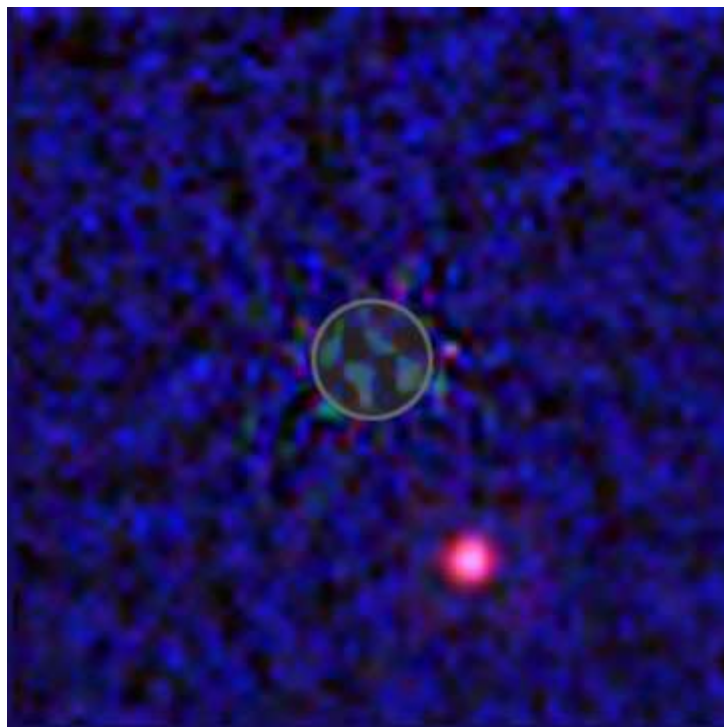
Several methods are used to detect exoplanets. Direct imaging is the most difficult and uncommon of these methods, due to glare from the host star brilliantly obscuring any candidate planets, but is ironically the best way of confirming the existence of said planets. The most widespread modus operandi, however, is observations of radial velocity. Radial velocity measures small changes in the star’s speed as it moves in its path, caused by its own orbit around the system’s center of mass. Its center of mass can only be offset by unseen companions, and therefore the perturbations are a reliable indicator of planetary bodies.

An excellent but position-dependent method is the method of detection by transit. As the planet passes in front of its star, there is a slight dip in the light measured from that star. Based on the length and nature of the dimming, astronomers can infer many characteristics of the planet, such as diameter, orbital period, and even composition. As mentioned, this method only works if the orbital plane of the planet is in our line of sight.

A key player in the coming decade in the arena of exoplanets will undoubtedly be the Kepler Space Observatory, launched in March 2009. The mission, the inaugural data of which were first received this past January, will survey countless nearby stars for new planets, as well as extrasolar systems we already know of to refine data and measurements. It is already reporting back planets more distant and near-Earth size than any previous science mission. Scientists are eager to get their hands on observing time as well as observations from this cutting edge observatory.

Until Kepler, the smallest planet detected around a normal star was Gliese 581-e, discovered in April 2009. At an estimated 1.9 Earth masses, it is comparable in size to Earth, although we can’t get reliable figures with regard to its composition, and lies well outside the proposed habitable zone based on the temperature of its star. The Kepler mission is poised to discover several such Earthlike planets and it is promising to give us some of the most exciting information ever gleaned from such observations, possibly including atmospheric components of such exo-Earths.

With this new year, expect to see even more planets in the queue for analysis than ever before. Astronomers may even have a backlog of planets that they have to stuff in their pockets to pretend as though they’re keeping up. As we inch closer to our ultimate goal of finding a livable Earth, we look back on the long road of pioneers and researchers who have laid the foundation for these staggeringly profound discoveries. One day soon, well within our lifetimes, we’ll be able to look deep into space and see our own reflection, as clearly as we look up to admire the full moon on a cloudless night.



Above: Hubble’s keen infrared eyes have potentially spotted the first directly-imaged extrasolar planet. Image credit: NASA

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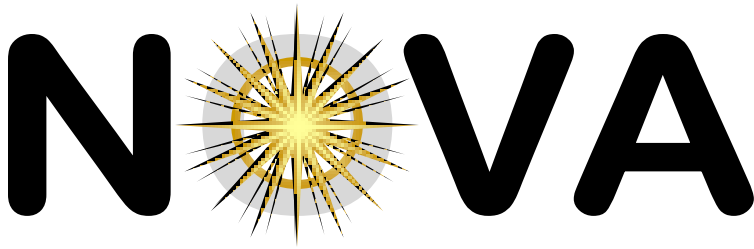
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Remaining Dates of the Rockoon competition Design and Safety Review Timeline

Critical Design Review:

3/31/2010

Review the detailed design to ensure that the design implementation has met the requirements.

Safety Review

6/31/2010

All safety requirements listed in section 4.0 of the competition rules must have been tested and deemed fit for the competition.

Test Readiness Review:

5/31/2010

Review readiness for testing of all phases for competition. All safety and design requirements are met.

Final Design Review

Mid-July

Ensure that the design is completed and accurately documented and ready for competition (or is in final stages).

Correction from last issue: An old version the Letter from the Chair in the Q4 2009 edition of the NOVA stated that NASA had received a big budget increase, the Constellation program was cancelled, and NASA was going to be designing a new heavy lift vehicle. While that is true now, at the time this was incorrect. This was corrected and re-uploaded as of 1/15/2010.

SEDS LEGISLATIVE UPDATE

SEDS-USA & Council of Chapters Quarterly Summary: CoC SUMMARY:

January 06, 2010

- Discussion and updates among the chapters: UB, CU and GWSS had brief summaries of their activity
- Motion carries 9-3-2 to continue using Skype at next meeting. (this is the first CoC meeting in the telecon style compared to traditional meeting style of AIM)
- Discussion to change requirements so that schools can join before getting official school status. Pro- feasibility of student chapters to join, Con- chapters may not be established enough to join. Compromise: make it a strong suggestion to have this prior to gaining national recognition, no vote/action.
- Motion carries 13-0-1 to have the exec board research a timeline for when constitutional changes must to be updated on the website. Action later set to be 48 hours.

January 27, 2010

- Discussion and updates among the chapters: GWSS, UVA, UCF, CU, Kentucky, Iowa State, UCLA, UA, FI Tech, UIUC, BU and UB had brief summaries of their activity. Discussion on which chapters have distributed Q4-'09 NOVA and chapter involvement in Yuri's night.
- Discussion of SEDS/SFF Book Distribution Project, many chapters interested.
- Appointment by CoC to establish a temporary public affairs / political outreach position as a subset of the Exec board chair to research feasibility and impact of these positions on SEDS.
- Motion Carries 9-0-5 to hold the next meeting on Skype
- Motion Carries 7-2-5 to hold a vote to end each CoC meeting

February 24, 2010

- Discussion and updates among the chapters: UVA, Kentucky, Purdue, OU, GWSS, UIUC and FI Tech had brief summaries of their activity.
- Lengthy discussion regarding political outreach / public affairs position. Failed motions of merging the positions of political and public outreach and to abolish the position of political director.
- Motion Carries: 11-0-2, table discussion of political director until next meeting pending further research.
- Motion Fails: 6-2-5*, for each chapter to provide brief chapter updates for the quarter, done by each chapter (not within CoC) to be put on the SEDS-USA website
- Motion Fails: 3-8-2, to continue to use Skype as a conversation media, Discussions will revert back to AIM following several technical glitches with Skype.

EXEC BOARD SUMMARY:

- Exec board now has the ability to form subcommittees under the elected positions.
- Website: New SEDS website released! Sends comments to webmaster@seds.org
- Projects: A rockoon design and safety review schedule and guidelines have been drawn up and will soon go out to rockoon teams, 6 teams registered, 3 PDR extensions requested.
- Expansion: Spacevision videos are ready to go on the web. Strategies for focusing on regions (such as the Pacific Northwest) that are lacking of SEDS chapters. Multiple start-up chapters brewing, not yet formal.
- Publication: Board discussed distribution of the SEDS USA Nova, ideas for paid subscriptions to allow printing and shipping of complete issues to schools. Creating a list of industry members to receive NOVA.
- Future conferences: discussed the conferences that SEDS will try to have a booth at this year, which of course include ISDC, Newspace, etc. SpaceVision planning coming along, sponsorship package complete.
- SEDS Director of Political Outreach - Board discussed idea to add Political Outreach position as directed by CoC, and sent joint announcement regarding Political and Public Outreach positions. Board discussed the lack of response and open hostility towards the positions. Discussion, but no motion or action set.
- NASA Budget and SEDS Statement – SEDS-USA determined that SEDS should take a neutral stance but "encourage discussion" due to the likelihood of alienating potential sponsors of SEDS, approved the statement by the Space Exploration Alliance as an official SEDS stance on the NASA budget.

A complete summary of the activities this quarter is available at:

http://wiki.seds.org/index.php/SEDS-USA_Meetings, send questions/comments to secretary@seds.org

*Illegal motion under parliamentary procedure—since a past motion was made to put this into effect and there was never a motion to negate the creation of these updates, the second motion to enact the updates is against procedure.

Blast from the Past

A look back at previous versions of the NOVA:

Reflection by: Matt Cannella

This Quarter's Blast from the Past comes to us from the January 1997 version of the NOVA:

**LEGO-MANIA
AT UM-SEDS**

The University of Michigan SEDS group has started a unique tradition that I think all SEDS groups could build off of when brainstorming activities. On December 2nd they held their first Lego spaceship building contest. They held the event in the atrium of one of the engineering buildings on campus where many students traverse throughout the day. Students attempted to build a spaceship out of 950 Legos in 30 minute time slots. Each ship was captured with a Polaroid camera to be judged later by a Professor of the Aerospace Department for creativity as well as feasibility. They had over 30 participants enter the contest and received great publicity within the college of engineering. Four prizes were awarded consisting of different Lego sets. UM-SEDS has been asked to host this event again during University of Michigan's engineering week celebration due to its great success.

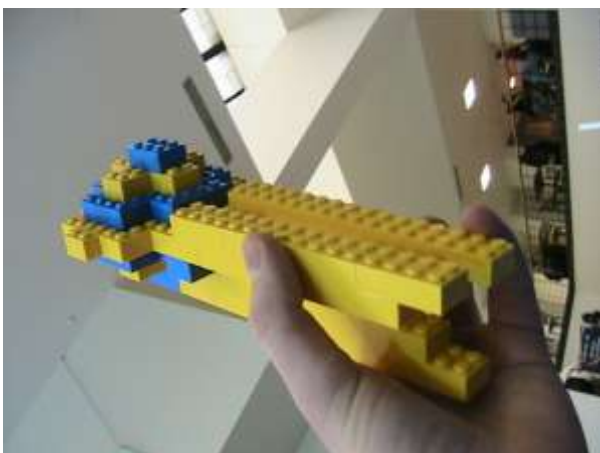
Please let me know what your society's activities are so we can spread the word of these great creative projects!
- Amber Thweatt, Chapter Affairs

12 years ago, the students of UM-SEDS hosted a Lego SpaceShip building contest, and encouraged other SEDS chapters to participate in similar activities. It remains today a great method to get SEDS members and



non-SEDS members involved in a fun, space themed interactive competition. This event was replicated recently by the University at Buffalo SEDS, who made a Lego Spaceship building competition an annual part of Engineers Week at the university. "The Lego Spaceship Building competition is a great way to build interest in Space Exploration & SEDS through a fun challenge. And lets face it , who doesn't love playing with Legos?" said Dan Pastuf, current UB-SEDS president and Managing Editor for the NOVA. The competition was held in the University at Buffalo Student Union on February 18th.

Ultimately, a lego competition can be an easy way to get members involved and thinking about space ship design.



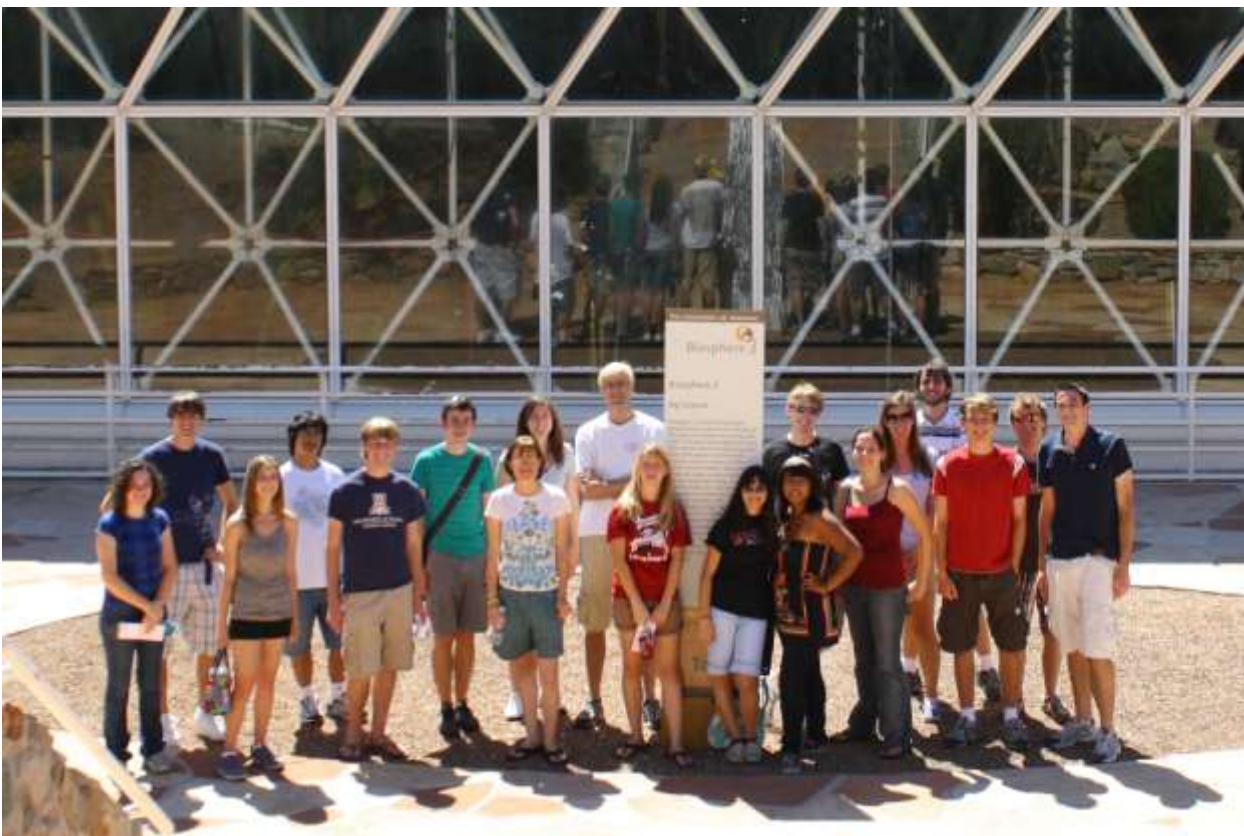
SEDS GALLERY



Above: The sun with a few cool sunspots in the upper right. Taken through an 8" Orion XT8 SkyQuest Classic Dobsonian telescope with a 3.0 MP camera. Image: UB-SEDS Astronomy



Above: The University of Central Florida SEDS recruitment station on display. A setup like this is sure to attract many students to become interested in SEDS. Image credit: SEDS-UCF



Below: Some University of Arizona SEDS members visit Biosphere 2. Image credit: UA-SEDS

Want your chapter's images to be featured here? Upload them to gallery.seds.org and your pictures might get selected!

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SEDS Mission Statement:

SEDS, or Students for the Exploration and Development of Space, is an independent, student-based organization which promotes the exploration and development of space. SEDS pursues this mission by educating people about the benefits of space, by supporting a network of interested students, by providing an opportunity for members to develop their leadership skills, and inspiring people through our involvement in space-related projects. SEDS believes in a space-faring civilization and that focusing the enthusiasm of young people is the key to our future in space.

History of SEDS:

Students for the Exploration and Development of Space was founded in 1980 at MIT and Princeton and consists of an international group of high school, undergraduate, and graduate students from a diverse range of educational backgrounds who are working to promote space as a whole. SEDS is a chapter based organization with chapters throughout the United States, Canada, United Kingdom, Asia, Latin America, and the Middle East. The permanent National Headquarters for SEDS-USA resides at MIT. Each chapter is fairly independent and coordinates activities and projects in its own area.

What do SEDS members do?

SEDS members are people interested in doing as much as they can to promote space exploration and development. The first step in this continual process is learning. SEDS provides an excellent environment in which to obtain access to many sources of information including speakers, tours, films, discussion groups & daily NASA updates. Astronomical observing trips and tours of local space facilities also play a significant role in the life of many SEDS members.

SEDS members often take the knowledge they have gained and use it to influence the future of the space program. Students at several chapters have played major roles in organizing large conferences and have established important contacts with members of the space community. Others have helped increase public awareness of the benefits of space exploration by offering presentations to local primary and secondary schools as well as universities. All chapters keep in contact with each other through on-line computer networks.

Finally, SEDS provides an environment in which people of common interests can relax and freely discuss issues important to them.

What can SEDS do for you?

SEDS can provide an organized pathway for you to begin space related projects and give you a chance to break away from the usual class work. You can also use SEDS as a stepping stone to a space-related career. Being actively involved in SEDS can put you in touch with many members of the space, technology, and education community and will allow you to develop the experience necessary to take leadership roles in your future career, whatever that may be.

For more information on SEDS, or to join/start a new chapter, go to www.seds.org.





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