

SEDS

3rd Quarter 2011



nova

The official publication of SEDS-USA



Front Page: *Space Shuttle Atlantis rocketing to the stars, marking the end of the era of the Space Shuttle Program. Image Credit: Andrew Dianetti, UB-SEDS President*

Above: *The Vehicle Assembly Bay at NASA Kennedy Space Flight Center in Florida. Image Credit: Andrew Dianetti, UB-SEDS President*

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SEDS members, alumni, and friends,

Once again, it is time for students to finish their summer 9-5 job and go back to the sleepless days of classes, homework, and SEDS! From the early news at our first council of chapters meeting of the semester, it sounds like many chapters have started off the new school year with a bang by hosting record numbers of students at their initial meetings. That's great news to hear! It means that students feel that SEDS provides the right projects and leadership activities to enhance their school experience and their résumés and means that all levels of SEDS leadership are doing a great job.

There are plenty of things to do in the fall with your chapter, and hopefully you will take time while the weather is still reasonable to bring students to a rocket launch, have a barbeque or football tailgate, or visit a local school for an outreach event. It is also an exciting time when young new students join SEDS chapters and get the opportunity to take up leadership roles in their chapter. As I always say, a student group is only as strong as its membership and leadership is. This is your chance to improve your chapter or the national group as a whole.

On the national level, you are hopefully already aware of the SEDS SpaceVision 2011 conference coming up in October and being hosted by the University of Colorado chapter in Boulder. It should be an amazing event that you won't want to miss and will feature great speakers like Bill Nye from the Planetary Society, Alan Ladwig from NASA, and representatives from Sierra Nevada, Virgin Galactic, ULA, and every other space company you have ever dreamed of. SpaceVision is your special opportunity to talk with these people in person about the industry, how space companies operate, and how you can get involved. If you think you can't afford to go, don't be afraid to work with your friends and other chapters to organize a road trip, fundraising activities, or room sharing. You definitely can attend SpaceVision on a budget and it is certainly worth your time.

Even if you can't attend SpaceVision in person, you still have the upcoming opportunity to join the board of SEDS-USA if you want to get some great leadership experience at the national level. SEDS-USA is working on a lot of different projects on many different fronts and even if you don't have the time to join the board for 2012, I promise that we could still use your part-time help in some way. So get involved, come to SpaceVision, do your homework and most of all – have a good time. The commercial revolution of space exploration is coming, be a part of it!

Ad astra,

Rick Hanton



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NewSpace Student Business Plan Competition

Think you can revolutionize the space industry with your idea for a business? Then you should enter the NewSpace Student Business Plan Competition.

Team up with business, marketing, engineering or any other related majors to put together a business plan for a chance to pitch your ideas to investors and new space start up companies and to win \$1k and an automatic entry into the NewSpace Business Plan Competition at NewSpace 2012 in CA. You can also win a second prize of \$500 or a third place prize of \$250 This years competition will be held at SpaceVision 2011. The intent to compete form is due September 30th. Make a team of 5 people undergraduate or graduate students and start on your plan now. Official rules and more information can be found at <http://spacefrontier.org/projects/seds/snbpc/>.

Good luck,
Sara Meschberger
Vice-Chair SEDS-USA



SEDS

SEDS Projects Update

SEDS 2011 High-Powered Rocketry Competition

Only one month remains in the SEDS 2011 High-Powered Rocketry competition. We have six chapters still competing at this final stretch: University of Buffalo SEDS, Purdue University SEDS, Arizona State University SEDS, the Illinois Space Society, Harvard University SEDS, and University of Central Florida SEDS. No chapter has made their competition launch yet, but there are several launches already planned for the days ahead.

Arizona State University SEDS will be launching between September 30th and October 2nd at the BALLS Experimental Rocket Launch. University of Central Florida SEDS will be launching on October 8th at the Northeast Florida Association of Rocketry (NEFAR). University of Buffalo SEDS is looking at an early October launch, likely with their local Tripoli chapter. Purdue University SEDS and the Illinois Space Society are scheduling at a joint launch, estimated to occur sometime in late October. Full rules and information on the SEDS 2011 High-Powered Rocketry Competition can be found at SEDS.org. Results will be announced at SpaceVision 2011. Keep an eye on SEDS.org for additional launch information and news of successful launches.

Best of luck to all competing chapters!

High Frontier Distribution

Dr. Gerard K. O'Neill's *The High Frontier: Human Colonies in Space* is viewed as one of the seminal works in the modern aerospace industry. First published in the 1970s during the denouement of the Apollo program, it provided an optimistic ideal of the incredible things that could be accomplished in space even using Apollo era technology, while at the same time providing a roadmap of how we could get there. O'Neill's work had a great effect on the industry that grew after it, often through the effect it had on those who would eventually join it. The High Frontier has had an incredible effect on inspiring students into participating in fields in the sciences and aerospace, many of whom have become remarkable contributors to industry and the sciences.

The SEDS-USA Space Frontier Foundation High Frontier Distribution Project is an ongoing joint educational outreach project between the Students for the Exploration and Development of Space USA and the Space Frontier Foundation to distribute copies of the 2nd edition of *The High Frontier: Human Colonies in Space* to high school and college libraries in the United States. In the last five months, we have shipped over a hundred twenty copies for placement in libraries that previously lacked a copy, through both direct requests by schools and distribution assistance by SEDS-USA chapters. Chapters participating in our distribution include the Iowa State Space Society, SEDS Arizona State University, American Society for Gravitational and Space Biology SEDS, University of North Carolina at Chapel Hill SEDS, and University of Buffalo SEDS. SEDS-USA greatly appreciates the contributions these chapters have made in furthering education on space development through their assistance.

There are still a large number of books needing placement. The book is available entirely free of charge thanks to a generous donation to the Space Frontier Foundation, allowing us to ship the book at absolutely no cost. Chapters wishing to assist in our distribution and school staff wishing to request books can find requisition forms on the SEDS.org High Frontier Distribution page.



NewSpace 2011 was jam packed with exciting events, top notch speakers and more students than ever before. The conference ran from July 27-30. The NewSpace 2011 conference took place at NASA Ames in



CA. The conference hosted many VIP speakers and panelists such as Lori Garver, Will Pomerantz, Tim Pickens, George Nield, Bob Richards and many others. Another feature of the conference were the special events such as recruiting by SpaceX, Space Systems Loral, Young Professionals networking dinner, the gala and the unique and fun event the NewSpace TweetUp at the Hacker Dojo. The NewSpace Business Plan Competition also took

place during the conference and held a boot camp along with the competition which was an intense time of refining and filling out ideas to make the best business plan. This year's winner was Jon Goff's company Altius Space Machines, who won the \$25,000 grand prize.

Some new features of the conference were the themed networking parties that took place each night, the ability to send in questions via email to moderators for panels and the sheer amount of exhibitors who were recruiting at the conference such as Space Systems Loral, SpaceX.

- Sara Meschberger, SEDS-USA Vice Chair



Above: The Celestial Circuits team presents at the NewSpace Business Plan Competition finals at the Space Frontier Foundation's NewSpace 2011 conference held at NASA Ames, on July 29, 2011 in San Jose, California. (Photo by Nancy Ostertag/SFF)

SEDS-USA

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SEDS ALUMNI SPOTLIGHT

Name: Robert Pearlman
SEDS Chapters: University of Maryland, College Park / Maryland SEDS (MSEDS)
Years: 1994-1998

1) What is collectSPACE and how did it get started?

collectSPACE is the leading online publication and community serving space history enthusiasts and professionals, including authors and historians, museum curators and conservators, former and present space program workers and space memorabilia collectors.

We provide original news reporting with a space history focus, resource guides, astronaut appearance and space history-related events calendars and host a very active discussion forum.

collectSPACE was founded in July 1999, born out of a desire to catalog my space artifact collection ahead of a move. The site then became a development playground for the work I was doing for Space.com and Space Adventures, slowly growing an audience by word of mouth. In 2005, with a readership expanding into the thousands, editing and producing collectSPACE became my full time profession. Today, over 250,000 visit the site monthly and through syndication agreements, our articles have a reach of more than 4 million people.

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

Other than recommending that all SEDS members take it upon themselves to see a space launch (or two) if for nothing else than the inspiration it provides, I would recommend the National Space Society's annual International Space Development Conference (ISDC).

When I was SEDS-USA vice chair and then national chair, I worked to increase the collaboration between SEDS and the NSS. As the oldest space advocacy organization, NSS has a long history of working with students and its goals of advancing a spacefaring civilization are in line with SEDS's own objectives.

In recent years, ISDC has become an excellent opportunity to hear from and network with leaders in



the space community. It also offers an excellent venue to showcase the work that SEDS and its chapters have accomplished.

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

SEDS was directly responsible for beginning my professional career. It was as the President of MSEDs that I co-chaired NASA's Human Exploration and Development of Space conference at the University of Maryland, where the National Space Society was an exhibitor. It was soon after that event, that I was approached by the NSS staff to intern at their headquarters, which eventually led to a staff position and later election to their board of directors.

Indirectly, many of the people I would later work for and with had connections to SEDS. I first met Eric Anderson when he was with University of Virginia's SEDS chapter but later worked with him to establish Space Adventures' early programs and marketing efforts. Space Adventures also introduced me to SEDS' founder Peter Diamandis, who I also helped with Ansari X PRIZE activities. Starport.com, a Space Adventures' spinoff company that was ultimately acquired by Space.com, reunited me with other past SEDS leaders, including Chris Lewicki (University of Arizona) and Jeff Foust (MIT).

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

There are several that come to mind, but on the local chapter level, I have very fond memories of joining other MSEDs members for our annual road trip to Greenbank, West Virginia and the National Radio Astronomy Observatory. We would make observations using one of the smaller dishes, but most of the fun was the time spent stargazing and debating space policy and the future of space travel throughout the night.

5) What advice can you offer to SEDS members in their trials during college from your own experiences?

Look to your fellow and past SEDS members as a rich source for inspiration, direction and opportunity. Some of the best advice and assistance I received in making the transition from college to career was from SEDS members on both the local and national level.

And use the opportunities the organization affords to explore how you can make a difference. Whether you (and your chapter) focus on building a satellite or are increasing awareness about the importance of space exploration on your college campus and local community, your voice and efforts have never been more important to the future direction of space activities than is now.

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



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CHAPTER UPDATES

GWSS SEDS

At the beginning of September GWSS SEDS appointed new chapter leadership and began planning for the semester. To kick off the semester we held a networking happy hour on Sept. 7 which brought together current chapter members from the GW Space Policy program and the GW School of Engineering and Applied Sciences, former chapter members, and members of the broader DC space community.

GWSS SEDS members are traveling extensively in September and October to participate in conferences and activities. These include the CalTech Space Challenge: Mission to an Asteroid (Pasadena, CA), AIAA Space 2011 (Long Beach, CA), 100 Year Starship Study Public Symposium (Orlando, FL), SpaceVision2011 (Boulder, CO), Space Generation Congress (Cape Town, South Africa), and the International Astronautical Congress (Cape Town, South Africa).

GWSS SEDS is also working to assist AIAA and Explore Mars, Inc. with events to be held on the GW campus this fall.

Montana State SEDS

Here at Montana State SEDS we were inactive over the summer break but excited about the new semester. We have been actively trying to recruit new, enthusiastic members for Montana State SEDS as of recently. In the last month we have represented our chapter at two recruiting fairs on campus and acquired a promising number of e-mail addresses. We have also had a couple executive board meetings to discuss some important issues in our club. We have put a lot of work into our budget and are preparing to submit proposals for some funding from both our student governments here at Montana State University as well as our College of Engineering. Along with these proposals we are looking to private organizations for additional funds. Our budget is one of our major priorities because we plan to have some rocket building workshops and also attend SpaceVision during this semester.

We are continuing with our biweekly speaker series for Montana State SEDS, and having our first such speaker tonight. We are really excited about the people who take time out of their day to come talk to us about their experience in the space industry. We're actively working to spread our enthusiasm for these meetings to other students on our campus.

Lastly, because we are a very new chapter at a university that isn't very active in aerospace studies we are considering a joint club with a new chapter of the AIAA (American Institute of Aeronautics and Astronautics). We spoke with one of the persons interested in creating this new chapter and we've decided that a joint club can really improve the member base and funding for both clubs assuming this chapter of AIAA is approved. It is appealing to merge these two groups because many of the students involved share very similar interests and it is always fun to meet more people. We are looking forward to what this semester has to bring and everyone is excited to meet more national SEDS members at SpaceVision later this year.

CHAPTER UPDATES

Purdue SEDS

Purdue SEDS currently has three major technical projects. The hybrid rocket is being completed and should launch within the next year. The USLI team is submitting their proposal to NASA today. The SEDS rocket is under construction and will be flown before SpaceVision 2011. Our current plans for outreach include plans on attending CSI at the Indiana State Fair, as well as attending Horbert High School in northern Indiana to get the high school kids there interested not only in engineering related fields, but more specifically engineering related fields at Purdue. Our Outreach lead is planning some activities for elementary school kids to get them excited about space at an early age. Also, working with USLI and we are planning an outreach event together, and all the details are still pending. Social events currently in the works are getting a cosmic bowling scheduled really soon, otherwise we have a rocket barbecue picnic coming up.

Purdue SEDS has formed a committee which is preparing a proposal to host SpaceVision 2012 at Purdue University and in the mean time we are fund raising to cover costs to support this years trip to SV2011 in Boulder Colorado. We have ~20 interested members in attending but are not entirely sure we will be able to raise enough fund to get all of them there/help with hotel costs.

SEDS—UCF

SEDS-UCF has been busy this semester so far, recruiting and participating in numerous projects. We recently had our first meeting and found a heavy interest in attending the upcoming Spacevision from our newer members. There is also a public symposium happening locally called the 100 Year Starship Symposium that some of our members are planning to attend.

We have numerous projects planned and in progress. Right now, our older members are currently participating in the SEDS National High-Powered Rocketry Competition. We are planning to perform the test launches and the competition launch for October. We also have a Rockoon project in the planning stages. We are planning to work with the local INCOSE chapter on a weather balloon and branch off from there. Our newer members have started participating in FSGC/NEFAR Hybrid Rocket competition. We also have plans for rocketry workshops for our freshmen members and an L1 Certification workshop.

Caltech SEDS

In the previous quarter, Caltech SEDS has been fairly quiet as we have only just started the new school year this past week. We have begun recruiting for club members with the club fair this week and will soon be meeting to figure out and divide up projects for the school year.

As for activity over the summer, Caltech recently hosted the Keck Institute for Space Studies' Space Challenge where we had several members compete and win first place as a team by designing and planning a deep space mission to a near-Earth asteroid and back, returning with a sample of rock or ice.

Our goals for this year include increasing membership, awareness, and activity while starting new projects to allow members (new and old) to pursue their ideas related to space.

CHAPTER UPDATES

ASGSB SEDS

Accepted to Graduate School

Hans Waldenmaier has been accepted to a PhD program at the Universidade de Sao Paulo, Brazil. He will be working with Dr. Cassius Stevani to study bioluminescent mushrooms. Here is a photo of Hans setting up his telescope to observe a shuttle launch.

Publications

Our student Christina Johnson's work with the BRIC-16 project will be published in next month's edition of *Astrobiology: An Endogenous Growth Pattern of Roots is Revealed in Seedlings Grown in Microgravity*. Here is a photo of Christina with her faculty mentor Dr. John Z. Kiss.

Upcoming Events

9/22/2011 – Our students Robert Ocampo, Maggie Brown, David Peterside, Chelsey Robinson, Johnny Wise and Christina Johnson will join AIAA at the Capitol for a panel entitled "Students Bringing Space Research Down to Earth," 1-3pm Russell Senate Office Building room 253.

10/21/2011 – Dr. Heike Winter-Sederoff will visit Miami University, Ohio to present a seminar "Transcriptional and posttranscriptional regulation of tropic responses in plants."

11/2-6/2011 – Annual Meeting. We are preparing for the 2011 American Society for Gravitational and Space Biology (ASGSB) & International Society for Gravitational Physiology (ISGP) joint meeting in San Jose, California. This is when our student members get to meet in person to decide on the upcoming year's events and vote in new officers.

UB-SEDS

UB-SEDS has been concentrating largely on its large Rocketry and Nanosat project groups in this past quarter, although other groups have also been in action:

Rocketry is close to finished with the high-powered system, which will be launched during early October. It will fly 10 pounds to 10,000 as part of the SEDS Rocketry Competition. After that project has been completed, the Rocketry Project Group will transition to design and development for the Intercollegiate Rocket Engineering Competition, which will include a custom flight computer and hybrid propulsion.

Nanosat leadership attended Preliminary Design Review in Logan, UT, in mid-August, as well as part of the SmallSat Conference. Comment review with the USAF is this morning! The size of the team is up past 50 now, as well, just in time for Critical Design Phase!

The High-Altitude Balloon Group is building their payload, which should launch later this month. The system will include a GPS Phone and HAM radio for tracking. It will collect data on height, pressure, temperature, and other environmental conditions. This project will continue if and when members propose supplementary experiments (which may be desirable for Nanosat testing).

The Educational Outreach Group is beginning biweekly volunteering at the Buffalo Museum of Science.

The Astronomy Group is looking forward to ordering new eyepieces and solar equipment this semester, and also will hopefully be observing the supernova in M101, pending good weather. In addition, the group hopes to start on the plans for a large-scale, student-run observatory on campus, with corporate and charitable support.

Lastly, the party committee will soon begin planning for Yuri's Night 2012, which should draw 100 or more people to a location in the city to celebrate the universe.

Farewell to the Space Shuttle Program

“On behalf of the greatest team in the world, good luck to you and your crew on the last flight of this true American icon.” –Mike Leinbach, STS-135 Launch Director

“The shuttle’s always going to be a reflection of what a great nation can do when it dares to be bold and commits to follow through. We’re not ending the journey today, we’re completing the chapter of a journey that will never end...let’s light this fire one more time and witness this great nation at its best.” – Christopher Ferguson, STS-135 Commander

It may have taken only eight minutes, but the launch of Atlantis on STS-135 will be forever vivid in the minds of over one million people who flocked to Florida’s space coast to experience it in person, and countless others who watched from work, school, or home on TV. It marked the end of a program that defined an entire generation, spanning three decades and flying 355 astronauts on 135 missions.



Above: Space Shuttle Atlantis prepared on the pad, waiting for the final countdown to reach zero. Image Credit: Andrew Dianetti, UB-SEDS President

Everywhere you went, people were all excited about the same thing – not only the shuttle launch itself, but space flight itself, and the achievements it has made and those that are yet to come. Not even the Super Bowl can draw so many people and create so much excitement in an area.

I was fortunate to have been one of 150 lucky NASA Twitter followers that were selected to attend the “NASA Tweetup.” NASA hosts Tweetups frequently – for all manned and unmanned launches, as well as other events, but if there was one that I wanted to be a part of, this was the one. We were given access to view the launch from the KSC Press Site, tour the VAB, visit pad 39A as the Rotating Service Structure was being rolled back, and meet with former and current astronauts as well as NASA managers. The experience was incredible – meeting so many people from so many different backgrounds that were excited and passionate about spaceflight was inspiring. Of course, watching four people ride atop 7 million pounds of thrust wasn’t too bad either!

Exciting is an understatement when describing any rocket launch, much more or less the space shuttle. But the energy and circumstances around this launch made it even more memorable. The countdown was not uneventful. The weather was abysmal the day before launch, dumping large amounts of rainfall and causing a lightning strike at the pad, which thankfully did not cause any damage. This rain continued through much of the night, and the next morning didn't look much better. Most people arrived at their viewing sites long before sunrise, and as it got light out, it remained quite dark and gloomy. This did little, however, to dampen positive attitudes. Even though there was only a forecast of 30% favorable weather, everyone remained positive, knowing that the odds still gave some chance of launch. As the day went on, the energy grew, and a few hours later, you could just feel it – there was a feeling in the air that there would indeed be a launch. The weather, although still cloudy, was drastically improved.

The weather was go, systems were go, and the world counted down one last time – until they stopped. The clock stopped at T-31 seconds, or the point of “auto sequence start,” when control is handed off from the Ground Launch Sequencer to Atlantis's onboard computers. This is a fairly common point for unexpected holds – it stood in striking similarity to Columbia's first launch on STS-1 30 years earlier, where the count was held at the same point. With only minutes remaining in the launch window, spectators initially feared the worst in the likelihood of a scrub. But the problem was minor – only a lack of verification that the Gaseous Vent Arm had been retracted – and the count resumed shortly after, this time, re-energizing the crowd even more. The launch was flawless, and invoked a variety of emotional responses in all of the people lucky enough to witness it. For those watching in person, looking at the SRB's was like looking into the sun, and the sound vibrations were far greater than anything most people have experienced.



Above: The aftermath of Space Shuttle Atlantis taking off to the stars for its last flight to space. Image Credit: Andrew Dianetti, UB-SEDS President

The mission was a large success, carrying nearly five tons of cargo to the International Space Station, and making a picture-perfect early morning landing at the Kennedy Space Center eight days later.

Although the shuttle program is now over, spirits remain positive as we look toward the future. This was an underlying theme that was evident among most that I met at the launch. Although it is sad to see the end to such an iconic program, it gives us the opportunity to develop new technologies and reach destinations beyond the confines of earth orbit. This presents exciting challenges for the future, and if we, in the words of Chris Ferguson, dare to be bold, we will continue the journey.

- Andrew Dianetti, UB-SEDS President

Background Images Credit: Andrew Dianetti, UB-SEDS President

Cosmic Fireworks

Imagine this. If our galaxy could be seen from a distance and time sped up to say, one second equals a million years, something curious would be observed. As the galaxy rotated once every quarter billion years, parts of its spiral arms and core would seem to flash brilliantly for brief instants, going off at a furious pace like fireflies in the night. The same goes for every other observable galaxy in our universe: they would be flickering madly as though someone had set a brushfire to a minefield. These sparks would outshine their entire parent galaxy at their peak brightness, and leave in their wake rapidly expanding clouds of gold, silver, and other precious elements. These flashes are the most violent and energetic events in the known universe: they are supernovae.



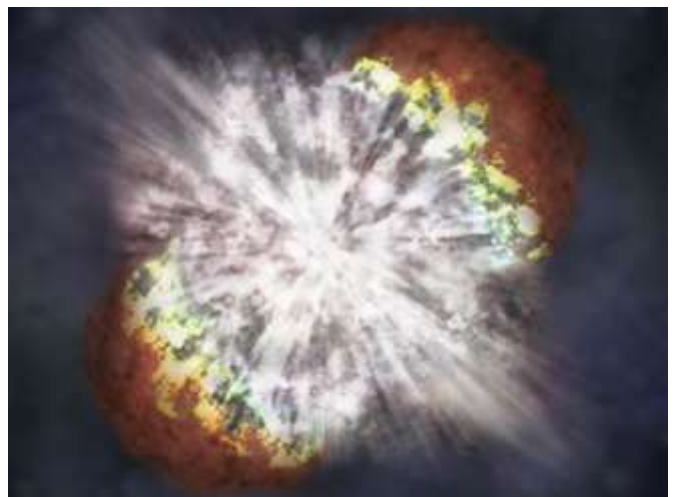
Above: An early image of the supernova in M101.

It is easy to forget that our universe is a dynamic place. We look up at night and see the same constellations, and except for the occasional meteor shower or eclipse, the matter and energy beyond the Earth seem fixed and timeless. This mindset fed past conventional wisdoms about the celestial sphere and how it was the realm of the gods; pristine and untouched, with an orderly aura that seemed altogether comforting. We are locked into a timescale where large-scale change happens over spans not easily perceivable to those trapped on Earth. In a way, this is a blessing. If things changed more rapidly, the universe would have probably wiped us out before we achieved an intelligent civilization. If things changed more slowly, life probably would have never gotten started. Sometimes, however, the universe affords us a rare and precious glimpse into the cataclysmic events that fuel its evolution.

In mid-August 2011, a systematic sky survey known as the Palomar Transient Factory snapped a routine image of M101, colloquially known as the Pinwheel Galaxy, a typical spiral galaxy in Ursa Major, the Big Dipper. When comparing images from August 22nd and 23rd respectively, astronomers discovered a blip on the image that indicated steady brightening of a former white dwarf star in one of the galaxy's spiral arms. The observations were unmistakable: astronomers had discovered a supernova. As untold quantities of energy were liberated from the exploding star, the event grew steadily in brightness until it rivaled the luminosity of its entire galaxy, outshining hundreds of billions of other stars. By early September, the supernova was easily visible through a household telescope, delighting amateur astronomers around the world.

The paradox of space-time is intimately intertwined in observations of these distant events. The Pinwheel Galaxy is roughly 21 million light-years from Earth. This means that this supernova actually occurred 21 million years ago, and its light is just now reaching our eyes and our instruments. The very galaxy in which it is embedded may look dramatically different now, though this speculation is wholly irrelevant. A massive supernova may have even erupted nearby in our own galaxy, but since the nearest star to our Sun is still a staggering four light-years away, it may be a while before we are clued in.

Supernovae within our own galaxy occur at a rate of roughly one per century, and luckily, supernovae within distances



Above: An artist's conception of a supernova.

that could adversely affect the Earth are even more infrequent. All eyes are on massive red giant stars in nearby constellations, most notably the great Betelgeuse in Orion. Though it is a safe radius away from us, the explosion of this star would be the astronomical event of a lifetime. Picture a star shining from horizon to horizon, generating enough light to cast shadows at night, and being clearly visible in broad daylight. A second Sun, as it were. Arab and Chinese astronomers observed such an event around the year 1054 A.D. The supernova remnant known as the Crab Nebula is most likely the remains of this explosion.

Not all stars end their lives in such an extravagant manner. As fusion slows due to lack of fresh hydrogen, many die as a planetary nebula, quietly shedding their layers until their compact core dims slowly out of existence. Our Sun, for example, will meet this fate in about five billion years, as it is not massive enough to explode. To go supernova, a star has to have the proper ratio of electron degeneracy pressure to inward gravitational pull. This means that the forces at work in the star's core have to lose against the tug of gravity attempting to collapse it. When gravity overcomes the electron forces and the core implodes, it generates a shockwave which rips the star apart and creates a massive burst of matter and radiation. A neutron star or a black hole is usually left in the aftermath, formed during the core implosion.

It is worth noting that regular fusion in stellar cores can only produce elements as heavy as iron. All elements heavier than atomic number 26 were generated in the shockwaves of ancient supernova explosions. All gold rings and silver pendants and thermometric mercury and natural uranium were borne out of this process. Gravitational shockwaves from supernovae have also probably influenced many star-forming events, where a cold, dense, homogenous cloud of gas and dust was waiting for the trigger to collapse and form new stars and planets.

Supernovae are not only the ends of stars; they are the beginning of new generations of heavy-element-enriched solar systems and star-forming regions. Stars are like Phoenixes, rising endlessly from their own ashes, but always in new and exciting ways. The Sun, the Earth, and even human beings themselves are products cosmic evolution, driven by slow change and catastrophic events alike. Supernovae have much to teach us of our origin and possible fate. They provide the extremes with which we bracket our understanding. They remind us of the simple truth that we are active participants in the grand story of our cosmos.

Sources Consulted:

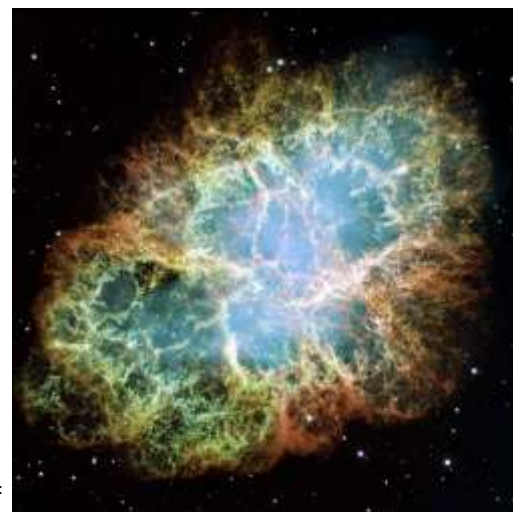
American Association of Variable Star Observers

Harvard Department of Astrophysics

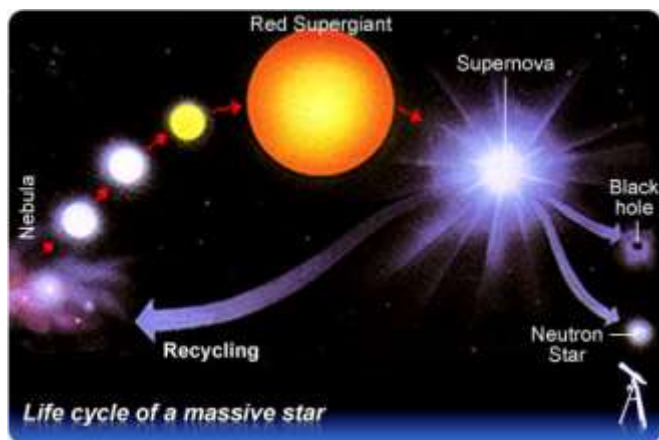
Farnham Astronomical Society

NASA

University of California, Irvine Department of Astronomy



Above: M1, commonly known as the Crab Nebula, in false color.



Above: A simple diagram of stellar life cycles.

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 **October 2001** version of the NOVA:



SEDS-USA returns, with your help!

Brad Beiter, PurdueSEDS, bjb@purdue.edu

Let me first introduce myself, my name is Brad Beiter and I hail from Purdue University in West Lafayette,

many projects I have in the pipeline, and I am sure everyone has an idea of what they would like to see SEDS-USA do.

It is my hope that you enjoy reading this publication, NOVA, but if you would rather see it in an online version, please make your voice heard. (As it takes a lot of

time to get this printed and mailed.)

Please read about the open positions if you would like to run for office. Also, if your chapter is doing an exciting project, please submit it to be included in the newsletter.

Indiana. I am attempting to get the SEDS-USA organization up and running again, in the hope of making it something sustainable and a benefit to us all! One of the major areas I need help in, is manpower. If you are interested in helping out on the national level, and perhaps serving on the Board of Directors, make sure you get in contact with me as soon as possible. There are

"If you would like to help..."

SEDS Online
www.seds.org

With all the project, events, and thriving culture living in SEDS today, its hard to imagine a time when SEDS wasn't strong among university students. Yet it wasn't that long ago that SEDS was on hiatus, and needed students like you to help get it back in gear. This article, from 2001, highlights one of those students, Brad Beiter, who challenged students across the country to take the charge and start SEDS anew. We here at the NOVA encourage you to be interactive in spreading the word about SEDS, and get involved with SEDS on a national level. With your help, we'll never see another article like this again!

5 years ago, SEDS was still in it's "re-building" phase. However, it was growing at a steady rate, and building up to the diverse organization it is today. This article notes the creation of the South Dakota School of Mines and Technology chapter of SEDS. And while that chapter is currently inactive (a quick internet search brought up the webpage- <http://sdspacegrant.sdsmt.edu/SEDS.htm>), the tradition of welcoming our new chapters in the NOVA continues. Nationally, SEDS currently sits at one of its strongest points in recent history, boasting over 30 chapters around the USA.

SEDS LEGISLATIVE UPDATE

Council of Chapters Summary:

July 27th, 2011

Discussion of Chapter Updates: UB, FIT, Harvard, Purdue, GWU, and UW presented brief summaries of activities

Executive Board updates, including a reminder of the *High Frontier* book distribution, a call for high school outreach materials, and a goal to see many candidates in the upcoming SEDS-USA elections

Update on the SEDS Space Advocacy Policy Document

August 31st, 2011

Discussion of Chapter Updates: ASU, Oklahoma, CSM, UA, ASGSB, UK, Montana State, UNC, Purdue, RPI, Texas A&M, Iowa State, Carnegie Mellon, Illinois, CU, UB, GWU, Cal-tech, and St. Louis presented brief summaries of activities

Executive Board updates, including the latest information regarding the SEDS membership system, SpaceVision 2011, and the *High Powered Rocketry Competition*

Motion Carries 19-0-0: Through the fiscal year of 2016, chapter dues shall be raised to 50 dollars per chapter per year

Executive Board Summary:

Released SpaceVision 2012 Bid Packet, which outlines requirements for chapter bids

Enforcing attendance requirements at CoC and Executive Board meetings. If a chapter misses consecutive CoC meetings, restrictions on the use of the "SEDS" name shall be incurred

Assisting SpaceVision 2011 registration

Looking for a temporary Director of Educational Outreach

Organized the *Business Plan Competition* for student teams

Still looking to distribute 300 – 400 copies of the *High Frontier*

Looking forward to the results from the *High Powered Rocketry Competition*

Finalizing the SEDS membership system

Continuing to grow the Endowment

As seen to the right, a SEDS banner was purchased for conferences



SEPTEMBER IN SPACE

- *September 1, 1979:* **Saturn received its first man-made visitor** as Pioneer 11 passed within 21,000 miles of the planet's outer rings.
- *September 3, 1976:* **Viking 2 landed in the Utopia Planitia** region of Mars, a relative flatland area often mentioned as the future construction site of the Enterprise in [Star Trek: The Next Generation](#).
- *September 5, 1977:* **Voyager 1 was launched on its way to Jupiter and Saturn**, trailing behind sister probe Voyager 2 but reaching Jupiter first.
- *September 9, 1975:* **Viking 2 was launched from Earth to Mars**; it arrived in just under a year, but you've probably already figured that out.
- *September 12, 1959:* **Man reached the moon...well, sort of.** The Luna 2 probe launched by the Soviets achieved more bragging rights than scientific facts. It slammed into the moon's surface, *the first man-made object to "land" there*.
- *September 12, 1966:* the next-to-last Gemini mission, **Gemini 11 was launched**, practicing maneuvers in Earth orbit that would be necessary to get live people to the moon without slamming them into its surface.

OCTOBER IN SPACE

- *October 1, 1958:* **NASA was formed.**
- *October 3, 1962:* **Wally Schirra spent 9 hours in orbit** on the Mercury 8 mission.
- *October 4, 1957:* **The Soviets were the first to reach space** when their Sputnik unmanned satellite was launched.
- *October 4, 1969:* Another Soviet first, the **Luna 3 space probe orbited the moon** and sent back pictures of 70% of its far side.
- *October 11, 1968:* The **Apollo 7 mission was launched**, a quiet test of America's first three-man space vehicle in Earth orbit; it was the first American space flight since the Apollo 1 fire had killed three astronauts in January 1967.
- *October 12, 1964:* the **Soviets launch their first three-man space vehicle**, Voskhod 1.
- *October 13, 1933:* The prestigious **British Interplanetary Society was founded.**
- *October 18, 1989:* The **Galileo space probe departed on a six-year journey to Jupiter** from the cargo bay of space shuttle Atlantis.
- *October 29, 1991:* The Galileo probe made history by becoming **the first space probe to study an asteroid**, 951 Gaspra, while en route to Jupiter.

NOVEMBER IN SPACE

- *November 1, 1962:* The **Soviet Mars 1 probe made the first successful flyby of Mars**, though contact with it was lost soon afterward.
- *November 3, 1957:* The **Soviets launched the first living being from Earth** aboard Sputnik 2.
- *November 3, 1973:* The **American space probe Mariner 10 was launched on a groundbreaking tour of the inner planets.**
- *November 9, 1967:* The **engines of the enormous Saturn V rocket used to launch all the moon missions were fired up for the first time.**
- *November 11, 1966:* **Gemini 12 was launched, the last flight of the two-man series** whose many flights yielded information vital to the moon-bound Apollo program.
- *November 12, 1980:* **Voyager 1 passed within 77,000 miles of Saturn's south pole**, its final planetary stop.
- *November 12, 1981:* **Space shuttle Columbia was launched for its second flight**, during which the first tests of the Canadian-supplied remote manipulator arm were carried out.
- *November 12, 1995:* Space shuttle Atlantis launched, **the second U.S. shuttle mission to Russian space station Mir.**
- *November 14, 1969:* **Apollo 12 was launched, the second successful manned moon landing.**
- *November 16, 1965:* The **Venera 3 probe launched by the U.S.S.R. became the first man-made object to enter the atmosphere of Venus**, though the pressure of the planet's atmosphere crushed the probe before it relayed any data.
- *November 19, 1996:* Space shuttle Columbia lifts off for mission number STS-80, **the longest U.S. manned space mission to date.**

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SEDS GALLERY



Left: ISSS SEDS enjoying the outdoors for the 2009 AerE 160 Launch. Image Credit: ISSS-SEDS

Want to see your chapter's pictures featured here? Take pictures of your events and upload them to the SEDS Gallery!

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the official publication of SEDS-USA

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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.

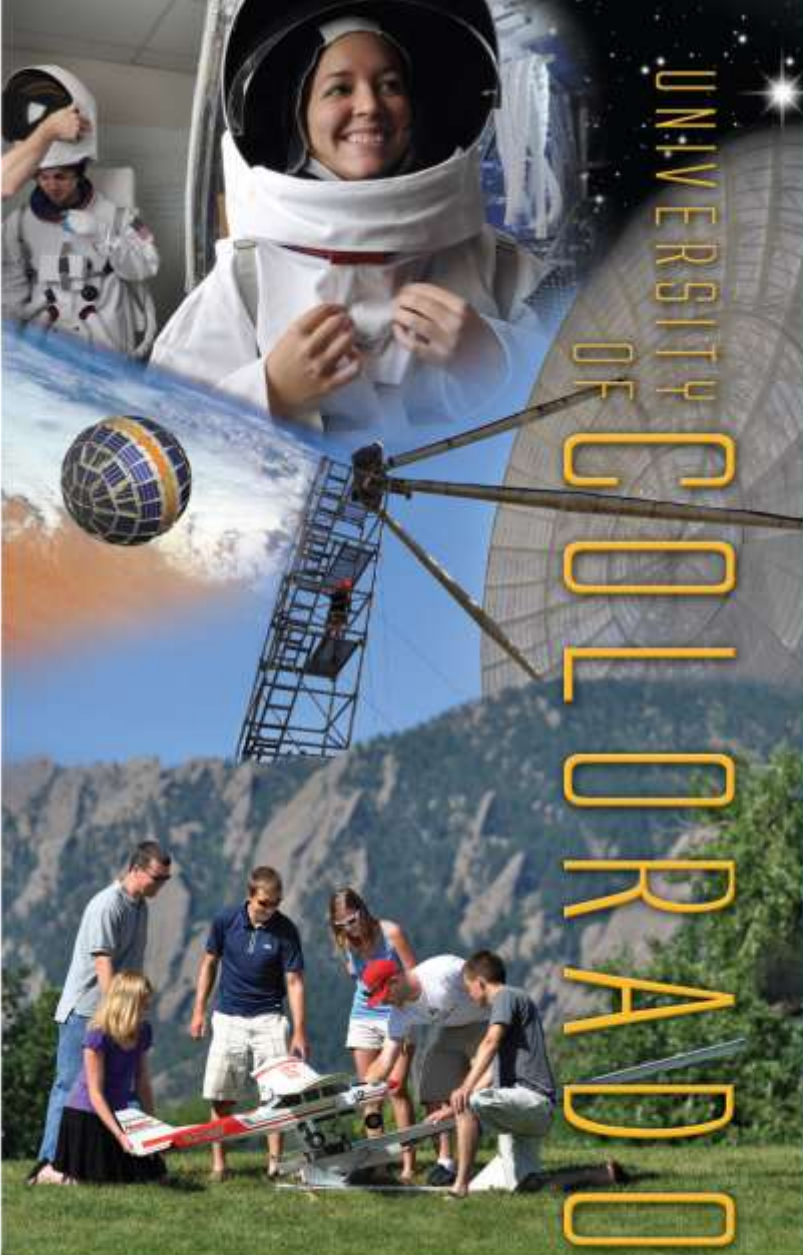
Finally, SEDS provides an environment in which people of common interests can relax and freely discuss issues important to them.

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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