MSGC Newsletter
January 2015

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Director’s Note

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TEDxBozeman

MARK YOUR CALENDARS!!! Please join us Friday, March 27th, 2015 for TEDxBozeman, Montana’s original and largest TEDx event. Selection of speakers is highly competitive and MSGC Director Angela Des Jardins has been chosen to talk. More information can be found here. This is the perfect event at which to hear why total solar eclipses are so rare.

National Network of Total Solar Eclipse High Altitude Balloon Flights

College students will conduct high altitude balloon (HAB) flights from 9-12 locations across the 8/21/2017 total eclipse path, from Oregon to South Carolina, sending live video and images from near space to the NASA website. Video and images during a total eclipse from near space are fascinating and it’s only been done once before in Australia in 2012, see footage here. It’s never been done live, and certainly not in a network of coverage across a continent.

Each team can fly a secondary payload either of their choice or in combination with a constellation of radiosonde payloads to measure temperature fluctuations, development of atmospheric gravity waves, solar coronal imaging and more.

Stay up to date on the project with our new website.

National Student Solar Spectrograph Competition

In its fourth year the National Student Solar Spectrograph Competition was held May 14 - 16, 2014 in Bozeman, MT. NSSSC is MSGC's Education Program for NASA's Interface Region Imaging Spectrograph (IRIS) mission. Student members of the winning teams were awarded funding to travel to the Rock-On Workshop at NASA Wallops Flight Facility (see photo to left). The competition has been suspended for the upcoming year. For information on past competitions, the 2014 winning teams, and updates on future competitions please visit the National Student Solar Spectrograph Competition website.
Updates

LAUNCH

Launching Culturally Relevant Montana Careers in STEM (Launch) is MSGC's NEW two-year program funded by NASA's National Space Grant College & Fellowship program that involves students from Montana's community colleges in a ladder of training opportunities designed to increase student skills while providing overarching retention and professional development support. Find out more about this exciting program on our Launch website.

Affiliate Highlight: Chief Dull Knife College

While the Montana Space Grant Consortium has been a part of the science program at Chief Dull Knife College for many years, the program continues to have new and surprising impacts on both staff and students. In 2013, seven of CDKC's faculty - math, science, computer and communications - got the opportunity through MSGC to travel to the MAVEN space launch at Cape Canaveral in Florida. The trip itself was a fantastic experience for all involved, but more importantly, it sparked interest in a number of different space-based opportunities at the college. Because of MSGC, CDKC has students learning about rocketry, building their own rockets and planning to attend the First Nations Rocket Competition in Wisconsin in May. The students already have built a water bottle rocket launcher and designed individual rockets for launch, built a large wind tunnel for testing their rockets, have explored possibilities for research payloads for their rockets to carry during the competition, and generally have become enthusiastic about both space and rocketry.

Students from CDKC also have received internships at NASA facilities, and have gone on to study science at a variety of universities, supported by MSGC scholarships. "The Montana Space Grant Consortium is like a catalyst in a chemistry experiment," said Jim Bertin, a math teacher at CDKC and MSGC representative. "It helps things get started, and makes things happen."

Congratulations to MSGC Graduates

In 2014 with graduation ceremonies across the state of Montana 18 MSGC students wore graduate sashes to highlight their involvement with MSGC. The photos to the left are Ed Kleinsasser - UM graduate, Mary Peterson and Andrew Crawford - MSU Graduates. All MSGC scholarship, fellowship, internship, and research students are encouraged to pick up a graduation sash to wear at their graduation ceremony and festivities. Congratulations to all of the 2014 MSGC grads!

Some MSGC students have been lucky enough to have MSGS Deputy Director Randy Larimer as an instructor (right), recipient of this year's MSU College of Engineering Excellence in Teaching award.
Awards

William A. Hiscock Memorial Award

Congratulations to Kobi Hudson, recipient of the 2014-2015 William A. Hiscock Memorial Award. Kobi is in his second year at Rocky Mountain College working towards majors in computer science, mathematics, and physics. It is also his second year being involved with the Montana Space Grant Consortium. Kobi spent this past summer in Bozeman working with the Space Science Engineering Laboratory (SSEL) on their many projects including FIREBIRD II and III CubeSats. Kobi hopes to continue his work in computer science, math, and physics and make it as space related as possible and eventually have a job involving aerospace!

This spring semester, with the aid of the Hiscock Memorial Award, Kobi will be continuing work started his freshman year on the Algae Growth and Remediation (AGAR) project to grow algae in zero gravity and test its CO2 remediation. The project involves designing a test structure for a NanoRacks NanoLabs enclosure for growing the algae. The test structure has to be built within the dimensions of a 1.5u CubeSat standard and the entire structure has to weigh one kilogram or less. Growing the algae in zero gravity has been attempted before by growing it in water. The problem with growing algae in water in zero gravity is that the water tends to bubble apart and stick to the walls of the containers it is in. The factor that the AGAR test will be switching up is the water. In this test the water will be replaced with agar. The test of growing algae in agar in zero gravity will be the first of its kind. Congratulations Kobi!

MSGC Scholarships and Fellowships

MSGC’s annual Scholarship and Fellowship Competitions are held each Spring for awards for the ensuing academic year. Awards are normally made to select students enrolled at MSGC campuses in disciplines related to Science, Math, Engineering, Technology or other areas of interest to NASA. Visit the MSGC website to find more information at our Scholarship and Fellowship Page.

ARES Research Awards

The Awards for Research in Engineering and Science (ARES) program traditionally awards funds to Montana's 19 smaller campuses for undergraduate research projects. Interested students work with a faculty mentor on a proposed research project beyond their coursework. Students receive a stipend of $750 per semester or $500 per quarter. Applications for spring ARES projects are due on February 20, 2015. Visit the MSGC website to find our ARES Page.

2014 ARES Projects

Congratulations to Victoria Kong of Carroll College on her Spring ARES award. She is a sophomore at Carroll College. Her research this past summer was focused on perfecting a screen-printing technique for the metal-oxide thin films on a glass substrate used with the SHArK kit. Victoria is working towards a Biology Major and a Combined Fine Arts Minor in both music and studio art. She was born in a suburb outside of Portland, Oregon and went to Lake Oswego High School. When she is not working on schoolwork, she likes to draw and paint in her free time. In particular, Victoria likes to focus on working towards creating photorealistic drawings. She also enjoys hiking and soaking in the sunshine, "it's even better when I can find a good place to sit and paint the scenery around me!"
**Expansion** of ARES Research Awards

MSGC has also supported undergraduate research programs at MSU-Bozeman, UM-Missoula, and Montana Tech directly through those institutions. Due to the success of the ARES program at the other MSGC campuses, we will be adding MSU-Bozeman, UM-Missoula, and Montana Tech funds to the pool for expanding ARES opportunities to those students starting in the Fall of 2015.

MSGC Apprenticeship Program

The MSGC Apprenticeship Program is an opportunity for Montana students at all member institutions working in Science, Technology, Engineering, and Mathematics (STEM) to receive funding to work on a major research project with an advisor on their campus. MSGC Apprenticeships are intended to be next steps after smaller undergraduate research projects and will typically take place during the academic year. Please see our webpage of current awardees.

2014 Apprenticeship Highlight

Congratulations to Angelita Bearquiver, recipient of a 2014-2015 Apprenticeship Award. Angelita is a graduate of Chief Dull Knife College and is currently pursuing a degree in Chemistry with a minor in Biology at MSU-Billings. She is from the southeastern part of Montana on the Northern Cheyenne Reservation in an area called Kirby and outside the town of Busby. She finds doing research an amazing adventure of new scientific discovery. Such as seeing what kinds of microbials are still existing within an ecosystem and how they relate to the foundation of life. Her apprenticeship research involves the investigation of how salinity levels in stream sediment shape microbial community assembly. Angelita’s research is a transplant experiment, where she is taking an group of microbials that has been exposed to a certain way of life, transferring them to a different area and see how long they will take to adapt to that area. It is a question of which microbials will become a domain specimens due to the transformation.

Student Opportunities

BOREALIS Ballooning Program

MSGC’s Balloon Outreach, Research, Education, and Landscape Imaging System (BOREALIS) trains Montana students to fly balloons carrying scientific payloads and imaging systems to the edge of space. Launch centers at MSU-Bozeman and UM-Missoula will fly student experiments for any MSGC affiliate institution.
Conducted our first successful valved balloon experiment.

This year, the BOREALIS program continued research into the development of a valve system that we can use to control the ascent and descent profile of our standard latex weather balloons. We accomplished our first of several successful valve controlled balloon flights in June of 2014. This technology was developed primarily by Tim Basta and has tremendously enhanced the capabilities of our ballooning program. The valve offers us the ability to obtain neutral buoyancy or float allowing for longer flight times at altitude. It also provides us control over when and where we want to descend so as to achieve a safe landing.

Implemented a landing prediction algorithm to our on-line balloon tracking website.

Nichole Murray and Elizabeth Carlson (Carroll College) developed code to extract the wind profile from GPS position data collected during the ascent to compute where the payload would land if the flight were to be terminated at that point in time.

BOREALIS Interns, Tim Basta and Scott Miller presented at the High Altitude Balloon Conference at University of North Dakota in June, 2014.

Tim Basta’s presentation was entitled: "Developing a Zero-Pressure Flight System” Scott Miller’s presented was entitled: "Repurposing an Iridium Satellite Modem into a Two-Way Balloon Tracking and Communications System.”

Transmitted live images of the Teton Mountains from 93,000 feet on July 31st launch from Rexburg Idaho.

BOREALIS Summer Intern, Luis Maia successfully downlinked images from a Raspberry Pi with a serial camera at altitude through a RF Modem.

MSU Football Pre-Game Stadium Launch, September 20th, 2014

MSGC students from MSU, UM, and Carroll College launched a balloon at midfield as part of the pre-game activities. This event was and pictures from the flight were highlighted in the MSU College of Letters and Science fall 2014 publication “Confluence”.

MSU payload flown on ATA Aerospace zero-pressure balloon launched on October 28th from Holloman AFB, New Mexico

Scott Miller, Trevor Clark and Randy Larimer travelled to Holloman AFB in New Mexico where they integrated our Raspberry Pi / RF Modem payload onto an ATA Aerospace zero pressure balloon. A new tracking antenna for the ground station was designed and constructed. The devices uses the GPS coordinates reported from our Iridium Satellite Tracker to keep the antenna pointed directly at the balloon payload.

Watch the year in review video on YouTube.

This summer the UM BOREALIS team began a new collaboration with UM climatologist Ashley Ballentyne. The project is to acquire $CO_2$ and methane atmospheric profiles from a balloon using an AirCore. The AirCore was developed by NOAA and a version was built this summer by Montana Tech mechanical engineering student, Shelby Mallin. The flight is an effort with both MSU and UM ballooning programs. An additional project was begun this summer by UM student and computational physics major Reed Hovenkotter to increase the forecast accuracy of balloon flight predictions utilizing NCAR's Weather Forecast and Research model (WRF). Continuing our data collection efforts with radiosonde flights, we joined Miles Community College and flew with their new radiosonde system (photo to left).
Space Public Outreach Team

Watch A Day in The Life of a SPOT Presenter on YouTube.

The Space Public Outreach Team (SPOT) provides FREE presentations about current NASA missions to Montana schools, youth programs, and community groups. Presentations available for the 2014/2015 school year are Mission to Mars and the revised show Life in the Universe. We have added interactive pieces to the show including the use of iClickers and role playing cards. To request a free presentation email spot.montana@gmail.com or visit the SPOT website.

Student Research Symposium

MSGC Student Research Symposium

The 2014 MSGC Student Research Symposium included 160 participants from 11 Montana campuses, 32 student speakers, 25 student posters, 5 corporate sponsors, and 6 student awards. The symposium is a unique opportunity for Montana students to present their research among twenty participating Montana institutions. We have two fantastic keynote speakers for 2015 with Jaime Waydo from Google[x] and Geoff Bland, NASA Engineer. All MSGC student participants and their advisers should plan to attend the Symposium at Montana State University in Bozeman on Saturday April 18, 2015. There are new awards being offered requiring a nomination ahead of the symposium. Please register online, view the draft schedule, and view the new award guidelines at www.spacegrant.montana.edu by Friday April 3, 2015.

2014 MSGC Student Research Symposium Awards

Each year at the MSGC Student Research Symposium cash prizes are awarded to the top student presenters. Left is the 2014 group picture. Included in the photo is the 2014 invited speaker Michelle Larson, director of the Adler Planetarium. Also included are high school and middle school Montana science competition awardees for travel to the research symposium provided by MSGC.

- Best Undergraduate Poster from a Research Institution: Kathryn Manning, Kassandra Miller, Mary Peterson, Genevieve Suwara, Tesha Tevary, Allison Walsh, Montana State University-Bozeman & Kyren Bogolub, University of Montana - Missoula
- Best Undergraduate Talk from a Small Institution: Noel Stewart, Salish Kootenai College
- Best Undergraduate Poster from a Small Institution: Ksenia Lynch, Rocky Mountain College
- Best Graduate Student Talk: Caleb Pan, University of Montana-Missoula
- Best Graduate Student Poster: Zach Gill, Montana State University-Bozeman
- Best Undergraduate Talk from a Research Institution: Allison Mueller, University of Montana-Missoula
Astronomy and Aerospace Day

Please join us Sunday, April 19th, 2015 for Montana's largest astronomy- and aerospace-related event.

Astronomy & Aerospace Day will be from 1-4pm at the Museum of the Rockies. This is our opportunity as STEM educators and industry leaders to uniquely communicate the importance of STEM to the community where we live and work. We all recognize how fortunate we are to be able to do what we do day to day. This is our chance to give back and foster stronger ties with our community that gives us so much in return.

This year we have additional opportunities for MSGC students at our affiliate institutions to share their passion for science to the public. If you are interested in being an exhibitor please fill out our web form.

April 19, 2015 1pm Museum of the Rockies

Summer Internships

NASA and MSGC Summer Internships

MSGC sponsors Montana students participating in summer research internships at NASA centers and in Montana. Internships come with a $6000 stipend from MSGC. Students not from MSU-Bozeman can apply to spend the summer working with the Space Science and Engineering Laboratory (SSEL) at MSU-Bozeman, and all Montana students can apply to work with MSGC’s BOREALIS balloon program at MSU-Bozeman and UM-Missoula. MSGC will also place interns in local aerospace companies including 406 Aerospace and Montana Instruments. The priority application deadline for Montana summer internships is March 1, 2015. MSGC also sponsors Montana students to travel to NASA centers for summer internships. The NASA internship applications should be completed by March 1, 2015.

Congratulations to Noel Stewart (above) on her Summer 2014 NASA Goddard internship and thank you for giving MSGC students and staff a tour of Goddard Space Flight Center.

Summer Internships at NASA Centers and MSGC

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<th>Jet Propulsion Laboratory</th>
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<td>NASA Summer Internships</td>
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<td>SSEL, specifically for students not from MSU-Bozeman</td>
<td>Priority Application Deadline March 1, 2015</td>
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<td>BOREALIS, MSGC’s high altitude balloon program</td>
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<td>406 Aerospace, Satellite Development and Services</td>
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<td>Montana Instruments, Thermal Imaging Technology</td>
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MSGC Affiliate Meeting

The annual Fall MSGC Affiliate Meeting was held on Saturday October 4, 2014 in Missoula. This was the first meeting outside Bozeman. We added an informal reception the night before at Missoula’s SpectrUM museum. We look forward to future meetings and having more time to interact with our member institutions. Thank you to the affiliate representatives for attending!

Welcome to our new member institutions Gallatin College, Great Falls College MSU, and Missoula College!

MSGC Affiliate Campus Visits

The MSGC staff has made visits to several affiliate campuses this past year. Visits usually include a presentation about MSGC for interested students, faculty, staff, and administrators and meetings with anyone on campus working in STEM fields or interested in MSGC programs. We try to include hands-on activities with students provided there is time. In 2014 MSGC staff have visited Salish Kootenai College (4-22-14), Miles Community College (July 15 & 16), Flathead Valley Community College (11-14-14), Great Falls College MSU (11-18 -14), Stone Child College (11-18-14), and Aaniiih Nakoda College (11-19-14). Affiliate campuses that are interested in scheduling a visit from MSGC are encouraged to contact us.
Education

2014 MSGC Education Enhancement Grants

Education Enhancement grants are awarded annually on a competitive basis to significantly improve educational programs and resources in fields of science, technology, engineering, and/or math (STEM) at the MSGC member colleges and universities and/or K-12 school systems. Please see our webpage for 2015 EE recipients such as Dr. Brenda Canine of Great Falls College - MSU and Dr. Nicholas Lux of Montana State University.

Montana NASA EPSCoR

Faculty Connections, Travel, and Faculty Research Supplies Programs

Montana NASA EPSCoR offers the Faculty Connections Program as an opportunity for Montana faculty to receive funding and support to make a connection with a new NASA research contact and travel to visit them at a NASA center. Participating faculty will work with the MSGC staff to make a connection between their research program or interests and a researcher or group at a NASA center. They will receive up to $1500 to arrange travel to a NASA research center with the goal of developing new collaborations, projects, and proposals to foster the growth of NASA related funded research at Montana institutions. There is no application deadline, applications may be submitted at any time. In 2014 four faculty participated in meetings at NASA centers through the Faculty Connections program.

The Montana NASA EPSCoR Travel Program offers up to $1000 for faculty travel to NASA Centers or Headquarters or visits to MSGC-member campuses by NASA personnel or other established, prominent scientists and engineers from universities and industry working in NASA-related fields. There is no application deadline, an application can be submitted at any time. In 2014 at least six faculty members applied and received funding. Students get support with the travel program if their application includes a letter identifying the benefits the travel will have on their advisor’s research.

The Montana NASA EPSCoR Faculty Research Supplies Program offers up to $1000 for research supplies for projects related to current NASA research goals. This is typically for the smaller campuses. There is no application deadline, an application can be submitted at any time. In 2014 at least three faculty members applied and received funding.

Current NASA EPSCoR Research Group Grants

NASA EPSCoR Research Group grants are awarded nationally each year. Montana groups have been successful in winning a number of these large awards. Please see our webpage for award recipients. Left is Dr. Wataru Nakagawa of Montana State University Bozeman presenting to collaborators and students at Flathead Valley Community College working with the 2014 award, Nanostructured Polarization Optics for Atmospheric Remote Sensing.
Research Initiation grants are awarded annually on a competitive basis through internal and external review of proposals. These are intended as seed money to submit a follow-on proposal to NASA for regular research funding. Visit the MSGC website to find past and current Research Initiation Awards. Congratulations to the 2015 Research Initiation grant awardees of Montana State University Bozeman Dr. Roberta Amendola and Dr. James Wilking.

(MSGC Calendar of Events)

February 20, 2015 - Spring ARES Applications Due - (http://spacegrant.montana.edu/ARES.htm)

February 25 - February 28, 2015 - National Space Grant Meeting, Washington, DC - (www.spacegrant.org)

March 1, 2015 - NASA Summer Internship Applications Due - (https://intern.nasa.gov/)

March 1, 2015 - MSGC Summer Internship Applications Due - (http://spacegrant.montana.edu/internshipsMSGC.html)

April 1, 2015 - MSGC Scholarship, Fellowship, & Apprenticeship Applications Due (http://spacegrant.montana.edu/apprenticeships.htm)

April 18, 2015 - MSGC Student Research Symposium - MSU - Bozeman (http://spacegrant.montana.edu/studentResearchSymposium.html)

April 19, 2015 - Astronomy and Aerospace Day - Museum of the Rockies - (http://eu.montana.edu/astronomyday/)

June, 2015 - Launch Summer Workshops - Salish Kootenai College and Haskell Indian Nations University (http://spacegrant.montana.edu/launch.html)

May 26 to August 7, 2015 - MSGC Summer Internships - Bozeman & Missoula (http://spacegrant.montana.edu/internshipsMSGC.html)

Early Fall 2015 - Research Initiation and Educational Enhancement Grants Call for Proposals (http://spacegrant.montana.edu/grantsFaculty.html)

September 2015 - MSGC Annual Affiliates Meeting in Great Falls

October 1, 2015 - Hiscock Award Applications Due (http://spacegrant.montana.edu/hiscockScholarship.html)

October 2015 - MSGC Fall ARES Applications Due (http://spacegrant.montana.edu/ARES.htm)
Congressional Visits

Monte and Champ took in the sites of Washington DC in 2014. Left - Right: Air and Space Museum, Rental Bikes, White House, Janet Rankin Statue at the Capitol

If you find yourself in Washington DC, we encourage you to visit with your Montana delegation. Your Congressman and Senators can arrange a free tour of the Capitol Building and if you are there on a Wednesday stop by the Montana morning coffee to get a photo, chat with fellow Montanans, and, of course, have a cup of coffee. MSGC has been well represented in Congress and your delegation enjoys hearing how beneficial their support has been.

A Note from the Director

Dear Friends of Montana Space Grant,

In the past year we've spent a lot of time, energy, and heart on making sure we're offering the most effective opportunities for our community. This can be seen in most of the highlights presented here and especially in the new Launching Culturally Relevant Montana Careers in STEM program for our community college students. The source of the energy and heart lies solidly with the MSGC staff and Affiliate Representatives. We have the most amazing team of people working tirelessly to create career-making chances for Montana's higher education students. In turn, the students constantly inspire us and keep us fueled with motivation!

If there's one message that seems to have spoken to us over and over in the last year it is the power of individuals in students' lives. Even a brief conversation with a student can trigger a life-long impact. All it takes is a simple one-on-one statement coming from a person of respect/authority, "I think you'd be great at this, you should try." Works almost every time.

We wish you a fantastic 2015! Keep up to date on MSGC opportunities by liking us on Facebook and checking our webpage regularly.

Best Regards,

Angela