

National Council of Space Grant Directors Fall Meeting

Charleston, South Carolina, October 13-15, 2013

SUNDAY, OCTOBER 13

The morning sessions consisted of business meetings, including the Executive Committee board meeting and the Foundation board meeting.

The general sessions began in the afternoon. Because of the government shutdown at the time, no NASA personnel could come to the meeting. Their presentations were cancelled and replaced by other talks, as indicated below.

Student posters were displayed throughout the meeting. It should be noted that all presentations that used visual aids are available at the Council web site.

General Session: Day 1 (Carolina Ballroom)

1:00 (10) Welcome – ***Cass Runyon***, SC Space Grant Consortium

- Cass Runyon opened the meeting by welcoming everyone. She gave information about logistics and the evening reception. She introduced all the SC campus directors. She described the poster areas.

1:10 (20) Intro and Executive Committee Update – ***Yervant Terzian*** (NY SGC), Council Chair

- Yervant Terzian welcomed everyone. He described the revised meeting schedule. Unfortunately, all talks by NASA personnel have been cancelled. Yervant wished a happy 25th anniversary to Space Grant. He introduced the 25th anniversary booklet. Yervant asked all attendees to make sure that this booklet is given to every congressional office. Each consortium will get fifty copies (postage to be paid by consortia).
- Yervant thanked Cass Runyon and her SC SGC team for their amazing organization and help. Yervant thanked Lenell Allen and Diane DeTroye for their support.
- The 25th year review is coming up. We do not have too many details as of now. Yervant stressed the importance of knowing the details of the review well in advance.
- Some consortia have been forward funded for FY 2014. Funding criteria not known by Executive Council.
- Spring 2014 meeting at Sheraton Crystal City, Feb. 27 - March 1. Fall 2015 meeting in Arizona.
- Yervant reported that the SG Executive Council discussed merits of the frequency of Space Grant meetings. He indicated that this issue will be discussed later on in this meeting.
- There are two new directors: Vermont introduced their interim director, Darren L. Hitt. Charisse Buising is the new director at Iowa. Susie Johnson is the new program manager of Idaho SGC. NC introduced Sandy Canfield, Assistant Director for Partnership and Resource Development. Jennifer Fowler is the new education specialist of Montana SGC. Delaware introduced associate director Chad Starks, of Delaware State University. Arizona introduced a new affiliate representative, Casey Kahn-Thornbrugh, of Tohono O'odham Community College.
- Yervant next gave a talk, together with a PowerPoint presentation, on Fallacies and Paradoxes.

1:30 (10) Secretary and Treasurer's Report – ***Haim Baruh*** (NJ SGC), Council Secretary and
Peter Sukanek (MS SGC), Council Treasurer

- Haim Baruh presented the minutes, which were approved unanimously.
- Peter Sukanek gave the treasurer's report. Also approved unanimously.

1:40 (10) Nominating Committee Update – ***Bill Garrard*** (MN SGC), Nominating Committee Chair
Elections and Report by the Foundation.

- Bill Garrard reported on vacancies in the Executive Council and Foundation.
- Nomination committee will have nominations for the Executive Council at the Spring meeting and there will be elections in the Spring meeting.
- Foundation election was held for two vacant positions. Nominees: Pat Hynes, Paul Johnson, Suzanne Smith. No nominations from the floor.

- Paul Johnson and Suzanne Smith were elected.

Invited Talks

1:50 (30) NASA Headquarters Presentation – **Leland Melvin**, NASA HQ

- This talk was replaced by elections for the Foundation and an informative talk about the Space Grant Foundation by Mark Fischer, Executive Director of the Foundation.
- The Foundation has about 2.2 FTE staff positions.
- Mark described the ten contracts that the Foundation has.
- Every state has an expendable fund and an endowment fund. Earnings cross-distributed between the two funds. Flexibility in choosing how the funds are invested. Directors will choose for their states.
- Foundation president Peter Sukanek described details of how the funds in each state's accounts can be spent.

2:20 (45) The Dawn Discovery Mission: A Voyage in Space and Time – **Christopher T. Russell**, UCLA (sponsored by CA SGC)

- John Kosmatka introduced the speaker. Dr. Russell has a very distinguished record, including over 1400 publications.
- Dr. Russell gave a history of asteroid finds and of scientists who postulated the presence of asteroids and who discovered the asteroids.
- He then talked about the history of the Dawn spacecraft project. The project began in 1992. After lots of discussions for eight years, the first time a request for proposal was issued in 2000.
- Dawn 2 began in 2001. Interruption due to Sept. 11 terrorist attacks. There were further delays in 2003, and a brief cancellation in 2006. JPL appealed the cancellation and won. Dawn project restarted. Further delays in 2007. Finally, successful launch in 2007. Dawn uses propulsion engines. There was a Mars assist in 2009.
- The mission will likely end in 2015. Data is currently being collected. Information gathered from asteroids also gives us information about the planets in the solar system. Information gathered on chemical composition of asteroid Vesta. Iron core, mantle, crust. Dark as well as bright material on surface of Vesta. Reason currently unknown. Most likely, there was water in Vesta for over four billion years.

3:05 (20) **Coffee Break and Networking**

Space Grant Student Talks I

All students made excellent presentations.

3:25 (15) Radiation Recoil Effects on the Dynamical Evolution of Asteroids – **Desireé Cotto-Figueroa**, Ohio SGC

- Talk based on her dissertation at Ohio University. There are 1400 potentially hazardous asteroids. They frequently fall to the earth. Plot of asteroid diameter vs. orbital period shows some interesting results. The speaker discussed the Yarkovsky effect. Drift due to rotation of asteroid, prograde or retrograde.
- The speaker also discussed the Yorp effect. Helps in estimating obliquity. Lots of open questions. Speaker developed simulations of the Yorp effect to test theories. Yorp changes spin. Spin changes shape. Shape changes Yorp.

3:40 (15) All for the STEM of It! – **Raven Hooper**, Pennsylvania SGC

- Ms. Hooper is an electrical engineering student at Temple University. She started a robotics lab (Lunabotics) at Temple, a CRATE club, and soccer playing robots.
- The talk was about the experiences of Ms. Hooper. She also was involved with a hovercraft project. She showed a Youtube video of a hovercraft competition. Also worked on a project for kids with hearing disabilities. Ms. Hooper plans to continue her projects in the next academic year.

3:55 (15) Developing a Tohono O'odham Weather and Climate Curriculum – **Casey Kahn-Thornbrugh**, Arizona SGC

- Dr. Kahn-Thornbrugh received his Ph.D. from the University of Arizona. He described teaching challenges at the Tohono O'odham Community College, a Native American tribal community college, located at the Tohono

O'odham Nation. Main issue is the high attrition rate. Part of the weather and climate challenge curriculum project is teaching weather and climate to native tribal cultures, who traditionally have a different type of knowledge of and ideas on weather.

- Historical issues include efforts to fight eradication of native languages. Also, teachers in tribal schools mostly do not have tribal backgrounds, resulting in poor communication with tribal students.
- Teaching methods used have developed based on surveys of tribal students. Weather studies is not a topic of interest to tribal students, as such students deal with the weather in their daily lives.
- Hands on student experiences and community outreach are two approaches that worked with the tribal students.

4:10 (15) First-Time Analysis of Completely Restored DTREM Instrument Data from Apollo 14 and 15 – **Marie McBride**, Florida SGC

- Ms. McBride is a senior at Florida Institute of Technology, studying science. New title of talk is: restoring Apollo, bringing Lunar data back to life.
- A scientific Lunar station was established on the Moon after the Lunar landings. The equipment worked for seven years. Efforts to turn them on in 1992 were not successful. Data collected during those seven years (dust, thermal and radiation data) was stored in microfiche. Someone in Texas digitized the data.
- Ms. McBride analyzed this digitized data and investigated the effects of degradation of lunar data on solar cells and their outputs over time. Pre-irradiated cells showed very little degradation. With respect to degradation, Apollo 14 and 15 data were very similar.

4:25 (15) 2013: A Space (Grant) Odyssey – **Daniel Wukelic**, Hawaii SGC

- Mr. Wukelic is a student in the University of Hawaii at Manoa. He discussed his very pleasant experiences with Space Grant. In 2011, he started with a CubeSat project. He then moved on to the Hawaii Space Flight Laboratory as volunteer intern. He was involved in attitude control test beds. Also did some work with CanSat.
- Mr. Wukelic then went on to the NASA Academy at Ames. He did research on tilt rotor aircraft. He conducted feasibility studies as to how big a tilt rotor passenger aircraft can be built. He won an award from NASA for future potential.

4:40 (15) Development of a Free-Floating Experiment Within a Suborbital Launch Vehicle – **Gerardo Martinez**, New Mexico SGC

- Mr. Martinez is a master's student in the Mechanical and Aerospace Engineering department at New Mexico State University.
- Mr. Martinez discussed why knowing the inertia properties of moving bodies is crucial. When they are not known, it is very important to identify them. To this end, Mr. Martinez developed a payload with an experiment, which was launched by an Up Aerospace rocket.
- The payload had a suborbital free flowing unit and a suborbital release unit. Spin test data was analyzed. SOF unit (look at presentation for more details) was also developed.
- Mr. Martinez hopes that in the future, such testing will continue. Parabolic flight testing is already done. Suborbital launch will follow in November, 2013. Hopefully, as ISS launch will also follow.

4:55 (05) Announcements and Recap of Day 1

Reception will be at 6 p.m. at the Colonial Ballroom, together with Space Grant Student Poster Session.

MONDAY, OCTOBER 14

General Session: Day 2 (Carolina Ballroom)

Invited Talk

8:00 (45) SOFIA - The Stratospheric Observatory For Infrared Astronomy: From First Light to First Science – **Terry Herter**, Cornell University (sponsored by NY SGC)

- Yervant introduced the speaker, who is department chair in astronomy at Cornell University. Dr. Herter's interests involve star formations. SOFIA is a flight test conducted by a telescope (Forcast) mounted inside a Boeing 747 aircraft.
- First flight in 2010. Dual channel infrared camera. Diffraction-limited filtering. Purpose is airborne astronomy. Dr. Herter discussed the advantage of atmospheric transmission. Ground based transmission is poor over the 5-40 micron region.
- Forcast is sensitive to emission from dust in interstellar medium.
- Infrared allows a complementary view of the universe relative to other wavelengths. Combine that with Forcast, and the result is better quality measurements and higher quality analysis.
- Original objectives include analyzing galactic center region, star formation, and circumstellar disks.
- The SOFIA project allows airborne astronomy. The science of airborne astronomy has improved from 30 cm telescope in 70s to a 91 cm telescope until 1996. Sofia has a 2.5 m telescope. Telescope in back of aircraft.
- Dr. Herter gave an interesting overview of how the telescope was installed inside the airplane. The telescope sits on an oil bearing and can be controlled to aim at an object in the sky regardless of the motions of the airplane.
- Tests conducted include line-ops, preparatory flights, short science flights, basic science flights, commissioning in 2013. Dr. Herter described glitches and implementation issues while taking measurements.

8:45 (15) RockOn! Update – **Chris Koehler**, CO SGC

- Chris Koehler talked about the RockOn program. The program has been running since 2008. 48 participants last year, which was a record high. Chris showed a video of RockOn! manufacturing activities during 2013.
- Registration site for 2014 is in the works and an announcement will be out shortly.
- Also being discussed by Chris and colleagues is possibly reinstating a ballooning program, which was discontinued as states were doing ballooning workshops on their own.

9:00 (15) Collaboration Between Space Grant Consortia and the NCSSE: Successes and New Opportunities – **Jeff Goldstein**, National Center for Earth and Space Science Education

- Jeff Goldstein's organization is an affiliate of the Maryland Space Grant Consortium. Mr. Goldstein works with 22 Space Grant consortia. The SSEP (student space flight experiments program) involves students grades 5-14 and it uses a pedagogical model. It is a pre-college program with international components implemented as on-orbit space venture.
- 8 SSEP opportunities since 2010. 68 communities have been involved in running 93 programs. 5090 flight experiment proposals received by the program and 58 experiments have been flown. Coming soon are 23 experiments in Dec. 2013 and 15 experiments in 2014. Three conferences at the National Air and Space museum.
- Two step proposal review process to select the experiments that are flown. Exhibition panels in National Mall on space education. They want to do such permanent exhibits nationwide.

9:15 (15) SC Space Grant and Sea Grant Collaborations – **M. Rick Devoe**, South Carolina Sea Grant Consortium

- Mr. Devoe is the Executive Director of the SC Sea Grant Consortium. Mr. Devoe began his talk by giving statistics and information. 24% of SC is wetlands. SC coast is 65% of wetlands. Population in SC coasts is increasing. Increased focus on increasing coast's contribution to the SC economy.
- Several challenges face the South Carolina coast: environment, climate change, water quality, storm water, coastal hazards, earthquakes, shoreline change, hurricanes. In the ocean, fisheries, energy, sand and gravel re-nourishment, aquaculture.
- The SC Sea Grant Consortium is involved with science, education, outreach, and sustainability. The consortium has broad program areas. It partners with business organizations.
- Collaboration opportunities abound. The organization gives out the Kathryn Sullivan award (A distinguished scientist, Ms. Sullivan works at NOAA).

9:30 (15) Northeast Regional Collaborative: Robotics Teacher Professional Development Workshop – **Raji Patel**, MA SGC

- Ms. Patel informed us that a robotics workshop for teachers was held in July 2013 in MA. Teachers built a NXT rover and learnt to program it in order to navigate a simulated Martian terrain.
- All states in the northeast region participated.

- The Cambridge STEM roundtable that MA SGC is involved with sent six teachers to the workshop who now will lead a pilot program in robotics for the Cambridge School system.
- The program received excellent feedback from teachers. The workshop also has international collaboration. Ms. Patel showed an informative video of what the teachers built.
- The workshop also discussed issues associated with attracting female students to STEM.
- In LEGO design teams, gender differences observed include: girls do not like direct competition, girls plan ahead of boys.
- The Cambridge STEM roundtable that MA SG is involved with was held in 2013 and it was very successful.

9:45 (10) Helicopter/UAV Program: Past and Future – **Tom Filburn**, CT SGC and **Chris Brown**, Both speakers made presentations. This program will be an expansion of the Connecticut Space Grant helicopter workshop. The program will alternate in NC and in CT every year. In 2014, the program will be held in NC. Slight expansion of focus. 23 people participated last year.

New Item: Japan Satellite Collaboration - **Denise Thorsen**, Alaska Space Grant
Short announcement from Alaska. The University of Alaska, Fairbanks, has an opportunity with Japan. The Japanese will be launching a satellite which still has empty space. All SG consortia are invited to build an experiment to be launched in the Japanese satellite. Contact Denise for more details.

9:55 (20) **Coffee Break and Networking**

Invited Talk

10:15 (45) Student-Built CubeSats for Scientific Research: The NSF CubeSat Program – **Richard Behnke**, NSF Geospace Section

Because of the government shutdown, this talk was not held. Instead, the talks by Dick Henry, Mary Sandy and John Wefel about the 25th anniversary of Space Grant were moved to this time slot.

- Dick Henry gave his perspective on the 25 years of Space Grant. He provided a history of the organization.
- Dick gave credit to the late Senator Lloyd Bentsen of Texas. Also gave credit to Dr. Julius Dasch, previous director of SG at HQ.
- In 1989, 17 winners were selected to establish consortia in their states. Then four additional consortia were selected. Report exists from the first SG meeting (held at Johns Hopkins). National Council of SG directors was founded at the meeting.
- Talked about initial collaborations in MD. Morgan State, a HBCU, was one of the first affiliated of MDSCG.
- Mary Sandy talked about her memories.
- Program was still being shaped when MS started at VASGC. Fond memories of colleagues in Education Office. They encouraged collaboration and contact building. She also fondly remembers several Space Grant directors, Elaine Hansen, and Sylvia Stein being two. Fond memories of visiting different states for SG conferences.
- Mary talked about how she learned about dealing with Congress.
- She remembered the late Bill Hiscock and Richard Hackney.
- Mary is very proud of our organization. She talked about the passion and that this passion has kept us and helped us face challenges. She thanked all current and previous directors, as well as our NASA colleagues.
- John Wefel talked about 25 years being a very important milestone. Space Grant is still here and is still functioning.
- He gave credit to Sen. Barbara Mikulski (MD). Senator Mikulski is the new recipient of AAS award for public service.
- Highlights on some achievements include student launch projects, and organization by directors. He recognized Richard Henry and Mary Sandy as two people who have worked tirelessly for Space Grant. He thanked them as organizers, chairs, dealing with NASA HQ, and congressional testimony.

- How about the future? Challenges include: maintaining the network, especially in view of reduced funding and the reality that not all affiliates can be funded.
- Budgetary resources. Buying power of SG about the same as 15 years ago, considering inflation. However, tuition and other college costs have skyrocketed.
- Designated and non-designated programs. Need to have regular competitions to upgrade to designated status.

Space Grant Student Talks II

11:00 (15) A Scalable Lunar Miner Prototype – **Aaron Olson**, Wisconsin SGC

- Mr. Olson is a graduate student at the University of Wisconsin, studying engineering mechanics and astronautics.
- Mr. Olson began his talk about uses of lunar Volatiles and lunar volatiles miner design.
- Volatiles are a very useful Lunar resource. Useful in nuclear fusion. With helium-3 fusion, no harsh effects from neutrons.
- There are three main sources of helium. The earth's atmosphere is one, but it has a very low concentration of helium. Decay of tritium is another. 12.3 year process for the fuel to become useful. While decay of tritium is a most promising source, due to extensive use prices are up and supplies are down.
- The third source is outer space. Helium exists in the Moon. Lunar samples, observations from probes provide the proof.
- Three Lunar miner designs have been completed at the University of Wisconsin to extract Lunar helium.

11:15 (15) KELT-6b: Discovery of a Transiting Mildly-Inflated Saturn with a Bright Metal-Poor Host – **Karen Collins**, Kentucky SGC

- Ms. Collins is a graduate student at the University of Louisville. She talked about discovery of exoplanet Kelt-6b. An exoplanet passes in front of its host star. Therefore, we cannot see the planet directly. We analyze its properties from the behavior of the star.
- Ms. Collins discussed the Kelt North Telescope, which is located in Arizona, and which has been monitoring skies since 2006. She showed images from the telescope. Follow up photometry done at University of Louisville. There was hint of a planet in the Kelt light curve. Researchers were able to catch the planet only at the tail end of the light curve. Kelt-6b is has a metal core.

11:30 (15) Stable Carbon Isotope Analysis of Putative High-Temperature-Tolerant Anaerobic Methanotrophs – **Zena Cardman**, North Carolina SGC

- Ms. Cardman is a fourth time NC Space Grant awardee. She currently working towards her Master's Degree at the University of North Carolina.
- She discussed methane consumption by microbes at the bottom of oceans. Methane is the most abundant hydrocarbon. It is generated by microbial methanogenesis.
- Samples were taken at a depth of 2000 near Baja California. Lots of particulates accumulate as sediment at the bottom of the ocean.
- The 16S gene was analyzed. Process begins with getting mud samples by submarines. Then, researchers isolate the genetic material and amplify it. The genes are sequenced and analyzed. Some genes that were found were not previously known and hence they were analyzed in more detail.

Lunch break, as student presentations ran longer than scheduled. Student presentations continued after lunch.

11:45 (15) Spin Stall of General Aviation Aircraft – **Dale Utt**, Minnesota SGC

- This talk was given in the afternoon after the JPL speech.
- Mr. Utt is an aerospace engineering graduate student at the University of Minnesota. He discussed roll stability of general aviation aircraft. He described spin stability issues and maneuvers involving roll.
- Roll stability affected by angle of attack. Difference in lift between the two wings can lead to roll instabilities.
- This research began as a senior design project. Due to the complexity of the model, student is continuing the research as a graduate student, with MNSGC support.
- Experimental results indicate limit cycle behavior at higher pitch angles. Analysis was conducted on when the aircraft will become unstable in roll.

12:00 (60) Lunch (Colonial Ballroom)

Invited Talk

1:00 (45) One Year Later - the Curiosity Rover on Mars – *Jennifer Trosper*, NASA JPL

- Yervant introduce the speaker. She has been involved with Mars programs for 20 years. She showed a video of the general public and NASA personnel reaction to the successful landing of Curiosity in 2012. She described where she was at that moment.
- She also described her duties, which were to make sure that all of thousands of commands sent to the rover were correct.
- Ms. Trosper began with the question whether there is water on Mars. Is there habitable environment there? She described the trajectory of Curiosity to Mars. She described what happened at different parts of the launch. Showed pictures of Mars landing taken by the reconnaissance orbiter. She also showed images taken by the heat shield during landing.
- She talked about Gale crater (where Curiosity landed) and Mount Sharp, which is in the middle of Gale Crater.
- Curiosity has 17 cameras. It has drilling capability. Antennae for communication with the Earth.
- Wheels show some sign of wear, due to the extensive amount of travel by Curiosity. Wealth of data and images. Found evidence of streams that moved slowly. Scoop samples and drill samples. Drill equipment has stabilizers.
- Observations from drilling in Yellow Knife Bay. Ancient river bed, low salinity, neither acidic or alkaline. Key chemical ingredients for life are present. Minerals in different stages of oxidation suggest environment exists for primitive life.
- Ms. Trosper then discussed the Mount Sharp climb. 8 km ride to get there. She talked about an interesting experience with autonomous navigation. A tracking station in Spain had to be involved. After that incident, the camera model and software had to be improved. JPL also wants to improve how much Curiosity can travel in a day.

Space Grant Student Talks III

1:45 (15) Ear Manipulations Reveal Importance of Gravity Input for Orientation Development – *Karen Elliott Thompson*, Iowa SGC

- Ms. Thompson is a biology graduate student in the University of Iowa.
- Ms. Thompson described the differences between what causes acceleration on Earth and in space. On Earth, gravity causes linear acceleration. In space, acceleration is based on angular acceleration of the spacecraft due to orbiting. When astronauts return to earth, the nervous system tries to counter for the lack of angular acceleration.
- She talked about movement perception by humans. Linear and angular acceleration are perceived by different parts of the inner ear.
- She described her work involving the manipulation of the gravity sensor, namely the inner ear and how asymmetrical and mismatched gravity detection affects perception of gravity.
- She discussed experiments on frogs, which were conducted by adding a third ear to frogs. The added ear distorts the sense of balance and leads to erratic swimming, as sense of direction and gravity get confused.

2:00 (15) A Discrete Multiphase Flow Approach to Monopropellant-Based Micro propulsion – *Ryan McDevitt*, Vermont SGC

- Mr. McDevitt is a mechanical engineering graduate student at the University of Vermont.
- Mr. McDevitt talked about micro propulsion, which is brought about by micro thrusters on nano satellites. One can put several such thrusters on a very small satellite. Requirements include 1-500 micro Newtons of thrust.
- Major obstacle to implementation is micro valves. Mr. McDevitt began his analysis of micro valves with Taylor flow, in a micro channel, where two flows meet. By controlling flow rates, the thrust can be analyzed.
- He talked about 3D simulation of the multiphase flow. Experimental work has also been conducted. Results of the analytical and experimental work match and are encouraging. Next step is integrated microsystems.

2:15 (15) Using a New Crustal Thickness Model to Test Previous Candidate Lunar Basins and to Search

for New Candidates – **Heather Meyer**, South Carolina SGC

- Ms. Meyer received her undergraduate degree in South Carolina and currently is a graduate student at Arizona State University.
- There was bombardment of the Moon 3-4 billion years ago. Ms. Meyer is looking at craters in the Moon to investigate this issue.
- She uses a crustal thickness model to analyze impact basins on the Moon for possible age-dating. This is done to also ascertain if similar things happened on earth.
- Previously identified basins were tested by a new crustal thickness model using laser altimeter topography and Kaguya gravity measurements. The research produced different results from previous results on the number of and type of impact basins.
- Ms. Meyer discussed categorization of basins. She gave example of the Lorenz basin. She analyzed 113 large diameter (>300 m) basin candidates. 26 of the old basins were no longer classified as basins, while nine new basins were discovered.

2:30 (15) Five Years, One Rocket, Zero Gravity: A Success Story Begun with the Alaska Space Grant – **Tess Caswell**, Alaska SGC

- Ms. Caswell received her undergraduate degree at the University of Alaska, Fairbanks. Now, she is a graduate student at Brown. Path that Space Grant set her on her research at University of Alaska led to her becoming a graduate student at Brown.
- Ms. Caswell's Space Grant involvement began with a student rocket project. She was involved with the ISIS launch, conducting data analysis. Unfortunately, there only was five minutes of data.
- She then joined the Alaska microgravity team. Attitude determination and control of spacecraft. She was involved in microgravity aircraft.
- She worked on mission control center for ISS. Worked on environmental and thermal operating system. Water filtration, temperature and humidity control. Also, emergency response. Countermeasures for rapid depressurization, fire, and any kind of toxic release were issues she worked on.
- She is currently studying an ice-covered satellite as it orbits Jupiter. In her experimental work, she imparts forces on ice and looks at the effects through an SEM.

2:45 (20) **Coffee Break and Group Picture**

25 Years of Space Grant

3:05 (45) Directors' Perspective on 25 Years of Space Grant – **Dick Henry**, MD SGC, **Mary Sandy**, VA SGC, and **John Wefel**, LA SGC
Moved to earlier during the day.

TUESDAY, OCTOBER 15

General Session: Day 3 (Carolina Ballroom)

Mission Directorate Working Groups

8:10 (30) Mission Directorate Working Group breakouts

8:40 (20) Mission Directorate Working Group Chair reports

Aeronautics Research (Calhoun Room)

Haim Baruh gave a summary. The Aeronautics Working Group discussed increasing collaboration with aeronautical technical schools in view of the excellent working relations that some consortia have with such schools and the increased interest in the Space Grant Office at NASA HQ regarding collaboration of Space Grant with community colleges. The co-chairs, Michaela Lucas and Haim Baruh, will compile information about aeronautical technical colleges and distribute first to the working group and then to all consortia.

Human Exploration and Operations

Barrett Caldwell gave a summary. The working group talked about the changing nature of student internships and work experiences. There is growing interest in working with the commercial companies, and more recognition of mission operations as a viable professional development pathway, which the Space Grant consortia could also emphasize and partner. This could be of particular value to the smaller commercial spaceflight companies, who might find Space Grant connections and networks helpful in directing the best students to them.

Science (Carolina Ballroom – side 2)

Terry Teays gave report. Discussed the state of SMD EPO. It has been hard to find out how best to partner with SMD. We then discussed the SMD/SG internship program, which will be gearing up much sooner this year, the commitments and/or expressed interests of various SMD missions. Terry will be conducting the program again, and already has identified a few places for interns. The working group will continue the work with SG alumni currently working at SMD missions.

Space Technology (Pinkney Room)

Denise Thorsen gave a report. She visited STMD last summer, where she discussed impact of SG on STMD programs, specifically, Space Technology Research Fellowships, Small Spacecraft Technology, and NIAC. The working group discussed ways to assess impact better and to develop ideas. The working group also discussed the technology webinar that recently took place and asked if anyone was tracking attendees from their jurisdiction. A few of the working group members were.

Invited Talk

9:00 (30) Space for STEM: Re-thinking our Options and Opportunities – *Shirley Malcolm*, American Association for the Advancement of Science (AAAS)

- Yervant introduced speaker. Dr. Malcolm is the recipient of 15 honorary awards.
- Post-Sputnik galvanized U.S. resolve to improve STEM education. Improvement of infrastructure, investment in STEM at every level, focus in capacity building, talent development.
- Inspiration to young people, possibility of careers in STEM, attention to space in the media, reinforcing stereotypes, reduce others.
- Sputnik inspired technology, increase in human and institutionalization, commercialization.
- Dr. Malcolm posed the questions of how we teach - how we learn? Asking important questions, making connections, applying our knowledge to global challenges.
- She asked us to think about what the narrative for this generation is?
- She discussed the need to engage non-scientists to understand us and help us tell our story.
- Dr. Malcolm then opened a discussion on activities that can be undertaken to promote STEM education. She said that NASA's biggest challenge is political.
- How do we as the SG community make the whole bigger than the sum of the parts?

New Item -Video on high school wing design competition - *Suzanne Smith*, Kentucky SGC

The video showed the competition for high school students, jointly supported by the Kentucky Institute of Aerospace Education and Kentucky SGC. Participation in the contest has increased tremendously in recent years.

New Item - Announcement from Oregon SGC - *Toby Dietrich*

On August 21, 2017, a solar eclipse begins in Oregon. The eclipse can be viewed by 500 million people. Opportunities may be possible for Space Grant consortia to develop educational programs. Oregon will contact us for collaboration opportunities.

National Space Grant Foundation

9:30 (15) Foundation Updates – *Peter Sukanek* (MS SGC), President and *Mark Fischer*, Executive Director

Moved to earlier part of the meeting.

9:45 (10) Foundation Election/Voting – *Bill Garrard* (MN SGC), Nominating Committee Chair

Moved to earlier part of the meeting.

New presentation - By *Greg Guzik*, Louisiana SG.

High Altitude Student Platform. Greg invited everyone to participate. Contact LASGC for more details.

Consortium Coordination

10:15 (45) Consortium Coordination Session: Updates from the Program Office – *Lenell Allen* and *Diane DeTroye*, NASA HQ, and SG Directors and Coordinators

Replaced by general discussion.

- Yervant collected questions to discuss.
- OEPM - Privacy issues with birth dates and SSN. Opposition to entering such data by SG consortia.
- Diversity goals. Yervant asked NASA HQ for clarification. They agreed to provide some.
- Space Grant meeting frequency. Do we want to go back to two national meetings a year? Different ideas include: two national meetings yearly and elimination of regional meetings, one national meeting per year, with teleconferences for updates, keeping the current format. Yervant will bring this issue up Dr. Allen.
- Chris Koehler talked about taking SG to Lenell Allen. Maybe states coming to DC to talk to her. Or maybe have Dr. Allen visit the different Space Grant consortia.
- Mary Sandy discussed having an advisory committee for talking with Dr. Lenell Allen.
- Robert Winglee asked about developments on the strategic plan. Steve Ruffin mentioned that some conversation was held about a strategic plan during the last transition meeting.
- Question on whether there can be coordinators only meetings? Idea was warmly received.
- Montana SGC will send announcements for a student competition soon.

SG Regional Breakouts

11:00 (30) Space Grant Regional Breakout Sessions

Great Midwestern (Carolina Ballroom) Charisse Buising reported. No hosts for regional meeting yet. Best practices were discussed, outreach activities, engaging the public and students.

Mid-Atlantic (Carolina Ballroom) Dick Henry reported. Mid Atlantic meetings have improved in the last 10 years. Consensus of mid-Atlantic SGC is to only have national meetings.

Northeast (Calhoun Room) Toni Galvin reported. Massachusetts will host the next regional meeting. There will be emphasis on community colleges at the meeting. The Northeast teacher workshop will continue, so will the helicopter workshop.

Southeast (Pinkney Room) Jaydeep Mukherjee reported. Improving relations with NASA centers. Representatives from SpaceX, at the regional meeting which will be held at Cocoa Beach.

Western (Carolina Ballroom) Chris Koehler reported. The next regional meeting will be held in Boulder, Colorado. Some Arduino work will be done at the meeting, as well as a tour of Lockheed Martin.

11:50 (10) Meeting conclusion with recap of key discussions, upcoming events, and outstanding actions. Yervant thanked South Carolina SGC and its wonderful staff for their tremendous efforts and hospitality. Everyone agreed wholeheartedly. THANK YOU, South Carolina.

12:00 p.m. **Adjourn**