Honors and Awards

Ianik Plante finished third in the Poster Contest’s Postdoctoral Research Fellow category at the 21st Annual NASA Space Radiation Investigators’ Workshop, Port Jefferson, New York. His poster was entitled “Monte-Carlo simulation of radiation track structure and calculation of dose deposition in nanovolumes.”

Ianik also received a Scholars in Training (SIT) travel award for the 56th Annual Meeting of the Radiation Research Society, to be held in Maui, Hawaii, September 26-29, 2010.

Marguerite Sognier received the Ball High School Magnet Program Appreciation Award.

Lori Ploutz-Snyder delivered the commencement address to the Syracuse University School of Education.

Ajitkumar Mulavara and Jeff Ryder received the NASA JSC Group Achievement Award, Functional

Ianik Plante, MD PhD
Marguerite Sognier, PhD
Lori Ploutz-Snyder, PhD
Ajit Mulavara, PhD
Jeff Ryder, PhD

U.S. Patent Awarded


Grants Awarded

G. Osinski’s and Christian Otto’s proposal “Impacts and Ice: Lunar Sample Return from the South Pole – Aitken Basin” for a short-duration (7-day) lunar human mission test scenario at Mistastin Lake Crater, Labrador, Canada, a 3-week field season in the summer of 2010, and a 3-4 week season in 2011, was accepted for funding by the Canadian Space Agency.

The JSC Innovation Charge Account authorized 23 proposals for Cycle 2. Among those awardees is Susana Zanello. Susi’s idea centered on process improvement for RNA-DNA Storage and Transport at Room Temperature.

Congratulations, Susi and Christian!
### Grant Proposals Submitted


Osinski G & **Otto C**. An in situ investigation of geology in a lunar analogue environment. Submitted to the Canadian Space Agency.

**Otto C**. Human Space Exploration Analogue Study: In Situ Monitoring of Human Health and Performance in Remote Environments. Submitted to the Canadian Space Agency.

**Ploutz-Snyder L**, Step 2 proposal, Does Milk Enhance The Effectiveness of Exercise for the Maintenance of Muscle Function During Extended Periods Of Unloading?, submitted to the National Dairy Council for funding to supplement the NASA limb suspension study.


Houston C & **Sognier M**. T-STEM Center Cycle 2, selected as a finalist by the Texas Education Agency.

Houston C and **Sognier M**. Phase I proposal to the Collaborative Action Group on Climate Change Literacy in the Caribbean Eco-region (COACCH), National Science Foundation.

**Westby C**. The Effects of Low Fluence High Energy Particle Radiation on Measures of Vascular Function, Oxidative Stress, and Systemic Inflammation”, submitted step II proposal in response to Ground-Based Studies in Space Radiobiology NRA NNJ10ZSA001N.


**Zwart SR** & Smith SM. Exploration of the interrelationships between diet, biochemical markers of nutrient status, and chromosomal damage from ISS missions, submitted as a data mining proposal to HRP.

### Happy Birthday!

The following DSLS team members are celebrating their birthday in the near future:

- July 8 - Jancy McPhee
- July 15 - Alex Dunlap
- July 16 - Gail Pacetti
- July 25 - Artem Ponomarev
- August 9 - Ginger Wotring
- August 14 - Kay Nute
- August 24 - Shaowen Hu
- August 25 - Lori Chappell

Happy birthday to you - and many happy returns of the day!
Rob Ploutz-Snyder, PhD, a Senior Scientist in Biostatistics Laboratory, was recently interviewed for the Spotlight Article.

Tell us about yourself and your family.
You may regret asking me about my family because it is my favorite subject in the world to talk about and there’s limited space in this article! Most USRA folks probably know my wife, Lori, because she is also a USRA scientist. Lori heads up the Exercise Physiology and Counter Measures lab at NASA JSC. We’ve been happily married for almost 18 years and have two healthy, beautiful children. Our oldest girl, Alexis, just turned 10 in June. Her little sister Allison will be 7 in September. Both were born in Syracuse, where we lived for about 13 years prior to moving to Houston to work for USRA in the summer of 2008. (Prior to USRA, I was an Associate Professor of Medicine at the State University of New York, Upstate Medical University in Syracuse, NY.) They seem to have adjusted well to the Texas climate and culture, and are thriving at their school in League City. They are both competitive swimmers year round, which means that we spend every weekend in the summer, and many weekends throughout the rest of the year cheering them on at various swim meets held throughout the region. That’s great fun; let me tell you, but it is a huge commitment getting the girls to swim practice 5 or 6 days per week. Luckily, my mother also recently moved to Texas (from Pennsylvania) to be nearby and spend more time with her grandchildren, and she helps out tremendously with getting the kids to/from swim practice after school. Our kids keep us busy, no doubt, but I could not possibly imagine life without them.

What are you presently working on at JSC?
I work in the Human Research Program’s (HRP) Biostatistics Lab with Drs. Al Feiveson and USRA Scientist James Fiedler. We work on quite a variety of studies with scientists from many of the labs and projects in/around the HRP. The huge diversity of projects is one of the things that I really love about my job because I get to learn about so many different disciplines and the issues and problems they are dealing with as relates to spaceflight and the human. I work closely with members of the Bone, Exercise Physiology & Countermeasures (ExPC), Neurology, Nutrition, Cardiology, and Behavioral Health labs in trying to appreciate how microgravity affects the human systems, and how best to model and quantify those changes. My contributions are primarily in designing/conducting the statistical models that characterize and quantify these changes, and in comparing the effectiveness of different countermeasures designed to reduce the negative effects.

I also work some with scientists and engineers from the EVA project in helping them understand how different aspects of the EVA suit interact with characteristics of the human to affect performance. Recently I’ve been working with USRA Scientist Dr. Larry Kuznetz on a statistical model that will help the EVA team estimate consumables remaining during an EVA from sensors (and proposed sensors) in the suits so that future suits can be intelligent enough to alert the astronauts when they should return from EVA. We presented our statistical model at a recent Biometrics conference but we still have a few outstanding issues to work on. Perhaps my favorite current study is a multidisciplinary investigation in which we are examining data across several disciplines collected from our long duration astronauts. This study emanated from the ExPC lab as part of their endeavor to understand how the historical exercise prescriptions and the data they obtain from existing exercise hardware (CVIS, TVIS, RED) relate to changes in several bone measures, nutritional markers for bone changes, several muscle strength and work capacity variables, and some cardiovascular fitness outcomes. It’s a very rich dataset combining information from several key disciplines, and we are also using it to better understand how changes in one system relate to changes in another. This is the first time I’ve been involved with such a multidisciplinary study at NASA, and that is particularly exciting. Nevertheless, this also presents some very serious challenges from a statistical perspective, and that has my wheels spinning! Multidiscipline studies have many variables, and that typically demands ‘big-n’ for multivariate analysis. Even with all ISS astronaut data in-hand, our sample size remains small!

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Add to that the realities of missing data in all of those variables and sample size can quickly drop to less than a handful. This is certainly not something that can be handled with traditional statistical methods, but we are making progress using a combination of multiple imputation techniques for handling missing data and complex multivariate analysis to model the multidisciplinary relationships. Sprinkle in a little Bayesian here and there, and now you have something to get excited about (if you’re a stats geek like me).

What is most important to you regarding your work at JSC?
When I am able to meet with researchers early in the process, as in when they are designing a new study or starting to write a new grant proposal, I feel like I can make the biggest impact because I can help them understand how experimental design details can enable us to use better statistical techniques in the end. Researchers often think about statistics as something that happens at the end of a study, and I suppose that’s natural because temporally, the analysis happens then. This can have the unfortunate consequence of also tacking on the statistical analysis part of a proposal AFTER a study has been designed, or worse, after data collection has begun. By then, it’s too late to make changes to an experimental protocol, and all too often that means that I am not able to apply the very best analytical techniques due to experimental design constraints. So it is very rewarding for me when I am able to work with colleagues early in the design phases of a study, so that ultimately we are able to answer the research questions to the best of our abilities.

What are your goals for this year?
One of the biggest challenges that I experience working at NASA is that the datasets that we have to work with are painfully small in terms of sample size, and this problem is exacerbated by missing data issues that are commonplace in our research. We collect a lot of data from many different research venues, but common to all of them is the fact that NASA research is very expensive and time consuming to conduct. That often means that we end up with very small datasets that are underpowered to detect the effects that we are looking for. To make matters worse, our datasets are often plagued with missing data due to the real-world constraints imposed on research participants. ISS astronauts, for example, often miss a planned data acquisition due to mission operations. The consequences of missing data can be severe from a statistical perspective, so one of my big goals this year is to get up to speed on the latest multiple imputation (MI) theory and applications that have the potential to reduce the negative impact of missing data. MI is no “silver bullet” that repairs all missing data problems, but with better computing power and a combination of Bayesian and Frequentist techniques, I think that MI may be one way in which the Biostatistics lab can make better use of the data that HRP researchers acquire.

What is the one aspect about statistics everyone should know (but probably is afraid to ask)?
It is my sincere hope that nobody is afraid to ask questions, statistical or otherwise. I have been fortunate enough over the years to work on some very successful and productive research teams. Common to all of them was the idea that a productive research team requires expertise from several disciplines; no single investigator can know it all. (Gone are single-author publications or grant proposals days!) You know, when I work with content experts, they are never surprised to learn that I am not an expert in their discipline. So why then are people sometimes ‘afraid to ask’ statistical questions, when that’s not their discipline either? Statistics, like every other discipline, is not static. It has evolved over the years, and the statistics that discipline leaders learned back when s/he was in graduate school may not be the cutting edge techniques of today. Realizing that, I hope that people know that it is always good to ask questions.

Thanks so much for agreeing to be the DSLS Spotlight Scientist for this edition of the newsletter, Rob!
New Publications by DSLS Scientists


Regina Buccello-Stout is mentoring a Human Factors and Ergonomics student.

Johnny Conkin mentored an Aerospace Medicine Clerk assigned a project to understand more about the knee joint and DCS. He provided altitude chamber tours for seven Aerospace Medicine Clerks and briefed five Flight Surgeons on DCS and hypoxia research. Johnny also provided a technical review of a paper on “decompression illness risk at 6553 m breathing two gas mixtures” for *Aviat Space and Environ Med* and provided extensive analysis of his own data in order to assist the authors with their revisions.

Roni Cromwell participated in a “Scouting “ interview with Sara Holt, producer for the PBS NOVA series, and began to mentor NSBRI Summer Intern Cheryl Goetz. Roni also reviewed an article for the *Journal of Gerontology Psychological Sciences*.

Ramona Gaza provided a lab tour for the Space X Team.

Megumi Hada hosted a science seminar and lab tour for visiting Japanese scientist Dr. Yatagai, and reviewed a manuscript for *Radiation Research*.

Myung Kim made weekly contributions to the Earth-Moon-Mars Radiation Exposure Module (EMMREM) community.

Larry Kuznetz mentors Tom Miller, a graduate student at the University of Southwest Alabama, regarding an improved 2-Dimensional human body thermal model.

Ajit Mulavara provided a lab tour for Prof. Marras from Ohio State University.

Lealem Mulugeta continued the conceptual development of an online STEM education game centered on human health and countermeasures for space exploration missions. He recruited one Biology major student for a summer internship with the Digital Astronaut Project, and agreed to mentor a Biomedical Engineering student assigned to the DAP by NASA management.

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Recent Scientific Presentations

21st Annual NASA Space Radiation Investigators’ Workshop, Port Jefferson, New York

Abstract. Chappell LJ & Cucinotta FA. Non-targeted effects and the dose response for heavy ion tumorigenesis. Poster presented by Chappell.


Abstract. George K, Hada M, Cucinotta F. Silicon ions have a significantly higher biological effectiveness than iron ions for the induction of chromosome damage in human lymphocytes.


81st Annual Scientific Meeting of the Aerospace Medical Association, Phoenix, Arizona


(Cont. on page 7)

**International Space Medicine Summit 2010, Rice University**

Invited talk. **Otto C**. International Integrated Analog/Ground-Based and Space Collaborative Research Projects.

**11th International Workshop on Radiation Damage to DNA, Atlanta, Georgia**

Abstract. **Carra C**, Cucinotta FA. Selectivity and binding mechanism of e. coli DNA recombinase protein, a computational approach. Oral talk presented by **Carra**.

The **Nexus of Research on Cancer, Radiation and Supercomputing, Rice University**

Abstract. **Hu S** & Cucinotta FA. Characterization of the irradiation-damaged compartmental structure of bone marrow based on modeling of the dynamics of granulocytes in blood. Poster.

**NASA JSC Space Radiation Journal Club**

**Carra C**, Theoretical Study on the Binding Mechanism of the Replication Protein A (RPA).

**Hada M**, The contribution of Homologous Recombination Repair in repairing DSBs induced by high LET irradiation (Article review).


**Mangala L**, Biocompatible nanovectors for in vivo siRNA delivery.

**Wang M**, Poly (ADP-ribose) polymerase protects neural cells from clustered DNA damage induced by ionizing radiation.

**DSLS Brown Bag Luncheon Seminar Series**

**Gaza R** & **Wood SJ**. Preparing for suborbital biomedical research: personal perspectives from the NASTAR training course.

**Otto C**. Breaking Down the Mars Communication Barrier: Asynchronous Guidance of a Non-Surgeon Crew Medical Office Performing a Laparoscopic Appendectomy.

**Statistical Methods and Applications Review**

**Fiedler J**, More Topics in Data Visualization.

**Fiedler J**, Data Visualization – Part 3.

**Presentations at Other Conferences and Seminars**


Invited talk. **Wotring V**. Pharmacology – from Molecules to Spaceflight. UTMB Pharmacology and Toxicology Department weekly seminar, Galveston, TX.


What’s Going On With …. ?

**Alexander Dunlap** is preparing to chair a full day scientific session at the upcoming COSPAR meeting in Bremen, Germany.

**James Fiedler** wrote two new State programs: one to auto-generate variable labels while creating variables, and one for Rob Ploutz-Snyder to transfer some imputed data values into a Stata data set in place of missing data values.

The Space Radiation Analysis Group (Ramona Gaza, Dazhuang Zhou, and Yvonne Roed) recently participated in a Six Sigma event to evaluate the current lab workflow and to optimize productivity for the Shuttle and ISS radiation flight hardware processing. Objectives of this three-day event were met successfully, and the lab scored high after completion. For more information about Six Sigma, please visit [http://en.wikipedia.org/wiki/Six_Sigma](http://en.wikipedia.org/wiki/Six_Sigma).

Under **Myung-Hee Kim**’s leadership, the old version of GERM code was modified extensively to fix compiling and run-time errors. The new fully compatible GERM code was made with 64-bit Intel FORTRAN compiler on a 64-bit MS Windows XP operating system.

**Jancy McPhee** continued the development of the Youth Art Competition associated with the Humans in Space Symposium. With the help of international colleagues, especially at ESA, the competition flyer has been translated into five languages and distributed to teacher workshops. Go to [http://www.dsls.usra.edu/meetings/IAA/artContest/](http://www.dsls.usra.edu/meetings/IAA/artContest/) to learn more!

**Ianik Plante** was invited to write a chapter for the book “Theory and Applications of Monte Carlo Simulations”. Ianik was also invited as a speaker in a symposium on “Bridging the gap between track structure and stable end products” at the upcoming 56th Annual Meeting of the Radiation Research Society in Hawaii.

**Lori Ploutz-Snyder** was certified as an instructor for flight training studies (Sprint).

**Frank Sulzman** worked with NASA HQ to prepare the NAS radiation review, and coordinated the status of proton beam lines and NASA investigator usage with Loma Linda University.

**Scott Wood** completed ZAG-Otolith STS-132 Post-flight testing with 2 subjects, and continued preflight data collection on STS-133 and 134 (1 subject each). Scott also completed post-flight MedB1.5 (Posture medical requirement) testing on 2 subjects returning from ISS expedition 23, and performed preflight data collection for Expedition 24.

**Sara Zwart** submitted the Nutrition chapter for the Biomedical Results of Shuttle book.

### ISS Research Academy!

On **August 3 - 5, 2010**, NASA’s ISS National Lab Office will hold an ISS Research Academy at South Shore Harbour Hotel. The purpose of the academy is to provide new principal investigators an overview of the capabilities of the ISS for research; to educate participants about available ISS research opportunities and application processes for NASA, NIH and NSF; to provide a good understanding of the NASA ISS Payload Planning, Integration and Operation Process; and to inform about several services that the NASA ISS Payloads Office has available.

For more information and to register for this no-cost academy, please go to [http://www.nasa.gov/pdf/466224main_NASA_ISS_payload_Training_Academy_062910.pdf](http://www.nasa.gov/pdf/466224main_NASA_ISS_payload_Training_Academy_062910.pdf)


Christian also wrote a Field Notes article entitled “Antarctic Rescue,” which was published in the March/April Issue of Outpost Magazine (pp. 16-18).

Zarana Patel mentored the Reducd Gravity Education Flight Program / Systems Engineering Educational Discovery (SEED) project “Microgravity Apparatus for 3-D Cell Culture”. The team of Yale students successfully reassembled the test equipment, passed Test Readiness Review, and was cleared for flights on April 15 and 16. Half the team flew on April 15, followed by a debrief of problems that had occurred and how they could be addressed for the second flight. The second half of the team, including Zarana, flew on April 16. Both flights were successful and the team was able to evaluate the functionality of the equipment. Zarana also mentored a National Community College Aerospace Scholars team, acting as ‘CEO’ of Yellow Jacket Aerospace, a fictional aerospace company competing to develop a Mars Autonomous Roving Survey Utility Vehicle (MARSUV). Her team designed, built, and tested a rover prototype on a simulated Mars environment, remaining within budget.

Lori Ploutz-Snyder presented a lecture for a University of Houston Space Life Sciences course, which involved preparing and delivering a 3 hr lecture, homework assignment (short paper) and grading of paper. Lori also advises two PhD students, Kyle Hackney and Meghan Everett.

Jessica Scott provided lab tours for two exercise physiology job applicants. Jess also mentored 12 High School Aerospace Scholar students for their week-long project “Living on Mars”.

Marguerite Sognier presented a four hour-workshop to Greater Galveston County teachers and the NSTA Online Learning Center.

Chris Westby mentors NSBRI Summer Student Intern Carlos Ramos, a first year medical student at UTMB, who will study race related differences in lower limb venous compliance following long-term bed rest.

Scott Wood mentors Guan Lu Zhang, International Space University Masters Program, and Tomoko Makishama MD PhD, UTMB, NIH K08 Mentored Clinical Scientist Award. Scott also reviewed manuscripts for Experimental Brain Research.

Virginia Wotring reviewed a manuscript for Neuropharmacology.

Patrice Yarbough presented a talk entitled “Answering the Call: Career Strategies for 21st Century Scientists” to graduate students and post-doc fellows in the Baylor College of Medicine NIH Initiative for Maximizing Student Diversity (ISMD) Program. She also presented a talk and Q&A session with middle school students at Aldine Middle School’s Career Day, and served as a panelist, “Extreme Jobs: Preparing for a Career in Science, Before, During, and After Princeton,” hosted by Women in Science at Princeton Focus Group and Office of Academic Affairs and Diversity, Princeton University.

Susi Zanello advises Texas A&M University summer student Kevin Shimkus.

Sara Zwart reviewed a proposal for NASA’s Experimental Program to Stimulate Competitive Research (EPSCoR) through NSPIRES, a proposal for Florida International University’s MBRS SCORE program, and a manuscript for Immunological Investigations. Sara also led a tour of the Nutritional Biochemistry Lab for the Space X team.
A Day of Celebration at JSC

On June 10, 2010, Building 37 at Johnson Space Center celebrated its proud history as the Lunar Receiving Laboratory during the Apollo missions. Under the leadership of DSLS Senior Scientist Larry Kuznetz, PhD, former astronauts and support team members joined together in a dedication ceremony. In attendance, among many others, were Apollo astronauts Neil Armstrong, Buzz Aldrin, and Harrison Schmitt.

Several plaques were unveiled throughout the building, commemorating special events that had taken place in this facility.

Building 37 had served as the quarantine sleeping quarters for the Apollo 11 crew and for the returning astronauts of the Apollo 12 and 14 missions. There was even a crew lounge and dining area.

The result of 14 EVAs by 12 different astronauts from six Apollo missions, all geological materials like rocks, soil samples, and cores returned from the Moon were received in Building 37 too.

The samples arrived in vacuum-sealed containers and were moved to a specially constructed high-vacuum chamber or to cabinets filled with dry nitrogen. During the biological containment period for three weeks after departing the lunar surface, portions of the samples were distributed to specialized laboratories behind the biological barrier wall to be examined by scientists and technicians from JSC (then the Manned Spacecraft Center or MSC) and from around the world.

Today’s Conference Room 1 served as the primary contact point between crewmembers and non-quarantined personnel during Apollo 11, 12 and 14. The crew conducted debriefings, interviews and visits with NASA officials, media and family inside this room which was sealed and kept at a lower pressure than Conference Room 2, reserved for non-quarantined personnel.

Even the command module (CM) of Apollo 11 received its post-mission processing in what is Building 37 today. The crew named CM-107 “Columbia”, honoring earlier sailing vessels of the same name. Twelve years later, the CM was itself honored by becoming the namesake of Space Shuttle Columbia, the first orbiter to fly in 1981, entering space 28 times before being lost during re-entry in 2003.

See the following page for the photo montage that was sent to all attendees (with Neil Armstrong’s gracious approval). Then be sure to walk through Building 37 some time to examine the commemorative plaques - and to remember the pioneers of human space flight.
“ALL WAS READY, EVERYTHING HAD BEEN DONE, THE TIME HAD COME

AS WE ASCENDED IN THE ELEVATOR TO THE TOP
WE KNEW THAT HUNDREDS OF THOUSANDS HAD GIVEN THEIR BEST
TO GIVE US THIS CHANCE
NOW IT WAS TIME FOR US TO GIVE OUR BEST”