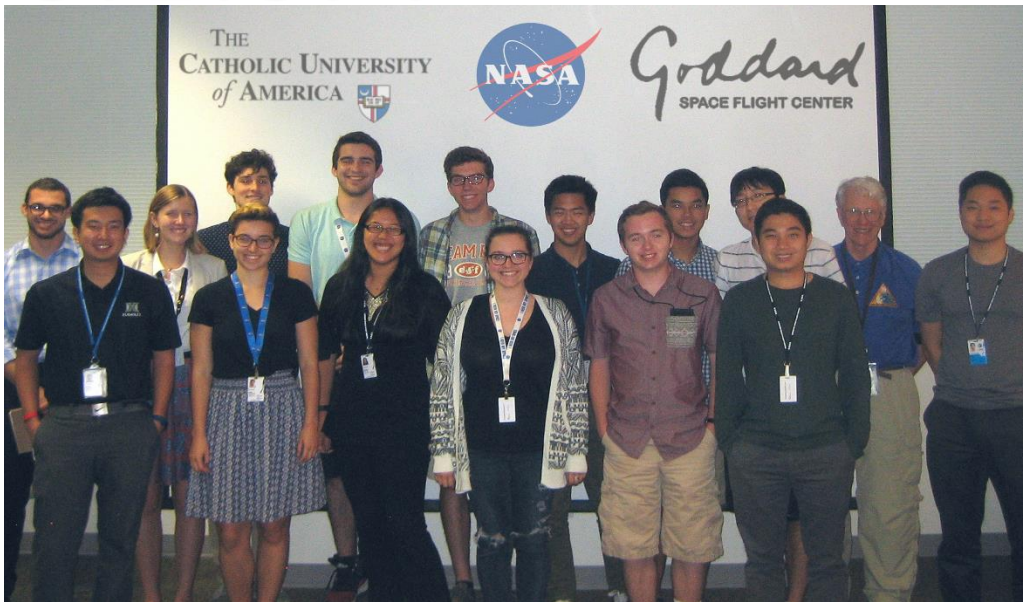
S.E.S.I. The Scientific & Engineering Student Internship Program



Pictured: Our 2016 interns and mentor/ lecturer Dr. Richard Fisher.

What is SESI?

The internship is a cooperative program between the Physics Department at The Catholic University of America (CUA) and the Heliophysics Science Division at the NASA Goddard Space Flight Center (GSFC) in Greenbelt, Maryland.

SESI provides talented students with exciting research opportunities and the chance to work with their mentors (the scientists, engineers, and researchers of GSFC) in the areas of solar and heliospheric physics, data analysis and computational modeling, building space hardware, and many other engaging scientific fields.

Students attend weekly lectures from senior scientists, tour Goddard's facilities, and participate in optional weekend activities in the DC area such as picnics, park/trail hiking, and museum tours.

2016 Student Research Topics

Code 587 – Science Data Processing Branch

Metrics and Validation
Sean Malone (UMD, College Park)
Mentor: Justin Boblitt

SEA5: Space Environment Automated Alerts & Anomaly Analysis Assistant
Daniel Jiang (UC, Berkeley)
Mentor: Justin Boblitt

A Machine Learning Approach to Magnetospheric Modeling
Albert Hsiung (UC, Berkeley)
Mentors: Justin Boblitt, Asher Pembroke

Developing the Integrated Space Weather Analysis (iSWA) System iOS Application in Swift 3 for iOS 10
Binh Le (Massachusetts Institute of Technology)
Mentors: Justin Boblitt, Richard Mullinix

Code 670 – Heliophysics Science Division

Type III Radio Burst Characteristics of SEP Events at the Maximum of Sunspot Cycle 24
Bryan Yamashiro (University of Hawai'i, Mānoa)
Mentor: Richard Fisher

Code 671 – Solar Physics Laboratory

In Search of the Small: Ephemeral Coronal Holes
Rachel O'Connor (Smith College)
Mentor: Dean Pesnell

Shooting Through the Sun
Amalia Gjerloev (University of Richmond)
Mentor: Dean Pesnell

Code 672 – Heliospheric Physics Laboratory

Do CMEs Expand in the Heliosphere?
Aaron Williams (Catholic University of America)
Mentor: Teresa Nieves-Chinchilla

Sensor and Environment Modeling
Pablo Machuca Varela (Purdue University)
Mentor: Joseph Davila (Code 670)

Code 674 – Space Weather Laboratory

Solar Flares: Building a New Forecasting Procedure
Anna Voelker (The Ohio State University),
Evan Frangipane (UC, Berkeley), and
Michael Greklek-McKeon (UMD, College Park)
Mentor: Yihua Zheng

Exploring the Real-Time Value of the Bz4Cast Tool
Hayley Austin (Johns Hopkins University) and
Collin Van Son (Pennsylvania State University)
Mentors: Yihua Zheng, M. Leila Mays

Validation of Real-time Modeling of Coronal Mass Ejections with the WSA-ENLIL+Cone Model
Alexandra Wold (American University)
Mentor: Yihua Zheng

Awards

Peer Awards for Best Presentations
First Place: Albert Hsiung (Code 587)
Second Place: Anna Voelker, Evan Frangipane, and Michael Greklek-McKeon (Code 674)
Third Place: Binh Le (Code 587)
Orbit Award for Science (2016 Poster Session)
Anna Voelker, Evan Frangipane, and Michael Greklek-McKeon (Code 674)

What are they up to now?

We're always proud of the work that our students accomplish at NASA Goddard during their summer internships. That isn't to say though that we don't love hearing about all the ways that our students explore the bounds of science throughout the rest of their year!

2016 SESI intern Anna Voelker recently contacted us to discuss what she's been up to. Anna (pictured in the image below) has been working at a science theater, where she is developing theater games aimed to teach scientific topics, such as neuron interactions and tidal locking, to children on the autism spectrum. Anna says that these games are based on the Shakespeare and Autism Project.

On Nov. 3, Anna helped to coordinate a "Sensory Friendly Day" at COSI (Center of Science & Industry in Columbus, OH) where over 100 children were able to play the educational games Anna created and enjoyed COSI's demonstrations and activities.

Interns Mike Greklek-McKeon, Anna Voelker, and Evan Frangipane pose with SED Director and GSFC Acting Center Director for Science, Dr. Colleen Hartman, after winning the Orbit Award for Science for their 2016 Intern Poster Session research submission.

A Word from a Mentor – Dean Pesnell

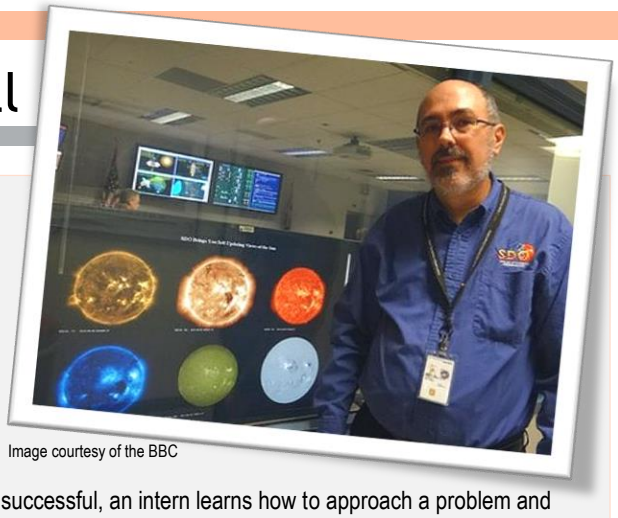


Image courtesy of the BBC

Dr. W. Dean Pesnell is the Project Scientist for the Solar Dynamics Observatory. He has been working at NASA Goddard Space Flight Center since 1990 and has been a long-standing internship mentor. Below he discusses his mentoring experience with the SESI Program.

I have mentored summer students since starting at Goddard, before SESI existed. Six of the students were in the SESI program, most for several summers. All of them worked on projects that helped my research. Although it can be difficult to find projects that provide noticeable progress but can be finished in a summer, each of the interns were able to make progress in some area of research. This also makes the interns attractive; they spend a summer looking at a subject that could turn out to be a fruitful line of research.

Internships are valuable for that and other reasons. By working on a problem that may be unsuccessful, an intern learns how to approach a problem and how success in a research project can be determined. That isn't as easy as it sounds. Most of the research projects have involved some sort of data analysis. An example research project is a search for events in a satellite dataset. The intermittent way most satellites acquire or report data can mean that events seen in one dataset do not show up in another (even if the second has better instruments.) Or the events are rare and the duty cycle of the satellite misses them. Setting up the search is as important as the actual work.

A summer as a SESI intern can be the difference between someone staying in a career as a scientist or engineer and moving to another field. An intern develops an ability to use computers, analyze data, interact with scientists, and report on their results. Each of these skills is essential to their future career as a scientist. SESI also allows the interns to meet peers interested in science. These people will be referees and confidants for years to come. I still talk with people I met when I was a summer intern at Los Alamos. Those personal relationships may be the most important reason to become a SESI Intern.

If you would like to mentor or co-mentor a SESI student for the 2017 Summer Session, please visit our website (http://sesi.gsfc.nasa.gov/) and click on the "For Mentors" link to find OSSI account creation/research posting directions.

If you already have a student that you would like to mentor for the 2017 Summer Session, please direct them to the "For Interns" link at the same url, http://sesi.gsfc.nasa.gov/, to find OSSI intern account creation/research application directions.

The SESI website also contains information about past summer sessions and access to individual research presentations.

A Chat with a Former SESI Intern – Nishu Karna

Dr. Nishu Karna recently moved to Boston to continue her research. Before that, Nishu was a doctoral candidate at George Washington University; she spent over 6 years as a GSFC/ GMU research assistant. She also worked with her mentor, Dean Pesnell, as an intern in the SESI Program. Below, she answers a few questions about her time in SESI.

During which years were you a part of the SESI program?
I participated in the program in 2009 and 2010.

What did you research during those years?
Both years I received an opportunity to work with the mentor working in the field of solar and heliospheric physics. In 2009, I studied the change in the number of relativistic electrons (1991-2005) using data from UARS. It was my first research project. I learned about the process of research and IDL programming at the same time.

In 2010, I measured polar coronal hole areas from 1996 through 2010 using SOHO/EIT synoptic maps.

Has working with SESI affected your career/academic work?
Yes, it helped me to set the foundation for my career.

What are you working on now?
Currently, I am working on three different projects. First, I am studying the formation mechanism of a [solar] polar crown cavity. Second, I am studying the spatial relationship between the Equatorial coronal hole and the Active regions. Third, I am working on coronal modeling.

If you had to sum up your SESI experience in one sentence, what would you say?
Simply awesome!! It enhanced my research and technical skills.

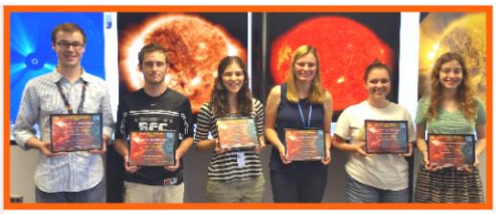
Mission/Project Spotlight for Interns – The CCMC

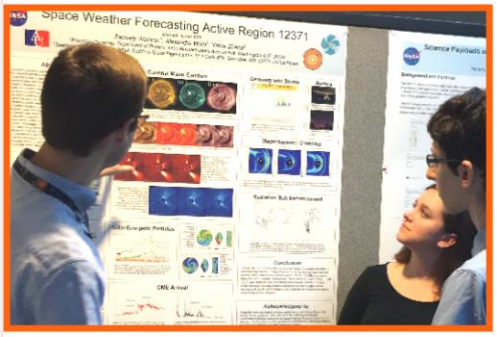
The Community Coordinated Modeling Center (CCMC) is an international, multiagency partnership that is centrally located at NASA/GSFC. The CCMC provides modern space science and space weather simulations to the international scientific community. To date, the CCMC has offered a large number of internship and fellowship positions, including those for our Summer SESI sessions in the fields of science and computer science. Some of these SESI interns will go on to work as part-time, year-round, remote researchers with the CCMC.

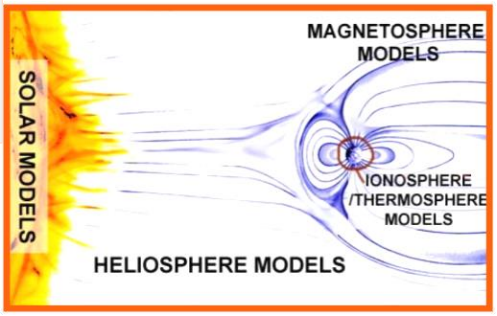
In the scientific field, our SESI Space Weather Research and Operations interns work in Code 674, Goddard's Space Weather Laboratory. They learn to forecast space weather through the identification and analysis of solar events and study their impact on spacecraft and technology here on Earth. As they advance, they may even become independent forecasters for the CCMC.

In the field of computer science, the SESI Space Weather Software and Visualization Development interns work in Code 587, the Science Data Processing Branch. Their research is mainly focused on the software (and occasionally some hardware) the CCMC uses to generate, interpolate, and disseminate its space weather models and information.

The CCMC also hosts the annual Space Weather (SW) REDI Bootcamp. The SW REDI Bootcamp, which many SESI interns participate in, is one or two-week opportunity to learn about space weather applications. After the first week of lectures on basic space weather and forecasting, the program is split into two tracks. In Track A, participants are given practical tutorials that will leave them as knowledgeable, independent space weather forecasters. In Track B, participants learn how the CCMC's tools and models, such as the many Runs on Request options, can aid in their space science and research. The 2017 Bootcamp will be held from June 6-16.







Photos courtesy of the CCMC website.

Thank you to all of our 2016 SESI Mentors, Lecturers, and Facilitators!

Mentors (Official and Unofficial)

Code 587 – Justin Boblitt, Richard Mullinix, and Asher Pembroke

Code 670 – Dick Fisher and Joe Davila

Code 671 – Dean Pesnell, Vadim Uritsky, and Barbara Thompson

Code 672 – Teresa Nieves-Chinchilla

Code 674 – Yihua Zheng, Masha Kuznetsova, Antti Pulkkinen, Leila Mays, Sandro Taktakishvili, Karin Muglach, Yari Collado-Vega, and Anna Chulaki

Code 695 – Joe Grebowsky

Lecturers (and their topics)

Dr. Richard Fisher, Scientist Emeritus in the Heliophysics Science Division
Science, Scientists, and NASA Management at GSFC and *Skylab: A Rosetta Stone for Heliophysics*

Dr. Eric Christian, Senior Research Scientist in the Heliospheric Science Lab
Energetic Particle Cubesats at Goddard: Today and Tomorrow

Dr. Albert Shih, Deputy Mission Scientist of RHESSI and Project Manager/ Project Scientist for GRIPS
2016 Antarctic GRIPS Flight

Dr. W. Dean Pesnell, Project Scientist of the Solar Dynamics Observatory
Why Does SDO Study the Sun?

Dr. Shrikanth Kanekal, Deputy Mission Scientist for the Van Allen Probes
The Near Earth Radiation Environment: Van Allen Belts, Solar Particles, Jovian Electrons and All That

Dr. Michael Hesse, Former Heliophysics Science Division Director at GSFC
Science in Heliophysics

And a special thanks to Steven Kraemer, Bob Robinson, Jeff Brosius, Gina Vandross-Martin, Patrick Burke, Katya Verner, Fred Bruhweiler, Doug Rabin, Blanche Meeson, the NASA/ Goddard Office of Education, and the Heliophysics Science Division (HSD) at GSFC.

Thanks again,
FROM YOUR SESI TEAM

Left: Teresa Nieves-Chinchilla, CEPHEUS Director of Education, teresa.nieves-chinchil-1@nasa.gov Phone: 301.286.8681

Right: Silvina Guidoni, CEPHEUS Assistant Director of Education, silvina.e.guidoni@nasa.gov Phone: 301.286.3094

Middle: Lizz Bowlen, CEPHEUS/SESI Program Manager, elizabeth.a.bowlen@nasa.gov Phone: 301.286.7921