



December 2016

SURF Newsletter

Dear SURF Friend,

As the year comes to an end, we'd like to say thank you to everyone who helps to make SURF a success, especially:

- the mentors and co-mentors who dedicate their time to helping our students grow into scholars;
- the donors who give generously in order to provide such important opportunities;
- the SURF Administrative Committee and SURF Board, both of which provide leadership to ensure that the program stays strong and robust; and,
- the staff across campus who help to make sure our students are housed, fed, kept safe, and cared for!

The small, but mighty SFP staff is grateful for your partnership!

Best wishes for a happy, healthy, and safe holiday season.

Candace Rypisi
Director, Student-Faculty Programs

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Dr. Dianne Newman, Gordon M. Binder/Amgen
Professor of Biology and Geobiology

A SURF Mentor and MacArthur Fellow

By Mike Stefanko

I was excited to learn that Caltech's two new MacArthur Fellows, Victoria Orphan and Dianne Newman, are both SURF mentors. Both are quite busy since receiving the award, but Dianne shared that she is "a huge fan of SURF, one of the best programs at Caltech" and asked me to contact a couple of past students she mentored to share their experiences. I heard from Alice Michel and Ben Wang, who were both eager to describe what being mentored by Dianne meant to them. Alice did a SURF with the Newman Group after her freshman year and then was invited to continue her work with Dianne the following year at the Marine Biological Lab in Woods Hole. Ben did three SURFs in Dianne's lab.

When asked the best part of their SURF experience, both cited working directly with Dianne and their co-mentors. Alice noted that she "learned how to really read scientific papers, and having conversations with them [her mentors] were some of the most important parts of my Caltech education." Ben noted that he started out knowing nothing about research, but was able to fully immerse himself through SURF and eventually "was able to take ownership for parts of the project." His experience has led him to choose a career in research; he is currently a graduate student in the Biology program at MIT.

Asked to share a special challenge, Alice mentioned having to present the research at an international NASA conference: "Speaking in front of a room full of scientists who had initiated the research we did was definitely pretty far out of my comfort zone, but Dianne convinced me that I could do it." It turned out to be "a wonderful experience. I think one of the best things about doing research with Dianne is that she understands people and is excited about helping her students grow." The challenge for Ben was remaining patient and positive. "When I started doing crystallography experiments, my progress slowed down dramatically and it would often be weeks before I was able to grow 'good' crystals! However, whenever I felt down I was always encouraged by Nate [my co-mentor] and Dianne."

A question about the long-term benefits they see reveals the additional impact of the SURF program in general and having a mentor like Dianne Newman in particular. For Alice, "One of the benefits has been having Dianne to go to for life advice. I once emailed her asking if we could chat about my indecision over what to do after Caltech, and though she was extremely busy she still found the time to meet and give me really helpful advice." Ben is reaping benefits in his graduate work. "I have found that in addition to all the technical skills I picked up in the lab, Dianne and Nate have really taught me how to think like a scientist. Both Dianne and Nate worked closely with me to improve my presentation skills. When I was preparing for the Perfall finals, both Dianne and Nate would take time out of their busy schedules to hear me practice my talk countless times. They gave me so many helpful suggestions - with tons of their help, we won the competition my junior year!"

The experiences of Alice Michel and Ben Wang convince me that the MacArthur Fellowship committee made a very wise choice in selecting Dianne Newman, and the SURF program has benefited greatly from her willingness to mentor so many students.



Poster competition finalists with Barbara Gee.

Gee SURF Poster Competition

Central to the SURF experience is the opportunity for students to practice and hone their communication skills. They do this by writing progress reports and a final report and by giving a final presentation. Many students give a final talk at SURF Seminar Day, however an increasing number of students are choosing to give poster talks instead. In 2012, John and Barbara Gee established the Gee Family Poster Competition to encourage and support excellence in scientific communication. Posters are judged on content, visual organization, and verbal presentation.

On SURF Seminar Day 38 students presented a poster. Five students were selected to present at a final round on November 15. They were:

Jacob Abrahams

Thermal Evolution of a Partially Differentiated H Chondrite Parent Body

Diandra Almasco

Effect of Laser Power and Scan Speed on the Mechanical Properties of Two-Photon Lithography Structures

Beatriz Atsavapranee

Protein-Catalyzed Capture Agents Targeting Misfolded Superoxide Dismutase 1

Ankit Kumar

Investigation of Magnetism Induced Massive Dirac Spectra and Topological Defects in the Surface States of Cr-Doped Ternary Topological Insulators

Derik Ngyuen

Significance of Cellular Activity in Granule Cell Survival and Mitral Cell Refinement

The judges had a difficult time choosing winners. All the posters were great! And, the verbal presentations were particularly strong this year. However, they awarded first place to Diandra Almasco and second place to Beatriz Atsavapranee. Congratulations!



Credit: NASA/JPL-Caltech/MSSS

Explore JPL Series

In 1983, five years after the program started, Caltech students starting SURFing at the Jet Propulsion Laboratory (JPL). Since then, over 800 Caltech students have completed SURF projects with JPL scientists and engineers. In recent years collaborative efforts between SURF and JPL's Education Office have focused on increasing the opportunities on lab for Caltech students. One such effort is the Explore JPL Series.

In 2016, five lunchtime seminars were offered where students had the chance to hear from JPL scientists and engineers about their research and potential SURF projects for the upcoming summer. Speakers included:

Serina Diniega (SURF '02) a mathematical planetary geomorphologist -- meaning that she enjoys explaining why landforms look the way they do on different planets, via a mathematical framework that reflects the physical processes acting on that landscape.

Glenn Orton (Ph.D. '75) who works primarily in the infrared, doing remote sensing of the atmospheres of the outer solar system to determine thermal structure and composition. Dr. Orton has mentored about 200 students in SURF and various other programs.

Ryan Hendrickson, a Planetary Protection Engineer currently working on Planetary Protection Implementation efforts on InSight and Mars 2020 missions.

Time was left at the end of the seminar for students to connect with the speakers and make plans for follow-up conversations. Approximately 70 students attended these seminars weekly. In January 2017, participants will get to visit JPL for a tour and a networking session with additional JPL mentors. Since beginning the Explore JPL series in 2014, the number of Caltech students SURFing at JPL has increased by over 20%.

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Aron Meltzner with 2013 SURFers

Year-End Giving

SURF relies on the generosity of our alumni, parents, and friends to fund the program. In November you may have received a letter written by alum and donor, Aron Meltzner (SURF '97, '98, '99; Class of 2000) sharing his SURF story. Aron wrote:

"My first experience with SURF came midway through high school, as I was contemplating colleges to which to apply. Although there are many reasons to like Caltech, I was particularly attracted by the opportunities to partake in cutting-edge research as an undergraduate. The reputation of SURF preceded itself, and I was sold-Caltech quickly became my first choice, and I've never regretted my decision to enroll.

During my undergraduate years as a geology major, I was fortunate enough to SURF for three consecutive summers. I thoroughly enjoyed the process, and I looked forward each summer to writing up my results and presenting my work. One year, however, my would-be SURF talk was preempted by a magnitude 7 earthquake in the wee hours of Seminar Day morning. Seminar Day went on, but by the time of my scheduled talk, I was on a marine base beginning an unexpected new research project involving the mapping of earthquake rupture. All was not lost-I made up my SURF talk a few weeks later, and I went on to present my results at the Fall Meeting of the American Geophysical Union. Collectively, my SURFs resulted in two first-author peer-reviewed publications, plus an additional co-authored paper. More broadly, my experience guided me down future research paths and gave me confidence that I wanted to spend my career doing research.

Now as a researcher at the Earth Observatory of Singapore, I serve as a SURF mentor. Wanting to find qualified students, I turned to the place where I knew of an abundance of smart, talented, and eager undergraduates-the SURF program at Caltech. Over two recent summers, we brought seven Caltech undergrads to Singapore to do research with my group, and the benefits were clearly mutual. That the SURFers had an enriching experience in Singapore is evident in the reputation we quickly developed, and we're on our way to several publications that will result from these collaborations.

I'm also a SURF donor. I started giving a few years after graduation. I gave small amounts at first, then more as the years progressed. I see it as my way to repay the investments that others made in me-and also as a way to engage the next generation."

Dr. Meltzner's story highlights the impact that SURF has had in the lives of many students. We would appreciate your financial support to ensure that future generations of students have such opportunities.

If you would like to make a year-end gift to SURF [you can make an online gift](#).

- After entering your donation amount, select "Choose specific designations."
- In the pop-up designations window, scroll to the "Research Support" section and select "SURF (Summer Undergraduate Research Fellowships)."

- Click on "Continue" to close the pop-up.

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Upcoming Events

[Perpall Speaking Competition Finals, January 12](#)

[SURF2017 Kickoff Dinner, February 16](#)

[SURF Applications Due, February 22](#)

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Student-Faculty Programs

Want more information about SURF? We'd love to hear from you.

Call us at 626-395-2885
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