



Features: Three enterprises, one roof • **SORCE**—10 years in space • **LASP** instrument fills solar data gap • The latest on the Kepler mission

Letter from the director

Dan Baker



Three enterprises, one roof—LASP is an institute at the University of Colorado (CU)-Boulder, a public institution of higher learning that

is striving to better define its identity in a rapidly changing academic world. CU-Boulder provides an effective integration of three key elements that live synergistically under one administrative roof.

The first core element of CU-Boulder is analogous to that of all state universities: By statute and tradition, flagship state universities head a hierarchy of institutions of higher learning to educate the young people of our state and thereby produce teachers, business people, and professionals of all callings. The second enterprise of higher education in Colorado is a quite different and distinct activity—although it is closely identified and commingled with the first. This is the promotion and marketing of higher education to young people from other states and other countries. This function is a business—an endeavor to define an attractive commodity, package this commodity in the best possible way, and to provide it at the most appropriate price possible.

The third enterprise of CU-Boulder is research and graduate training. Again, this

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IN FOCUS

SORCE celebrates 10 years in space

LASP celebrated the 10-year anniversary of the NASA Solar Radiation and Climate Experiment (SORCE) mission that launched on January 25, 2003. The SORCE satellite carries four instruments developed and built by LASP: the Total Irradiance Monitor (TIM), Spectral Irradiance Monitor (SIM), Solar Stellar Irradiance Comparison Experiment (SOLSTICE), and X-ray Photometer System (XPS). The primary objectives for SORCE are to measure important solar input to Earth's radiation budget and to relate how solar variability influences our atmosphere and climate.

The SORCE mission has exceeded expectations in precisely and accurately measuring total solar irradiance (TSI) and solar spectral irradiance (SSI) for ten years—five more years than planned. For example, the TIM's improved accuracy has established a TSI level that is 0.3% lower than prior observations; SIM, SOLSTICE, and XPS have acquired the first continuous measurements of SSI in the 0.1–2400 nm range.

During the course of the mission, the Sun has given us opportunities to challenge our understanding of how Earth's atmosphere and climate respond to different levels of solar activity. SORCE launched during the descending phase of solar cycle 23 and observed an unusually extended minimum in 2008–2009. Now, it is observing the peak of solar cycle 24, which is potentially the least active cycle in 180 years.

The SORCE mission has proven to be a highly successful principal investigator-led mission. Its success



The SORCE spacecraft with the solar arrays deployed during the integration and test phase. (Courtesy Orbital Sciences Corporation)

Student news

Joseph Burns graduated in the spring of 2013 with a degree in computer science and will be working at Intel in Pennsylvania.

Matthew Carton completed his master's in electrical engineering in the spring of 2013 and has taken a job at Blue Canyon Technologies in Boulder, CO.

Adam Clarke graduated in spring of 2013 with a degree in aerospace engineering and will be working at Echostar in Englewood, CO.

Mariel Desroche, who completed her PhD on the solar wind interaction with the magnetospheres of Jupiter and Saturn in December 2012, is currently teaching physics classes at Redrocks Community College.

Jason English, who graduated in the fall of 2011 with a PhD in atmospheric sciences, received a post-doctoral fellowship at the National Center for Atmospheric Research (NCAR) in Boulder.

Bobby Fleshman completed his PhD in July 2013 on modeling neutral-plasma interactions in the Enceladus torus at Saturn. A successful scientist with four publications, he is now pursuing brewing science at UC Davis.

Lance Markovchic graduated with a master's in aerospace engineering in the spring of 2013 and has accepted a position at Raytheon in Arizona.

Steven MacCoun, who earned a master's in computer science in the spring of 2013, will be working at EMC Corporation in Denver.

Katelynn McCalmont completed her master's in aerospace engineering in the spring of 2013 and took a position at Ball Aerospace.

is the product of the dedicated engineers, managers and scientists at LASP, Orbital Sciences Corp., and Goddard Space Flight Center (GSFC), as well as a diligent mission operations team who is now skillfully managing an aging spacecraft. SORCE is poised for an extended mission

out to 2017, and our next-generation TIM and SIM instruments are planned to launch on a NOAA satellite in 2016.

For more information, visit the SORCE mission website at <http://lasp.colorado.edu/sorce/>.

Tom Woods is the associate director of technical divisions at LASP, and principal investigator for SORCE.

Letter from the director

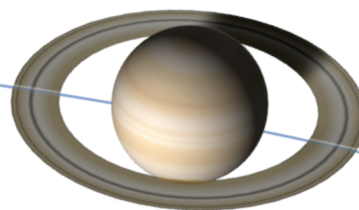
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is quite distinct from the first two enterprises, but integral to CU-Boulder's success. Like the second enterprise, research is a business. It is done as a contract between topflight research practitioners and federal government agencies or industrial partners. University research can be a tremendous magnet for attracting the best and brightest Colorado undergraduate students (enterprise one) or the most highly motivated out-of-state students (enterprise two), but fundamentally the research enterprise is not a constitutional or statutory component of CU-Boulder. It should not be run as if it were.

Over time, the circumstances of CU-Boulder have changed dramatically: Now, only 4% of CU's operating budget comes from State of Colorado coffers. Roughly 40% of the yearly operating budget comes from student tuition, 30% comes from research revenues, and a small portion comes from campus services. The great power of CU-Boulder comes from the merger of its three separate enterprises into an amazingly efficient and effective

academic machine. CU-Boulder—more than essentially any other comparable university in the nation—has had to look to the second and third enterprises to survive. And survive it has. Many would say that CU-Boulder has thrived. But in doing so, it has gone away from simply being a public university. In reality, it has become a private university with a high public purpose. It is finally time that the citizens of Colorado and state leaders recognize this transition and come to terms with it.

LASP brings to CU-Boulder a sizable fraction of the federal research dollars that come to the campus each year. In the future, it is expected that an increasing portion of LASP revenues will arise from more direct industry-academia partnerships. The management and direction of these activities should be carried out in a business-like fashion with the best and most efficient university practices. Thus, CU-Boulder should be exploring new oversight and advisory structures to maximize CU's competitiveness in a brave new academic world.



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Student news

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Ethan Peck was awarded second prize for student oral presentations at the American Meteorological Society's 10th Conference on Space Weather in Austin in January.

Bryce Peters graduated with a degree in mechanical engineering in the spring of 2013 and will work at JPL in California.

Richard Urata graduated in the spring of 2012 with a PhD in astrophysical and planetary sciences and received a post-doctoral fellowship at NASA Ames Research Center.

Are you a former LASP student employee? Let us know what you're doing now.

Email: brook.motz@lasp.colorado.edu



LASP instrument fills solar data gap


When the NASA Glory mission crashed into the ocean in 2011, the solar science community was stunned. Many people—including many at LASP—had dedicated years to the mission. But there was another issue for the community: a likely gap in the otherwise continuous 34-year climate data record of the Sun's net energy output, or total solar irradiance (TSI). But why is TSI important?

Greg Kopp, LASP scientist, said, "To understand the causes of climate change, we need to monitor fluctuations in incident sunlight, which is the dominant energy driving Earth's climate." Scientists do this by measuring total solar irradiance.

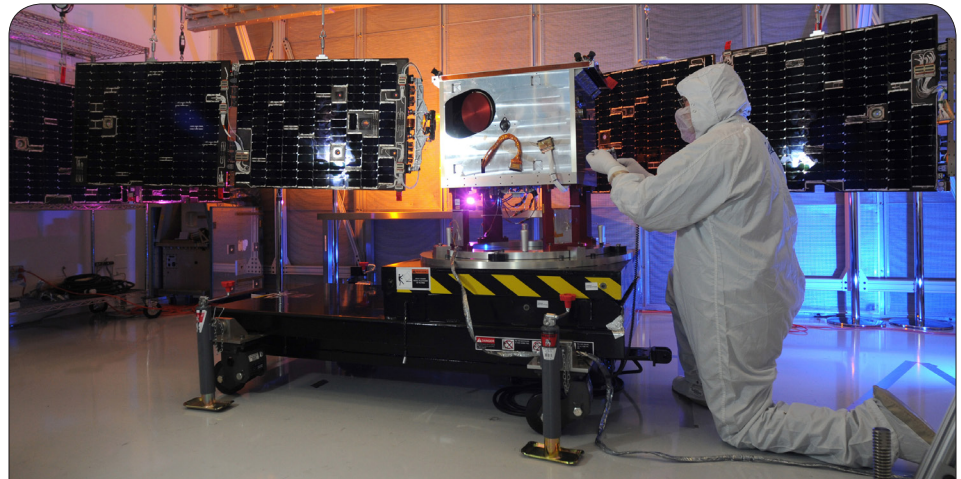
The scientific community wondered

how the problematic data gap might be filled. An answer came to the fore: a LASP-built instrument—called the NOAA Total Solar Irradiance Calibration Transfer Experiment (TCTE)—will fill the gap. Built alongside the original SORCE Total Irradiance Monitor (TIM), TCTE will launch this October on the Air Force's existing STPSat-3 mission.

"TCTE will provide overlap between a currently on-orbit but aging TIM and a future version of the instrument," said Kopp, who is TIM's instrument scientist.

For more information about TCTE, please visit <http://lasp.colorado.edu/home/about/quick-facts-tcte/>. 

Stephanie Renfrow interviewed Greg Kopp for this article; she leads the LASP Office of Communications and Outreach (OCO).



The LASP-built TCTE will fill an important data gap in total solar irradiance. (Courtesy Ball Aerospace)

The latest on the Kepler mission

The Kepler mission, operated by LASP, has made exciting new discoveries about planets that orbit distant stars. The Kepler science team presented some phenomenal results at the American Astronomical Society meeting in early January. Kepler data shows that one in six stars have an Earth-sized planet in an orbit closer than

Earth's Mercury. The study concludes that because our galaxy has about 100 billion stars, there may be at least 17 billion Earth-sized planets out there and that at least 70% of stars have at least one planet orbiting the star.

LASP's Kepler operations team consists of staff and students, working

Mission status

Phase A/B (funded concept study)

GOLD

Solar Probe Plus

Phase C (design and fabrication)

GeoOptics CICERO

IIP Hyperspectral/Balloon

NSF ATOMMS

Phase D (assembly and test)

GOES-R/EXIS

JPSS/TSIS

MMS Fields/Boom

Launch/Early Orbit [launch date]

LADEE/LDEX [09/2013]

TCTE/TIM [10/2013]

MAVEN [11/2013]

Prime Mission [end date]

MESSENGER/MASCS [2013]

Van Allen Probes REPT/FIELDS [2014]

SDO/EVE [2015]

New Horizons/SDC [2020]

Extended Mission [end date]

AIM [2014]

Kepler [2014]

THEMIS & ARTEMIS [2014]

TIMED/SEE [2015]

QuikSCAT [2015]

SORCE [2015]


Cassini/UVIS [2017]

For more information on current missions, as well as full instrument and mission names, visit <http://lasp.colorado.edu>.

tirelessly to ensure the spacecraft is performing well. Operations student Elise Kowalski, who has been at LASP for two years said, “Working on Kepler is a blast! Although we sometimes work late hours, I always enjoy the work because we have such a great team. The most rewarding part about working with Kepler is hearing about all the new discoveries and knowing that I had a part in making that happen.”

On Tuesday, May 14, 2013, at our semi-weekly contact, we found Kepler in safe mode. When we attempted to recover the spacecraft and return to reaction wheel control, we noticed that another reaction wheel did not spin up as expected. At this point the Kepler spacecraft is safe. The teams at NASA, Ball Aerospace,

and LASP are diligently working to understand the reaction wheel anomaly. They have pulled together a “tiger team” of reaction wheel experts to work on options to try and recover the wheel. This process may take many weeks or months. Unfortunately, until we recover fully to reaction wheel control, the Kepler spacecraft is unable to return to the high accuracy pointing needed to continuously stare at the precise region of space being studied and return such amazing science results. For updates, please visit <http://kepler.nasa.gov/news/nasakeplernews/>.

For more information on Kepler, please visit <http://lasp.colorado.edu/home/missions-projects/quick-facts-kepler/>. 

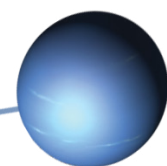
Bill Possel is the director of Mission Operations and Data Systems at LASP.



LASP students support Kepler spacecraft operations. (Courtesy University of Colorado/LASP)

Administrative stats

Scientific researchers	46
Tenure-track faculty	17
Professionals	232
Graduate students	58
Undergraduate students	67
Total	420



Mission & technical stats

- LASP currently has 13 instruments in space on 9 different NASA satellites.
- LASP currently operates four satellites for NASA.

LASP is currently developing 15 instruments for 7 different satellite missions.

Education events

Research Experience for Undergraduates Program in Solar and Space Physics (Funded by the National Science Foundation)

June 9–August 3

MAVEN New Media Practitioner Professional Development Workshop

August 23–25

MAVEN Red Planet Workshop for Elementary Educators

August 24 (Los Angeles) and September 21 (Boulder)

For more information, visit <http://lasp.colorado.edu/education>.

LASP 65th anniversary kickoff—October 11

Save the date! The public is invited to attend a special event in honor of LASP's 65th anniversary. The event and lecture about LASP's history and future will be held the evening of October 11 at LASP in Boulder, CO. For details as they emerge, please visit lasp.colorado.edu or contact epomail@lasp.colorado.edu with "65th anniversary" in the subject line.

LAB NOTES

News

LASP will partner on NASA mission to study Earth's upper atmosphere

NASA announced in April that LASP will collaborate on a \$55 million project to build and launch an ultraviolet imaging spectrograph to image the Earth's upper atmosphere.

Global-scale Observations of the Limb and Disk (GOLD) is a collaboration among LASP, the University of Central Florida (UCF), and the commercial satellite company, SES Government Solutions (SES-GS). LASP will manage the project, design and build the instrument, provide the science operations center, and lead education and public outreach (EPO).

GOLD will be carried to geosynchronous orbit aboard an SES-GS satellite in 2017.

GOLD is an important NASA mission that investigates the global-scale response of the thermosphere and ionosphere to geomagnetic storms, advancing our understanding about space weather's impact on communication and navigation satellites. Richard Eastes from UCF is the principal investigator. The science team includes five LASP researchers: Bill McClintock (deputy principal investigator), Laila Andersson, Frank Eparvier, David Rusch, and Tom Woods. Mark Lankton is GOLD project manager and Stephanie Renfrow leads EPO.

For more information on the GOLD mission, please visit <http://lasp.colorado.edu/home/?p=13322>.

Public outreach

Go to Mars with MAVEN

The public can now participate in NASA's Mars Atmosphere and Volatile Evolution (MAVEN) mission through the Going to Mars campaign, which began with a student art contest on March 15. A Colorado kindergarten class' winning artwork, chosen via online voting on May 6, will be used on the label of a DVD that will fly to Mars on the spacecraft.

The second wave of the campaign began May 1 and invited the public to submit their names and optional message online. The names and top-voted

messages, in the form of haiku, will be burned to the DVD.

Stephanie Renfrow, lead for the MAVEN EPO program, said, "The Going to Mars campaign is an exciting opportunity for people around the world to create a personal connection with the MAVEN mission and share in the thrill of space exploration."

Public vote on haiku ran from July 15–29 and the winner will be announced August 8. Names will be accepted through September 10 so get on board now. Participate at <http://lasp.colorado.edu/maven/goingtomars>.

Achievement awards

Dr. Jack Gosling awarded 2013 Arctowski Medal



LASP physicist Dr. John "Jack" Gosling received the U.S. National Academy of Sciences 2013

Arctowski Medal for outstanding contributions to the field of solar physics.

Gosling received the award for his extensive research on energetic solar events and their effects on Earth. He was honored at a ceremony on April 28, during the Academy's 150th annual meeting in Washington, D.C.

Gosling is a LASP senior research

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LASP homepage



Newsletter archives

Links to a variety of social media networks can be found on our homepage, <http://lasp.colorado.edu>.

If you know someone who might like to receive LASPSPACE, please encourage them to email Laura Bloom, publisher, at laura.bloom@lasp.colorado.edu to subscribe. Should you prefer not to receive future issues, please email with "Unsubscribe" in the subject line.

To view LASPSPACE archives, visit <http://lasp.colorado.edu/home/about/publications/newsletters/>.

associate and retired laboratory fellow at the Los Alamos National Laboratory. He has provided valuable insight into how solar processes affect Earth and the heliosphere—the magnetic bubble surrounding our Solar System, and has found magnetic reconnection in the solar wind, which causes space weather.

Inner space Endowed fellowship fund created

On June 14, LASP hosted the John T. Gosling 75th Birthday Symposium, where a new endowed fellowship fund in Gosling's name was announced. Combined with additional personal funds, Gosling used the proceeds from his 2013 Arctowski Medal award (see previous story) to establish the John T. Gosling Endowed Fellowship Fund to benefit future undergraduate and graduate students who pursue solar-terrestrial physics and/or space plasma physics including the study of the Sun, solar wind, the Sun-Earth connection, or the study of the solar wind's

The medal is awarded every two years in recognition of exceptional studies in solar physics and Sun-Earth relationships. It includes a \$20,000 award for the winner and \$60,000 to support future research in the field.

For more information, see <http://lasp.colorado.edu/home/?p=12618>.

interaction with the Earth's magnetosphere. Please consider contributing to this fellowship by making your tax-deductible contributions to the University of Colorado Foundation; mention in the memo line or a note with your gift that it is for the John T. Gosling Endowed Fellowship Fund (151050). Send your gift to the University of Colorado Foundation, 4740 Walnut Street, Boulder, CO 80301, attention: Barb Perin. Or, donate online at <http://www.cufund.org/guide-to-giving/what-to-give/cashcheckscredit-card>.

Notable departure



Caroline Himes, executive associate director and administration division manager, has departed LASP after a long

career with the organization, beginning in 1997. Himes has been responsible for operations and support of LASP scientific and technical goals, as well as providing oversight of human resources, business management, and finances.

In response to the growing importance of academic-industry-partnerships at the university, Himes had been working with CU-Boulder's vice chancellor's office to

address industry relations, and had been offered the job of director of the Office of Industry Relations and Special Opportunities. With LASP's full support, she assumed these new duties on July 8, 2013.

LASP greatly appreciates the years of dedication and countless contributions that Himes has provided to LASP and offers our sincere congratulations on this important new appointment. An executive search committee has been created to fill the position.

If you would like to nominate a candidate for this important position, please see http://lasp.colorado.edu/home/?post_type=jobs&p=13672.