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ESA Newsletter

Electrostatics Society of America - The Friendly Society

President's Message

Dear ESA Colleagues,

I enjoyed seeing many of you at the ESA annual meeting at Notre Dame. The meeting was the second largest ESA meeting in history, just 3 people short of the record set in 1995 (not counting the Joint Electrostatics meetings hosted in collaboration with other societies). But the meeting had more than just quantity – the quality was also top notch. Several people told me they thought the presentations were the best they've seen at an ESA meeting. And the venue was outstanding – located in a great conference center on a beautiful campus, with great food and everything conveniently located. Many thanks to Technical Program Chair Poupak Mehrani and Conference Chair David Go for making such an excellent conference! Also, many thanks to Al Seaver for his volunteer service as photographer and photo archivist. The photos may be found at *http://electrostatics.us/esa/2014/page_01.htm*

As ESA President, I have the honor to present the ESA Awards at the meeting banquet. This year we had four award recipients:

- Raji Sundararajan received the Distinguished Service Award in recognition of her years of leadership in the ESA. Raji's contributions include service as ESA president and on the ESA Executive Committee, as well as hosting an annual meeting. Raji's award was especially meaningful for me -- the first ESA meeting I attended was the 2007 meeting hosted by Raji at Purdue, and Raji went out of her way to welcome me to the meeting and encourage me to become active in the ESA.

- Bill Wayman received the Lifetime Achievement Award for his many important contributions to xerography during his long tenure at Xerox. Bill has over 80 patents for inventions related to applications of electrostatics in xerography. Of particular importance were Bill's contributions to the scavengeless development process. And we are also grateful to Bill for his educational and entertaining presentations at ESA meetings, which included hands-on demonstrations of early Xerox machines and videos showing how Xerox television commercials evolved over time.

- Glenn Schmieg received the Lifetime Achievement Award for his work in promoting the excitement of electrostatics -- and science more generally -- to the public. Glenn has a unique combination of skills: technical expertise, passion for science, wit, adventure (eg, doesn't shy away from fires!), excellent public speaking, and a kindness and genuine interest in others. By mixing these ingredients, Glenn becomes the most effective proponent of the excitement of science that I have ever seen. His banquet talks at the ESA annual meetings had been a highlight for many years, and it's impressive that each year Glenn lived up to the high expectations we all had.

- Mark Zaretsky received the Honorary Life Member Award for his exceptional contributions to both the ESA and to the field of Electrostatics. Mark's technical contributions include the development of numerous improvements to photoprinting technology based on electrostatics, as well

(cont'd. on p. 2)

ESA Officers

President:
Dan Lacks, Case Western Reserve Univ.
Vice President
Shesha Jayaram, Univ. of Waterloo
Executive Council
Sheryl Barringer, Ohio State Univ.
Kelly Robinson, Electrostatic Answers, LLC
Rajeswari Sundararajan, Purdue Univ.

Calendar

- SFE 2014 (9th Conf.) Aug. 27-29, 2014, Toulouse, France, *secretariat-sfe2014@laplace.univ-tlse.fr* (abstract due Jan. 31, 2014)
- 2014 EOS/ESD Symposium Sep. 7-12, 2014, Tuscon, AZ, USA, *http://www.esda.org/symposia.html*, Contact: *info@esda.org*
- IEEE/IAS Annual Mtg. Oct. 5-9, 2014, Vancouver, BC, Canada, *http://www.ewh.ieee.org/soc/ias/2014/* Contact: Rajesh Sharma, *rsharma@astate.edu*
- ESA 2015, June 16-18, 2015, California State Polytechnic University, Pomona, CA, USA, Keith Forward, *kmforward@csupomona.edu*

President's Message (cont'd.)

as the implementation and commercialization of these improvements in Kodak products. And Mark's contributions to the ESA are second-to-none, as he has been the editor of the ESA newsletter for over 10 years.

The 2015 ESA meeting will be held at California State Polytechnic University in Pomona, California. It will be our first meeting on the West Coast in over 10 years. The Conference Chair is Keith Forward, who just finished his second year as a professor at Cal Poly Pomona. The Technical Program Chair is Peter Ireland, from the University of Newcastle, Australia (for Peter the West Coast location of the meeting will make the travel a little easier). The conference will be held June 16-18, 2015 – save the date!

Regards,
Dan Lacks,
President, ESA
daniel.lacks@case.edu

Current Events

Scientists think they can control weather with lasers

For many Americans who wished they could change the weather -- whether it be in the Northeast during this past winter or in drought-stricken California -- researchers may have found a way to aim a high-energy laser beam into clouds to make it rain or trigger lightning.

The existence of condensation, storms and lightning are all due to the presence of large amounts of static electricity in the clouds. Researchers from the University of Central Florida and the University of Arizona say that a laser beam could activate those large amounts of static electricity and create storms on demand. By surrounding a beam with another beam that will act as an energy reservoir, the central beam will be sustained for greater distances than previously possible. The secondary beam will refuel and help to prevent the dissipation of the primary beam, which would break down quickly on its own.

Although lasers can already travel great distances, it behaves differently than usual, collapsing inward on itself when a laser beam becomes intense enough, according to Matthew Mills, a graduate student at the UFC Center for Research and Education in Optics and Lasers. "The collapse becomes so intense that electrons in the air's oxygen and nitrogen are ripped off creating plasma -- basically a soup of electrons," Mills explained in a statement.

Afterwards, the plasma tries to spread the beam back out -- causing an internal struggle between collapsing and spreading -- what's known as "filamentation." This process in turn creates a light string that lasts only until the beam disperses. "Because a filament creates excited electrons in its wake as it moves, it artificially seeds the conditions necessary for rain and lightning to occur," Mills explained.

Previous work done by other researchers have led to some type of "electrical event" in clouds -- raising an added risk of a lightning strike when seeding clouds with lasers, according to the researchers.

"What would be nice is to have a sneaky way which allows us to produce an arbitrary long 'filament extension cable.' It turns out that if you wrap a large, low intensity, doughnut-like 'dress' beam around the filament and slowly move it inward, you can provide this arbitrary extension," Mills said in a statement. "Since we have control over the length of a filament with our method, one could seed the conditions needed for a rainstorm from afar. Ultimately, you could artificially control the rain and lightning over a large expanse with such ideas."

"This work could ultimately lead to ultra-long optically induced filaments or plasma channels that are otherwise impossible to establish under normal conditions,"

Current Events (cont'd.)

Demetrios Christodoulides, a professor that is working with the graduate students on the project, said in a statement.

Using this method, Mills, along with fellow graduate researcher Ali Miri, have extended the pulse seven-fold -- from just under a foot to around seven feet. Still, they're not done yet, with hopes to extend the filament even further.

(excerpted from *http://www.cbsnews.com/news/inducing-rain-lightning-weather-lasers/*)

Shocking News: Lightning Can Shape a Mountain!

Don Boroughs

Stefan Grab has long been familiar with the power of the lightning bolts that regularly strike the Drakensberg Mountains of southern Africa. Nineteen years ago, the geomorphologist was caught in a storm of such electric ferocity that he vowed never again to camp there in the summer. But if you had told him at the time that lightning played a major role in shaping those mountains, he observes, "I would have said, 'You must be joking—what nonsense.'"

Not anymore. Grab and a colleague at Johannesburg's University of the Witwatersrand, geologist Jasper Knight, have just given a jolt of their own to conventional notions about the forces that shape mountains. In research published in the January 1 issue of the journal Geomorphology, they present evidence that lightning—rather than ice or heat—is the main force shattering rocks on Drakensberg summits.

Grab and Knight surveyed a quarter square mile amid Drakensberg peaks in Lesotho and found 90 sites where lightning strikes had blasted apart the basalt rock face, scattering up to ten tons of debris a dozen feet or more. The electric impacts leave behind pits up to three feet deep and can shift a boulder the size of a small truck.

The Drakensberg—like nearly all other ranges—were generally thought to have been chiseled by the weathering effects of ice, with smaller contributions from heat and naturally occurring chemicals. Turns out, "that's not the case," says Knight.

Lightning splits rock in much the same way as the better-known cause of weathering: frost shattering. Just as water expands when frozen, it also expands if it's been vaporized by lightning. This expansion occurs within cracks in the rocks, wedging blocks apart. But frost shattering generally occurs over thousands of years. Lightning, at temperatures of up to 54,000°F (almost 30,000°C), can burst rocks in milliseconds. "It basically causes a bomb to explode on the rock surface," explains Knight.

The fact that a lightning strike will partially melt basalt in an instant allowed Knight and Grab to develop a diagnostic "tool kit" to distinguish the sites of lightning strikes from other rock fragments. A key piece of evidence: The tremendous amount of electricity in lightning leaves a magnetic signature so strong that the needle of a compass passed over a strike site often swings wildly. And compared with other rocks in the area, lightning-blasted fragments are harder, smoother, and more often free of lichens because they are freshly broken and sheared off in an instant.

Powerful electric currents also spread tiny cracks deep within rocks. This sets the stage for water, plants, ice, and heat to weather rocks further. Lightning, says Grab, is "part of the much bigger jigsaw," a puzzle piece that had been passed over by geoscientists for decades. The impact is most obvious up close, but peaks shaped by lightning will likely look more jagged when viewed from afar, Knight notes.

The two researchers believe that further exploration will reveal other examples of mountain ranges shaped in large part by lightning—especially in warmer regions of Australia, Africa, and Asia that were mostly passed over by the Ice Age. Unlike the Rockies and Appalachians, the Drakensberg Mountains were never heavily scoured by glaciers.

No one disputes that the northern ranges were shaped largely by rivers of ice. But where glaciers have now melted and lightning storms are common, such as the southern Rockies, lightning could play an important role in the ongoing weathering of peaks. And in a warming world, that role is likely to grow.

(from *http://news.nationalgeographic.com/news/2014/01/140105-lightning-mountains-south-africa-drakensberg-mountains-geology/*)

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ESA-2015 Annual Meeting
June 16-18, 2015
California State Polytechnic University
Pomona, California, USA