



MEDIA CONTACTS:

Julie Chao, JHChao@lbl.gov, 510-486-6491

Laurel Kellner, LKellner@lbl.gov, 510-590-8034

Christina Procopiou, ckprocopiou@lbl.gov, 510-486-5202

Berkeley Lab Researchers at AGU 2019

Topics include: Wildfire, Desalination, Geothermal Energy, Sustainable Agriculture, Machine Learning, and Harmful Algal Blooms

Scientists from Lawrence Berkeley National Laboratory will be presenting on a wide variety of subjects all week. Some highlights are listed below.

Reporter Roundtables – Moscone South 305-306 (Press Room)

Enhanced **geothermal systems R&D: Harnessing an untapped source of renewable electricity**

Tuesday, 10 December, 9:00 | Presentations Centennial - SWIRL, H14D-08, MR21B-0074, GC23E-03

Geothermal energy currently makes up less than 1% of total U.S. energy generation. But according to a recent report by the U.S. Department of Energy, advancements in technology could lead to a 26-fold increase of electric generation from geothermal systems by 2050. Scientists engaged in enhanced geothermal systems research, funded by DOE, will discuss how to move these engineered geothermal systems safely, reliably and sustainably toward industrial scale.

Participants:

- Pat Dobson, Lawrence Berkeley National Laboratory
- Susan Hamm, Geothermal Technologies Office, U.S. Department of Energy
- Tim Kneafsey, Lawrence Berkeley National Laboratory
- Paul Schwering, Sandia National Laboratories

Is **desalination the answer to our water woes?**

Thursday, 12 December, 10:00 | Presentation GC13C-02

Desalination is a decades-old technology that is getting a fresh look with a \$100-million investment by the U.S. Department of Energy, the largest federal investment in water treatment research in 50 years. Speakers will discuss how desalination technologies can play a role in achieving a “circular water economy” and can answer questions on the DOE water hub, the role of science, and the role of industry, as well as California-specific water issues.

Participants:

- Peter Fiske, Lawrence Berkeley National Laboratory and the National Alliance for Water Innovation (NAWI)
- Megan Mauter, Stanford University and NAWI

Scientific Presentations

Climate and Hydrological Controls on Coastal Harmful Algal Blooms (OS11B-07)

Monday, 9 December, 9:30-9:45 | Moscone West 2000, L2 | Presenter: Michelle Newcomer

While many studies suggest nutrients drive coastal blooms, this is not always the case, leading to the problem of stressed, intractable models, and fundamentally unpredictable onset. Feedbacks and couplings through biogeochemical and biological pathways within the water column, hyporheic, and benthic zones down the watershed ultimately control the fate and delivery of metals, nutrients, and solutes important for HAB formation. Mechanistic representation and understanding of these complex, non-linear drivers is poorly understood, and in this work we present novel machine learning and numerical modeling approaches to address this challenge.

The AR1K Project: Machine Learning for Sustainable Agriculture (B31E-08)

Wednesday, 11 December, 8:00-10:00 | Moscone South eLightning Theater III | Presenter: Karl Schaettle

The AR1K Project Consortium aims to reduce the need for agricultural chemical inputs while maintaining or increasing yields and improving environmental stewardship. We are motivated by the fact that modern agriculture is predicated on the availability of fertilizers, including non-renewable rock phosphorous, as well as organic carbon in soil. It is essential that we remediate or compensate for the destabilization of agricultural yield – our growing global population requires a doubling of food production within twenty years. Using 1,000 acres in Arkansas as a testbed, we have developed a computational architecture that couples multi-scale measurements to next-generation statistical machine learning algorithms to automate the construction of models of ecosystem processes and their impacts on productivity and resource utilization. (More at AR1k.org)

Deep Learning for Extreme Weather Detection (GC33A-05)

Wednesday, 11 December, 14:40-14:55 | Moscone West 2018, L2 | Presenter: Mr. Prabhat

Characterizing the frequency and intensity of extreme weather phenomena (tropical cyclones, extra-tropical cyclones, atmospheric rivers, etc) under climate change scenarios is an important problem. This talk will review a number of results from our group in classifying, detecting, segmenting and tracking these features in massive climate datasets. A common theme spanning these projects is the successful adaptation of Deep Learning methods, and the utilization of large-scale HPC resources.

Fire in the Environment: Pyrogenic Organic Matter Cycling and Environmental Impacts Across Watersheds (B41A)

Wednesday, 11 December, 13:40 – 18:00 | Moscone South Poster Hall | Presenter: Michelle Newcomer
Thursday, 12 December, 8:00-10:00 | Moscone West 3012, L3 | Convener: Michelle Newcomer

Fires have increased in frequency in many places around the world. However, a significant knowledge gap remains as to how fires affect carbon and nutrient cycling and watershed functioning. Examples of environmental impacts include water chemistry and hydrological changes, disruption to ecosystem services, transitions in carbon and nitrogen cycles, shifts in plant communities, changes in surface albedo, evapotranspiration, water infiltration and runoff, and hydrophobicity of soils. (Poster: B33G)

Utilizing Diverse Data in Scientific Analysis and Modeling for **Water Resource Management (IN51A-01)**

Friday, 13 December, 8:00-8:15 | Moscone West 2018, L2 | Presenter: Charuleka Varadharajan

There has been an explosion of water data over the past two decades. This presentation presents a perspective on the challenges in utilizing these data for scientific purposes such as data analysis or modeling. We present many tools that we have developed over the years to manage, use, and publish water resources data. We also discuss the barriers to using the data for machine learning or mechanistic modeling. We call out technologies and scientific advances that are needed to make water data usable for science. These should be considered in several federal and state efforts in the United States to make water data more open and reusable.

AGU Named Lecture

Tyndall History of Global Environmental Change Lecture: This annual lecture offers a historical perspective on global environmental change. The lecture is named in honor of 19th century Irish-born scientist John Tyndall FRS, whose measurements in the mid-century confirmed the significance of the greenhouse effect, which had been first hypothesized by French mathematician/physicist Joseph Fourier in 1824.

Revealing the Radiative Forcing by **Well-Mixed Greenhouse Gases: From Derivation and Detection to Future Discoveries (GC34E-01)**

Wednesday, 11 December, 17:00-18:00 | Moscone West 2022 | Presenter: William Collins

We take stock of the past, current and prospective future research on radiative forcing by well-mixed greenhouse gases (WMGHGs), the primary anthropogenic agents that are driving recent global warming. We discuss the history of the research into these gases starting from the discovery that each WMGHG could affect the energy balance of the climate system, through early numerical experiments of their climatic impacts, up to the current measurement and modeling of their greenhouse effects.

Collins is Director of Berkeley Lab's Climate & Ecosystem Sciences Division and Director of UC Berkeley's Environmental Resilience Accelerator

Booth

Visit Berkeley Lab's Earth & Environmental Sciences Area all week in Booth #1622 and meet our scientists! They will be sharing details about their efforts to answer questions such as: how intense wildfires affect California drinking water quality; how to create buildings, bridges, and dams that are more resilient to extremes like wildfires and earthquakes; and how to leverage artificial intelligence and machine learning to increase agricultural productivity.

Go here for the booth schedule:

<https://eesa-agu19.webflow.io/schedule>

Social Media

Follow our Earth & Environmental Sciences Area on Twitter:

@eesalbnl

#EESAatAGU

Also follow:

@BerkeleyLab