34th SATELLITES & EDUCATION CONFERENCE

Conference Program

July 24, 2021

Presented By

SATELLITE EDUCATORS ASSOCIATION

a 501 (c)(3) nonprofit corporation

Hosted on ZOOM by

CAL STATE LA Charter College of EDUCATION

SATELLITES & EDUCATION

Conference XXXIV

July 24, 2021

The Satellite Educators Association wishes to expres its profound gratitude to our sponsors without whom the Satellites & Education Conference would not be possible:

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NASA-Jet Propulsion Laboratory
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The Aerospace Corporation
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EARTH SPEAKS

WE LISTEN

Gathering 8:00 am (Bring Your Own Breakfast)

Opportunity to reconnect with old friends and

Make new friends

8:45 am OPENING and WELCOME

Monica Maynard, President of Satellite Educators Association

And Dr. Cheryl Ney, Dean of the Charter College of Education

Cheryl Ney earned her Ph.D. in biochemistry from the University of Chicago, her M.S. in chemistry from Baylor University, and her B.S. in chemistry from Arizona State University. She has served as a professor of chemistry, associate provost, associate vice president, and National Science Foundation Distinguished Visiting Professor of Women in Science in the University of Wisconsin system. January 2017 she was named Dean of the Charter College of Education. Dr. Ney is a strong advocate for STEM education and has been a valuable supporter of this conference.

9:00 – 9:40 am Opening KEYNOTE SPEAKER:

Shawn Cochran

Associate Director,

Civil and Environmental Space in

Customer Engagement and Solutions,

Raytheon Technologies

Climate Science

The 2020 Atlantic hurricane season was the most active on record. There were 30 named storms. Twelve made landfall. It was the fifth above-normal season in a row, according to the National Oceanic and Atmospheric Administration, and the eighteenth in 26 years.

"We're seeing stronger events, we're seeing wetter events, and that's because there's more energy available to hurricanes to be able to intensify and become the monsters that they become," said Shawn Cochran, a scientist and senior business development manager at Raytheon Intelligence & Space, a Raytheon Technologies business.

For Mr. Cochran and his colleagues, the challenge is clear.

"We need to improve our ability to understand the atmosphere and the state of the atmosphere," he said. "And we need to reduce the timescale."

The key, he believes, is in the frequency of soundings – vertical measurements of temperature and humidity from Earth's surface to the top of the troposphere. Right now, those happen about once every six hours. The trouble, Cochran says, is that severe weather makes big changes much faster.

Shawn Cochran says, “We will talk about what kind of satellites are used for weather and climate observations, and how they are used for weather prediction with a focus on tropical cyclones and hurricanes.”

9:40 am *Live with AIAA* – Ken Lui and Sherry Stukes

9:50 am – 10:25 am Plenary Session 2

Kelley Le, Director of the UCI Science Project and Co-Founder of RRISE UP (Radical Reimagination of Inclusion, Science, and Education)

Taking on Climate Change with Courage

Dr. Kelley Le will share about her new book to support teachers taking on climate change in meaningful and culturally relevant ways. Participants will engage in activities and reflection as they explore evidence-based pedagogical practices that support student learning. Resources will also be provided to extend learning beyond the session.

10:25 – 11:00 am Plenary Session 3

Dominique Evans-Bye, Educator, Clark Magnet High School, California
Student Co-Presenter: Matthew Keshishian

CTE Mission: CubeSat

CTE Mission: CubeSat was developed by the Department of Education as a national challenge "to build technical skills for careers in space and beyond." The Honors GIS and Remote Sensing class at Clark Magnet High School in La Crescenta, CA, collaborated on a mission proposal as a first quarter project. Their proposal to build a CubeSat with an infrared sensor to identify homeless encampments within high fire risk areas was chosen as one of five national finalists, and they were awarded $5,000 to implement their mission. In this session, the student co-presenter will detail how the team built a CubeSat, programmed data collection with Arduino, determined site suitability for the project, then flew their mission using a weather balloon and analyzed the flight data using GIS all during distance learning.

11:00 am *Aerospace Corp Teacher Resources* – Monica Maynard

11:10 – 11:45 am Plenary Session 4

Ed Murashie, President, ProEngineered Solutions, California

EarthKam: The Ultimate Selfie

I am sure you have snapped a selfie from your phone, but have you ever snapped a selfie from the International Space Station? I will show you how plus other cool space related activities.

11:45 am – 12:20 pm Plenary Session 5

Robert A. Black, Author, Royal Fireworks Publishing Co., New York

Bottomless Wonders from Simple Rules

Two of the most significant mathematical discoveries of the past 70 years – Fractal Geometry and Chaos Theory – have surprisingly simple roots. Both came in the early years of the Computer Age, when researchers were just beginning to use their new electronic tools, but those tools still had limited capabilities. Today, the key points of those breakthroughs can be re-created using standard computer software on a classroom computer, or even with a pencil and paper.

In this presentation, author Robert Black introduces you to the two men behind the discoveries, Benoit Mandelbrot and Edward Lorenz. Both are part of his *Mathematical Lives* biography series for teenage readers. Mandelbrot, who hid from the Nazis as a Jewish teenager in Vichy France, saw the same patterns in multiple disciplines, and discovered the mathematical key that described all of them. Lorenz was researching numerical weather prediction in 1960 when a computer glitch helped him discover a brand new field of science. Both men gave us ways to understand and model nature as it really exists, with building blocks that are accessible to middle school or high school students.

Benoit Mandelbrot: Reshaping the World was released in 2021, and *Edward Lorenz and the Chaotic Butterflies* will be released in 2022. Another volume in the series, *David Blackwell and the Deadliest Duel*, was named an Honor Book of 2020 by the Mathematical Sciences Research Institute. All are available from Royal Fireworks Press, http://www.rfwp.com.

12:20 pm *American Meteorological Society* – Steve LaDochy

12:30 – 1:05 pm Plenary Session 6

Monica Maynard, STEM Coordinator, Aerospace Corp, California

Mars Escape Room

Participants will engage in a team competition in which they collaborate to find and save the Tardigrade (water bear) and bring it back to Earth. Competitors will explore several regions of Mars and complete space related tasks designed to keep everyone learning while having fun.

1:05 – 1:45 pm Plenary Session 7

Keynote Speaker: *Ben Holt*

NASA – JPL

Research Scientist –
Oceanography Group

B.A., Human Biology and Anthropology, Stanford University, 1972

M.S., Physical Oceanography, Dept. of Geology, University of Southern California, 1988

Observing Arctic Sea Ice Thickness

Benjamin Holt is a Research Scientist with the Ocean Circulation group within the Earth Science Section at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, which he joined in 1978. His research interests include using multi-sensor remote sensing data to examine the geophysical state of polar sea ice and snow, coastal oceanography and circulation, and the detection of marine pollution. In addition, he is also involved with new instrument development and techniques for microwave measurement of sea ice thickness.

In his talk today, he will explain that sea ice *thickness* is the single-most important measurement of the polar-covered seas, as *thickness* integrates the balance of energy fluxes between the atmosphere and underlying ocean. Yet sea ice thickness is one of the most challenging measurement on any meaningful spatial and temporal scale, including from space. Mr. Holt will provide an overview of the current state of the Arctic climate and a historical perspective of understanding thickness measurements from field campaigns through the current satellite record.

1:45 pm *NASA DEVELOP* - Erica Carcelen, Geoinformatics Fellow, JPL Lead

1:55 – 2:30 pm Plenary Session 8

John Moore, Executive Director, Institute for Earth Observations, New Jersey

Student Co-Presenters: **Max Friedman** and **Sriram Elango**

A³Sat: Engaging the Next Generation of Earth SySTEM Professionals

CubeSats are playing an ever-increasing role in the Aerospace community from observing the Earth system to providing guidance for satellite missions to Mars and the Moon. These types of authentic experiences can no longer wait to be explored only at the college or university level, they must begin in the pre-college community. This project will result in broadening participation and creating diversity within these communities due to the interdisciplinary nature and requirements of such an Integrated Earth SySTEM project.

The A³Sat project will allow students to build an active model mirroring many aspects of an authentic CubeSat design engineers use for launch into space. A large number of sensors that will be onboard A³Sat come from an integrated board known as the Enviro+. The data from all these sensors are both recorded and time stamped in a log file as well as displayed as an overlay in both the visible and infrared camera views.

The data and/or imagery provide a wide range of innovative and transformative opportunities to gain experience, develop proficiencies, expand skills in data literacy, and explore career pathways, that are not readily available to the pre-college community, thus, broadening participation in STEM career pathways.

2:30 pm *NASA/JPL Resources* – Peter Falcon, Annie Richardson

2:40 – 3:15 pm Plenary Session 9

Nahum Melamed, Project Leader, Guidance and Control Subdivision, Aerospace Corp, California

Move an Asteroid, Shape the Future

The Aerospace Corporation conducts asteroid deflection teaming workshops using a web-based asteroid deflection app developed in collaboration with NASA/JPL intended for students, science teachers and the public. Historical asteroid impact events and the risk and consequences of a future impact with Earth are described. The asteroid deflection app is used to illustrate technology used for orbit change and deflection of a hypothetical asteroid away from Earth. Conducting a friendly asteroid deflection competition is explained and demonstrated. Educational resources based on the Next Generation Science Standards (NGSS) are available here: https://planetary-defense.aerospace.org/

3:15 pm *The Young Meteorologist Program* – Update - Ron Gird, Meteorologist, **PLAN!T NOW**

3:25 pm – 4:10 pm Plenary Session 10

Closing Keynote Speaker:

Dr. Kerry Cawse-Nicholson

NASA/JPL Deputy Science Lead

ECOSTRESS

ECOSTRESS

Dr. Kerry Cawse-Nicholson is a member of the Carbon Cycle and Ecosystems group at the NASA Jet Propulsion Laboratory. She is an expert in spectroscopic imagery, particularly in fusing datasets acquired over different parts of the electromagnetic spectrum and in quantifying uncertainty. Kerry works as part of several product development and applications teams, as the Deputy Science Lead for ECOSTRESS – a thermal radiometer mounted on the International Space Station – and the co-lead for the Algorithms Working Group for an upcoming space-borne mission designated to study Surface Biology and Geology (SBG). Kerry produces hourly land surface temperature (LST) products over North and South America through a MEaSUREs project, produces evapotranspiration (ET) products over the continental US for ECOSTRESS, and serves as an invited working group member of the land processes distributed active archive center (LP DAAC) which distributes these products.

4:10 pm GLOBE - Cornell Lewis, SSAI

4:20 – 5:30 pm Annual Satellite Educators Association Members Meeting

All are invited. Only Paid Up-To-Date Members may vote.

OUR EXHIBITORS

Satellite Educators Association
Contact: Pete Arvedson (arvedson@aol.com)

The Satellite Educators Association was established in 1989 as a professional society to promote the innovative use of satellite technology in education and disseminate information internationally to all members. Membership includes master educators who are orchestrating the learning process for their students. We have the ability to connect teachers with the appropriate discipline. We can teach the technology skills needed to study practical questions and problems. The Satellite Educators Association contributes to the perspective and expertise of our membership in K-16 education to help students understand Earth Systems and space science. Teacher resources, curriculum and hands-on activities are developed in accordance with the current national standards. Services to educators include providing resources and materials, offering support, training, networking and continuously updating curriculum. The Satellite Educators Association presents the annual Satellites & Education Conference.

National Oceanic and Atmospheric Administration (NOAA)
NESDIS, NWS, and Education Coordinated by NESDIS
Contact: Ron Gird (rsgird@gmail.com)

The National Oceanic and Atmospheric Administration's (**NOAA**'s) mission is to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs. **NESDIS:** National Environmental Satellite, Data and Information Service is dedicated to providing timely access to global environmental data from satellites and other sources to promote, protect, and enhance the nation's economy, security, environment and quality of life. To fulfill its responsibilities, NESDIS acquires and manages the nation's operational environmental satellites, provides data and informational services and conducts related research. **NWS:** The National Weather Service is the primary source of weather data, forecasts and warnings for the United States. Television weathercasters and private meteorology companies prepare their forecasts using this information. The NWS is the sole United States official voice for issuing warnings during life-threatening weather situations.

The Aerospace Corporation
Contact: Monica Maynard (Monica.I.Maynard@aero.org)

The Aerospace Corporation has a longstanding dedication to education. Aerospace is committed to inspiring the next generation. Since 2013, we have supported K-12 education by hosting summer educational programs for teachers and high school students. Free of charge, these events expose participants to the research, state-of-the-art facilities, and 21st century skills needed to succeed in the STEM fields and provide real-world examples of problems and solutions. Aerospace is committed to sharing our passion for the Science, Technology, Engineering, and Math (STEM) disciplines to inspire the next generation – shaping and securing the future of our nation.

American Institute of Aeronautics & Astronautics

Contact: Ken Lui (kcons2014@kensconsulting.net)

Our purpose is to ignite and celebrate aerospace ingenuity and collaboration, and its importance to our way of life. Our promise is to be your vital lifelong link to the aerospace community and a champion for its achievements. One Remarkable Fact Says It All: Since 1963, members from a single professional society have achieved virtually every milestone in modern American flight. That society is the American Institute of Aeronautics and Astronautics. With nearly 30,000 individual members from 91 countries, and 95 corporate members, AIAA is the world's largest technical society dedicated to the global aerospace profession. AIAA carries forth a proud tradition of more than 80 years of aerospace leadership. The Los Angeles – Las Vegas Section is a community of 6,000+ Aerospace Professionals, providing services to the communities from Los Angeles to Las Vegas, including San Bernardino and Riverside. Southern California and Las Vegas area has lots of aerospace organizations and activities and is the center of American aerospace.

Science Systems and Applications, Inc.

Contact: Alex Kim (alex.kim@ssaihq.com)
Contact: Autumn Burdick (autumn.burdick@ssaihq.com)
Contact: Cornell Lewis (cornell.lewis@ssaihq.com)

Science Systems and Applications, Inc. (SSAI) is a leading provider of scientific, engineering, and IT support for customers seeking new frontiers in science and technology. For more than 40 years, we have been by their side, aligning with their vision and goals to provide research and technical support. We support pioneers in science and engineering—such as NASA and NOAA—and we've made significant contributions to more than 150 Earth and space science missions. SSAI's services are built on our genuine passion for research and innovative solutions. Our expert scientists, engineers, and IT professionals share a commitment to providing solutions for the unique needs of each customer.

American Meteorological Society Education Program

Contact: Steve LaDochy (sladoch@calstatela.edu)

The American Meteorological Society Education Program includes teacher training. AMS's K-12 teacher training and instructional resources build your skills while using real-world data to help your students learn to love science, technology, and mathematics. There are two training workshops: The Maury Project (Ocean Studies) and Project Atmosphere (Weather), as well as three online courses for K-12 teachers (Atmosphere, Ocean, and Climate).

NASA/Jet Propulsion Laboratory
Contact: Peter Falcon (pedro.c.falcon@jpl.nasa.gov)
Contact: Annie Richardson (annie.h.richardson@jpl.nasa.gov)
NASA DEVELOP National Program
Contact: Erica Carcelen (erica.c.carcelen@jpl.nasa.gov)

The Jet Propulsion Laboratory, managed by the California Institute of Technology, is NASA's lead center for robotic exploration of the solar system. Their spacecraft have visited all the planets in the solar system except Pluto. JPL telescopes are observing distant galaxies in the universe to study how the solar system was formed. They also manage the worldwide Deep Space Network, which communicates with spacecraft and conducts scientific investigations from its complexes in California's Mojave Desert near Goldstone; near Madrid, Spain; and near Canberra, Australia. JPL cameras and sensors are aboard satellites circling Earth to study the ozone, oceans and other Earth sciences. To support continued exploration, JPL is making advances in technology with new instruments and computer programs to help our spaceships travel father and our telescopes see farther than ever before.

DEVELOP, part of NASA's Applied Sciences Program, addresses environmental and public policy issues by conducting interdisciplinary feasibility projects that apply the lens of NASA Earth observations to community concerns around the globe. Bridging the gap between NASA Earth Science and society, DEVELOP builds capacity in both participants and partner organizations to better prepare them to address the challenges that face our society and future generations. With the competitive nature and growing societal role of science and technology in today's global workplace, DEVELOP is fostering an adept corps of tomorrow's scientists and leaders. Erika is assisted by Nick Rousseau.

Our deepest gratitude to our many supporters!

Charter College of Education
Cal State LA

Raytheon

Although Raytheon, NOAA, and the CCOE do not have any exhibits, they are very supportive of the community, education, and specifically our conference. To all at Raytheon, Cal State LA CCOE, and NASA we say

Thank you!!

Satellites & Education Conference XXXIV
At-A-Glance

Saturday, July 24, 2021

8:00 am	**Gather, Bring-Your-Own-Breakfast, Community Conversations**
8:45-9:00 am Welcome	Welcome: ***Monica Maynard,* President,** Satellite Educators Association and ***Dr. Cheryl Ney***, Dean, Charter College of Education
9:00-9:40 am *Plenary 1*	Keynote Speaker: ***Shawn Cochran*,** Raytheon, ***How Satellites Go From Photons to Forecasts***
9:40-9:50 am	***Live with AIAA – Ken Lui and Sherry Stukes***
9:50-10:25 am *Plenary 2*	***Kelley Le,*** Director of the UCI Science Project & Co-Founder of RRISE UP, ***Taking on Climate Change with Courage***
10:25-11:00 am *Plenary 3*	***Dominique Evans-Bye,*** and students Clark Magnet High School, ***CTE Mission: CubeSat***
11:00-11:10 am	***Aerospace Corp Teacher Resources* – Monica Maynard**
11:10-11:45 am *Plenary 4*	***Ed Murashie,*** President, ProEngineered Solutions, ***EarthKam: The Ultimate Selfie***
11:45-12:20 pm *Plenary 5*	***Robert A. Black,*** Author, Royal Fireworks Publishing, ***Bottomless Wonders from Simple Rules***
12:20-12:30 pm	***American Meteorological Society – Steve LaDochy***
12:30-1:05 pm *Plenary 6*	***Monica Maynard,*** STEM Coordinator, Aerospace Corp**, *Mars Escape Room***
1:05-1:45 pm Plenary 7	Keynote Speaker: ***Ben Holt***, NASA, ***Observing Arctic Ocean Sea Ice Thickness***
1:45-1:55 pm	***NASA DEVELOP* –** Erica Carcelen, Geoinformatics Fellow, JPL Lead
1:55-2:30 pm *Plenary 8*	***John Moore,*** Executive Director, Institute for Earth Observations, New Jersey, ***A^3 Sat: Engaging the Next Generation of Earth SySTEM Professionals***
2:30-2:40 pm	***NASA/JPL Resources* –** Peter Falcon, Annie Richardson
2:40-3:15 pm *Plenary 9*	***Nahum Melamed,*** Project Leader, Aerospace Corp, ***Move an Asteroid, Shape the Future***
3:15-3:25 pm	***The Young Meteorologist Program update* – Ron Gird**, Meteorologist
3:25-4:10 pm *Plenary 10*	Keynote Speaker: ***Kerry Cawse-Nicholson,*** NASA/JPL Deputy Science Lead**, ECOSTRESS - *a Thermal Radiometer Mounted on the International Space Station***
4:10-4:20 pm	***GLOBE* –** Cornell Lewis, SSAI
4:20-5:30 pm	Annual Meeting of the Satellite Educators Association Members