



# 32<sup>nd</sup>

## *SATELLITES & EDUCATION CONFERENCE*

# Conference Program

August 1-3, 2019



Presented By

*SATELLITE EDUCATORS ASSOCIATION*

a 501 (c)(3) nonprofit corporation

Hosted By



Charter College of  
**EDUCATION**



# **SATELLITES & EDUCATION**

Conference XXXII  
August 1-3, 2019



**Charter College of  
EDUCATION**

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

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NASA-Jet Propulsion Laboratory  
NOAA-National Environmental Satellite, Data, and Information Service  
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Special thanks to these supporters who have helped make your conference experience so enjoyable and valuable:

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**EARTH  
SPEAKS**



**WE  
LISTEN**

Opening Session  
Continental Breakfast, 8:00 - 9:00 am  
Golden Eagle Ballrooms

Friday, August 2, 2019

9:00 am, Golden Eagle Ballrooms

**Welcome & Introductions**  
**Mark McKay, President**  
Satellite Educators Association



and

**Agustin Cervantes, Director**  
Office of Student Services



**CHARTER COLLEGE OF**  
**EDUCATION**

*Keynote Speaker, 9:15 – 10:15 am*

**Noel Ellis**  
Raytheon Space and Airborne Systems  
Director, Engineering Learning and  
University Relations



*The Importance of Hands-on Learning and Role Models for STEM Education... and How Industry Can Help*

Mr. Ellis will share his thoughts on how industry can partner with educators to provide project-based learning and mentoring opportunities for students of all ages. Using his own experience as an “accidental engineer”, he will discuss how growing up without STEM-specific role models influenced his early academic choices and how project-based learning – outside of a classroom – helped him find a career in engineering.

Noel Ellis has over 30 years of experience working in a variety of engineering and entrepreneurial endeavors. He is currently responsible for Engineering Continuing Education, Organizational Training, as well as a number of Talent Development programs at Raytheon Space and Airborne Systems (SAS). He also leads Engineering University Relations and manages the SAS University Research portfolio. Mr. Ellis served as Raytheon’s Professor of Practice and Cal Poly San Luis Obispo from 2012-2013 and is a leader and spokesperson for STEM. He participates regularly in community outreach events to increase awareness of STEM career opportunities among middle and high school students. He will also draw on his now more than 15 years of experience in STEM outreach to identify how industry can help close those gaps for all students; and how industry can find value in doing so.

**10:15 – 10:30 am Q & A, Break, Exhibits**

Plenary Session 2                      10:30 – 11:30 am (Remain in Ballrooms for SEA Panel Discussion)

**A Successful Apollo 11’s Impact on Industry & Education**

<i>Jeff Puschell</i>	Raytheon Space & Airborne Systems
<i>Duane Laursen</i>	Retired Science Teacher
<i>Robert Black</i>	Author, Engineer, and Space Historian
<i>Paula Arvedson</i>	Moderator/Reader of Helen Martin’s Reflections

**11:30 am – 12:30 pm LUNCH & EXHIBITS**  
Golden Eagle Ballrooms

**Synethia Ennis – Research Poster**

*Female students' motivation, math anxiety and self-efficacy in STEM calculus classes at urban university in California*

This concurrent mixed method study looks at the effect pedagogical practices have on female students' motivation, math anxiety and self-efficacy in STEM calculus classes at Urban University in California". This study will make significant contribution to the field because most of the studies look at students and not the professors and what they do in the classroom. Also most of the studies do not have statistical data to support the narratives from the teachers and students. This study will provide both and will provide a richer dialogue into the issue.

12:30 pm – 1:30 pm

**Plenary Session 3 – Golden Eagle Ballrooms AND Patio**

**Edward Murashie, President**  
**ProEngineered Solutions**

***Weather Satellite Reception***

Weather satellite reception made simple for your middle school through college classroom featuring live reception and imagery display. You will be given all of the information so you can construct and operate your own satellite ground station.

1:30 pm – 2:30 pm

**Plenary Session 4 – Golden Eagle Ballrooms**

**Monica Maynard, STEM Outreach Coordinator**  
**The Aerospace Corporation**

***Communication Activity with LEGOS***

Participants in this workshop will engage in a communications activity using Legos to recreate a structure. They will use listening and verbal communication skills as well as develop better ideas on how to communicate solutions to a problem in order to succeed in the mission.

**2:30 pm – 2:45 pm BREAK & EXHIBITS**

2:45 pm – 3:45 pm

**Peter Falcon, Earth Science Communications**

**Co-Presenter: Kalina Velez**

**NASA/JPL**

***GLOBE Program Student Observations***

The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment.

3:45 pm – 4:45 pm

**John Moore, Executive Director**

**Institute for Earth Observations**

***Acquire -Analyze -Apply (A<sup>3</sup>)***

Participants will be introduced to the fundamentals of introducing remote sensing concepts of acquiring, analyzing, and applying imagery and data through using the augmented reality "HoloGLOBE" app with the Merge Cube. Experience NOAA and NASA data sets commonly found on "Science on a Sphere" in the palms of your hands now. HoloGLOBE was developed as a part of the NASA GLOBE Mission Earth CAN grant and a NSF IUSE Big Data grant. Learn how you can participate in NASA GLOBE Mission Earth Project.

**Reception & Posters**

5:00 pm – 6:00 pm

Golden Eagle Patio (No-Host Bar)

**Isabel Escobar-Sanchez**

*Modeling changes to hydrologic components due to wildfire in Southern California*

Wildfires alter the hydrologic components processes within a watershed. This research demonstrates how ParFlow, a 3D, distributed subsurface hydrologic model, coupled with a land-surface model, the Common Land Model (CLM), can simulate post-fire hydrologic processes to provide improved guidance for post-fire watershed management. Dataset

inputs into Parflow-CLM include visible and shortwave radiation [ $\text{W}/\text{m}^2$ ], longwave radiation [ $\text{W}/\text{m}^2$ ], precipitation [ $\text{mm}/\text{s}$ ], air temperature [ $\text{K}$ ], East-West wind speed [ $\text{m}/\text{s}$ ], South-to-North wind speed [ $\text{m}/\text{s}$ ], atmospheric pressure [ $\text{Pa}$ ], and specific humidity [ $\text{kg}/\text{kg}$ ]. Hourly data was retrieved from the Phase 2 North American Land Data Assimilation System (NLDAS-2). We developed a hillslope-scale model of the 2003 Old Fire in Devil Canyon, California, defined by a 500 m x 1000 m lateral extent. The subsurface reaches 12.4 m and is assigned a variable cell thickness, allowing an explicit consideration of the soil burn severity. Pre-fire runs considered 4 landuse types (forested and bare soil classifications), and post-fire runs added impermeable layers to the landuse classifications ranging from 1 – 4 cm thickness, reduced the leaf area index (LAI), eradicated the forest to grass or dirt, and had no changes to system (control). This amounted to approximately 76 simulations. Model calibration was performed estimating evapotranspiration using the Penman Monteith equation and measurable observations. Evapotranspiration decreased with LAI, causing an increase in mean runoff from the hillslope. Maximum runoff was experienced due to vegetation removal to dirt and largely increased surface storage (conversely decreasing subsurface storage). Future work involves upscaling to watershed scale and extending model period.

### **Brandon Hilliard**

#### *Analyzing the Velocity Structure of Young Protostellar Disks and Collapsing Envelopes*

The life of a star begins in a giant molecular cloud of gas and dust. Driven by its own gravitational potential energy and conservation of angular momentum, the densest region of the cloud (envelope) radially and rotationally collapse causing the young star (protostar) to form a surrounding disk, and accumulate matter. The trajectories of collapsing material toward the central mass will be visualized along line of sight velocities by implementing rotational kinematics. Using this technique the velocity structure will be modeled for various protostar sources. In order to enhance the current velocity structure model the motion of the material both in the midplane of the disk and outside this region will be visualized. By utilizing protostar data from the Spitzer and Hubble Space Telescopes, spectral line cubes, Position-Velocity diagrams, and moment maps will be generated and used to determine the initial conditions for planet forming (protoplanetary) disks. The motion of the gas and dust, during the earliest stages of the protostar's evolution, will be fundamental in determining how the star system develops, and reveal key characteristics such as protostar mass, chemical composition and abundance. This investigation will discuss how the velocity structure model can be improved, and demonstrate simulated protostar data in relation to the well-known model of an edge-on source, namely the protostar L1527, found in the Taurus molecular cloud.

## Jessica Kromer

*Determining the impact of precipitation datasets on the surface mass balance over Greenland*

Accurate estimates of precipitation are critical towards modeling the behavior and response of ice sheets in a warming climate. Currently, there is a lack of ground-based observational data particularly at high latitudes, forcing us to rely on satellite observations to estimate precipitation in these regions. Recent research suggests that satellite derived precipitation estimates can vary greatly globally and regionally, however, at high latitudes and in particular over Greenland, the spread and uncertainty in precipitation datasets is relatively unknown. Accordingly, this project will focus on quantifying uncertainty in precipitation datasets for the high latitudes, and more specifically Greenland.

### Conference Banquet

Beginning at 6:00 pm  
Golden Eagle Ballroom #3

**Welcome & Recognitions, Mark McKay, SEA President**

Keynote Speaker: **Janelle Wellons**  
Instrument Operations Engineer  
NASA/JPL

### *Journey to JPL*

Janelle Wellons graduated from the Massachusetts Institute Technology with a B.S. in Aerospace Engineering. After graduating, she began work at the NASA Jet Propulsion Laboratory as an instrument operations engineer. She currently works on the Lunar Reconnaissance Orbiter, the earth-observing Multi-Angle Imager for Aerosols (MAIA), and previously on the Saturnian Cassini mission. Her job consists of creating the commands for and monitoring the health and safety of a variety of instruments. She also works in development, specifically for the ground data system and instrument operations concepts for the MAIA mission. When she isn't working you can find her playing video games, reading, enjoying the outdoors, and doing outreach.



**Saturday, August 3, 2019**  
**Continental Breakfast, 8:00 - 9:00 am**  
**Golden Eagle Ballrooms**

9:00 am – 10 am Keynote Speaker: **Laurel Gutierrez**

Raytheon  
Space Systems Chief Architect as well as Chief Engineer,  
Civil, Commercial and International Space Product Area



### ***Highlights of 30 Years in the Aerospace Industry***

Laurel has over 30 years of aerospace system engineering experience including systems architecture, design, development, test, operations and maintenance of military and commercial space, ground and airborne systems. Over her career, she has developed solutions for a diverse array of applications including Missile Defense, Remote Sensing, Communications, Space Exploration and Environmental Science. Laurel holds a bachelor's degree in applied mathematics from UCLA, and a master's degree in aerospace systems architecting and engineering from USC.

**10:00 am – 10:15 am Q&A, BREAK, EXHIBITORS**

**10:15 am – 11:15 am Pete Arvedson**  
**PI for M.Y. S.P.A.C.E., SEA Web Manager**

### ***Accessing Satellite Data and Making Sense of It***

Ever wondered where we get those images of the Earth seen from space -- especially the ones that highlight specific events like a forest fire, a major hurricane, changes in land use, a flooding river, or a volcanic eruption? Once the image is in view, how do we really know anything about it like how big is that hurricane's cyclonic cloud formation, or how far does that volcanic ash cloud travel, or what percent of the crop in a specific agricultural field is healthy? This session will introduce you to (1) several online tools for easily accessing and visualizing remote-sensing data and (2) a number of high-quality, no-cost, easy to use tools for analysis and interpretation. Online access tools include NASA's Giovanni, NOAA's NOAAView, GloVis Next from USGS, and Live Access Servers used by My NASA Data

and the Physical Oceanography archive at NASA JPL. Participants will take-home tutorials for ImageJ, MultiSpec, and ArcGIS Online. Each attendee will walk away with new knowledge and a pocket full of resources for applying that new knowledge. If desired, bring your WiFi enabled laptop for a hands-on experience

11:15 am – 12:15 pm Keynote Speaker:

**Robert A. Black**

Author

### ***STEM Through Storytelling***

Author Robert Black returns with the latest developments in the use of storytelling to teach STEM concepts. In 2014, Black and his publisher Royal Fireworks Press released the first volume in the "Mathematical Nights" series, about a middle school girl who solves math problems for supernatural creatures. Now they have released the first two volumes in the "Mathematical Lives" series of biographies, which profile mathematicians and the problems they worked on. The first book, "Pascal and Fermat: The Probability Pen Pals" takes the reader through the 1654 request for gambling advice that led to the invention of probability theory. The second, "Florence Nightingale: The Lady with the Diagrams" reveals the nursing pioneer's lesser-known contribution in statistics. This presentation will also preview the remaining volumes in the series - David Blackwell, Ada Lovelace, Benoit Mandelbrot, and Edward Lorenz - along with some ideas for projects still to come.



**EXHIBITS and LUNCH**

**Golden Eagle Ballrooms**

**12:15 pm – 1:15 pm**

Closing Remarks: Mark McKay  
SEA President

***Reflections on 32 Years of the Satellites & Education Conference***

*(Please be sure to submit your evaluation forms.)*

## **OUR EXHIBITORS**

### **Satellite Educators Association**

**Contact: Mark McKay ([mmckay95376@gmail.com](mailto:mmckay95376@gmail.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. Staffing the booth is Duane Laursen, founding member of SEA.

### **NASA/Jet Propulsion Laboratory**

**Contact: Annie Richardson ([Annie.H.Richardson@jpl.nasa.gov](mailto:Annie.H.Richardson@jpl.nasa.gov))**

The Jet Propulsion Laboratory, managed by the California Institute of Technology, is a Federally Funded Research and Development Center managed by the California Institute of Technology for NASA. It 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 farther and our telescopes see farther than ever before. Staffing is assisted by Peter Falcon and Kalina Velez.

### **NOAA/NASA GOES-R Series Program**

**Contact: Alysha Payne ([alysha.r.payne@nasa.gov](mailto:alysha.r.payne@nasa.gov))**

The GOES-R Series Program is a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA) to develop, launch and operate the satellites. NOAA's latest generation of Geostationary Operational Environmental Satellites (GOES), known as the GOES-R Series, is the nation's most advanced fleet including GOES-R, GOES-S, GOES-T, and GOES-U, and provides advanced imagery and atmospheric measurements of Earth's weather, oceans and environment, real-time mapping of total lightning activity, and improved monitoring of solar activity and space weather.

**National Oceanic and Atmospheric Administration (NOAA)  
NESDIS, NWS, and Education Coordinated by NESDIS  
Contact: Ron Gird ([rsgird@gmail.com](mailto:rsgird@gmail.com)) Materials from Tom Wrublewski**

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](mailto:Monica.I.Maynard@aero.org))**

The Aerospace Corporation has a longstanding dedication to education. The Aerospace Institute offers opportunities for both our employees and our customers to expand their knowledge through a wide variety of courses related to our work in support of national security space efforts. The corporation sponsors a number of technical workshops each year designed as educational resources for space professionals, including the Space Power Workshop, the Ground System Architectures Workshop, the Aerospace Testing Seminar, and the Mission Assurance Improvement Workshop.

In addition, Aerospace is strongly committed to inspiring the next generation of engineers and scientists by supporting science, technology, engineering, and math (STEM) projects and programs in a number of ways.

One of the company's primary goals is to provide volunteer role models to demonstrate the value of a strong emphasis in science and math education. Students who excel in math and science are often unaware of the exciting career opportunities available to them. Our employees enhance the image of those exciting careers by working directly with K-12 students, supporting science and math teachers, and partnering with local schools to support STEM outreach programs.

**American Institute of Aeronautics & Astronautics  
Contact: Ken Lui ([kcons2014@kensconsulting.net](mailto:kcons2014@kensconsulting.net))**

The American Institute of Aeronautics & Astronautics is the world's largest technical society dedicated to the global aerospace profession. The Los Angeles/Las Vegas Section of the American Institute of Aeronautics & Astronautics (AIAA) is providing a booth showcasing its pre-college Science, Technology, Engineering, and Mathematics (STEM) educational outreach capabilities, tools, and resources available to teachers and students, several keynote speakers, and career information. We are seeking students for a new student chapter at Cal State LA.

Along with information on AIAA hands-on, interactive, STEM educational outreach programs, free AIAA Educator Associate Membership Applications will be available at this booth. Also helping at the booth are Sherry Stukes, JPL, and Dean Davis, Northrop Grumman, former SEA Vice President.

## **Robert A. Black, Author**

**Contact: Bob Black ([rablackauthor@att.net](mailto:rablackauthor@att.net))**

Author Robert Black returns with the first two volumes in the “Mathematical Lives” series, profiling mathematicians and the problems they solved. The first book, *Pascal and Fermat: The Probability Pen Pals*, describes the development of probability theory, while the second, *Florence Nightingale: The Lady with the Diagrams*, relates the lesser-known mathematical story of the famous nursing pioneer. Each book includes an appendix called “Doing the Math,” in which readers can work through the math problems themselves. Robert Black previously wrote for the Nickelodeon cable series, *You Can’t Do That On Television*, has a degree in mechanical engineering and mathematics from Vanderbilt University, and has spent 20 years in manufacturing as a lab test engineer, project manager, engineering manager and quality assurance manager. Copies of his *Mathematical Nights* fiction series will also be available. Staffing is assisted by Emma Rault.

## **Science Systems and Applications, Inc.**

**Contact: Autumn Burdick ([autumn.burdick@ssaihq.com](mailto:autumn.burdick@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. Staffing assisted by David Overoye, Cornell Lewis, and two interns, Richard Tirado and Eve Terrill.

## **Amateur Radio on the International Space Station**

**Contact: Darrell Warren ([dgwarren@verizon.net](mailto:dgwarren@verizon.net))**

Amateur Radio on the International Space Station (ARISS) inspires students, worldwide, to pursue interests and careers in science, technology, engineering and math through amateur radio communications opportunities with the International Space Station (ISS) on-orbit crew. Students learn about life on board the ISS and explore Earth from space through science and math activities. ARISS provides opportunities for the school community (students, teachers, families and community members) to become more aware of the substantial benefits of human spaceflight and the exploration and discovery that occur on spaceflight journeys. Students have the opportunity to learn about space technologies and the technologies involved with space communications through exploration of amateur radio.

Darrell Warren is a retired teacher from Los Angeles Academy Middle School (LAUSD). Last February, his students and he spoke with Astronaut Joseph Acaba in the ISS by direct radio contact using amateur radio. Pete Arvedson also attended the event. This was done in association with the Cal State LA Charter College of Education. Students from Cal State LA and Dr. Mario Castaneda worked with students from LA Academy in their "Space Academy" and were video taped. Mr. Warren has information regarding ARISS, the organization that coordinates with NASA for such contacts. He will display lots of pictures and answer questions. Staffing is assisted by Norm Thorn, Bob Koepke, and Brian Johnson (Hughes Amateur Radio Club).

## American Meteorological Society Education Program

Contact: Steve LaDochy ([sladoch@calstatela.edu](mailto: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).

## Nonscriptum LLC

Contact: Joan Horvath ([joan@nonscriptum.com](mailto:joan@nonscriptum.com))

Contact: Rich Cameron ([rich@nonscriptum.com](mailto:rich@nonscriptum.com))

Nonscriptum LLC was founded in 2015 to train educators, scientists and others how to use 3D printing and other maker technologies. In particular we are focused on using 3D to teach math and science concepts, including an upcoming hands-on calculus book. The company is a creative partnership of Joan Horvath and Rich Cameron, a recovering rocket scientist and a 3D printer hacker, who have collaborated on 7 published books.

*Our deepest gratitude to our many supporters!*

## **Raytheon**

Although Raytheon does not have an exhibit booth, they are very supportive of the community, education, and specifically, our conference. To all at Raytheon, we say

*Thank you!!*