Gathering 8:00 am (Continental Breakfast for In-Person Attendees)

Opportunity to reconnect with old friends and

Make new friends

#### 9:00 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. 9:15 - 10:00 am Opening KEYNOTE SPEAKER:

F2F

Dave Doody

JPL Senior Systems Engineer,

Europa Clipper: Looking for signs of life beyond Earth



### EUROPA, Moon of Jupiter. Potential for life.

Scientists are almost certain a vast ocean lies beneath Europa's icy shell. NASA's Europa Clipper spacecraft will perform dozens of close flybys of Jupiter's moon Europa, gathering detailed measurements to investigate whether the moon could have conditions suitable for life. Europa Clipper is not a life detection mission – its main science goal is to determine whether there are places below Europa's surface that could support life.

Our speaker, Dave, led real-time flight operations (aka "Mission Control") for the 20year, multinational *Cassini-Huygens* Mission in the Saturn system; it ended in 2017. Among *Cassini's* many discoveries was that Saturn's tiny moon Enceladus turned out to be yet another promising ocean world here in our own solar system. Dave will talk about how *Europa Clipper* will be conducting a thorough reconnaissance of Jupiter's ocean-world Europa, "Merely half as far away, exploring Europa offers its own set of challenges."

The spacecraft, in orbit around Jupiter, will make nearly 50 flybys of Europa at closestapproach altitudes as low as 16 miles (25 kilometers) above the surface, soaring over a different location during each flyby to scan nearly the entire moon. Europa Clipper will launch in October 2024 and will follow a Mars-Earth Gravity Assist (MEGA) trajectory. The spacecraft will travel for five and half years and arrive at Jupiter in April 2030. The Europa Clipper is NASA's largest planetary mission spacecraft. With its massive solar arrays and radar antennas, Europa Clipper will be the largest spacecraft NASA has ever developed for a planetary mission. The spacecraft needs large solar arrays to collect enough light for its power needs as it operates in the Jupiter system, which is more than five times as far from the Sun as Earth.

#### 10:00 am - 10:30 am Zoom Plenary Session 2

Luke Meier and Ishaan Agrawal High School Students at Beaverton Academy of Science and Engineering, Oregon, *Winners* of the Northwest Science Expo.

#### Project Nieuwestad: Modeling Exoplanet Habitability with Machine Learning

As advancements in space exploration and astronomy have increased dramatically in recent decades, looking to humanity's future in an extraterrestrial or even an extrasolar context is gradually emerging from science fiction into science fact. Additionally, the pervasive question of "are we alone in the universe?" has driven much data collection on observable exoplanets. Thus, the collection, cataloging, and organization of these planets in the context of habitability is an important field of work within astrophysical research. While these are barely even a measurable percentage of what's out there, impressive thousands of exoplanets have been observed and catalogued. Models and their features in a relevant context present an important question with constantly evolving answers. Our research aims to combine machine learning and exoplanet databases to model the prospective habitability of these observed exoplanets. In our model construction, we trained a machine-learning algorithm to identify the most important features that make a planet habitable and to identify whether or not a planet is habitable.

#### 10:30 am - 11:15 am F2F Plenary Session 3

Fredric Raab, Educator, Faculty at College of the Desert, California

#### Classroom Activities with the AMSAT Functional CubeSat Simulator



In this presentation, find out how to engage students with CubeSat operation and transmission of data to Earth using the **AMSAT CubeSat Simulator**. With the simulator, students are able to manage a satellite's solar power; determine the satellite's orbital period, orientation, and spin rates; expand mission payloads; utilize radio protocols; and more.

The Radio Amateur Corporation (AMSAT) is a non-profit educational organization founded in 1969. For more than 50 years, AMSAT has placed satellites in low Earth orbit enabling voice communications between amateur radio operators. Since

2015, four of those have been CubeSats, and the AMSAT radio designs and protocols for those CubeSats have been adopted by numerous educational CubeSats currently in orbit.

AMSAT developed the CubeSat Simulator to provide students with hands-on, classroom experience receiving and interpreting operational telemetry data using the same radio communications methods employed by CubeSats. AMSAT makes simulators and ground stations available for loan to teachers and other educational groups accompanied by instructions for classroom activities.

The ground station software enables students to hear, visually observe, and decode many of the radio formats in use today for data exchange, reporting position, and image reception. The station is built around the popular Raspberry Pi single-board computer attached to a small screen displaying data transmitted by an active orbiting AMSAT satellite or the CubeSat Simulator.

#### 11:15 am – Noon Zoom Plenary Session 4

#### John Moore, Executive Director and Maxwell Friedman, Engineering Design Lead, Institute for Earth Observations (New Jersey)

#### Earth SySTEM: Using Satellites to Monitor the Earth

The A3Sat Project allows students to build an active model mirroring many aspects of an authentic CubeSat design engineers use for launch into space.

A3Sat has been programmed to send data and imagery to a designed ground station replicating collection and transmission of data. The app is a desktop software application, compatible with both macOS and Windows, and is able to communicate and transfer various data through Python socket communication. Students are able to pair the A3Sat and the computer



through a WIFI hotspot from the Raspberry Pi, and further control the A3Sat from the app while also viewing real-time environmental data, health data (CPU intensity, etc.), as well as infrared and regular images. Built within the Group Station app are data analysis and visualization tools, such as data plotting of all environmental data, as well as a 3D graph visualization of the altitude/displacement of the A3Sat. Students are able to conduct data analysis while the A3Sat is still in flight, viewing data stream into the app while also being plotted live within.

NOON – Lunch distributed for all Face 2 Face Attendees

#### 1:00 - 1:15 am Live with NASA-DEVELOP - Erica Carcelen and Adriana Le Compte



Adriana Le Compte, Fellow, NASA DEVELOP National Program. DEVELOP, part of NASA's Applied Sciences Capacity Building 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.

#### 1:15 – 2:15 pm Zoom Plenary Session 5

#### Lucas Moxey, Project Manager, NASA TechRise Student Challenge

#### Overview of the NASA TechRise Student Challenge

This presentation will provide an overview of the NASA TechRise Student Challenge, sponsored by NASA's Flight Opportunities Program. This challenge invites teams of 6<sup>th</sup> to 12<sup>th</sup> grade students throughout the United States and its territories to engage in hands-on science, technology, engineering, and math (STEM) opportunities. The program empowers students to propose experiment ideas that leverage the use of electronics and microcontrollers, and it offers winning teams an opportunity to fly



those experiments on a suborbital flight platform, with the goal of testing their experiments in near-space and/or microgravity (i.e., weightlessness) conditions.

As part of the TechRise 2021-2023 challenge, a total of 57 student teams were selected from across the nation to participate. Each winning team was awarded a \$1,500 prize, a customized flight hardware enclosure, engineering and buildup support, as well as a flight test on either a high-altitude balloon or a rocket-powered suborbital vehicle. The current student experiments span a wide variety of technology areas and applications.

#### 2:15 pm - 3:00 pm F2F Plenary Session 6

#### Joan Horvath and Rich Cameron, Co-Founders, Nonscriptum LLC

#### Making Math Accessible

3D printing is a natural fit to teaching many subjects, most notably math, engineering and other STEM subjects. Joan and Rich are the authors of many popular books about 3D printing and its classroom applications, including MAKE: Geometry and the upcoming MAKE: Calculus. They have also developed geometry curriculum modules for teachers of visually impaired students. Join them to hear about the opportunities and barriers for 3D printing for students in K-12, universities, and special education.

#### 3:00 – 4:15 pm F2F Plenary Session 7

Ed Murashie, President of ProEngineered Solutions

NGSS + Satellite Imagery + Motivation = Success!



Satellite imagery can be the tool to implement the Next Generation Science Standards in kindergarten through high school. But how do you learn about satellite imagery and where can you find it? This presentation, of course!

Not only will you learn about satellites but you will also be motivated by hands-on demonstrations using live satellite reception and walk away with lesson plans and other online references.



5:30-6:00 pm check in for dinner at the Hilton Hotel, 225 W. Valley Blvd. Keynote Speaker: Rhonda Morgan, Senior Optical Scientist, JPL

#### SATURDAY, 7/30/2022

Gathering 8:00 am (Continental Breakfast for In-Person Attendees)

Opportunity to reconnect with old friends and

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#### 9:00 am – 10:00 am F2F Plenary Session 8

Monica Maynard, STEM Coordinator, Aerospace Corp, California

CubeSat Mission: Human Impacts on the Planet

In this two-part lesson plan, students will research human impacts on the planet and design CubeSat to monitor a specific example. Throughout the project, key skills including critical thinking, communication, and collaboration will be used to understand the true value of data from space.



#### 10:00 am - 11:00 am Zoom Plenary Session 9

Steven Mills, Director, Polymath Geo (Massachusetts)

#### Earth Station Lab, An Educational Computer Application Using Satellite Remote Sensing Data



Earth Station Lab (ESLab) is a web-based application that has been developed by Polymath Geo (PG) and the CSUN (California State University at Northridge) Center for Geospatial Science and Technology (CGST). It is intended as a lab component of Earth science curricula. It links Geographic Information Systems (GIS) and Virtual Learning Environment (VLE) software, and uses government produced satellite remote sensing data as a part of Project-Based Learning curricula. The VLE has separate interfaces for students and teachers. ESLab uses the WISE VLE application developed with NSF funds at UC Berkeley. Satellites produce vast quantities of data made available to the public, but the volume of the data and the complexity of GIS makes it difficult for teachers and students to use within a classroom setting. ESLab simplifies this process so that this technology can be a part of any classroom.

In 2021, PG and CGST developed a simple to use data conduit application that connects with the big satellite databases of NASA, NOAA, and other federal agencies and converts these data into slippy maps compatible with OpenLayers. Called Earth Station Link (ESLink), it is designed to allow teachers to download local and timely data that is relevant to their own lesson units. ESLink ensures that teachers do not need to complete an exhaustive search of the agency portals or convert the data into a usable format on their own. As part of this presentation, we will demonstrate ESLab and ESLink. This will include a high school lesson unit on the ENSO.

#### 11:00 am – Noon F2F Plenary Session 10

#### Robert Black, Author, Royal Fireworks Press

#### Learning Math through the People Who Lived It

Author and engineer Robert Black returns to the Satellites & Education Conference with his newly-completed biography series for teens, *The Mathematical Lives*. Developed over the past five years, the six volumes introduce readers to some of history's most important mathematicians and the problems they worked on. Each book even gives readers the chance to work the actual historical problems themselves. In this presentation, author



Robert Black reveals the themes behind the series, exploring how our understanding of math has changed, and how that understanding has changed us. He also recounts how the Satellites & Education Conference helped with the development of the series, and of his mathematically-themed writing in general.

NOON - Lunch distributed for all Face 2 Face Attendees

#### 1:00 pm – 2:00 pm F2F Plenary Session 11



Dominique Evans-Bye, Educator, Clark Magnet High School, California *Mapping Mars* 

Students at any level can enjoy exploring Mars and mapping its topography. This presentation will introduce Mars viewers from NASA, fun activities to hook students' attention, and mapping activities using ArcGIS Online, JMARS and ArcGIS Pro.

A story map will be shared that has links and instructions to complete each of the activities presented.

Mapping Mars is part of a quarter long unit of GIS & Remote Sensing at Clark Magnet High School. It is an extension of the Mars Student Imaging Project developed by Arizona State University (<u>http://marsed.asu.edu/msip</u>).

#### 2:00 pm - 3:00 pm F2F Plenary Session 12

#### Closing KEYNOTE SPEAKER

#### Dr. Barbara Shannon

Dr. Shannon holds a BA and MS in Biology and an EdD in Learning and Instruction, Science Education. She recently retired as Director of STEM Education at Synergy Academies. She was the founding principal of both Synergy Kinetic Academy (middle school) and Synergy Quantum Academies (high school).



#### A Challenge for Teachers to Be the BEST for Our Students!

Showing the educational community how to make better use of the resources discovered this weekend in order to achieve greater results

#### OUR EXHIBITORS

#### Satellite Educators Association Contact: Duane Laursen (sea.web@SatED.org)

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.

#### 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 21<sup>st</sup> 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.

#### NASA/Jet Propulsion Laboratory Contact: Annie Richardson (annie.h.richardson@jpl.nasa.gov) NASA DEVELOP National Program Contact: Erica Carcelen (<u>erica.c.carcelen@jpl.nasa.gov</u>) Contact: Adriana Le Compte (Adriana.lecompte@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 farther 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.



# Royal Fireworks Press Contact: Robert Black (rablackauthor@att.net)

Author Robert Black presents his complete mathematically-themed biography series for teens, *The Mathematical Lives*. The conference will be his first time presenting all six volumes together. Titles include

Pascal & Fermat: The Probability Pen Pals Florence Nightingale: The Lady with the Diagrams David Blackwell and the Deadliest Duel (2020 Mathical Honor Book) Ada Lovelace: Programming the Future Benoit Mandelbrot: Reshaping the World (2022 NSTA Best STEM Books List) Edward Lorenz and the Chaotic Butterflies

Also appearing will be Robert Black's mathematically-themed fantasy series, *The Mathematical Nights*, in which a teenager discovers that her destiny is to solve math problems for monsters.

#### American Meteorological Society Education Program Contact: Steve LaDochy (<u>sladoch@calstatela.edu</u>)

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). AMS educational resources and lesson plans are available for in-person participants.

#### Educational Passages (Cassie Stymiest; cassie@educationalpassages.org) Contact: Linda Sciaroni, Teacher (<u>sciaronilinda@aol.com</u>)

(https://educationalpassages.org/) Students at Marco Antonio Firebaugh High School in Lynwood, California, built a 7-foot sail boat from a kit from Educational Passages. Our sail boat has been sending us data from the Pacific Gyre aka the garbage patch for 250 days. Our Boat Fledgling Freddy was equipped with two tracking systems, one with a camera, temperature sensors, GPS, and meters for tilt.

#### Nonscriptum LLC Contact: Joan Horvath (joan@nonscriptum.com) Rich Cameron (rich@nonscriptum.com)

Nonscriptum LLC is a consulting and training firm founded in 2015 by Joan Horvath and Rich "Whosawhatsis" Cameron, based in Pasadena, California. We focus on teaching educators and scientists how to use maker tech, and together have authored 7 books for Apress, and numerous courses for LinkedIn Learning (formerly Lynda.com). Joan is an MIT alumna, recovering rocket scientist and educator, and Rich is an open-source 3D printer hacker who designed the RepRap Wallace and Bukito 3D printers.

#### EnCorps Contact: Leah Rodriguez (leah.rodriguez@encorps.org)

To address the STEM teacher shortage, EnCorps has been working earnestly since 2007 to recruit the best and brightest science, technology, engineering, and mathematics (STEM) professionals to teaching, providing meaningful opportunities to impact students in low-income communities. We believe all students deserve access to a great STEM teacher, a great STEM education and all the opportunities that those can provide. We're here to address the conditions limiting under-resourced student opportunities. EnCorps Fellows, who become EnCorps STEM Teachers in under-resourced schools, are connecting students to real-world math and science career and economic opportunities, preparing the STEM workforce pipeline, and transforming public education statewide. The EnCorps STEM Teachers Fellowship recruits, selects, develops and supports the best and brightest STEM professionals and military veterans, as an innovative, long-term solution to the shortage of high quality, impactful educators for students in under-resourced schools. Our deepest gratitude to our many supporters!

# Charter College of Education Cal State LA





Although Raytheon 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!!

# **Program At-A-Glance**

# Friday, July 29, 2022

8:00 am	Breakfast Served for F2F Attendees, Community Conversations
9:00 am Welcome	Welcome: <i>Monica Maynard,</i> President, Satellite Educators Association and <i>Dr. Cheryl Ney</i> , Dean, Charter College of Education
9:15-10:00 am <i>Plenary 1</i>	F2F & Zoom, Keynote Speaker: <i>Dave Doody</i> , JPL Senior Systems Engineer, <i>Europa Clipper:</i> Looking for Signs of Life Beyond Earth
10:00-10:30 am <i>Plenary 2</i>	Zoom, Luke Meier & Ishaan Agrawal Winners of Northwest Science Expo, Project Nieuwestad: Modeling Exoplanet Habitability with Machine Learning
10:30-11:15 am <i>Plenary</i> 3	F2F/Zoom <i>Fredric Raab,</i> Educator at College of the Desert, <i>Classroom Activities with the AMSAT Functional CubeSat Simulator</i>
11:15-noon <i>Plenary 4</i>	Zoom John Moore & Maxwell Friedman, Institute for Earth Observations, Earth SySTEM: Using Satellites to Monitor the Earth
Noon	LUNCH distributed for all F2F Attendees
1:00-1:15 pm <i>Live with NASA</i>	F2F/Zoom <i>Adriana Le Compte,</i> Fellow, NASA DEVELOP, <b>Description</b> of the Exhibit resources available from NASA DEVELOP
1:15-2:15 pm <i>Plenary 5</i>	Zoom Lucas Moxey, Project Manager, NASA Project TechRise, Overview of the NASA TechRise Student Challenge
2:15-3:00 pm <i>Plenary</i> 6	F2F/Zoom <i>Joan Horvath</i> & <i>Rich Cameron,</i> Co-Founders, Nonscriptum, Making Math Accessible
3:00-4:15 pm <i>Plenary 7</i>	F2F <i>Ed Murashie,</i> President of ProEngineered Solutions, NGSS + Satellite Imagery + Motivation = Success!
6:00 pm	Banquet at Hilton Hotel: Keynote Speaker: <i>Rhonda Morgan</i> , NASA JPL Senior Optical Scientist, <i>JWST and Beyond!</i>

# Saturday, July 30, 2022

8:00 am	Breakfast Served for F2F Attendees, Community Conversations
9:00-10:00 am <i>Plenary</i> 8	F2F/Zoom <i>Monica Maynard,</i> STEM Coordinator, Aerospace Corp, CubeSat Mission: Human Impacts on the Planet
10:00-11:00 am <i>Plenary 9</i>	Zoom, Steven Mills, Director of Polymath Geo, Earth Station Lab, An Educational Computer App Using Satellite Remote Sensing Data
11:00 am-Noon <i>Plenary 10</i>	F2F/Zoom <i>Robert Black,</i> Author, Royal Fireworks Press, Learning Math through the People Who Lived It
Noon	LUNCH distributed for all F2F Attendees
1:00-2:00 pm <i>Plenary 11</i>	F2F/Zoom <b>Dominique Evans-Bye,</b> Educator, Clark Magnet High School, Mapping Mars
2:00-3:00 pm <i>Plenary 12</i>	F2F/Zoom Keynote: <i>Dr. Barbara Shannon,</i> Director-STEM Education, Synergy Academies, A Challenge for Teachers!