

## 2024 Annual AsMA Plenary Lectures

### 69<sup>th</sup> Louis H. Bauer Lecture

**Harrison Schmitt, M.Sc., Ph.D., astronaut and former Senator**

***“Human Space Adaptation—Apollo Experience—Honoring the Past ... Preparing for the Future”***



Joining NASA in its first astronaut class to include scientist-astronauts in June 1965, geologist Harrison H. “Jack” Schmitt was on the backup crew for Apollo 15. In August 1971, he was assigned as the Lunar Module Pilot for the last Apollo mission to the Moon, Apollo 17.

Dr. Schmitt received a Bachelor of Science degree in science from the California Institute of Technology in 1957; studied as a Fulbright Fellow at the University of Oslo in Norway from 1957 to

1958; and received a doctorate in geology from Harvard University in 1964, based on geological work in western Norway. In 1957, he began geological fieldwork on the west coast of Norway, returning there in 1960 to work in that region for the Norwegian Geological Survey. He also worked in the field for the U.S. Geological Survey in New Mexico, Arizona, and Montana. He was with the U.S. Geological Survey’s Astrogeology Branch in Flagstaff, AZ, in 1964–1965, serving as Project Chief for Lunar Field Geological Methods on contract to NASA. He also was responsible for a lunar photographic and telescopic mapping project and for instructing NASA astronauts during their early geological training trips.

**NASA Experience:** Dr. Schmitt was selected in Astronaut Group 4 as a scientist-astronaut in June 1965. As a civilian, he completed jet and helicopter flight training at Williams AFB, AZ, and at the Pensacola Naval Air Station, FL. He logged more than 2100 hours flying time, including 1600 hours in jet aircraft (primarily the T-38 Talon) and 210 hours in helicopters (H-13). During the period of his general preparation for spaceflight, he assisted in the integration of operational and scientific activities into the Apollo lunar missions, as well as the planning for lunar orbit and surface operations for Apollo missions 8–13. These responsibilities included the design and oversight of an upgraded geological training program for Apollo missions 13–17. He was designated as the Mission Scientist in support of Apollo 11 and, in early 1970, he was assigned as the Backup Lunar Module Pilot for Apollo 15 that flew to the Moon in July 1971. In August 1971, Dr. Schmitt was assigned as Lunar Module Pilot for the Apollo 17 mission. Apollo 17 launched at 12:33 p.m. (EST), December 7, 1972, and splashed down in the Pacific on December 19, 1972, having completed 3 days of geological and geophysical exploration in the valley of Taurus-Littrow on the Moon. Schmitt is the first scientist and 12th and last person to step on the Moon. This last Apollo mission to the Moon broke several records set by previous flights, including longest manned lunar landing flight (301 hours, 51 minutes); longest total lunar surface extravehicular activities (22 hours, 4 minutes); longest distance traveled in the Lunar Roving Vehicle (35 km); largest lunar sample return [an estimated 115 Kg (249 lb)]; and the longest time in lunar orbit (147 hours, 48 minutes).

**Post-Apollo 17 Career:** In February 1973, Dr. Schmitt assumed additional duties for NASA as Chief of Scientist Astronauts, assisting in the definition of crew responsibilities for space operations during future Space Shuttle missions. He was appointed NASA Assistant Administrator for Energy Programs in January 1974, serving until late 1975 when he left NASA to run for election to the U.S. Senate from New Mexico. Elected to the Senate in 1976, he served for 6 years. After leaving the Senate in 1983, he served on President Reagan’s Foreign Intelligence Advisory Board, President Bush 41’s Commission on Ethics Law Reform, the Army Science Board, the Department of Interior’s Strategic Minerals Advisory Board, and other federal advisory entities and delegations to international meetings and elections. He became a consultant to the Fusion Technology Institute at the University of Wisconsin-Madison in 1986, advising on the economic geology of lunar resources, eventually teaching in the course “Resources from Space” from 1996–2004. He remains an Associate Fellow of Engineering at the University of Wisconsin. During NASA’s Constellation Program, he became chairman of the NASA Advisory Council in November 2005 and served until October 2008. From 2017–2022, he served as a member of the National Space Council’s User Advisory Board. He is a prolific writer, having been published in many diverse venues, including *Science Magazine*, *Icarus*, the *Wall Street Journal*, and the *National Geographic Magazine*. In 2006, Springer published his book, “Return to the Moon,” outlining a private sector approach to accessing lunar helium-3 for fusion power, medical diagnosis, and other applications. He also electronically published an annotated and illustrated version of the voice transcript from the Apollo 17 mission. Active in the private aerospace business sector, he was a Director of the Orbital ATK Corporation and its predecessor company, Orbital Sciences Corporation (1983–2018). In 1990, he joined the Board of Directors of the Draper Laboratory and, as a retired Director, he continues as an Emeritus Member of the Corporation that oversees the Laboratory. He continues to synthesize scientific data related to his exploration of Taurus-Littrow, including participation in NASA’s “Apollo Next Generation Sample Analysis” (ANGSA) Program, as well as consulting with NASA and private entities on issues involved with NASA’s Artemis Program to return to the Moon.

### 10<sup>th</sup> Reinartz Lecture

**Panelists: Astronaut Joan Higgenbotham; Astronaut Robert Cabana; Astronaut (Dr.) Joe Kerwin; and Astronaut (Dr.) Serena Auñón-Chancellor**

**Panel: *“Space Operations—Honoring the Past ... Preparing for the Future”***

Joan Higgenbotham is an electrical engineer, rocket scientist and retired astronaut, with dual master’s degrees, and a 35-year career working with Fortune 500 companies in the aerospace, energy, and retail sectors.

During her 9-year tenure at NASA’s Kennedy Space Center (KSC), Ms. Higgenbotham participated in numerous space shuttle launches from the firing room, the “nerve center” for launches—an impressive accomplishment for anyone. However, when she returned to KSC for the launch of space shuttle Discovery on STS-116, she took “participation” to a whole new level: as astronaut Joan Higgenbotham. On her nearly 13-day space mis-



sion, her primary task was to operate the International Space Station Remote Manipulator System (SSRMS), better known as the robotic arm, assisting with the installation of the P5 truss and supporting crewmembers during spacewalks to rewire the space station's power system and retract a solar panel. She is the third African American female astronaut to fly in space.

In 2022, she founded Joan Higginbotham, Ad Astra, LLC, an aerospace consulting firm. She consulted with Blue Origin, who was awarded a \$3.4 billion contract by NASA to develop and fly a lunar lander.

Ms. Higginbotham has received numerous awards, including the World Who's Who of Women, Charlotte's (NC) 50 Most Influential Women, the NASA Exceptional Service Medal, *Savoy Magazine's* Top Influential Women in Corporate America, and she appeared in Alicia Key's Superwoman video. She was awarded an Honorary Doctorate in Aerospace Science from Southern Illinois University at Carbondale, her alma mater, and an Honorary Doctorate in Humanities from the University of New Orleans.



Robert D. Cabana is a former NASA astronaut, and recently retired as the agency's associate administrator, its third highest-ranking executive and highest-ranking civil servant. He was the senior advisor to NASA Administrator Bill Nelson and Deputy Administrator Pam Melroy. In that role, He led the agency's 10 center directors as well as the mission directorate associate administrators at headquarters. He acted as the agency's chief operating officer for more than 18,000 employees and an annual budget of more than \$25 billion.

Before taking that position, Mr. Cabana was director of NASA's John F. Kennedy Space Center in Florida. In that role, Cabana managed all NASA facilities and activities at the spaceport, including the team of civil service and contractor employees who operate and support numerous space programs and projects.

Born in Minneapolis, MN, Mr. Cabana graduated from the U.S. Naval Academy in 1971 with a bachelor's degree in mathematics. He was commissioned a second lieutenant in the U.S. Marine Corps and completed Naval Flight Officer training in Pensacola, FL, in 1972. He then served as an A-6 bombardier/navigator with Marine Air Wings in Cherry Point, NC, and Iwakuni, Japan.

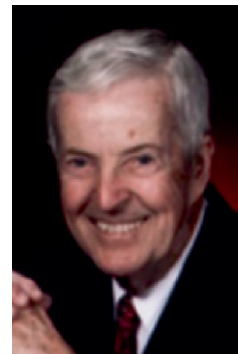
Returning to Pensacola in 1975, Mr. Cabana began pilot training and was designated a naval aviator in September 1976, earning the Daughters of the American Revolution award as the top Marine to complete flight training that year. He graduated with distinction from the U.S. Naval Test Pilot School in 1981 and served in the Flight Systems Branch at the Naval Air Test Center until 1984. During his career, Cabana has logged over 7000 hours in more than 50 different kinds of aircraft.

Mr. Cabana was selected as an astronaut candidate in June 1985 and completed his initial astronaut training in July 1986.

He was assigned to the Lyndon B. Johnson Space Center Astronaut Office, serving in a number of leadership positions, including lead astronaut in the Shuttle Avionics Integration Laboratory; Mission Control Spacecraft Communicator, famously known as CAPCOM; and chief of NASA's Astronaut Office.

A veteran of four spaceflights, Mr. Cabana has logged 38 days in space, serving as the pilot on STS-41 and STS-53 and mission commander on STS-65 and STS-88. His fourth flight was the first assembly mission of the International Space Station in December 1998. Following his retirement as a colonel from the Marine Corps in September 2000, he was appointed a member of the Federal Senior Executive Service. He served in numerous challenging senior management positions at Johnson Space Center in Houston, ultimately becoming deputy director. In October 2007, he was appointed director of NASA's John C. Stennis Space Center in Mississippi. A year later he was reassigned as the 10th director of the John F. Kennedy Space Center.

Mr. Cabana's many achievements have been recognized with induction into the Astronaut Hall of Fame and being named an Associate Fellow in the American Institute of Aeronautics and Astronautics and a Fellow in the Society of Experimental Test Pilots. He has received numerous personal awards and decorations, including the Distinguished Flying Cross, the Presidential Distinguished Rank Award, and the National Space Club Florida Committee's Dr. Kurt H. Debus Award. He also is a recipient of the Rotary National Award for Space Achievement's National Space Trophy.



After graduating from Holy Cross in 1953, Joe Kerwin obtained an M.D. degree from Northwestern University, was drafted, and served as a U.S. Navy Flight Surgeon and Naval Aviator for 7 years before becoming a scientist-astronaut in 1965. He flew as Science Pilot on the first Skylab mission, spending a month in space in 1973. After Skylab he served in various NASA management positions, including NASA Representative in Australia (1982-1983) and Director of Space and Life Sciences at the Johnson Space Center (1984-1987.) He retired from the Navy, left NASA, and joined Lockheed in 1987.

At Lockheed Dr. Kerwin managed the Extravehicular Systems Project, providing hardware for Space Station Freedom from 1988-1990; with two other Lockheed employees he invented the Simplified Aid for EVA Rescue (SAFER), currently used by space-walking astronauts on the International Space Station (ISS). In 1994-1995, he led the Houston liaison group for Lockheed Martin's FGB contract, the procurement of the Russian "space tug" which has become the first element of the ISS.

Dr. Kerwin joined Systems Research Laboratories in June 1996 to serve as Program Manager of the team which bid to win the Medical Support and Integration Contract at the Johnson Space Center. He lost. The incumbent, KRUG Life Sciences, was selected. Then KRUG recruited him to replace its retiring President. He joined KRUG on April 1, 1997. In 1998, KRUG Life Sciences became the Life Sciences Special Business Unit of Wyle Laboratories of El Segundo, CA. Dr. Kerwin continued to lead the unit as Senior Vice President of Wyle. In 2003, Wyle was awarded the 10-year Bioastronautics contract by NASA to manage its future

medical work in support of human spaceflight. Dr. Kerwin managed that program until July 2004, when he retired.

In addition to his duties at Wyle, Dr. Kerwin served on the Board of Directors of the National Space Biomedical Research Institute (NSBRI) as an Industry representative until retirement. He now serves on its User Panel. He is also an Adjunct Professor of Space Medicine at the University of Texas Medical Branch (UTMB), and an Adjunct Professor of Physiology at the Texas A&M University College of Veterinary Medicine.



Dr. Serena M. Auñón-Chancellor was selected by NASA in 2009. Board certified in Internal and Aerospace Medicine, she recently served as Flight Engineer on the International Space Station for Expeditions 56 and 57. During her time on orbit, the crews contributed to hundreds of experiments in biology, biotechnology, physical science, and Earth science aboard the International Space Station. Investigations were led into new cancer treatment methods and algae growth in space. The crew also installed a new Life Sciences Glovebox, a sealed work area for life science and technology investigations that can accommodate two astronauts. During Dr. Auñón-Chancellor's first flight, she logged in 197 days in space. She currently covers medical issues and on-orbit support in the Astronaut Office.

Dr. Auñón-Chancellor graduated from Poudre High School, Fort Collins, CO, in 1993. She received a Bachelor of Science in Electrical Engineering from The George Washington University, Washington, DC, in 1997 and a Doctorate of Medicine from The University of Texas Health Science Center at Houston in 2001. She completed a 3-year residency in internal medicine at The University of Texas Medical Branch (UTMB) in Galveston, TX, in 2004, and then completed an additional year as Chief Resident in the Internal Medicine Department in 2005. She also completed an aerospace medicine residency at UTMB as well as a Master of Public Health in 2007. She is board-certified in Internal and Aerospace Medicine.

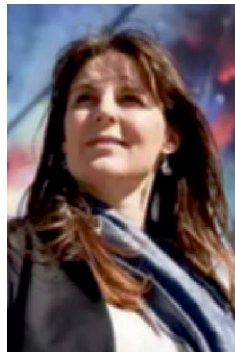
Dr. Aunon-Chancellor came to Johnson Space Center in August 2006, employed as a Flight Surgeon under the UTMB/Wyle Bioastronautics contract. She spent more than 9 months in Russia supporting medical operations for International Space Station crewmembers in Star City, including water survival training

in the Ukraine. She served as the Deputy Crew Surgeon for STS-127 and also held the role of Deputy Lead for Orion Medical Operations.

#### 58<sup>th</sup> Harry G. Armstrong Lecture

**Lisa Kaltenecker, Ph.D., Director of the Carl Sagan Institute at Cornell University**

**"Searching for Alien Earths and Life in the Cosmos"**



Prof. Lisa Kaltenecker is an award-winning astrophysicist and astrobiologist, the Founding Director of the Carl Sagan Institute at Cornell, Professor in Astronomy at Cornell University, and author of "Alien Earths: The Science for Planet Hunting in the Cosmos" (April 16, 2024). Asteroid 7734Kaltenecker is named after her.

Prof. Kaltenecker is a pioneer and world-leading expert in modeling habitable worlds and their light fingerprints and has spent the last decade finding new ways to spot life in the cosmos, working with NASA and ESA from Austria to the Netherlands, Harvard, Germany, and now Cornell. She is the author of more than 100 peer-reviewed publications.

Prof. Kaltenecker served on the National Science Foundation's Astronomy and Astrophysics Advisory Committee (AAAC), and on NASA senior review of operating missions, among others. She is a Science Team Member of NASA's Transiting Exoplanet Survey Satellite (TESS) Mission and the Near Infrared Imager and Slitless Spectrograph (NIRISS) instrument on the James Webb Space Telescope.

*The Bauer Lecture was given on Monday, May 6, at 8:00 a.m. during Opening Ceremonies. Educational Support was provided by Wyle.*

*The Reinartz Lecture was given on Tuesday, May 7, at 8:30 a.m. Support was provided by the Eugen Reinartz Memorial Fund.*

*The Armstrong Lecture was given on Thursday, May 9, at 8:15 a.m. Educational support was provided by Environmental Tectonics Corp.*