GRAA NEWSLETTER

P.O. Box 1184, Greenbelt, MD 20768-1184

March 2023 http://GoddardRetirees.org **39th Year of Publication**

UPCOMING LUNCHEONS: We meet at 11:15 AM on the 2nd Tuesday of each month at the American Legion Post #136 at 6900 Greenbelt Road. **Reservations are required;** please contact graalunch@gmail.com (preferred) or call (240) 720-7833 **before Thursday, March 9th**.

March 14	**Elaine Shell, Jonathan Wilmot, and David McComas** will present "**The core Flight System (cFS) Software**". The cFS, originally engineered to apply the "faster, better, cheaper" principle to Goddard mission flight software, has since been licensed as open source and is now being used in the classroom and on projects ranging from CubeSats to the Artemis Gateway program.
April 11	**Dr. Joanne (Joe) Hill-Kittle,** Dept. Dir., Goddard Engineering and Technology Directorate will discuss "**The Future of Goddard Engineering":** major thrust areas, incorporation of Digital Engineering, and pivoting to commercial space capabilities.

COMMENTS FROM TONY COMBERIATE

Our February speakers were Mark Lupisella**,** Goddard's Exploration Integration Manager, and, Cliff Brambora, Lunar Ice Cube manager and a recent retiree. Mark's "How Goddard is Contributing to Artemis" presentation reviewed our research and development in a variety of areas ranging from lunar science to habitation. For example, Goddard is leading the Lunar Base Site Planning and design effort and supporting the technical integration of science and technology into the Artemis Program. Goddard also has numerous roles in supporting efforts for Human Landing Systems, Gateway, and Lunar Terrain vehicles ranging from evaluating and providing software and avionics to communications and lunar surface mobility systems. Mark's team also supports the Mars Environmental Dynamics Analyzer science team. The multifaceted Artemis Base Camp on the Moon effort includes defining the objectives and functions to be performed and identifying their limitations and constraints, characterizing the environment, comparing site locations, assessing how multiple functions will interact on the Moon, and identifying knowledge and technology gaps as well as known and unknown risks.

When Artemis 1, an unmanned test flight to lunar orbit, launched last November, it carried a number of small secondary payloads, called CubeSats, on its stage adapter, which connects Orion to the upper stage of the SLS. These low-cost experiments, not much larger than a shoebox, carry out science and technology investigations that will help pave the way for

future deep space missions. Our second speaker was Cliff Brambora, who was the lead engineer in the development of the Lunar Ice Cube instrument that flew on Artemis 1. Lunar Ice Cube's mission was to study the distribution of water and organic volatiles on the Moon from lunar orbit and to enable broadband spectral determination of composition and distribution of volatiles in regolith on the Moon and analogous bodies, provide geological context by way of spectral determination of major minerals, and enable understanding of current dynamics of volatile sources, sinks, and processes, with implications for the evolutionary origin of volatiles.

The Lunar Ice Cube was approximately 10 x 20 x 30 cm, with two deployable solar panel wings. Its mass was ~ 14 kg and included an ion propulsion system, solar cells, rechargeable batteries, an X-band radio with dual patch antennas, and a UHF beacon along with its science instrument, the Broadband InfraRed Compact High-resolution Explorer Spectrometer (BIRCHES). Its mission was to transfer from Earth to Lunar orbit about 100 km above the lunar surface, collecting data on any water on the surface in gaseous, liquid, and solid form, as well as other resources which could aid our astronauts in future missions. In-situ resources also reduce the number of raw materials that need to be carried into space. Water on the moon could also be used to generate rocket fuel to return to Earth or venture further into the solar system.

The Artemis secondary payloads were successfully deployed, but unfortunately, at least 6 of them, including Ice Cube, have not made contact with controllers on the ground or have failed for other reasons. Although the Lunar Ice Cube mission ultimately did not succeed, Cliff said that he and his team learned more about building spacecraft from this experience than from any other mission he had worked on. As we know, space missions are hard, but the path is challenging and the rewards are worth the risks. There is reason to think deployment tumbling rates were higher than expected, causing communication and operational difficulties for many of the secondary CubeSats.

DONATIONS: GRAA depends on donations to print and mail Newsletters and biennial Directories. Send donations to **GRAA, P. O. Box 1184, Greenbelt, MD 20768-1184.** We plan to mail multi-month summaries of recent Newsletters to our retirees without email access. If you send us your email address, we can send electronic copies. Past Newsletters and videos of luncheon talks are on our website http://goddardretirees.org.

TREASURER'S REPORT: Jackie Gasch received tax-deductible donations from the following: Mike Cushner, Barbara Lunde, Elaine Shell, Tony Comberiate, Walter Goodale, Robert Huddleston, Edward Sullivan, Glenn Harris and Raymond Maqur.

FROM THE GODDARD ARCHIVES: March 5, 1978, Delta launched Landsat -3 which was the last Landsat based on the Nimbus spacecraft design. The multi-spectral scanner was its main instrument.

REMEMBERING OUR FORMER COLLEAGUES:

Kenneth Roy Wallgren, 88, passed away on September 22, 2022. He was born on April 11, 1934 in St Paul, MN. He obtained a degree in nuclear physics and subsequently built nuclear reactors for submarines while serving in the U.S. Army. After leaving the Army, he engineered batteries for Gould for a few years before designing supercomputers, then subsequently managing teams that built supercomputers, working at NASA for over twenty years, first at GSFC and later at NASA Headquarters before going to work for the Supercomputing Research Center in Bowie, MD where he worked for 10 years.

Peter "Pete" Davies Hyde, 82, of Seabrook, MD, passed away on January 6, 2023. Born in 1940 in Norwich, CT, he earned degrees in mathematics from Harvard University and the University of Pennsylvania. Pete worked with early computing systems at Burroughs Corporation and in Aerospace Guidance and Control at General Electric and the Willow Run Labs in Ann Arbor, Michigan. A full-time doctoral student at the University of Maryland, he was hired by NASA, where he worked on the Hubble Space Telescope for over 20 years.

Laurence "Larry" Donald Anderson, 71, of Crofton, Maryland passed away on January 18, 2023. Born in 1952 in Tangier, Morocco, where his father worked for Voice of America, Larry graduated from the University of Maryland (B.A. in Philosophy) in 1973 and George Washington University (M.S. in Information Systems Technology) in 1979. Larry had a long career as a computer scientist at NOAA and Goddard.

Ronald K. Byzet, 72, of Huntingtown passed away on January 27, 2023. Born May 28, 1950, he graduated from Memphis State University in 1972 with a B.S. in Engineering Technology. He began working at Goddard in the late 1970s and received many awards for the work he did on the Hubble Telescope.

Dale L. Fahnestock, 86, of Elkridge, Maryland, born in Mount Holly Springs, PA, passed away on February 21, 2023. In 1979, Dale was appointed Head of Code 503, overseeing all of Code 500's HST work. Dale moved from that job to the Deputy Director of Code 500 and then later to the Director of Code 500.

Robert Earl Samuelson, Ph.D.,87, died on February 10, 2023. Born in Osceola, Nebraska, he graduated from the University of Michigan, and earned his doctorate in Astronomy from Georgetown University, in Washington, DC. He joined Goddard's Infrared & Radio Astronomy Branch in 1962 and worked on infrared observations of planetary atmospheres, with a focus on ices and aerosols contained within the atmosphere of Saturn's moon Titan. He was a co-investigator on the Voyager 1 and 2 missions to the giant planets in the 1980s and the Cassini mission to Saturn until 2017.

Natalie A. Quigley, 81, of Shannondale, Harpers Ferry, West Virginia passed away on February 23, 2023. Born on May 31, 1941, in Washington, D.C., she worked in the Mission Operations and Data Systems Directorate's Resource Management Office and retired from NASA (Goddard Space Flight Center) in 1994 after twenty years of service.

Edwin E. Speaker, 94**,** passed away on February 24, 2023, in Mount Pleasant, SC. At Goddard, Ted was Project Manager for the ALOSS Office in the Flight Projects Directorate, followed by work on NASA's ISS Planning Team, and Chief of Plans Integration for the ISS Program Office.