# GRAA NEWSLETTER

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

**June 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 (410)-709-8889 **before Thursday, June 8th**.

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| June 13 |  | **Dr. Scott Braun,** Research Meteorologist in Code 612 and Project Scientist for ESO-AOS missions will discuss "The Atmosphere Observing System (AOS): Future Space-Based and Suborbital Observations for the Study of Coupled Aerosol-Cloud-Precipitation Interactions." |
| July 11 |  | **Dr. Julie McEnery,** Nancy Grace Roman Project Scientist will discuss the Science of the Roman Space Telescope, NASA's next Astrophysics Flagship Mission. |

### COMMENTS FROM TONY COMBERIATE AND ARLIN KRUEGER

Our May speaker was **Dr. Joanna Joiner**, from Goddard's Atmospheric Chemistry and Dynamics Branch, and the 2020 William Nordberg Memorial Award winner. Dr. Joiner gave us a preview of her pandemic-delayed Scientific Colloquium Nordberg Lecture. Her presentation was titled "**How do we make and improve satellite data products that enable breakthrough science? Journeys through solar backscatter (BUV) observations**."

Goddard's world-leading ozone research began with the 1970 launch of the Backscatter UV (BUV) instrument on Nimbus-4, then expanded to global mapping with the 1978 launch of the Total Ozone Mapping Spectrometer (TOMS) on Nimbus-7.  The 1960s ozone retrieval algorithms were based on the physics of ozone absorption, Rayleigh scattering, and reflection by surface and clouds, and later, in the TOMS data, sulfur dioxide. The 1970s-era spacecraft data limitations allowed just the few wavelength bands needed to obtain the ozone profile and total amount. Yet this was sufficient to monitor stratospheric ozone, map the Antarctic Ozone Hole, and bring about international agreements to ban CFC gases. Surprisingly, TOMS was also able to quantify large volcanic eruptions for the first time and track these plumes for aviation safety.

By the turn of the Century, spacecraft technology had improved dramatically so that the full UV/visible spectrum can be measured in high *spectral and spatial* resolution. Over the past two decades, the European GOME and OMI instruments have taken advantage of this technology to measure the Earth's albedo in each pixel at hundreds of wavelengths.  This

opened new avenues of research from biological fluorescence to air pollution, which require much higher ground resolution than TOMS.  With the massive increase in data volume, new data processing approaches were needed.

Dr. Joiner introduced novel retrieval algorithms that make use of Principal Component Analysis (PCA), artificial intelligence (AI), and machine learning to replace or augment physical retrievals and produce far better quality data.  For example, noise and biases in $SO_2$ retrievals were removed using a PCA spectral fitting algorithm allowing much smaller sources to be detected and monitored.  This works by using only the leading principal components to capture basic features without reproducing the noise. With this, missing pollution sources have been identified and long-term changes in air pollution $SO_2$ and $NO_2$ are now tracked, leading to far better data on global pollution.  In addition, Dr. Joiner recognized that geophysical information could be retrieved within Fraunhofer lines in the solar spectrum.  In these deep lines, inelastic Raman scattering can be observed and used, for example, to define UV "optical centroid" pressures in clouds to improve ozone retrievals and to measure the ozone within clouds.

Machine learning is now being used not only to speed up processing of the massive amounts of data but also to enhance the data products.  In cloudy areas, AI, trained with independent data, can recover vegetation indices, gross primary production, and ocean-color products like chlorophyll.  Also, we now are able to measure small signals arising from solar-induced fluorescence inside leaves, leading to a global measurement of the total amount of $CO_2$ taken up by plants.

Dr. Joiner is on the science teams of several other NASA satellite missions, including the recently-launched geostationary Tropospheric Emissions: Monitoring of Pollution (TEMPO) mission, and the Plankton, Aerosol, Cloud, and Ocean Ecosystem (PACE) mission. She also serves as the instrument scientist for NOAA's Geostationary Extended Observations (GeoXO) Atmospheric Composition sensor (ACX) that will launch in the next decade.


**DIRECTORIES AND NEWSLETTERS**: We depend on retirees to furnish their home addresses to be listed in the biennial **GRAA Membership Directories**, which are only available as mailed hardcopies to members.  Multi-month *abstracts* **of Newsletters** are also mailed by USPS to our retirees with only mail addresses in our files.  These are supported by donations to GRAA, P. O. Box 1184, Greenbelt, MD 20768-1184.

Retirees need to register their email addresses to get our monthly **Newsletters,** which include synopses of the talks, special community announcements, and obituaries.   Please send your email address to goddardretirees@gmail.com. Past Newsletters and videos are on our website https://goddardretirees.org.

**TREASURER'S REPORT**: Treasurer Jackie Gasch received donations from Colleen Quinn/House and Frank Ottens.

**FROM THE GODDARD ARCHIVES:** Fifty years ago, on June 10, 1973, Delta launched Explorer 49/Radio Astronomy Explorer to study low-frequency radio emissions from the solar system. Its antennae were 1500 ft tip to tip extending 750 feet from the spacecraft body.

**REMEMBERING OUR FORMER COLLEAGUES**:

**Helen Sullivan Baniszewski**, 67, passed peacefully at her home on May 22, 2023. Helen earned a BS in Business Mgt from UMD, College Park, then joined Goddard where she was Deputy Project Manager for Resources on GOES N-P, and supported the POES and EOS Terra, and HST Projects. Friends may call at the Slack Funeral Home, 3871 Old Columbia Pike, Ellicott City, MD 21043 on Friday June 9th from 6-9 p.m. and Saturday June 10th from 1-3 p.m. A Celebration of Life will begin at 3 p.m. A Mass of Christian Burial will be celebrated Tuesday June 13th at 11 a.m. at St. Paul's Catholic Church, 3755 St. Paul St., Ellicott City, MD 21043. Interment Private. In lieu of flowers, memorial contributions in Mrs. Baniszewski's name may be directed to the Susan G Komen Foundation ( http://www.komen.org ) Please see the Slack Funeral Home website https://www.slackfuneralhome.com/ .

**Albert J. Fleig**, 86, passed away in Bethesda on May 18, 2023. Born in Rochester, NY, he earned a BS in Engineering Sciences at Purdue and a Ph.D. in Space Science from Catholic Univ. Al joined GSFC in 1962, where he worked with the Nimbus project in managing contracts for data production from SBUV/TOMS and succeeding TOMS missions until his retirement in 1992. The data from these missions were crucial in international efforts to monitor and manage sources of ozone depletion. He continued to support Goddard as a contractor until 2022.

**William A. Pfeiffer**, 89, of Melbourne, FL. Bill worked with the Australians in supporting Apollo 13 during some critical support periods. He later became the Goddard Networks Procedures & Evaluation Division Chief from the mid-1970s to the early 1980s before retiring from Goddard.

**Stephen Drake**, 72, passed away on May 8, 2023. He was born in Birkenhead, England on February 3, 1951, attended Edinburgh University where he received his BSc in Astrophysics, and in 1973 attended graduate school at UCLA where he received his Ph.D. in Astronomy. He worked at Goddard from 1985 until he retired in 2018. His work with the Swift satellite detected the strongest, hottest, and longest-lasting sequence of stellar flares ever seen from a nearby red dwarf star. The initial blast was as much as 10,000 times more powerful than the largest solar flare ever recorded.

**Peter Ward**, 79, of Bradenton, FL passed away at home on May 7, 2023. He was raised in Fayetteville, NY, and graduated from Hillsdale College in Michigan. He began his career in the late 1960s as a mathematician supporting NASA space flight missions at Cape Kennedy and at Goddard and then worked for the National Security Agency for over 40 years.

**John Sudey Jr.,** 90, of Timonium, MD, passed away on January 5, 2023. John grew up in Slovakia under Nazi rule. He was an engineer in the Electromechanical Systems Branch (Code 716) and

over the course of his career supported many missions including Apollo, GOES, Landsat, and the Hubble Space Telescope—he was co-author of a paper on the jitter performance of the GOES spacecraft and instruments and one on Landsat-4 sensors and the methodology used to correct images from the Landsat Thematic Mapper instrument.

**Edward "Bud" Michael Ashelford, Sr.**, 84 of Mt. Airy, passed away on May 21, 2023. Born on March 12, 1939, Ashelford retired from Goddard, where he worked for over 35 years, and 10 years for the Naval Ordnance Laboratory as a Machinist and Mechanical Engineer, receiving numerous awards from both. He was at the Eniwetok Islands to witness Atomic Bomb tests and also witnessed many Hydrogen Bomb tests. Bud was instrumental in the diagnosis of the O-Ring failure in the Challenger Shuttle Disaster. He served four years in the United State Army and, in his last year, he met face-to-face with President Eisenhower and even drove the Army Surgeon General.

**Joyce Lynn Corley (Longnecker)**, 78, passed away on May 22, 2023. Born October 15, 1944, in Berwyn, MD, Joyce worked at Goddard for 42 years, where her strong will and determination helped her to make significant contributions to the organization. She loved spending time with her mother, sister, and family and she was a very thoughtful, generous woman who doted on those she loved. Joyce also enjoyed relaxing at her beach house in Chincoteague VA, where she liked to shop, sight-see, and enjoy the horses and wildlife.

**George Frederick Vogt, Jr.**, 96, passed away on Feb. 8, 2023. George was born and raised in Baltimore City, Maryland and served in the U.S. Navy for two years during WWII.  He then attended Johns Hopkins University, graduating as an Electrical Engineer.  He was the Electrical Engineering Section Head in the Facilities Engineering Division and later worked in the Plant Operations and Maintenance Division.