



Marshall Star, May 8, 2013 Edition

# MARSHALL STAR

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## **NASA Astrophysicist Elected to National Academy of Sciences**

*By Janet Anderson*

NASA astrophysicist Dr. Chryssa Kouveliotou, a senior scientist at NASA's Marshall Space Flight Center, has been selected for membership in the National Academy of Sciences in recognition of her distinguished and continuing achievements in original scientific research.

***Image right: Chryssa Kouveliotou (NASA/MSFC)***

Kouveliotou, a longtime leading researcher in NASA's space science mission, conducts extensive research on a host of astronomical phenomena including black holes, neutron stars and gamma-ray bursts. She is one of 84 new members and 21 foreign associates from 14 countries recently announced as members.



"I salute the National Academy of Sciences for their recognition of the groundbreaking scientific contributions that Dr. Kouveliotou has made in the field of high energy astrophysics," said John Grunsfeld, associate administrator for NASA's Science Mission Directorate in Washington. "Her work in expanding our knowledge of the nature of cosmic gamma-ray bursts, and her broad efforts in the service of science are exemplary of the creativity, collaboration and innovation that are hallmarks of a great scientist. I extend my heartfelt congratulations to her, and am confident that she will continue to do great science and serve the nation as a member of the academy."

Kouveliotou, who joined NASA in 2004, has been the principal investigator on numerous research projects in the United States and Europe. Currently, she is a co-investigator on the Gamma-ray Burst Monitor, an instrument flying aboard the Fermi Gamma-ray Space Telescope; an associated scientist on Swift, a multi-wavelength observatory dedicated to the study of gamma-ray burst science; and a member of NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) science team, researching topics that investigate the most powerful explosions in the universe. Throughout her career, she has worked on a succession of vital NASA research missions, including the International Sun Earth Explorer-3, the Solar Maximum Mission and the Burst and Transient Source Experiment, which flew on NASA's Compton Gamma-Ray Observatory.

Her numerous contributions to the fields of astronomy and astrophysics have expanded scientific understanding of fleeting, transient phenomena in the Milky Way galaxy and throughout the universe. Besides determining the unique properties of the highly energetic emissions from gamma-ray bursts -- the brightest and most powerful cosmic events ever documented -- Kouveliotou was part of the team which first revealed the extragalactic nature of these sources. She and her team made the first confirmed detection of ultra-dense neutron stars called magnetars, which are the cinders of stars left over after a supernova.

A native of Athens, Greece, Kouveliotou has received numerous awards for her work. In 2012 alone, she earned the Dannie Heineman Prize for Astrophysics and the NASA Exceptional Service Medal, and was named one of Time Magazine's 25 most influential people in space.

Kouveliotou was featured in a Women@NASA profile which can be viewed [here](#).

*Anderson is a public affairs officer in the Office of Strategic Analysis & Communications.*

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## **From Couch to 5K: Marshall Team Members Complete the SHE Day Race**

*By Jena Rowe*



Several team members from NASA's Marshall Space Flight Center tackled a personal fitness journey and completed the SHE Day 5K race to graduate from Marshall Running Club's "Couch to 5K" running program.

***Image left: Team members from the Marshall Center completed a "Couch to 5K" program culminating with the completion of the SHE Day 5K race. (NASA/MSFC/Fred Deaton)***

"Many of the participants were not regular exercisers to begin with or they wanted to get back in the habit of regular exercise," said

Charlie Finnegan, the organizer and a coach for the program and the chief engineer for Marshall's Science & Technology Office. "The focus of the program was to emphasize a healthy lifestyle and to motivate people to exercise. The Couch to 5K program is great for people ranging in ability, so it was ideal for a group like ours."

The program is designed to slowly build strength and stamina by alternating between walking and running three days a week. Starting off with a balance of jogging and walking, as the weeks progress participants build muscle and their endurance is improved. Over the course of 10 weeks, the distance and time is increased and culminates with continuous jogging for 3.1 miles or 5K.

The group started training around the beginning of February and held the SHE Day 5K race in sight as their finish line. In February, more than 50 people signed up to participate in the program. As the training progressed, 19 people persevered to complete the program and finish the race.

Participants were encouraged along the way by coaches Charlie Finnegan, Angie Jackman of the Advanced Development Office, Julia Khodabandeh of the Boosters Office, and Ruth Conrad of the Space Systems Department at Marshall. Twice a week the coaches would meet with team members and complete the day's workout. The third workout of the week was completed by team members on their own without a coach.

"I was not a runner to begin with and Charlie told us we were going to do this rain or shine. Some days we were running in 30 degree weather," said Lakiesha Hawkins, participant and team lead for Propulsion Dynamic Loads and Data Analysis. "It was hard, but I stuck with it. The most fun part was that I felt so empowered. I was doing something that I originally thought my body could not do. The accountability of my teammates and coaches helped me to push through when I wanted to give up. This is one of the best things I have seen at Marshall to encourage a healthy lifestyle and I'm glad I did not give up." Hawkins plans to continue running and will participate in the Mercedes-Benz Cotton Row Run on May 27.

This was the first year that the Couch to 5K program was offered through the Marshall Running Club. Coaches plan to offer it annually and hope to have the training culminate with the SHE Day 5K race every year.

For more information about the Marshall Running Club visit, [here](#). For more information about the Couch to 5K program, contact [Charlie Finnegan](#).

*Rowe, an Analytical Services Inc. employee and the Marshall Star editor, supports the Office of Strategic Analysis & Communications.*

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## 'The Best Things in Life are SHE!'

NASA'S Marshall Space Flight Center kicked off the 2013 Safety, Health and Environmental, or SHE, Day on May 1 with a tree-planting ceremony. Digging in are, from left, Stephen Cash, director of the Safety & Mission Assurance Directorate; Peter Allen, supervisor of the Safety & Quality Department; Teresa Vanhooser, deputy director of the Marshall Center; Ed Kiessling, supervisor of the Environmental Engineering & Occupational Health Office; Robin Henderson, associate director of the Marshall Center; and Steve Doering, director of the Office of Center Operations. (NASA/MSFC/Emmett Given)



Tables and booths inside Building 4316 during SHE Day offered safety, health and environmental information on a variety of topics, from radon awareness and home safety to the NASA Safety Reporting System and hydro-gardening. At the Marshall Security table, JoAnn Gunn, right, an intern from Calhoun Community College working in the Logistics Services Office, puts together a packet of information for Lisa Andrus, left, a Will Technology employee supporting the Training & Incentives Office, as Diana Simpson of Excalibur Security looks on. (NASA/MSFC/Emmett Given)

Among the Marshall Center's SHE Day programs was a fiery demonstration by Huntsville Utilities workers of the danger contained in the electrical lines that run power to our homes, and the safety procedures workers follow. (NASA/MSFC/Emmett Given)



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## **Raymond "Corky" Clinton, Marshall Deputy for Science & Technology, Elected Fellow in AIAA Society**

*By Janet Anderson*



Raymond G. "Corky" Clinton  
(NASA/MSFC)

Dr. Raymond G. "Corky" Clinton Jr., deputy manager of the Science & Technology Office at NASA's Marshall Space Flight Center, has been elected a Fellow of the American Institute of Aeronautics and Astronautics, or AIAA, the nation's largest society devoted to the advancement of aviation, space and defense.

The title of fellow, the highest distinction conferred by the AIAA, is granted to preeminent individuals who have had long and highly contributory careers in aerospace and who embody the highest possible standards in the fields of aeronautics and astronautics.

He was to be honored May 8 at the AIAA Aerospace Spotlight Awards Gala at the Ronald Reagan Building and International Trade Center in Washington.

In his position at the Marshall Center, Clinton handles day-to-day oversight of the Science & Technology Office and its more than 250 civil service and contract employees. The office conducts advanced research at the intersection of science and exploration -- expanding general scientific knowledge and understanding, while furthering NASA's mission to extend our reach across the solar system.

Additionally, the Science & Technology Office is responsible for integrating early stage research and game-changing technology development activities for projects assigned to and competitively won by Marshall. The office also manages the Centennial Challenges Program, NASA's space competition prize contests for non-government-funded technology achievements by American inventor teams.

Clinton was appointed in 2003 to the Senior Executive Service -- the personnel system that covers most top managerial, supervisory and policy positions in the executive branch of the federal government.

He joined the Marshall Center in 1984 as an aerospace ceramic materials engineer in the Materials and Processes

Laboratory of the center's former Science and Engineering Directorate.

A native of Hot Springs, Ark., Clinton earned his bachelor's, master's and doctoral degrees from the Georgia Institute of Technology in Atlanta, in 1973, 1976 and 1982, respectively. He has published more than 75 papers and technical reports.

He is the recipient of numerous NASA and industry awards, which include the Presidential Rank Award for Meritorious Executive for his outstanding achievements at NASA. Additional awards are the NASA Silver Snoopy award, presented in 1990 by the Astronaut Corps for his noteworthy contributions to NASA's ongoing human spaceflight missions. He also received the NASA Exceptional Achievement Medal in 1995 for his leadership in developing and testing advanced materials for the space shuttle's powerful reusable solid rocket motors, which helped propel the shuttle to orbit. In 2000, the Engineers Council honored him with the Distinguished Engineering Achievement award for his efforts in the development of nonmetallic materials for application to current and future launch systems. He received NASA's Outstanding Leadership Medal in 2006 for his leadership of the Reinforced Carbon-Carbon Aging Effects Team and his contributions to Return to Flight.

*Anderson is a public affairs officer in the Office of Strategic Analysis & Communications.*

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## **Marshall Team Members are Invited to put Pedals to the Pavement in the 12th Annual Director's Tour d'Arsenal on May 21**

*By Jena Rowe*

NASA's Marshall Space Flight Center team members are encouraged to make plans to put their pedals to the pavement and bicycle through Redstone Arsenal during the 12th annual Director's Tour d'Arsenal on May 21.

Steve Doering, director of the Marshall Center's Office of Center Operations, and Steve Cornelius, director of missile development for the U.S. Army Aviation and Missile Research Development and Engineering Center, will lead the ride hosted by the MARS Team Redstone Alliance for Cycling (MTRAC) beginning at 5 p.m. at the NASA Wellness Center, Building 4315.

Cyclists will tour through NASA test areas escorted by Marshall Center security then ride through Army Test Area 1 on Dodd Rd to the southern part of the arsenal to see the Tennessee River. Once all cyclists are through Test Area 1, everyone will return to the NASA Wellness Center at their own pace and by various routes of 18-25 miles.

"Last year we had the largest turnout for the event, with nearly 200 cyclists," said Jamie Miernik, the organizer for the event and a senior engineer for Teledyne Brown Engineering supporting the Army Space & Missile Defense Command (SMDC) and partnering with NASA on rocket programs. "We look forward to the possibility of exceeding that number this year. It is a great opportunity for team members to see the arsenal from a whole new perspective and bring credibility to cycling on Redstone Arsenal. All Marshall and Redstone team members are invited to bring their bikes for this exciting ride."

All cyclists are required to wear helmets and reflective vests. Anyone interested in participating in the Director's Tour d'Arsenal must sign a waiver. Please contact [Scott Stevens](#) or [Jamie Miernik](#) for more information or to receive a waiver in advance.

May is National Bike Month and May 13-17 is National Bike to Work Week. For more information about bicycling activities and safety during May, visit [here](#).

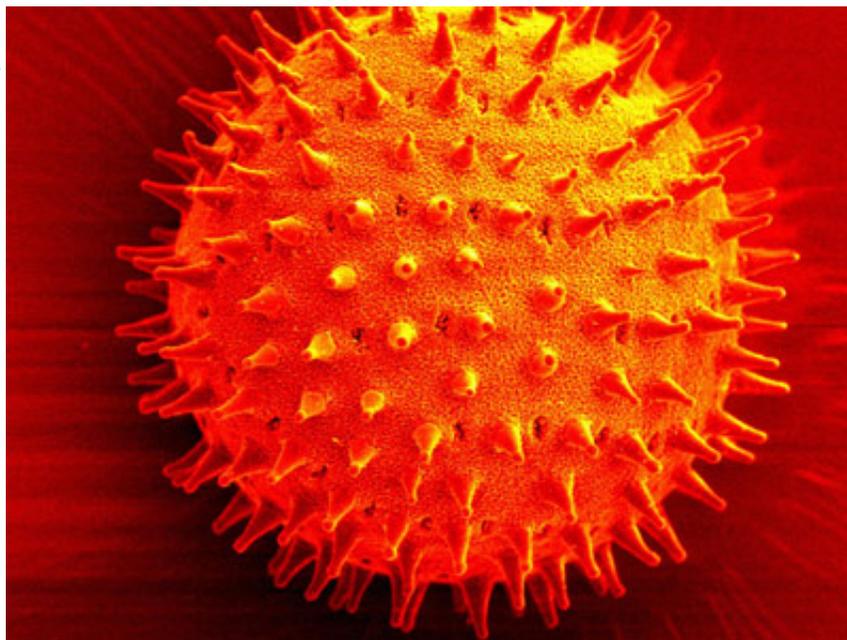
*Rowe, an Analytical Services Inc. employee and the Marshall Star editor, supports the Office of Strategic Analysis & Communications.*

## Pollen: You Can Run, but You Can't Hide

By Janet Anderson

It's the yellowish coating on cars. It floats on ponds, blows with the spring breeze and serves as a potent irritant to allergy sufferers.

**Image right: A false color electron microscope scan of pollen. (Dartmouth College/Charles Daghlian)**



Now a NASA team is targeting pollen -- and its work could help alleviate some of the suffering. Partnering with experts from academia, health organizations, the medical community and other federal agencies, the team is modeling pollen release cycles and concentrations in the American Southwest to better forecast high-level pollen release and movement -- potentially creating a better early-warning system to help protect allergy sufferers from the debilitating yellow dust.

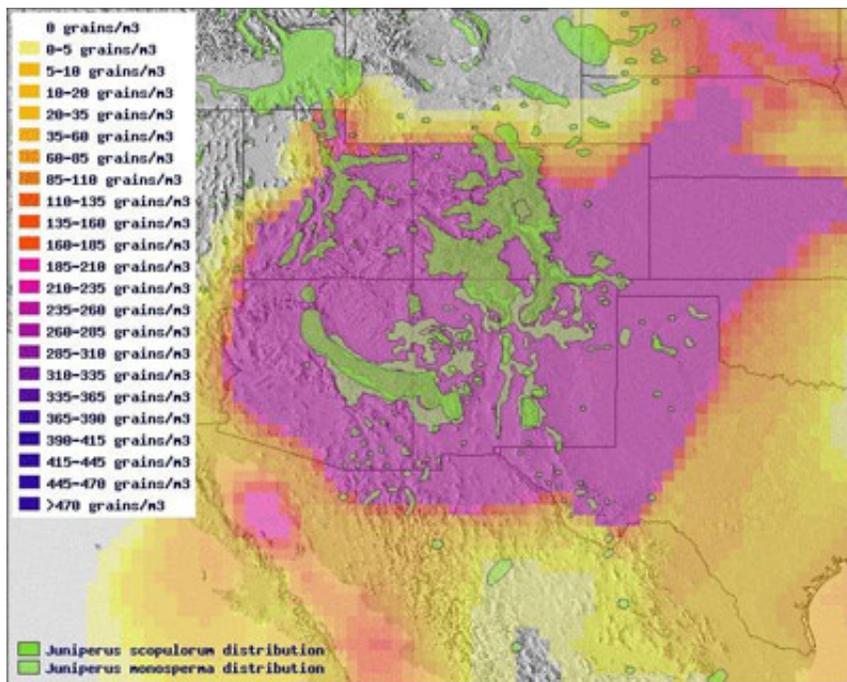
"The concept of this project is to integrate Earth science data into a weather forecast model which can forecast pollen transport," said Jeff Luvall, principal investigator and Earth scientist at NASA's Marshall Space Flight Center. "A large percentage of the population suffers with allergies; this research could really help give people some relief."

A more accurate pollen forecasting system could greatly benefit health programs and organizations, such as the Public Health Tracking program run by the Centers for Disease Control and Prevention in Atlanta and its partners in the New Mexico Environmental Public Health Tracking system. Better predictions and warnings about high pollen counts could minimize health problems for asthma sufferers, reduce emergency-room visits involving respiratory and cardiovascular complications, and reduce allergy-related absences from school and work.

"Since seasons vary, the onset of the pollen season can fluctuate by two to three weeks," said Dr. Estelle Levetin, an aerobiologist with the University of Tulsa. "The ability to forecast 72 hours ahead of pollen release and incursion would give us the opportunity to alert the public about incoming pollen and provide physicians extra time to treat patients before pollen arrives."

For this study, scientists focused on pollen release from four species of juniper trees -- some of the most potent pollen-producers in the plant kingdom -- in parts of New Mexico, Texas and Oklahoma.

Most people think of fall and spring as allergy season, but there is a significant release of pollen from millions of acres of juniper trees in Texas and Oklahoma during the winter months. This release cycle can impact a huge population. The airborne pollen produced by these juniper trees has been well documented to affect inhabitants of cities and towns adjacent to woodlands where they're concentrated. In fact, in January 1999, juniper pollen grains identified as coming from *J. ashei* trees in Texas were reportedly traced to Ontario, Canada.



The distances traveled by that irksome yellow irritant don't surprise Luvall. "Pollen from juniper trees is widely transported by the wind over long distances and can affect people in cities far from the pollen source," he said. "NASA satellite data has been extremely useful in tracking the changes in the juniper canopy, which is a precursor to the release of pollen."

***Image left: A PREAM output map of pollen provides early warning for conditions that exacerbate asthma and allergies in the three-state region, thereby allowing sufferers to take cover during pollen peaks. The near-real-time model is based on current weather data and satellite information and is verified by ground observations. (Earth Data Analysis Center/University of New Mexico)***

Satellite observations were utilized from a pair of special sensors called the Moderate Resolution Imaging Spectroradiometers, or MODIS, orbiting Earth aboard NASA's Terra and Aqua satellites. MODIS senses the growth stages of different plants by observing color changes that occur in the plant canopy. Certain color changes reveal when the plants below -- in this case juniper trees -- are about to release their pollen.

Capitalizing on an existing NASA model for dust observations, scientists modified the computer program to simulate the release and transport of pollen. They dubbed the new model the Pollen Regional Atmospheric Model, or PREAM. After analyzing two-and-a-half years' of data, the team learned that 10 a.m. is the peak release time for pollen in the three-state focus area studied -- likely the result of climate factors such as humidity and temperature. Next, researchers plan to compare the results of their models with medical records and a more widespread series of ground-based pollen observations.

"This is good news for the public," said Luvall. "NASA's science mission begins here on Earth, with greater awareness and understanding of our changing planet, and solutions for protecting our environment, resources and human lives."

The joint research effort is funded through a NASA Applied Sciences, Health program proposal called "Decision support through Earth Science Research Results," an element of the NASA ROSES 2008 solicitation.

For more information visit: <http://appliedsciences.nasa.gov>. For more information about the National Phenology Network visit: <https://www.usanpn.org/nn/jpp>.

*Anderson is a public affairs officer in the Office of Strategic Analysis & Communications.*

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## Scientists Study a Giant Gas Cloud in System NGC 6240

Scientists have used the Chandra X-ray Observatory to make a detailed study of an enormous cloud of hot gas enveloping two large, colliding galaxies. This unusually large reservoir of gas contains as much mass as 10 billion suns, spans about 300,000 light years and radiates at a temperature of more than 7 million degrees.

***Image right: In this new composite image of NGC 6240, the X-rays from Chandra that reveal the hot gas cloud are colored purple. Data has been combined with optical data from the Hubble Space Telescope to show long tidal tails from the merging galaxies, extending to the right and bottom of the image. (X-ray: NASA/CXC/SAO/E. Nardini et al; Optical: NASA/STScI)***



This giant gas cloud, which scientists call a "halo," is located in the system called NGC 6240. Astronomers have long known that NGC 6240 is the site of the merger of two large spiral galaxies similar in size to our own Milky Way. Each galaxy contains a supermassive black hole at its center. The black holes are spiraling toward one another and may eventually merge to form a larger black hole.

Another consequence of the collision between the galaxies is that the gas contained in each individual galaxy has been violently stirred up. This caused a baby boom of new stars that has lasted for at least 200 million years. During this burst of stellar birth, some of the most massive stars raced through their evolution and exploded relatively quickly as supernovas.

The scientists involved with this study argue that this rush of supernova explosions dispersed relatively high amounts of important elements such as oxygen, neon, magnesium and silicon into the hot gas of the newly combined galaxies. According to the researchers, the data suggests that this enriched gas has slowly expanded into and mixed with cooler gas that was already there.

During the extended baby boom, shorter bursts of star formation have occurred. For example, the most recent burst of star formation lasted for about five million years and occurred about 20 million years ago in Earth's timeframe. However, the authors do not think that the hot gas was produced just by this shorter burst.

What does the future hold for observations of NGC 6240? Most likely the two spiral galaxies will form one young elliptical galaxy over the course of millions of years. It is unclear, however, how much of the hot gas can be retained by this newly formed galaxy, rather than lost to surrounding space. Regardless, the collision offers the opportunity to witness a relatively nearby version of an event that was common in the early universe when galaxies were much closer together and merged more often.

A paper describing the new results on NGC 6240 is available online and appeared in the March 10, 2013, issue of [The Astrophysical Journal](#).

NASA's Marshall Space Flight Center manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

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## **\$1.5M Autonomous Robot Challenge to be Recompeted in June**

*By Janet Sudnik*

Fourteen teams from across the country and around the globe are perfecting their hardware and software to compete for \$1.5 million in prize money at NASA's 2013 Sample Return Robot Challenge, the latest competition of the agency's Centennial Challenges program. The event will take place in June at the Worcester Polytechnic Institute in Worcester, Mass.

The teams will compete to demonstrate a robot that can locate and collect geologic samples from a wide and varied terrain without human control. The objective is to encourage innovations in automatic navigation and robotic manipulator technologies. Innovations stemming from this challenge may improve NASA's capability to explore a variety of destinations in space, as well as enhance the nation's robotic technology for use in industries and applications on Earth.

There are two levels of competition, in which a team's robot must autonomously navigate and retrieve pre-cached samples within a 15-minute (Level 1) or two-hour time limit (Level 2).

This competition will be the second running of this event. At the first event in June 2012, 11 teams registered to compete, narrowing to six as the competition approached. After impoundment of the robots for inspection, one team met the rigorous requirements. The team's robot competed in Level 1, but no prize money was awarded because it failed to collect the required samples in the allotted time. The Centennial Challenges program does not award funds to competitors unless the challenge objectives have been met. This assures that desired results are gained before government funds are paid.

Returning teams include SpacePRIDE of Graniteville, S.C.; Survey of Los Angeles; Wunderkammer of Topanga, Calif.; Intrepid of Lynnwood, Wash.; and the University of Waterloo from Ontario, Canada. New teams entering the competition are Cyberdyne Systems of Pasadena, Calif., Friends of Elpenor of Arlington, Mass.; Embry-Riddle Aeronautical University of Prescott, Ariz.; Fetch of Alexandria, Va.; Middleman of Dunedin, Fla.; Mystic Late Robots of The Woodlands, Texas; Team AERO of Worcester, Mass.; the University of California at Santa Cruz; and KuKuuglur of Estonia.

"Last year, teams were finding their footing and tweaking their designs," said Sam Ortega, program manager of Centennial Challenges, managed out of NASA's Marshall Space Flight Center. "This year, we have several teams that know what they're up against, and they can't wait to get back on the field. We also have a lot of new competitors who have had the opportunity to learn from the 2012 competition, which will make things interesting and challenging.

"Improving this technology will be a huge boon, not just to NASA for things like exploring other worlds, but to countless applications here on Earth," said Ortega.

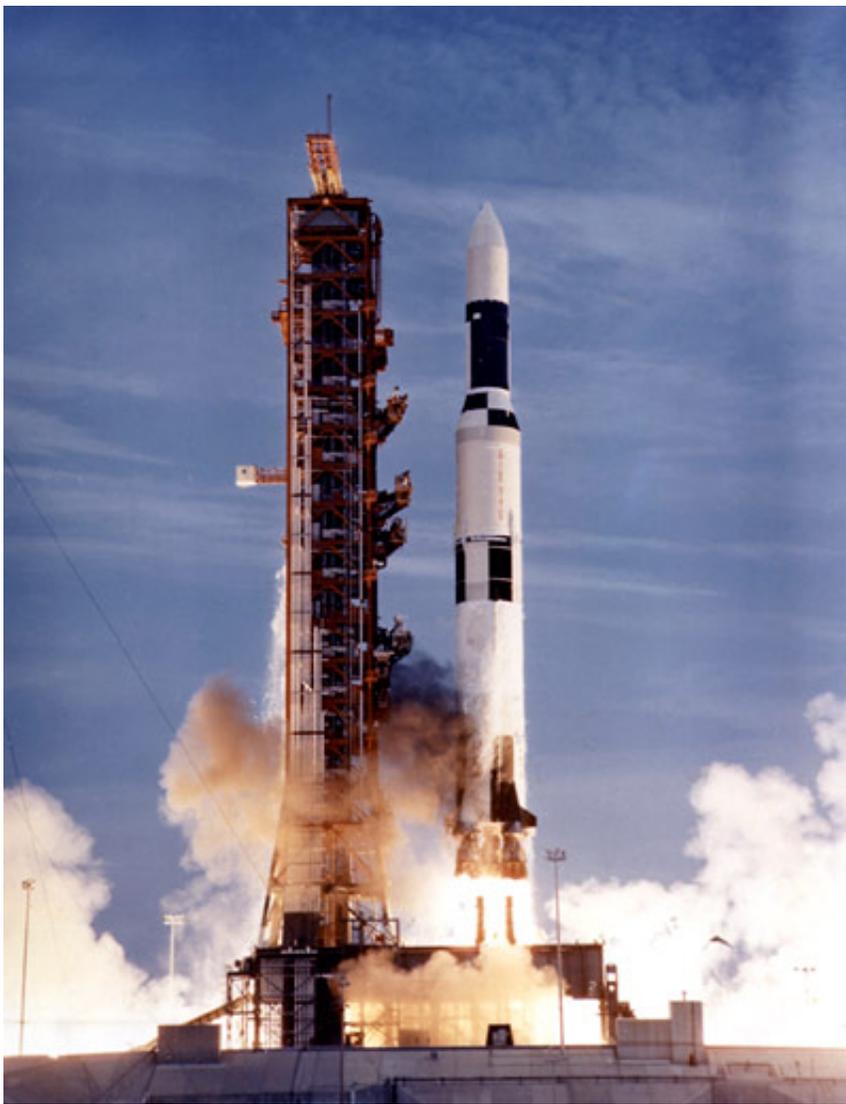
*Sudnik, an Analytical Services Inc. employee, supports the Office of Strategic Analysis & Communications.*

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## **Skylab: An Unprecedented Scientific Adventure**

*By Michael Wright*



Forty years ago on May 14, 1973, the United States launched its first space station into orbit: Skylab. Skylab was the first long-duration American spacecraft dedicated to scientific research. NASA's Marshall Space Flight Center played an important role in designing and building Skylab and in the operation of this unprecedented scientific venture. Skylab's three different three-man crews spent a total of 171 days in low Earth orbit, with each crew setting a new world record for human presence in space. While living aboard Skylab, the crews performed almost 300 experiments in a variety of scientific disciplines.

***Image left: Saturn V launching Skylab 40 years ago on May 14, 1973. (NASA/MSFC)***

Dr. Wernher von Braun came up with the original idea of converting a spent rocket stage into an orbital workshop. As the Apollo lunar program wound down, several rocket stages became available for such a conversion, and von Braun and others matured the concept. In 1973, the Marshall Center provided four Saturn launch vehicles to send Skylab and its three crews to space and supplied many major Skylab components and experiments, including the Apollo Telescope Mount, which was

essentially the first space solar observatory.

Skylab was conceived to fulfill one of this nation's oldest dreams in space: a space station dedicated to research. But shortly after launch, it became one of the agency's most daring challenges. The 11 days after the unmanned Skylab workshop launched was a busy, anxious time at NASA. Almost immediately, communication from Skylab indicated it was in serious trouble. Investigation revealed the meteoroid/sunshield had been ripped off 63 seconds into the flight. Then, it tore off one of the solar array panels and jammed the second, preventing its deployment.

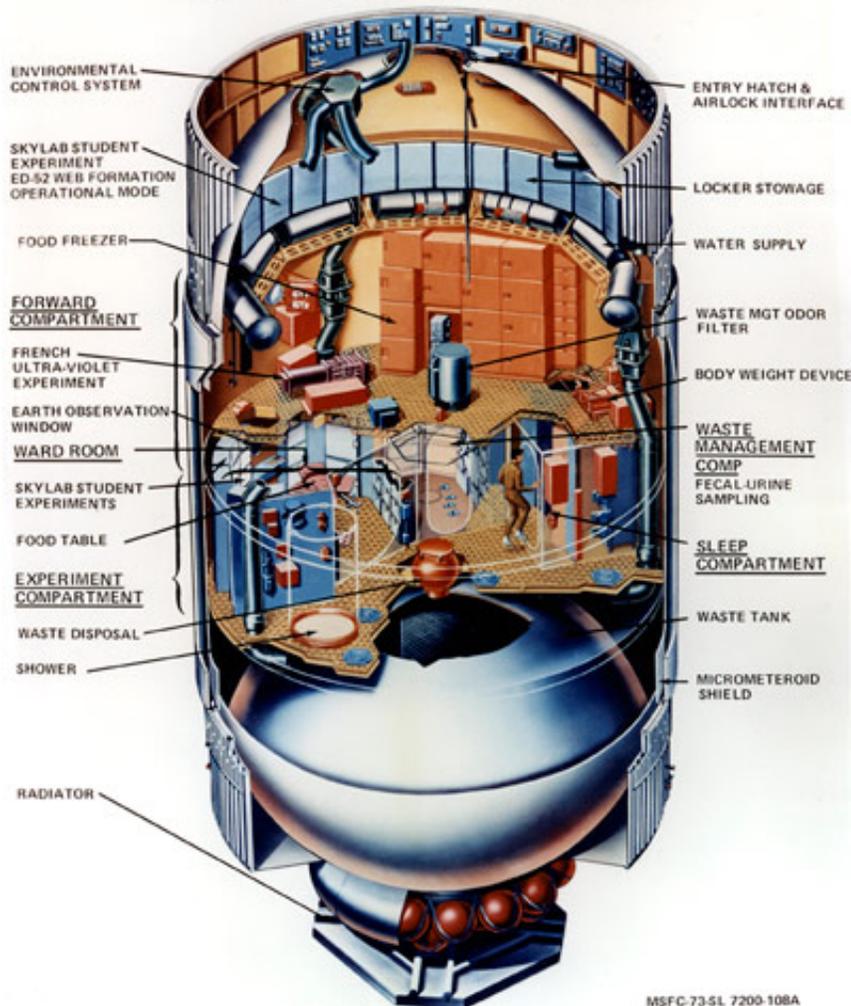
***Image right: Skylab in orbit. (NASA/MSFC)***

Immediately, NASA teams tackled the various aspects of the problem. With no sunshield and no way to generate power for cooling, Skylab quickly became overheated and much too hot for human occupation. At launch, Skylab was loaded with film, food and other perishable

items, so the temperature had to come down before NASA could consider sending crews to the orbital outpost. Engineers at Marshall worked out a plan to reposition the vehicle to bring down the temperature while still maintaining enough electricity to operate the station. Meanwhile, engineers at Marshall and NASA's Johnson Space Center in Houston worked out a plan for repairing Skylab. Astronauts practiced the procedure in Marshall's underwater simulator.



## SKYLAB ORBITAL WORKSHOP



Less than two weeks after a Saturn V delivered Skylab to orbit, the first Skylab crew launched on a Saturn IB on May 25, 1973, and successfully docked to the workshop. Then the first Skylab crew completed one of the most complicated repairs ever attempted in space at the time. Their activities proved humans could work for extended periods in space and conduct repair procedures in orbit.

*Image left: Skylab Orbital Workshop, America's First Space Station. (NASA/MSFC)*

The first crew immediately moved into their new home and began working on the science experiments. One of the main science goals of Skylab was to prove humans could live and work in space for longer missions. Acting as their own guinea pigs, the astronauts monitored one another's physical reactions to microgravity. Knowing just how well humans could tolerate microgravity was essential to planning future exploration missions.

While Skylab no longer orbits the Earth, its legacy is the International Space Station. Before Skylab, much of what we knew about

the long-term human occupation of space was mere theory. After Skylab, we not only knew that humans could live and work in space for long periods, we also knew that humans could conduct repairs and that low Earth orbit provided an excellent place for carrying out science in a variety of disciplines.

*Wright is the Marshall Center historian.*

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### Obituaries

**John Wallace Burns**, 85, of Madison died April 24. He retired from the Marshall Center in 1987 as a communications specialist.

**Richard N. Rodgers**, 82, of Tarrant City died April 28. He is survived by his wife, Erika Bankston Rodgers. He retired from the Marshall Center in 1989 as an aerospace engineer.

Find this article at:

<http://www.nasa.gov/centers/marshall/about/star/index.html>