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Breaking the STEM mold, one woman at a time

By Susan A. Romano, AFTAC Public Affairs

PATRICK AIR FORCE BASE, Fla. – In 1976, esteemed historian and author Laurel Thatcher Ulrich wrote a book entitled, “Well-Behaved Women Seldom Make History.” The premise of her work was to shine a light on famous women throughout history who challenged the way things were done. While the title may seem to be a modern-day rallying cry for women to go out and break the rules through misbehavior, that was not the premise of her message. Ulrich’s emphasis was to encourage women to do more – to break with convention, make a mark on history and prove that ordinary people, including women, can have a lasting impact on the world by doing the unexpected.

Today, women from all walks of life are taking Ulrich’s words to heart and finding ways to break those proverbial molds as they seek out careers in positions traditionally held by men.

Women make up half the current U.S. workforce, but only 26 percent of them are in STEM – science, technology, engineering and math. According to the U.S. Census Bureau, 61 percent of women in STEM are in the social sciences (communication, education, public health, etc.). Only 13 percent of women are in a hard science field such as engineering.

From an Air Force perspective, 64,367 of the nearly 321,000 Airmen currently on active duty are women. Of that 20 percent, even less are in STEM-related fields. Air Force leadership is trying to break that cycle.

In a live session with The Washington Post’s David Ignatius last month, Secretary of the Air Force Heather Wilson discussed new Air Force initiatives aimed at inspiring more women to enter scientific career fields. During the interview, Wilson elaborated on steps the service is taking to recruit more women.

“One of the things we’re trying to do is to encourage more young women to go to engineering school,” said Wilson. “Sometimes the way in which we talk about engineering is not resonating with our daughters, and it is with our sons. We found that if you look at teenagers, more boys are satisfied by solving the problem. They get satisfaction out of fixing something. A disproportionate number of girls want to know why the problem matters. So, if we say, ‘Come be an engineer and you can do cool stuff,’ we’re talking to the boys. If you say, ‘If you want to make a difference in someone’s life; if you want to have clean water or save the life of a family member you love, or make the environment cleaner, or provide energy to the world, be an engineer.’ Then we’re talking to both boys and girls.”



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2-2-2 MOLD

One Air Force entity has made great strides on making Wilson's STEM goals a reality. The Air Force Technical Applications Center, headquartered at Patrick AFB, Fla., is a highly-technical organization made up of scientists, technicians, engineers and analysts whose role is to detect, identify, analyze and report nuclear detonations underground, in the atmosphere, underwater or in space.

It is the sole organization in the Department of Defense charged with this vital international mission.

Despite its vital role to national decision makers, AFTAC's pool of employees leans heavily male. Of its more than 1,000+ members who make up the center's workforce, only 160 are military or civilian females. Even fewer than that are in STEM positions.

One of the ways AFTAC is looking to increase the number of female employees in technically-skilled roles is hosting its annual Women in Science and Engineering Symposium. For the past four years, AFTAC has invited the best speakers from various industries – academia, defense, corporate and commercial – to share best practices on how to recruit, engage, employ and encourage women into hard science career paths.

Rose Day, AFTAC's chief of civilian recruiting, believes the best way to "break the mold" is to expose girls at an early age to the sciences.

"One of the messages I like to relay to students when we travel for recruiting efforts is very simple: I tell the girls, 'You are needed.' Everyone wants to hear those words because it makes them feel like they are a valuable, needed contributor," Day explained. "We have to be advocates, we have to set the example and we have to collaborate. But we can't do this alone. We also have to partner with the men in the room because their advocacy is a critical part to the partnership. That's how we break the mold."

This year, America celebrates the 38th anniversary of the establishment of National Women's Equality Day, on Aug. 26. The commemoration stemmed out of the National Women's History Project as a way to promote and educate the role of women throughout history.

In honor of National Women's Equality Day, here are just a few of AFTAC's "mold-breakers:"



Staff Sgt. Terica G. Clewis

Staff Sgt. Terica Clewis has been assigned to the nuclear treaty monitoring center performing various roles for the past three years. Her current duties include designing innovated software systems that assist center personnel (as well as the rest of the Air Force) efficiently manage, store and process large-scale data.

"My team and I are responsible for exploring ways to apply machine-learning algorithms to the data so analysts can provide more robust information to leadership at a much faster rate," Clewis explained. "I have been able to demonstrate how the development process can foster greater innovation and better teamwork. Collaborating together requires everyone to see the impact of communicating properly with colleagues. It's extremely rewarding."

But the "reward" didn't always come easy to Clewis.

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3-3-3 MOLD

"I'm a single mom, and right after my daughter was born I was in a predominantly-male maintenance squadron. There were times I had to go above and beyond what was typically required just to prove I was part of the team. I volunteered for every repair job and performed all the preventative maintenance tasks to build up my skills and illustrate I was just as good – if not better – than my male coworkers. Because women sometimes have to juggle so many different responsibilities at once, we are great at finding creative ways to perform tasks faster and more efficiently."

Clewis holds a bachelor's degree in business administration and has her sights on earning her master's degree in data science.

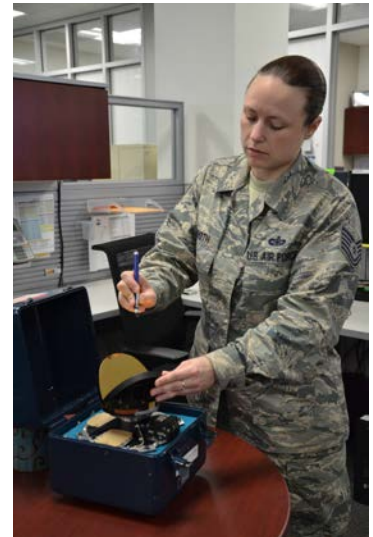
"Ten years from now, I see myself completing my graduate degree, recruiting more women into the 9S100 (scientific applications specialist) career field, mentoring other young female Airmen and preparing for military retirement!"

Tech. Sgt. BreAnne Groth

When AFTAC celebrated National Pi Day on March 14, Tech. Sgt. BreAnne Groth's section was amazed when the NCO picked up a dry-erase marker and began writing out Pi in decimal form from memory. With ease, she surpassed 100 decimal points and stopped only because she ran out of room on the white board and had to get back to work.

Math and science have always been a passion of hers, and she definitely applies her knowledge in her everyday responsibilities at AFTAC. As the center's satellite technique alert officer, she is a qualified national expert in analyzing and reporting global nuclear detonations to national decision makers in accordance with ratified nuclear treaties. She is also responsible for monitoring state-of-the-art health and configuration control of more than 200 sensors on 38 orbiting space vehicles.

"This means I'm not only concerned with ensuring and optimizing current sensor performance; I also advise the treaty monitoring community of future constellations and make recommendations for sensors that will be used well after I retire from the Air Force," Groth said.



During the seven years she's been assigned to AFTAC, Groth progressed through different positions: satellite data analyst, radiation measurements technician, space operations system analyst, and now noncommissioned officer in charge of U.S. Nuclear Detonation Detection System (USNDS) operations. She possesses two academic degrees, an associates degree in scientific analysis technology and a bachelor's degree in applied mathematics. Her goal is to be selected to attend the Air Force Institute of Technology to earn a master's degree in space systems.

"My parents taught me when I was younger to 'do what you love,' and that has never steered me wrong," said Groth. "Any career field may seem like a challenge, but the secret is to embrace and learn from the differences. STEM has so many different kinds of people, including really smart women, but the one thing we all have in common is our passion for science!"

Senior Master Sgt. Tonya L. Cobarruviaz

When Senior Master Sgt. Tonya L. Cobarruviaz enlisted in the Air Force more than 16 years ago, little did she know she would spend 14 of those 16 years with the same organization. It is a testament to her knowledge, skill and expertise that she remains one of the stalwart senior NCOs assigned to the center.

4-4-4 MOLD



She arrived at AFTAC when she was a tender 20 years old, and over the years she has worked at AFTAC's headquarters at Patrick AFB as well as at several of AFTAC's overseas and stateside detachments.

As the superintendent for the experts who conduct advanced analysis on data received from geophysical and atmosphere and space mission sets, she is tasked with ensuring members of the 23rd Analysis Squadron have the resources they need to get the mission done. She also goes to great lengths to remove any barriers that may stand in their way to achieve the mission.

"I like helping people," she said. "I feel very rewarded when there is something I can do that makes someone else's job or life better, even slightly. It takes a lot of effort to affect change in a large organization like ours, and the few times I've been able to do that were some of the best work moments I've ever experienced."

Cobarruviaz, who holds a dual-major bachelor's degree in interdisciplinary studies and business management, and a master's degree in strategic intelligence, prides herself not only on what she's accomplished academically, but also what she's achieved physically.

"As one of the few women in an organization dominated by men, I have always pushed myself to be at least as good as the average male when it comes to physical fitness," she said. "Male and female Airmen have different requirements for push-ups, run times, sit-ups and body measurements, but I typically use the men's standards to push myself to be better. The older I get, the harder it is, but I still try. I think being mentally fit is equally important as being physically fit."

Capt. Pamela Zhang

Capt. Pamela Zhang joined the AFTAC team in 2016 as a chemist. She's parlayed the education she received at the U.S. Air Force Academy into an important leadership position within AFTAC's 709th Surveillance and Analysis Group. She credits her continued success to a solid upbringing.

"My family was instrumental in creating a foundation where I felt encouraged to pursue science, and hard work made anything attainable," Zhang stated. "I went to summer science camps and participated in a lot of extra-curricular STEM activities while I was growing up, so I think doing all those activities when I was young showed me how to have thick skin and to be OK with being different, especially since most of the camps were made up of boys. I remember one summer some younger boys were teasing me, and I was so infuriated with them for being so immature and unfair. But my parents made me return and taught me to never back down from any problem I faced. From that, I learned to ask a lot of questions of my teachers, instructors and counselors, and I think that had a lot to do with where I am today."



Zhang, who also has a master's degree in chemistry from the University of Illinois-Urbana Champaign, is pursuing a second graduate degree in international relations and contemporary war.

**5-5-5
MOLD**

“Being well-rounded is an important part of education and being an officer,” she explained. “As much as I enjoy STEM and studying it, if we as STEM professionals fail to understand the greater global environment and how STEM is used by other nations, our work can lack impact and be used in unanticipated ways. I may regret leaving the safety of the STEM field, at least academically, but I’m excited to begin studying a new and foreign subject.”

Diana C. Velosa

An ever-present participant when AFTAC showcases its mission on the road, Diana Velosa enjoys reaching out to America’s youth to encourage them to pursue careers in STEM. For the past several years, members of the treaty monitoring center have conducted STEM outreach at numerous venues – science bowls, robotics competitions, science fair judging, school mentoring and summer science camps.

Her field of expertise is chemistry, and she puts her degree to good use in the Air Force’s only one of its kind capabilities, the Ciambrone Radiochemistry Laboratory.

“I’ve had the pleasure of being a part of the AFTAC family since 2014,” Velosa said. “I assist with separation, purification and analytical chemical techniques, as well as work with spectroscopy instrumentation and alpha, beta and gamma measurement equipment. I am very proud of our mission and what we are able to accomplish on a daily basis, especially when I know I am contributing to the safety of our country and that of our allies.”

When asked what it has been like as a woman to work in a predominantly male field of study, Velosa said, “I think our society has come a long way in accepting women as a vital part of the workforce, and we contribute just as much as our male counterparts. However, it is sometimes a lot more challenging for us to be a good mother, wife and scientist all at the same time. I’ve been very lucky, though – I’ve had many very supportive supervisors who put themselves in the shoes of us modern-day women, and they understand how much we have to balance.”

She added, “Being a Hispanic female scientist whose first language is not English, I’ve faced a lot of challenges. But if I could give my young self a piece of advice, I would say this: don’t worry about fitting into anybody else’s mold of what career a girl should pursue. Explore your interests and seek out internships to discover your passion. Then go for it!”

Parveen S. Kapoor

One of only four women in her squadron, Parveen Kapoor is the chief of the Atmosphere and Space Operations Flight within the 23rd Analysis Squadron at AFTAC. She leads a flight comprised of military and civilian scientists, mathematicians, engineers and technicians responsible for the operation and maintenance of the USNDS.

As a 34-year career civil servant, Kapoor served in a multitude of STEM roles for the Air Force, with 16 of those years at AFTAC. With a bachelor’s degree in applied mathematics and a minor in physics, coupled with her master’s degree in applied statistics, Kapoor’s broad educational background has proven instrumental to AFTAC’s success and mission accomplishment.



6-6-6
MOLD

“As a young child, I struggled quite a bit in math,” Kapoor said. “In fact, my first grade teacher told my parents I would never be able to do math successfully. Even up to about 8th grade, I remember not understanding mathematical principles very well. It wasn’t until about my sophomore year in high school that I had a great algebra teacher who explained things in a very basic, easy-to-understand manner. All of a sudden, things began to click and my grades drastically improved. That was definitely a turning point in my early STEM education.”

Kapoor knows first-hand how important the right teacher is to a struggling student. So much so that she tutors high school and college students in her spare time.

“In order for us as a nation to be a technical superpower, we need to groom talent in STEM and it starts in the schools” she explained. “Recently, there has been a major emphasis placed in this area for young girls, and while I’m completely on board with that, I believe there needs to be encouragement across the board for both boys and girls in STEM.”