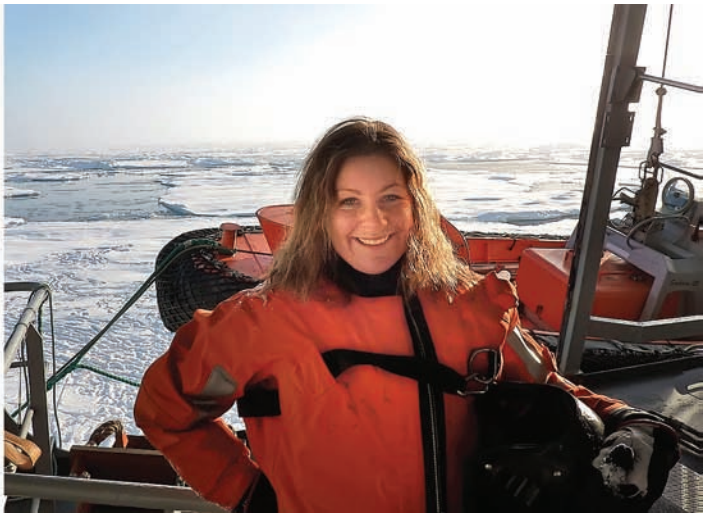
WOMEN IN ACOUSTICS: YESTERDAY AND TODAY

Marcia J. Isakson
Applied Research Laboratories, University of Texas at Austin
Austin, Texas 78758



Women have been a part of the Acoustical Society of America (ASA) from its inception. Of the 450 charter members of the society in 1929, at least one, Dr. M. Katherine Frehafer, was female. Dr. Frehafer received her Ph.D. in physics from Johns Hopkins University in 1919 at a time when few women were pursuing natural science degrees. She was primarily interested in spectroscopy and was the second doctorate level female at the National Bureau of Standards (now the National Institute of Standards and Technology, NIST). Dr. Frehafer was a professor of physics at Goucher College from 1925-1952.

"In mechanical engineering, a field that includes many acousticians, women comprise a mere 6.7% of the workforce."

Women became more involved in the society as the number of women in science and engineering grew. However, even by 1973, the first year statistics were calculated, women comprised a mere 4% of the society membership. One of the pioneers for women in acoustics was Dr. Katherine Harris. Joining the society in 1954, Dr. Harris became the first female recipient of the Gold Medal, the highest honor that the society bestows. Dr. Harris not only pioneered electromyography (EMG) to study the dynamics of motor control in speech production, she also mentored many students in her roles in academia and research. Dr. Harris provided an invaluable role model for the special challenges of female researchers.

Today there are nearly 1200 female members of the society making strides in all areas. One of these researchers is Dr. Lily Wang from the Architectural Engineering Program at the University of Nebraska-Lincoln. Attracted to acoustics through a love of music, Dr. Wang initially entered the field with a desire to design concert halls. She now studies the effect of noise on performance and perception in the workplace. Dr. Wang and her team discovered that noises that were perceived to be rumbly generally produced lower performance on typing and math/reasoning tasks. She and her student, Lauren Ronsse, have recently begun to apply these results to the classroom. They have found that higher background noise levels in classrooms are correlated to lower elementary school student achievement scores on reading comprehension tests.

Women are involved in all scales of acoustic research from the mechanics of the tiny inner ear to propagation in the largest oceans. One of the largest scale acoustics tests to date was conducted in part by researcher, Dr. Lora Van Ufflen. In this test, designed to study acoustic tomography in the ocean, the source and receiver were as much as 640 km apart. Although Dr. Van Ufflen has only recently completed her Ph.D., she has already taken part in 17 sea cruises from the Arctic to the Southern Ocean. Her main interest is shadow zone arrivals, mysterious arrivals first observed on ocean bottom receivers. Through careful modeling using the parabolic equation method, Lora demonstrated that scattering from internal waves accounted for the vertical extent and magnitude of these arrivals even at ranges of 500 to 1000 km. Dr. Van Ufflen has just accepted a research position at the University of Hawaii where she plans to continue her work on long range propagation.

Although women have made major strides in the Society from one charter member in 1929 to the almost 1200 women participating today, there is more work to be done. As of 2008, men hold 73% of jobs in science, technology, engineering and mathematics (STEM) according to the AAUW (for-

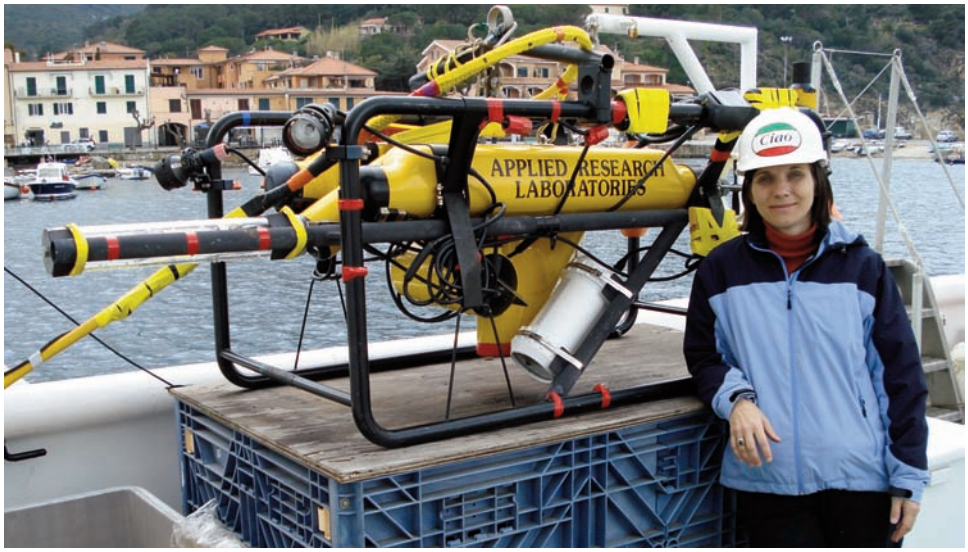
merly the American Association of University Women). In mechanical engineering, a field that includes many acousticians, women comprise a mere 6.7% of the workforce. In the ASA, only 16% of the membership is female. As the number of U.S. students studying STEM fields decreases, the female population remains a huge untapped resource. Young women have substantially higher grade point averages in science and mathematics in high school. (GPAs 2.76 for women vs. 2.56 for men in 2005 according to U.S. Department of Education, National Center for Education Statistics) Yet, a much smaller percentage of young women pursue STEM careers in college (29% for men vs. 15% for women in 2006 according to the National Science Foundation). The reason for the disparity in higher education has been linked to self confidence issues regarding math and science ability beginning in middle school. [F. Pajares, "Self-efficacy beliefs and mathematical problem-solving of gifted students," Contemporary Educational Psychology, 21(4), 325–344 (1996).]

The ASA's Women in Acoustics Committee has begun a program to address the self confidence issues of middle and high school girls. One of the key initiatives of the program is to provide positive role models in scientific careers. The first step occurred at the recent ASA meeting in Baltimore. Middle and high school girl scouts from the local area were invited to participate in a demonstration session at the meeting. Over twenty hands-on acoustic experiments, mostly presented by female members of the society, were available. A contingent of female midshipmen from the nearby Naval Academy presented an additional five exciting hands-on demonstrations. Drs. Kathleen Wage and Lora Van Ufflen presented a live broadcast from their Philippine sea test and a question and answer session with the girls was conducted via the internet. The Women in Acoustics Committee now plans to conduct a similar session at every domestic meeting of the society.

As the number of jobs in science and technology grows, it is apparent that talent must be tapped from the entire population. The Acoustical Society of America is committed to encouraging women in math and science by continued sponsorship of the Women in Acoustics Committee to help address the unique challenges of women researchers today and the new Girl Scout program for the next generation.

For more information on women in STEM careers, see the AAUW publication "Why so Few?: Women in Science, Technology, Engineering and Mathematics."

Thanks to Elaine Moran and Fredericka Bell-Berti for their help in researching this article.AT



Marcia Isakson received a B.S. with a double major in engineering physics and mathematics in 1992 from the United States Military Academy at West Point, New York. Upon graduation, she was awarded the Hertz Foundation Fellowship for the study of atomic and molecular physics. She earned her M.A. in atomic and molecular physics from The University of Texas at Austin in 1994. From 1994 to 1997, Isakson served as an officer in the United States Army at Fort Hood, Texas and in 1997, Captain Isakson was honorably discharged. In 2001, she began work on acoustics at Applied Research Laboratories at the University of Texas at Austin where she earned a Ph.D. in 2002. Her research interests include finite element propagation modeling in shallow water waveguides, and acoustic reflection from ocean sediments. Marcia lives in Austin, TX, with her husband, Ike, two beautiful children, Grace and Nicholas, and three dogs.