

Women Radio Science Contributions: A Special Greeting to Pat Doherty

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and Rosa Scapatucci^{ID}

Despite a thousand actions put in place to reestablish a proper gender balance in the science, technology, engineering, and mathematics disciplines, still, women working in those fields are fewer than men, and often, their studies are not adequately acknowledged. Fortunately, in the last decades, this trend seems to be changing, and this is surely also related to the contribution of brilliant women like Prof. Patricia Doherty, who dedicated many efforts in her life to encourage young women to pursue a career in science. Based on these considerations, Prof. Patricia Doherty was invited as a speaker at the special session “Women Radio Science Contributions” that we organized at the 3rd URSI Atlantic/Asia-Pacific Radio Science Meeting (AT-AP-RASC) 2022. In this column, we will report on Patricia’s contribution to the special session and to her scientific field in general, not neglecting her huge personal skills, as witnessed by people she met during her life and career.

The presence of women in science can be traced back to the origins of the history of science, wherein they have made significant contributions. Despite this, women working in scientific fields are fewer than men, and often, their studies are not adequately

EDITOR’S NOTE

This month’s “Women in Engineering” column is dedicated to Prof. Patricia Doherty, director and senior research scientist at Boston College’s Institute for Scientific Research (ISR), who died on 14 July 2022. Prof. Doherty was an internationally recognized leader in space weather and global navigation systems, and she is here remembered by colleagues and friends from her career. She promoted and supported the presence of women in the radio science world, and she was and will be an inspiring personality for young women to pursue a career in science.



Francesca Vipiana

acknowledged [1]. However, something is changing, and more and more women are receiving a proper recognition for their contributions to science. This is due to brilliant women who have been able to inspire and encourage young women to pursue a career in science. By starting from these considerations, we organized a special session titled “Women Radio Science Contributions” at the third URSI AT-AP-RASC 2022. The URSI AT-RASC and AP-RASC conferences are two among the URSI flagship conferences besides the URSI General Assembly and Scientific Symposium. Each one takes place every three years to review current research trends; present new discoveries; and make plans for future research and special projects in all areas of radio science (for more details, visit <https://www.ursi.org/homepage.php>). Since the COVID-19 pandemic situation, these two conferences took

place simultaneously in Gran Canaria, Spain, in a hybrid format.

The session “Women Radio Science Contributions” was aimed at highlighting the contributions of women in the field of radio science. Basically, it shared the same aim as the session described in [2], but it enlarges the audience to all women working in radio science.

For the invited talk, we decided to contact Prof. Patricia Doherty, director and senior research scientist at Boston College’s Institute for Scientific Research (ISR). She was an internationally recognized leader in space weather and its impact on global navigation systems. Her talk dealt with her research activity on the effects of space weather on satellite-based technology and also her experience as a woman in radio science. She said:

I didn’t plan my career. I studied science because I enjoyed it. My job is not a job because I really

enjoy it! I also had great mentors. For young women, having mentors is really important. And this is one of the reasons why WIRS [Women in Radio Science] tries to help and mentor young women in all the steps of their careers. Some years ago, when I attended an international symposium, I went to the conference room, and there were exactly two women besides me. We became good friends, and we supported each other in all these years up to now. [...] In my opinion, key ingredients for women in radio science are hard work and good mentors.

We were so impressed by her talk and personality that we decided to focus this “Women in Engineering” column on her. At the end of the session, we informed Patricia of our idea. She looked enthusiastic about this possibility, and she agreed to send us some notes on her experience as a researcher and woman in radio science. Unfortunately, Patricia Doherty died about a month after. She left a huge void in the research community and, particularly, in the women scientists whom she represented and inspired in a so brilliant way.

Patricia Doherty earned a bachelor's degree from the University of Massachusetts-Amherst and an M.B.A. degree from Boston College. After she finished her studies, science was not the first place where she found her dimension, but she worked as a statistician for the insurance industry and, later, for the U.S. Internal Revenue Service. It was during a period of pause from the workforce to dedicate herself to her children and family that she understood that something was still missing in her professional satisfaction [3]. So, after eight years far from the office, luck would have it that she joined a research group at Emmanuel College, where she first came in touch with Earth's ionosphere and radio propagation studies. From that moment, her career took off as she came in touch with leaders in radio science, who soon recognized her merits and capabilities. After a couple of years, she moved to the ISR at Boston College, where she made a long and successful career, until arriving to be

the director of the ISR in 2008 (and she was still the ISR director at the time of her death).

Her interests focused on the ionosphere, space weather, and the GPS, and she contributed to more than 100 peer-reviewed scholarly journal and conference articles. Specific research initiatives during her career included radio wave propagation, focusing on ionospheric effects in satellite-based navigation, including satellite-based augmentation systems and the U.S. Federal Aviation Administration's Wide Area Augmentation System. Prof. Patricia Doherty also received numerous awards for her scientific research and her outreach activities, including the 2018 AGU Carrington Education and Outreach Award, and was a fellow of the Institute of Navigation and of the African Geospace Society.

One of the highlights of her career was the expansion of science education and research in developing countries [3]. This aspect was confirmed by Dr. Rezy Pradipta, a young research scientist who had the honor of working closely with Patricia at the Boston College ISR since 2012:

Other important things that I learned from Pat are the integration between science, technology, and policy as well as the importance of bringing space researchers from developing parts of the world up to speed in terms of capacity building. These were reflected in the global navigation satellite system (GNSS) and space weather training workshops that she routinely helped organize over the years.

Prof. Sembiam R. Rengarajan, immediate past chair of the U.S. National Committee (USNC)-URSI, remembered a story on how Patricia became the vice-chair of URSI during the period 2017–2021:

When I was the chair of the USNC-URSI, the USNC-URSI committee decided to nominate a candidate for the position of URSI president (Piergiorgio L. E. Uslenghi) and not nominate anyone for vice president. It was felt that we

had a strong candidate for president, and we didn't want to jeopardize his chance of winning by nominating a candidate for vice president. Later, Pat Doherty was nominated by the Polish national committee for vice president with the support of some other countries. We were overjoyed when both George Uslenghi and Pat Doherty were elected for the positions of URSI president and vice president, respectively, at URSI GASS, Rome, in August 2021. It was the first time that two members of the same national committee were elected to the URSI Board and the second time in the history of URSI that a woman was elected as the vice president of URSI in its 100-year history!

He also says:

During the AT-AP-RASC in Gran Canaria in May/June 2022, I learned that some national committees encouraged Pat to run for URSI president during the next triennium. I told her that the USNC-URSI will be delighted to support her candidacy and that I would bring up this at the USNC-URSI Executive Committee. [It was not possible to pursue this project, unfortunately...]

Beyond her success in space research, Prof. Doherty is an example for all women who try to combine family and work. She indeed was married and had two children and three grandchildren [3]. Being a mother and grandmother, promoting and supporting women in this delicate balance were her priorities. For instance, during the last AT-AP-RASC 2022 – URSI in Gran Canaria, she organized a lunch meeting, which some of us had the pleasure to attend, thus admiring the passion and enthusiasm of Prof. Doherty. Her idea was that of discussing possible strategies to promote and support the presence of women in the radio science world.

In this respect, Reyhan remembers:

I first heard of her when she became vice chair of URSI. [...] Within a few months of her confirmation, Pat reached out to me for

some information on WIRS. [...] Following that interaction, in my capacity as the inaugural USNC WIRS chair, I invited Prof. Doherty to our business meeting, which was held virtually through Zoom. Despite the time difference in Boston, she stayed with us and provided many helpful tips. We were all charmed by her wonderful, easygoing, and extremely modest personality. We were so honored to include her as our member. The biggest impression

and impact Prof. Doherty left on me is her modesty. When I sent an official invitation for her to be a plenary speaker at the USNC-URSI winter meeting, she asked me if I thought she was qualified or good enough. [...] I greatly admired her modesty, her openness with her concerns, and her sharing of this common experience that most of us have — “Am I good enough?”

Probably, all of us have this doubt from time to time, but it is people like

Prof. Doherty who constantly remind us that we are not alone, and all we need is to keep on working; improving ourselves; presenting our work and thoughts; and staying brave for challenges to come.

Another colleague who shares with us her experience with Prof. Doherty is Dr. Giorgiana De Franceschi, now the chair of Commission G. She told us:

Pat was a very pleasant and nice person [...] and was able to successfully carry out her many tasks (including family ones) because, in my opinion, she had a remarkable organizational capacity as well as a very bright mind. In 2016, she contacted me as she wanted to propose me as the vice chair of the G Commission. [...] Finally, I was elected during the GASS2017 in Montreal. So, from 2017 to 2021, I followed her (she was the chair), and I learned a lot about the organization of the commission. Since 2021, I have been following her example, I must say successfully as the G Commission is still one of the commissions with the highest number of sessions and submissions. It was terrifying to learn of her death after so short a time from AT-AP-RASC 2022. During this event, we took a nice group photo [...] [See Figure 1.] All the colleagues you see in the photo are her enthusiastic friends and colleagues. Indeed, during the next GASS2023, within WIRS, there will be a special session dedicated to her.

Another nice group photo taken during the Get-Together-Drink at the third URSI AT-AP-RASC 2022 is shown in Figure 2.

We wish to conclude the article by using Prof. Doherty’s advice for young women entering the research world (or also whatever kind of work) [3]:

[...] to have confidence in yourself to do what you may think is not possible; to not be afraid to make a mistake (everyone makes mistakes); to respect your colleagues



FIGURE 1. A nice group photo taken during the G commission work at the third URSI AT-AP-RASC 2022. Prof. Doherty is in the second standing row, the fourth from the right. (Source: Photo courtesy of Dr. Giorgiana de Franceschi.)



FIGURE 2. Another nice group photo taken during the Get-Together-Drink at the third URSI AT-AP-RASC 2022. Prof. Doherty is the second from the left. (Source: Photo courtesy of Prof. John Volakis.)

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(even when they make mistakes); to reach out to other women (and men) for friendship and to provide reassurance and encouragement they may need to succeed; and, finally, to be patient, flexible and understanding when it comes to balancing work and family for yourself and for your colleagues and staff. You really can have it all!

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