

Guest Editorial

Foreword to the Special Issue on the 9th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications (MicroRad '06)

THE 9th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications (MicroRad '06) was held from February 28 to March 3, 2006, in San Juan, Puerto Rico, a Commonwealth of the USA. The conference was chaired by Dr. Steven Reising of Colorado State University, Fort Collins, and the local organizing chair was Dr. Sandra Cruz-Pol of the University of Puerto Rico at Mayagüez. The objective of MicroRad '06 was to provide an open forum to report and discuss recent advances in the field of microwave radiometry and to gather all parties, including the research, industrial, and academic communities, who are involved in projects and studies in microwave radiometry of the land, oceans, and atmosphere. The meeting was highly successful, with 125 participants from 15 countries, 146 submitted abstracts, 80 oral presentations, and 50 interactive posters during four full days of sessions.

MicroRad '06 is the most recent in a series of meetings focusing on Microwave Radiometry and Remote Sensing of the Environment, dating back to 1983 when the first MicroRad meeting was organized and hosted by the late Prof. Giovanni d'Auria of the University "La Sapienza" of Rome, Italy. An In Memoriam article for Prof. d'Auria appeared on p. 8 of the *IEEE GRSS Newsletter*, Issue #142, March 2007. The second MicroRad meeting was held in Florence, Italy, organized and chaired by Dr. Paolo Pampaloni at Istituto di Ricerca sulle Onde Elettromagnetiche, Consiglio Nazionale delle Ricerche. Since then, MicroRad meetings have been held approximately every 2 1/2 years, alternating between the USA and Italy. Previous MicroRad meetings in the USA were held in Boulder, CO (1992 and 2001), and in Boston, MA (1996). The MicroRad meetings in Italy were convened in Rome at "La Sapienza" (1983 and 2004) and at "Tor Vergata" (1994), as well as in Florence (1988 and 1999).

The technical program of MicroRad '06 opened with a session on microwave radiometer calibration, featuring presentations on current and planned radiometer systems by representatives of government agencies, industry, and universities. The focus on sensors continued with a session devoted to instru-

mentation and advanced techniques and one on radiofrequency interference (RFI) mitigation. The first day concluded with a session on experimental campaigns, which included airborne and ground-based measurements as well as calibration and validation of spaceborne sensors. The second day shifted to consideration of science application areas, which began with a session on soil moisture and salinity satellite missions at L-band. This was followed by sessions focusing on ocean wind, sea ice, electromagnetic modeling of the sea surface, and snow cover. The morning of the third day focused on land surfaces with sessions on snow cover, soil moisture, vegetation, and electromagnetic modeling of microwave emission from the land and the cryosphere.

On the afternoon of the third day, the emphasis shifted to weather and the atmosphere, starting with two sessions on retrieval methodologies and radiance assimilation. These included four presentations from government laboratories on both sides of the Atlantic to highlight rapid advances in numerical weather prediction and direct applications of satellite radiances. Finally, the fourth and final day of MicroRad '06 focused on atmospheric remote sensing, which emphasized temperature and humidity in the morning and clouds and precipitation in the afternoon, including many presentations on ground-based techniques and sensor design.

At the conclusion of each of the 16 oral sessions of MicroRad '06, the co-chairs introduced the poster papers on the topic of the session. The long coffee breaks each morning and afternoon provided plenty of time for discussion with poster presenters, which gave the conference the distinctive academic flavor typical of MicroRad meetings.

The conference proceedings was published along with selected conference presentations (if the authors approved) on CD-ROM and distributed to the MicroRad '06 participants after the meeting. Additional copies are available from the conference chair on request. The MicroRad '06 Proceedings papers are available online from IEEE Xplore at <http://www.ieee.org/ieeexplore>.

From the full papers submitted on the topics of MicroRad, 38 papers were accepted for inclusion in this TGRS Special Issue. These papers are organized into topical areas and applications, which are in the general order of the MicroRad technical sessions: Radiometer Calibration and RFI Mitigation (4), Synthetic Aperture Radiometry (3), Land and Vegetation (6), Ocean Salinity (5), Ocean Wind (4), Atmosphere (3), Temperature and

Humidity Sounding (8), and Precipitation (5). As is evident from this list and from the table of contents, the published papers, which were rigorously peer-reviewed, span a broad range of microwave radiometry and remote sensing applications and reflect the topics and discussions at the MicroRad '06 meeting.

MicroRad '06 was held at the Condado Plaza Hotel on San Juan's beautiful Condado Beach, which is just a 5-min drive to the historical Old San Juan and within walking distance of a wide variety of restaurants. A number of participants also had the opportunity to visit the world's largest single-dish radio telescope at Arecibo Observatory, which is a uniquely valuable scientific treasure located in Puerto Rico. The observatory is part of the National Astronomy and Ionosphere Center operated by Cornell University under a cooperative agreement with the National Science Foundation.

The MicroRad '06 banquet was held at Casa Bacardi, where Bacardi rum is produced and shipped worldwide, which is only a 30-min bus ride from the conference venue. The 86 banquet attendees were treated to a tour of Bacardi's history back to 1863, given insights into the rum-manufacturing process, and allowed to sample the aromas. After their appetite was whetted, Bacardi provided a one-hour open-bar reception, which was followed by a catered plated dinner with wine and dessert. The evening ended with comments from Dr. Leung Tsang, current President of the GRSS, and with anecdotes and recollections from some of the Chairs of previous MicroRad meetings, including Dr. Ed Westwater, Dr. Calvin Swift, Dr. Frank Marzano, and Dr. Nazzareno Pierdicca. The meeting concluded with the announcement that the next MicroRad Specialist Meeting will be held in Florence, Italy, on March 11–14, 2008, and will be organized by Dr. Simonetta Paloscia and Dr. Giovanni Macelloni of the Istituto di Fisica Applicata—"Nello Carrara"—CNR. Further information on MicroRad '08 is available online at <http://www.microrad2008.org>

MicroRad '06 was organized by Colorado State University and expertly managed by Ms. Tammy Stein of Meeting and Conference Coordinators, Klein, TX. Many people and institutions contributed to the success of the MicroRad '06 conference. The meeting chair, Dr. Steven C. Reising, acknowledges the outstanding contributions of the Scientific and Steering Committee, which consists of Dr. Giovanni d'Auria (deceased), Dr. A. J. Gasiewski, Dr. Martti T. Hallikainen, Dr. Roger Lang, Dr. Frank S. Marzano, Dr. Eni G. Njoku, Dr. Simonetta Paloscia, Dr. Paolo Pampaloni, Dr. Nazzareno Pierdicca, Dr. Domenico Solimini, Dr. Calvin T. Swift, Dr. J. Vivekanandan, and Dr. Ed R. Westwater. The local organizing team, which consists of Dr. Sandra Cruz-Pol, Dr. Jose Colom Ustariz, and Dr. Mario Ierkic, introduced the

conference attendees to the unique culture of the island and the many attractions for visitors to Puerto Rico. In addition, a number of MicroRad attendees generously volunteered as abstract reviewers and session co-chairs at the meeting. Many anonymous reviewers for this Special Issue were extremely helpful in reviewing papers, with a number of multiple reviews, and in adhering to the strict deadlines of this special issue. The meeting organizers thank Dr. Eni G. Njoku of CalTech/National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory, Dr. J. Vivekanandan of the National Center for Atmospheric Research (NCAR), and Dr. Fuzhong Weng of the National Oceanic & Atmospheric Administration (NOAA)/National Environmental Satellite, Data, and Information Service (NESDIS) for engaging the financial sponsorship of their respective organizations. A final acknowledgment is addressed to the following sponsors of MicroRad '06, without whom the meeting would not have been possible: the IEEE Geoscience and Remote Sensing Society, NASA, NOAA, NCAR, the International Union of Radio Science (URSI), the University of Puerto Rico at Mayagüez, and Colorado State University.

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Steven C. Reising (S'88–M'98–SM'04) received the B.S.E.E. (*magna cum laude*) and M.S.E.E. degrees in electrical engineering from the Washington University, St. Louis, MO, and the Ph.D. degree from Stanford University, Stanford, CA, in 1998, where he was advised by Prof. Umran S. Inan and supported by a NASA Earth Systems Science Fellowship.

At Stanford University, his research focused on low-frequency remote sensing of lightning and its energetic coupling to the ionosphere, which produces chemical changes and transient optical emissions. From 1998 to 2004, he was an Assistant Professor in electrical and computer engineering at the University of Massachusetts, Amherst. During the summers of 1999, 2000, and 2003, he was a Summer Faculty Fellow in the Remote Sensing Division of the Naval Research Laboratory, Washington, DC. In September 2004, he became an Associate Professor in electrical and computer engineering at Colorado State University, Fort Collins. His research interests include passive microwave and millimeter-wave remote sensing of the oceans, atmosphere, and land, which include microwave radiometer systems and lidar systems for sensing of temperature

and winds in the middle and upper atmosphere.

Dr. Reising serves as an Associate Editor of the IEEE GEOSCIENCE AND REMOTE SENSING LETTERS (2004 to present) and as a Guest Editor of the Special Issue on Microwave Radiometry and Remote Sensing Applications of the IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING (TGARS), July 2007. He is an Elected Member of the IEEE Geoscience and Remote Sensing Society's (GRSS) Administrative Committee (2003–2008), where he is currently the Membership Chair. He served as the Editor of the *IEEE GRSS Newsletter* from April 2000 to March 2003. He was the Chair of the Springfield, MA, Joint Chapter of the IEEE Antennas and Propagation Society, Geoscience and Remote Sensing Society, Electron Devices Society, Microwave Theory and Techniques Society, and Lasers and Electro-Optics Society (1999–2004) and has been a Member of the Technical Program Committee of every IGARSS from 2001 to present. He is also a member of the American Meteorological Society, the American Geophysical Union, Tau Beta Pi, and Eta Kappa Nu. He has served as a reviewer for *Radio Science*, *Geophysical Research Letters*, and *Journal of Oceanography*. He chaired the 9th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications, MicroRad '06, which was held from February 28 to March 3, 2006, in San Juan, Puerto Rico. He chairs the annual United States National Committee (USNC)/International Union of Radio Science (URSI) Student Paper Competition in Boulder, CO (2004 to present). He is a Member of URSI Commissions F, G, and H and is the Secretary of USNC Commission F (2006–2008). He has served as a reviewer for the IEEE GEOSCIENCE AND REMOTE SENSING LETTERS and TGARS. He received the National Science Foundation CAREER Award (2003–2008) and the Office of Naval Research Young Investigator Program Award (2000–2003). He also received the Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award in 2004, the Lilly Teaching Fellowship for 2001–2002, and the Young Scientist Award at the URSI General Assembly in Toronto, Canada, in 1999. While at Stanford University, he received the First Place in the USNC/URSI Student Paper Competition at the 1998 National Radio Science Meeting in Boulder.

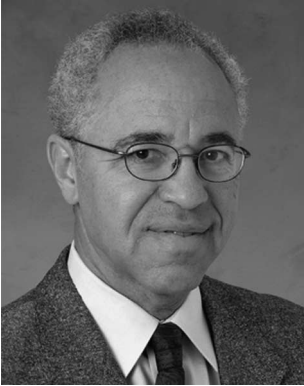


Frank Silvio Marzano (S'89–M'99–SM'03) received the Laurea degree (*cum laude*) in electrical engineering and the Ph.D. degree in applied electromagnetics from University of Rome "La Sapienza," Rome, Italy, in 1988 and 1993, respectively.

In 1993, he collaborated with the Institute of Atmospheric Physics, National Research Council, Rome. From 1994 to 1996, he was with the Italian Space Agency, Rome, as a Postdoctorate Researcher. After being a Lecturer at the University of Perugia, Italy, in 1997, he was with the Department of Electrical Engineering and cofounded the Centre of Excellence on Atmospheric Modelling and Remote Sensing, University of L'Aquila, L'Aquila, Italy, coordinating the Satellite and Radar Remote Sensing Laboratory. Since 2005, he has been in the Department of Electronic Engineering, University of Rome "La Sapienza," where he currently teaches courses on antennas, propagation, and remote sensing. His current research concerns on the passive and active remote sensing of the atmosphere from ground-based, airborne, and spaceborne platforms, with a particular focus on precipitation using microwave and infrared data, development of

inversion methods, radiative transfer modeling of scattering media, and radar meteorology issues. He is also involved in the radiopropagation topics in relation to the incoherent wave modeling, scintillation prediction, and rain fading analysis along the satellite microwave links.

Dr. Marzano was the recipient of the Young Scientist Award of XXIV URSI General Assembly in 1993 and the ARPAD Award from NRL, Washington, DC, in 1998. Since 2001, he has been the Italian national delegate for the European COST actions no. 720 and no. 280. Since January 2004, he has been acting as an Associate Editor of the IEEE GEOSCIENCE REMOTE SENSING LETTERS.



Eni G. Njoku (M'75–SM'83–F'95) received the B.A. degree in natural and electrical sciences from Cambridge University, Cambridge, MA, in 1972 and the M.S. and Ph.D. degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1974 and 1976, respectively.

From 1976 to 1977, he was a National Research Council Postdoctoral Research Associate. In 1977, he joined the Jet Propulsion Laboratory (JPL), California Institute of Technology, Pasadena, where he is currently a Senior Research Scientist and Supervisor of the Water and Carbon Cycles Group. He is a member of the Earth Observing System/Aqua Advanced Microwave Scanning Radiometer science team and, until 2006, was the JPL Project Scientist for the Hydros mission. From 1986 to 1990, he served as a Discipline Scientist for ocean and Earth science data systems at the National Aeronautics and Space Administration (NASA) Headquarters, Washington, DC, and, from 1993 to 1994, was the Manager of the Geology and Planetology Section, JPL. During the 2001/2002 academic year, he was on leave as a Visiting

Professor in the Department of Civil and Environmental Engineering, Massachusetts Institute of Technology. His primary interests are in applications of microwave remote sensing for land surface hydrology and climate. His research involves microwave modeling of the land and ocean surface, retrieval algorithm development, satellite and airborne sensor data analysis for hydrologic applications, and development of new spaceborne observing concepts.

Dr. Njoku is a member of the American Meteorological Society, the American Geophysical Union, the American Association for the Advancement of Science, Commission F of the International Union of Radio Science, and Sigma Xi. He has served as an Associate Editor of the *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING* (1985–1988), the Technical Program Chairman for IGARSS'94, and a member of the GRSS Administrative Committee (1997–2000). He was a recipient of the NASA Group Achievement Awards in 1980, 1982, and 1985 and of the NASA Exceptional Service Medal in 1985.



Ed R. Westwater (SM'91–F'01) received the B.A. degree in physics and mathematics from the Western State College of Colorado, Gunnison, in 1959, and the M.S. and Ph.D. degrees in physics from the University of Colorado, Boulder (CU) in 1962 and 1970, respectively.

From 1960 to 1995, he was with the U.S. Department of Commerce. Since 1995, he has been with the Cooperative Institute for Research in Environmental Science (CIRES), Department of Electrical and Computer Engineering (ECE), CU, and joined the U.S. National Oceanic and Atmospheric Administration–CU Center for Environmental Technology (CET), ECE, in 2006. He presented the American Meteorological Society's Remote Sensing Lecture in 1997. From 1999 to 2002, he served as an Associate Editor of *Radio Science*, and from 2000 to 2002, he was the Chairman of the International Union for Radio Science Commission F. He was the Chairman and Organizer of the 1992 International Specialists Meeting on Microwave Radiometry and Remote Sensing Applications (MicroRad) and was a Co-Organizer of MicroRad 2001. He is currently a Research Professor at CET and CIRES. He is the author or coauthor of more than

275 publications. His research interests are microwave absorption in the atmosphere, remote sensing of the atmosphere and ocean surface, microwave and infrared radiative transfer, ground- and satellite-based remote sensing by passive radiometry, and the application of mathematical inversion techniques to problems in remote sensing.

Dr. Westwater is a member of the American Meteorological Society, the American Geophysical Union, and the Mathematical Association of America. He received the 15th V. Vaisala Award from the World Meteorological Society in 2001 and the Distinguished Achievement Award from the IEEE Geoscience and Remote Sensing Society in 2003. He served as a Guest Editor of the *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING* (TGARS) Special Issue devoted to MicroRad 2004 and of the TGARS Special Issue devoted to MicroRad 2006 and is currently an Associate Editor of TGARS.