

Curriculum Vitae

CHRISTOPHER S. RUF

Professor of Atmospheric, Oceanic & Space Sciences
and Electrical Engineering & Computer Science

Director, Space Physics Research Laboratory

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EDUCATION

Ph.D. 1987 Electrical and Computer Engineering, Univ. of Massachusetts at Amherst
B.A. 1982 Physics, Reed College, Portland, OR

PROFESSIONAL EXPERIENCE

May 2006 - present *Director, Space Physics Research Laboratory*
University of Michigan, Ann Arbor, MI
Jul 2000 - present *Associate Professor/Professor, Departments of AOSS and EECS*
University of Michigan, Ann Arbor, MI
Sep 2000 – Dec 2000 *Guest Professor, Department of Electromagnetic Systems*
Technical University of Denmark, Lyngby, DK
Jan 1992 - Jun 2000 *Assistant/Associate Professor, Department of Electrical Engineering*
Pennsylvania State University, University Park, PA
Jul 1988 - Dec 1991 *Member of Technical Staff, Microwave Observational Systems*
Jet Propulsion Laboratory, Pasadena, CA
Jun 1987 - Jun 1988 *Visiting Professor and Research Engineer,*
Dept. Electrical and Comp. Eng., Univ. Massachusetts, Amherst, MA
Sep 1983 - May 1987 *Graduate Research Assistant, Microwave Remote Sensing Lab*
Dept. Electrical and Comp. Eng., Univ. Massachusetts, Amherst, MA

CURRENT RESEARCH ACTIVITIES

- Science and applications of remote sensing: Ocean surface wind speed and atmospheric precipitation retrieval in tropical cyclones using airborne and spaceborne passive microwave observations. Vicarious statistical calibration methods for microwave radiometry. Detection and mitigation of radio frequency interference. Measurement of non-thermal planetary emission.
- Instrumentation and technology development: Interferometric Fourier synthesis imaging. Digital microwave radiometry. Radio frequency interference detection and mitigation. Digital calibration sources for polarimetric, spectrometer and spatial interferometer microwave radiometers.
- Satellite Programs: Science, Cal/Val, Instrument Team member for: NASA Aquarius, NASA Global Precipitation Measurement, NASA Sol Moisture Active/Passive, NASA Juno, IPO NPOESS MIS.

TEACHING EXPERIENCE

Graduate level: Inversion of Integral Transforms in Remote Sensing
Mathematical Methods in Electromagnetics
Theory of Microwave Remote Sensing
Methods and Applications of Remote Sensing
Atmospheric Radiative Transfer

Undergraduate level: Electromagnetic Theory and Applications
Introduction to Remote Sensing
Radiowave Propagation and Communication
Introduction to Earth Science Data Analysis and Matlab Applications
Circuit Design & Linear Systems Theory and Applications

GRADUATE STUDENTS SUPERVISED

Bala Subramanya, M.S. 1993	Savyasachee Mathur, M.S. 1994
Justin Bobak, M.S. 1994, Ph.D. 1998	Shawn Beus, M.S. 1996
Sean Daisley, MS. 1997	Rajiv Dewan, M.S. 1998
Sandra Cruz-Pol, Ph.D. 1998	Jude Giampaolo, M.S. 1999
Hans Rosenberger, M.S. 1999	Haiping Zhang, M.S. 1999
Gozde Fidan, M.S. 2000	Jikang Li, M.S. 2002
Sandra Lindström, M.S. 2002	Chris Schwartz, M.S. 2004
Ying Hu, M.S. 2005	Shannon Brown, Ph.D. 2005
Hirofumi Kawakubo, M.S. 2007	Jinzheng Peng, Ph.D. 2008
Boon Lim, Ph.D. 2008	John Puckett, M.S. 2009
David Fenigstein, M.S. 2010	Sidharth Misra, Ph.D. 2011
Amanda Mims, <i>in progress</i>	Rachael Kroodsma, <i>in progress</i>
David Chen, <i>in progress</i>	Deepak Singh, <i>in progress</i>

UNIVERSITY SERVICE

AOSS Ph.D. Qualifying Exam Committee Chair/Co-chair (2008 – 2009)
AOSS Departmental Representative, EECS/AOSS/CEE Doctoral Program in Geoscience and Remote Sensing (2000-2009)
Program Director and Academic Adviser, AOSS Masters of Engineering in Space Engineering (2004-2006)
Program Director and Academic Adviser, AOSS Masters of Engineering in Applied Remote Sensing and GeoInformation Systems (2000-2004)
Member, Oversight Committee for Graduate Certificate Program in Spatial Analysis, School of Natural Resources and Environment (2001-present)
Faculty Advisor, U-M Amateur Radio Club (2003 –2006)

PROFESSIONAL SERVICE

Editor in Chief, IEEE Transactions on Geoscience and Remote Sensing (2008-present)
Associate Editor, AMS Journal of Atmospheric and Oceanic Technology (2006-2008)

Associate Editor, IEEE Transactions on Geoscience and Remote Sensing (2001-2008)
Guest Editor for WindSat Special Issue, IEEE Trans. Geosci. Remote Sens. (2005-2006)
Editor, *IEEE Geoscience and Remote Sensing Society Newsletter* (1997-2000)
Guest Editor for *AGU Radio Science*, American Geophysical Union (1997-1998)
Associate Editor, *AGU Radio Science*, American Geophysical Union (1992-1997)
Member of Technical Program Committee, Session Chairman for 2011 International Geoscience and Remote Sensing Symposium, Vancouver, BC, CANADA
Session Chairman for 2010 International Geoscience and Remote Sensing Symp. Honolulu, HI
Session Chairman for 2009 International Geoscience and Remote Sensing Symp., Cape Town, S.A.
Session Chairman for 2008 International Geoscience and Remote Sensing Symp., Boston, MA
Member of Technical Program Committee, Session Chairman for 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN
Session Chairman, Member of Technical Program Committee for 2006 International Geoscience and Remote Sensing Symposium, Denver, CO
Member of Technical Program Committee for 2005 International Geoscience and Remote Sensing Symposium, Seoul, Korea
Session Chairman, Member of Technical Program Committee for 2004 International Geoscience and Remote Sensing Symposium, Anchorage, Alaska
Member of Technical Program Committee for Microwave Remote Sensing Conference, SPIE International Asia-Pacific Environmental Remote Sensing Symposium, 8-12 November 2004, Honolulu, HI.
Session chairman, Technical Program Committee Member – 2003 International Geoscience and Remote Sensing Symposium, Toulouse, France
Session chairman (2), Technical Program Committee Member – 2002 International Geoscience and Remote Sensing Symposium, Toronto, Canada
Technical Program Committee Member for SPIE 3rd International Asia-Pacific Environmental Remote Sensing Symposium on Remote Sensing of the Atmosphere, Ocean, Environment and Space, Hangzhou, China, October 2002.
Technical Program Committee Member – 2002 Second Microwave Radiometer Calibration Workshop, Barcelona, SPAIN, October 2002
Session chairman, Technical Program Committee Member – 2001 International Geoscience and Remote Sensing Symposium, Sydney, Australia
Session chairman, Technical Program Committee Member – 2000 International Geoscience and Remote Sensing Symposium, Honolulu, Hawaii
Technical Program Committee Member – 1999 International Geoscience and Remote Sensing Symposium, Hamburg, Germany
Scientific Steering Committee Member, 5th Specialist Meeting on Microwave Radiometry and remote Sensing of the Environment, Boston, MA, November 1996

PROFESSIONAL MEMBERSHIP

Fellow, Institute of Electrical and Electronics Engineers (IEEE)
Member, American Geophysical Union (AGU)
Member, American Meteorological Society (AMS)
Member, International Union of Radio Science (URSI), Commission F

- Member, Instrumentation and Future Technologies Committee (1996-present)
- Member, GRS-S Tech. Comm. on Frequency Allocation in Remote Sensing (2002-present)
- Member of the Judith A. Resnik Technical Field Award Committee (2000 – 2003)
- Member, National Research Council Committee on Radio Frequency (2000-2003)
- Chairman, GRS-S Technical Committee on Frequency Allocations in Remote Sensing, 2001-2003.
- Microwave Sub-committee Co-chair, NASA Capabilities Roadmap Committee on Science Instruments and Sensors (2004-2005)
- Member, NASA Earth Science Technology Office Radar/Radiometry Working Group (2003-2004)
- Member, Weather Panel for the National Research Council’s Space Studies Board study “Earth Science and Applications from Space: A Community Assessment and Strategy for the Future” (2005-2006)
- Member, Committee on the Scientific Uses of the Radio Spectrum, National Research Council Board of Physics and Astronomy (2007-2009)

AWARDS and RECOGNITION

- 1990: NASA Certificate of Recognition for *Sparse Aperture Interferometric Radiometer – Refining Two Dimensional Antenna Configuration*
- 1992: NASA Certificates of Recognition (2) for *Synthetic Aperture Interferometric Radiometer Image Reconstruction Error Analysis* and *Piezoelectric Reflecting Array for Reflector Surface Distortion Compensation*
- 1993: NASA Group Achievement Awards (2) for *TOPEX Microwave Radiometer* and *TOPEX Precision Orbit Determination*
- 1994: NASA Group Achievement Award for *TOPEX Joint Verification Team*
- 1997: IEEE Transactions on Geoscience and Remote Sensing Prize Paper Award for “*Retrieval of tropospheric water vapor scale height from horizontal turbulence structure,*” by Ruf and Beus, TGARS, **35**(2), 203-211, 1997.
- 1999: IEEE Judith A. Resnik Technical Field Award “*For contributions to the absolute calibration of spaceborne microwave radiometers*”
- 2001: IEEE Fellow, “*For contributions in the development, calibration and remote sensing applications of microwave radiometers*”
- 2004: NASA Group Achievement Award for *Lightweight Rainfall Radiometer*
- 2007: IEEE Geoscience and Remote Sensing Symposium Prize Paper Award for “*Detection of RFI by its Amplitude Probability Distribution,*” by Ruf, Misra, Gross and De Roo, Proc. IGARSS 2006, Denver, CO, 31 Jul - 4 Aug 2006.

STUDENT AWARDS

- 2007: Amanda Mims, Second Place, Student Poster Competition, Great Midwestern Regional Space Grant Meeting, W. Lafayette, IN, Sep. 6-7, 2007.
- 2008: Amanda Mims, Annual National Weather Association Meteorological Satellite Applications Award
- 2009: Sidharth Misra, First Place, Student Paper Competition, Geoscience and Remote Sensing Symposium, Cape Town, S.A., 13-17 July 2009.

2010: Amanda Mims, Third Place, Student Paper Competition, Geoscience and Remote Sensing Symposium, Honolulu, HI, 26-30 July 2010.

JOURNAL PUBLICATIONS (underlined student authors)

56. Park, J., J. T. Johnson, N. Majurec, N. Niamsuwan, J. Piepmeier, P. Mohammed, C. Ruf, S. Misra, S. Yueh and S. Dinardo, "Airborne L-band Radio Frequency Interference Observations from the SMAPVEX08 Campaign and Associated Flights," *IEEE Trans. Geosci. Remote Sens.*, 49(9), 3359-3370, doi:10.1109/TGRS.2011.2107560, 2011.
55. McKague, D.S., C.S. Ruf and J.J. Puckett, "Beam Spoiling Correction for Spaceborne Microwave Radiometers using the Two-Point Vicarious Calibration Method," *IEEE Trans. Geosci. Remote Sens.*, 49(1), 21-27, doi:10.1109/TGRS.2010.2068052, 2011.
54. Bailey, M.C., R. Amarin, J. Johnson, P. Nelson, M. James, D. Simmons, C. Ruf, L. Jones and X. Gong, "Multi-Frequency Synthetic Thinned Array Antenna for the Hurricane Imaging Radiometer," *Trans. Antennas Propagat.*, 58(8), doi:10.1109/TAP.2010.2050453, 2010.
53. Peng, J., and C. S. Ruf, "Effects of clock frequency stability on digital microwave radiometer performance," *Radio Sci.*, 45, RS4005, doi:10.1029/2009RS004272, 2010.
52. Amarin, R., C. Ruf and L. Jones, "Impact of Spatial Resolution on Wind Field Derived Estimates of Air Pressure Depression in the Hurricane Eye," *Remote Sens.*, 2(3), 665-672, doi:10.3390/rs2030665, 2010.
51. Peng, J., and C. S. Ruf, "Covariance Statistics of Fully Polarimetric Brightness Temperature Measurements," *Geosci. Rem. Sens. Ltrs.*, 7(3), doi:10.1109/LGRS.2009.2039115, 2010.
50. El-Nimri, S. F., W. L. Jones, E. Uhlhorn, C. Ruf, J. Johnson and P. Black, "An Improved C-band Ocean Surface Emissivity Model at Hurricane-force Wind Speeds over a Wide Range of Earth Incidence Angles," *Geosci. Remote Sens. Ltrs*, 7(4), 10.1109/LGRS.2010.2043814, 2010.
49. Misra, S., P. N. Mohammed, B. Guner, C. S. Ruf, J. R. Piepmeier and J. T. Johnson, "Microwave Radiometer Radio Frequency Interference Detection Algorithms: A Comparative Study," *Trans. Geosci. Remote Sens.*, 47(11), 3742-3754, doi:10.1109/TGRS.2009.2031104, 2009.
48. Lim, B. H., and C. S. Ruf, "A High Resolution Full Earth Disk Model for Evaluating Synthetic Aperture Passive Microwave Observations from GEO," *Trans. Geosci. Remote Sens.*, 47(11), 3731-3741, doi:10.1109/TGRS.2009.2031172, 2009.
47. Keihm, S., S. Brown, J. Teixeira, S. Desai, W. Lu, E. Fetzer, C. Ruf, X. Huang and Y. Yung, "Ocean Water Vapor and Cloud Liquid Water Trends from 1992-2005 TOPEX Microwave Radiometer Data," *J. Geophys. Res.*, 114(D18101), doi:10.1029/2009JD012145, 2009.
46. Ruf, C., N. O. Renno, J. F. Kok, E. Bandelier, M. J. Sander, S. Gross, L. Skjerve, and B. Cantor, "Emission of Non-thermal Microwave Radiation by a Martian Dust Storm," *Geophys. Res. Lett.*, 36(13), L13202, doi:10.1029/2009GL038715, 2009.
45. Peng, J., and C. S. Ruf, "Covariance Statistics of Polarimetric Brightness Temperature Measurements," *Trans. Geosci. Remote Sens.*, 46(10), 3238-3251, 2008.
44. Misra, S., and C. S. Ruf, "Detection of Radio Frequency Interference for the Aquarius Radiometer," *Trans. Geosci. Remote Sens.*, 46(10), 3123-3128, 2008.
43. Peng, J., and C. S. Ruf, "Calibration Method for Fully Polarimetric Microwave Radiometers Using the Correlated Noise Calibration Standard," *Trans. Geosci. Remote Sens.*, 46(10), 3087-3097, 2008.

42. Lagerloef, G., F. R. Colomb, D. Le Vine, F. Wentz, S. Yueh, C. Ruf, J. Lilly, J. Gunn, Y. Chao, A. deCharon, G. Feldman and C. Swift, "The Aquarius/SAC-D mission –Designed to Meet the Salinity Remote Sensing Challenge," *Oceanography – Special Issues on Salinity*, **21**(1), 68-81, Mar 2008.
41. Tanner, A.B., W.J. Wilson, B.H. Lambrigsten, S.J. Dinardo, S.T. Brown, P.P. Kangaslahti, T.C. Gaier, C.S. Ruf, S.M. Gross, B.H. Lim, S. Musko, S. Rogacki, J.R. Piepmeier, "Initial Results of the Geostationary Synthetic Thinned Array Radiometer (GeoSTAR) Demonstrator Instrument," *Trans. Geosci. Remote Sens.*, **45**(7), 1947-1957, 2007.
40. De Roo, R., S. Misra and C. Ruf, "Sensitivity of the Kurtosis Statistic as a Detector of Pulsed Sinusoidal RFI," *Trans. Geosci. Remote Sens.*, **45**(7), 1938-1946, 2007.
39. Brown, S.T., and C.S. Ruf, "Validation and Development of Melting Layer Models Using Constraints by Active/Passive Microwave Observations of Rain and the Wind Roughened Ocean Surface," *AMS J. Oceanic Atmos. Tech.*, **24**(4), 543-563, 2007.
38. Ruf, C.S., and A.M. Warnock, "GEOSAT Follow On Water Vapor Radiometer: Performance with a Shared Active/Passive Antenna," *Trans. Geosci. Remote Sens.*, **45**(4), 970-977, 2007.
37. Ruf, C.S., S. M. Gross and S. Misra, "RFI Detection and Mitigation for Microwave Radiometry with an Agile Digital Detector," *Trans. Geosci. Remote Sens.*, **44**(3), 694-706, 2006.
36. Brown, S.T., C.S. Ruf and D.R. Lyzenga, "An Emissivity Based Wind Vector Retrieval Algorithm for the WindSat Polarimetric Radiometer," *Trans. Geosci. Remote Sens.*, **44**(3), 611-621, 2006.
35. Ruf, C.S., Y. Hu and S.T. Brown, "Calibration of WindSat Polarimetric Channels with a Vicarious Cold Reference," *Trans. Geosci. Remote Sens.*, **44**(3), 470-475, 2006.
34. Brown, S.T., and C.S. Ruf, "Determination of a Hot Blackbody Reference Target over the Amazon Rainforest for the On-orbit Calibration of Microwave Radiometers," *AMS J. Oceanic Atmos. Tech.*, **22**(9), 1340-1352, 2005.
33. Brown, S., C. Ruf, S. Keihm and A. Kitiyakara, "Jason Microwave Radiometer performance and on-orbit calibration," *Marine Geodesy*, **27**(1-2), 199-220, 2004.
32. Ruf, C.S. and J. Li, "A Correlated Noise Calibration Standard for Interferometric, Polarimetric and Autocorrelation Microwave Radiometers," *Trans. Geosci. Remote Sens.*, **41**(10), 2187-2196, 2003.
31. Ruf, C.S., "Vicarious Calibration of an Ocean Salinity Radiometer from Low Earth Orbit," *AMS J. Atmos. Oceanic Tech.*, **20**(11), 1656-1670, 2003.
30. Fischman, M.A., A.W. England and C.S. Ruf, "How digital correlation affects the fringe washing function in L-Band aperture synthesis radiometry", *Trans. Geosci. Remote Sens.*, **40**(3), 671-679, 2002.
29. Ruf, C.S., "Characterization and Correction of a Drift in Calibration of the TOPEX Microwave Radiometer", *Trans. Geosci. Remote Sens.*, **40**(2), 509-511, 2002.
28. Tran, N., D. Vandemark, C. Ruf and B. Chapron, "The dependence of nadir ocean surface emissivity on wind vector as measured with TMR", *Trans. Geosci. Remote Sens.*, **40**(2), 515-523, 2002.
27. Giampaolo, J.C. and C.S. Ruf, "The Effect of Atmospheric Stability on Microwave Excess Emissivity due to Wind," *Trans. Geosci. Remote Sens.*, **39**(10), 2311-2314, 2001.
26. Ruf, C.S. and H. Zhang, "Performance Evaluation of Single and Multichannel Microwave Radiometers for Soil Moisture Retrieval," *Remote Sens. of Envir.*, **75**(1), 86-99, 2001.
25. Gerrard, A.J., T.J. Kane, J.P. Thayer, C.S. Ruf and R.L. Collins, "Consideration of non-Poisson distributions for lidar applications" *Appl. Optics*, **40**(9), 1488-1492, 2001.
24. Keihm, S.J., V. Zlotnicki and C.S. Ruf, "TOPEX Microwave Radiometer Performance Evaluation, 1992-1998," *Trans. Geosci. Remote Sens.*, **38**(3), 1379-1386, 2000.
23. Cruz-Pol, S.L. and C.S. Ruf, "A modified model for specular sea surface emissivity at microwave frequencies," *Trans. Geosci. Remote Sens.*, **38**(2), 858-869, 2000.

22. Ruf, C.S. "Detection of calibration drifts in spaceborne microwave radiometers using a vicarious cold reference," *Trans. Geosci. Remote Sens.*, **38**(1), 44-52, 2000.
21. Bobak, J.P. and C.S. Ruf, "Improvements and complications involved with adding an 85 GHz channel to cloud liquid water radiometers," *Trans. Geosci. Remote Sens.*, **38**(1), 214-225, 2000.
20. Bobak, J.P. and C.S. Ruf, "A new model for the structure function of integrated water vapor in turbulence," *Radio Science*, **34**(6), 1461-1474, 1999.
19. Ruf, C.S. "Constraints on the polarization purity of a Stokes microwave radiometer," *Radio Science*, **33**(6), 1617-1639, 1998.
18. Cruz-Pol, S.L., C.S. Ruf, and S.J. Keihm, "Improved 20-32 GHz Atmospheric Absorption Model," *Radio Science*, **33**(5), 1319-1334, 1998.
17. Bas, C.F., T.J. Kane, and C.S. Ruf, "Enhanced-resolution lidar," *J. Opt. Soc. Am. A*, **14**(5), 1044-1050, 1997.
16. Ruf, C.S. and S.E. Beus, "Retrieval of tropospheric water vapor scale height from horizontal turbulence structure," *Trans. Geosci. Remote Sens.*, **35**(2), 203-211, 1997.
15. Ruf, C.S., R.P. Dewan, and B. Subramanya, "Combined microwave radiometer and altimeter retrieval of wet path delay for the GEOSAT Follow On," *Trans. Geosci. Remote Sens.*, **34**(4), 991-999, 1996.
14. Ruf, C.S., K. Aydin, S. Mathur, and J.P. Bobak, "35 GHz dual polarization propagation link for rain rate estimation," *J. Atmos. and Oceanic Techn.*, **13**(2), 419-425, 1996.
13. Ruf, C.S., "Digital correlators for synthetic aperture interferometric radiometry," *Trans. Geosci. Remote Sens.*, **33**(5), 1222-1229, 1995.
12. Keihm, S.J. and C.S. Ruf, "The role of water vapor radiometers for in-flight calibration of the TOPEX Microwave Radiometer," *Marine Geodesy*, **18**, 139-156, 1995.
11. Ruf, C.S., M.A. Janssen, and S.J. Keihm, "TOPEX/POSEIDON Microwave Radiometer (TMR): I. Instrument description and antenna temperature calibration," *Trans. Geosci. Remote Sens.*, **33**(1), 125-137, 1995.
10. Janssen, M.A., C.S. Ruf, and S.J. Keihm, "TOPEX/POSEIDON Microwave Radiometer (TMR): II. Antenna Pattern Correction and Brightness Temperature Algorithm," *Trans. Geosci. Remote Sens.*, **33**(1), 138-146, 1995.
9. Keihm, S.J., M.A. Janssen, and C.S. Ruf, "TOPEX/POSEIDON Microwave Radiometer (TMR): III. Wet tropospheric range correction and pre-launch error budget," *Trans. Geosci. Remote Sens.*, **33**(1), 147-161, 1995.
8. Ruf, C.S., S.J. Keihm, B. Subramanya, and M.A. Janssen, "TOPEX/POSEIDON Microwave Radiometer Performance and In-flight Calibration," *J. of Geophys. Res.*, **99**(C12), 24915-24926, 1994.
7. Ruf, C.S., "Numerical annealing of low redundancy linear arrays," *Trans. Antennas and Propag.*, **41**(1), 85-90, 1993.
6. Ruf, C.S., "Error analysis of image reconstruction by a synthetic aperture interferometric radiometer," *Radio Science*, **26**(6), 1419-1434, 1991.
5. Swift, C.T., D.M. Le Vine, and C.S. Ruf, "Aperture synthesis concepts in microwave remote sensing of the earth," *Trans. on Microwave Theory and Techniques*, **39**(12), 1931-1935, 1991.
4. Alishouse, J.C., J.B. Snider, E.R. Westwater, C.T. Swift, C.S. Ruf, S.A. Snyder, J. Vongsathorn and R.R. Ferraro, "Determination of cloud liquid water content using the SSM/I," *Trans. Geosci. Remote Sens.*, **28**(5), 817-822, 1990.

3. Ruf, C.S., C.T. Swift, A.B. Tanner and D.M. Le Vine, "Interferometric synthetic aperture microwave radiometry for the remote sensing of the earth," *Trans. Geosci. Remote Sens.*, **26**(5), 597-611, 1988.
2. Ruf, C.S. and C.T. Swift, "Atmospheric profiling of water vapor density with a 20.5-23.5 GHz autocorrelation radiometer," *J. Atmos. and Oceanic Techn.*, **5**(4), 539-546, 1988.
1. Walters, J.M., C.S. Ruf and C.T. Swift, "A microwave radiometer weather-correcting sea ice algorithm," *J. of Geophys. Res.*, **92**(C6), 6521-6534, 1987.

PROCEEDINGS PUBLICATIONS (underlined student authors)

96. Amarin, R., W. L. Jones, J. Johnson, C. Ruf, T. Miller, E. Uhlhorn, "The Hurricane Imaging Radiometer Wide Swath Simulation and Wind Speed Retrievals," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 4290-4293, 26-30 July 2010.
95. Curry, S., M. Ahlers, H. Elliot, S. Gross, D. McKague, S. Misra, J. Puckett, C. Ruf, "K-Band Radio Frequency Interference Survey of Southeastern Michigan," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 2486-2489, 26-30 July 2010.
94. Fenigstein, D., C. Ruf, M. James, D. Simmons, T. Miller, C. Buckley, "Analysis of Anechoic Chamber Testing of the Hurricane Imaging Radiometer," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 550-553, 26-30 July 2010.
93. Kroodsma, R., D. McKague, J. Puckett and C. Ruf, "Stability of the Vicarious Cold Calibration Statistic for the GPM Constellation," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 566-569, 26-30 July 2010.
92. McKague, D., J. Puckett and C. Ruf, "Characterization of K-Band Radio Frequency Interference from AMSR-E, WindSat and SSM/I," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 2492-2494, 26-30 July 2010.
91. Mims, A., R. Kroodsma, C. Ruf and D. McKague, "Windsat Retrieval of Ocean Surface Wind Speeds in Tropical Cyclones," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 1831-1834, 26-30 July 2010.
90. Misra, S., R. De Roo and C. Ruf, "Evaluation of the Kurtosis Algorithm in Detecting Radio Frequency Interference from Multiple Sources," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 2019-2022, 26-30 July 2010.
89. Amarin, R.A., L. Jones, J. Johnson, C. Ruf, T. Miller and S. Chen, "Hurricane imaging radiometer wind speed and rain rate retrieval: Part-2. Analysis of retrieval accuracy," Proc. 11th Specialist Meeting on Microwave Radiometry, pp. 200-204, doi: 10.1109/MICRORAD.2010.5559560, 2010.
88. El-Nimri, S.F., L. Jones, E. Uhlhorn, C. Ruf and P. Black, "Hurricane Imaging Radiometer wind speed and rain rate retrieval: Part-1. development of an improved ocean emissivity model," Proc. 11th Specialist Meeting on Microwave Radiometry, pp. 116-120, doi: 10.1109/MICRORAD.2010.5559579, 2010.
87. Ruf, C., and S. Gross, "Digital Radiometers for Earth Science," Proc. 2010 International Microwave Symposium, Anaheim, CA, USA, 22-28 May 2010.
86. Misra, S., and C. Ruf, "Characterization of L-Band Radio Frequency Interference Across the Continental USA Using a Kurtosis Detector," Proc. 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., 13-17 July 2009.

85. Misra, S., and C. Ruf, "Inversion Algorithm for Estimating Radio Frequency Interference Characteristics Based on Kurtosis Measurements," Proc. 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., Vol. II, 162-165, 13-17 July 2009.
84. Yueh, S., S. Dinardo, S. Chan, E. Njoku, T. Jackson, R. Bindlish, J. Johnson, J. Piepmeier and C. Ruf, "PALS-ADD and Airborne Campaigns to Support Soil Moisture and Sea Surface Salinity Missions," Proc. 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., 13-17 July 2009.
83. McKague, D., C. Ruf and J.J. Puckett, "Microwave Radiometer Inter-Calibration Using the Vicarious Calibration Method," Proc. 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., Vol. IV, 117-120, 13-17 July 2009.
82. Hood, R., R. Atlas, M. Bailey, P. Black, M.W. James, J. Johnson, L. Jones, T. Miller, C. Ruf, Uhlhorn, E., "Potential of Future Hurricane Imaging Radiometer (HIRAD) Ocean Surface Wind Observations for Determining Tropical Storm Vortex Intensity and Structure", EOS Trans. AGU, 89(53), Fall Mtg. Suppl., Abstract A21F-0251, 2008.
81. Amarin, R., B. Lim, J. Johnson, W.L. Jones and C. Ruf, "Performance Simulations For A Synthetic Aperture Radiometer Measuring Peak Surface Wind Speed In Hurricanes," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, Vol. I, 363-366, 7-11 July 2008.
80. Lim, B., C. Ruf and A. Tanner, "A High Resolution Full Earth Disk Model for Microwave Observations From GEO," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, Vol. III, 923-926, 7-11 July 2008.
79. McKague, D., C. Ruf and J. Puckett, "Vicarious Calibration of Global Precipitation Measurement Microwave Radiometers," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, Vol. IV, 459-462, 7-11 July 2008.
78. Misra, S., and C. Ruf, "Comparison of Pulsed Sinusoid Radio Frequency Interference Detection Algorithms Using Time and Frequency Sub-Sampling," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, Vo. II, 153-156, 7-11 July 2008.
77. Misra, S., C. Ruf and R. Kroodsma, "Detectability of Radio Frequency Interference due to Spread Spectrum Communication Signals using The Kurtosis Algorithm," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, Vol. II, 335-338, 7-11 July 2008.
76. Wilheit, T., K. Imaoka, M. Kachi, A. Shibata, C. Kummerow, W. Berg, E. Stoner, W.L. Jones, K. Gopalan, C. Ruf, D. McKague, J. Puckett, F. Weng, B. Yan, S. Yang, A. Hou and G. Skofronick-Jackson, "Cross Calibration of Microwave Radiometers in the GPM Constellation," Proc. 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July 2008.
75. Amarin, R., C. S. Ruf, L. Jones and S. S. Chen, "Improved microwave radiometric imaging of surface wind speed dynamics in the hurricane eye-wall," Proc. 28th Conf. on Hurricanes and Tropical Meteo., Orlando, FL, 28 Apr-2 May 2008.
74. El-Nimri, S., S. Al-Sweiss, R. Amarin, W. L. Jones and C. S. Ruf, "Improved microwave remote sensing of hurricane wind speed and rain rates using the Hurricane Imaging Radiometer (HIRAD)," Proc. 28th Conf. on Hurricanes and Tropical Meteo., Orlando, FL, 28 Apr-2 May 2008.
73. Ruf, C. S., A. M. Mims and C. C. Hennon, "The dependence of the microwave emissivity of the ocean on hurricane force wind speed," Proc. 28th Conf. on Hurricanes and Tropical Meteo., Orlando, FL, 28 Apr-2 May 2008.

72. Amarin, R.A., S.F. El-Nimri, J.W. Johnson, W.L. Jones, B.H. Lim and C.S. Ruf, "Instrument design simulations for synthetic aperture microwave radiometric imaging of wind speed and rain rate in hurricanes," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
71. Brown, S., S. Desai, S. Keihm, W. Lu and C. Ruf, "Ocean Water Vapor and Cloud Burden Trends Derived from the TOPEX Microwave Radiometer, Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
70. De Roo, R.D., C.S. Ruf and K. Sabet, "An L-band Radio Frequency Interference (RFI) Detection and Mitigation Testbed for Microwave Radiometry," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
69. De Roo, R.D., S. Misra and C.S. Ruf, "Sensitivity of the Kurtosis Statistic as a Detector of Pulsed Sinusoidal Radio Frequency Interference in a Microwave Radiometer Receiver," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
68. Lim, B.H., R. Amarin, S. El-Nimri, J. Johnson, L. Jones and C.S. Ruf, "Restrictions on the Field of View for an Undersampled 1-D Synthetic Thinned Aperture Radiometry," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
67. Peng, J., C.S. Ruf, S. Brown and J. Piepmeier, "Characterization of the Aquarius and Juno Radiometers Using a Programmable Digital Noise Source," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
66. Ruf, C.S., and S. Misra, "Detection of Radio Frequency Interference with the Aquarius Radiometer" Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
65. Ruf, C., R. Amarin, M.C. Bailey, B. Lim, R. Hood, M. James, J. Johnson, L. Jones, V. Rohwedder and K. Stephens, "The Hurricane Imaging Radiometer – An Octave Bandwidth Synthetic Thinned Array Radiometer," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
64. Tanner, A.B., S.T. Tanner, T.C. Gaier, B.H. Lambrigtsen, B.H. Lim and C.S. Ruf, "Field tests of the GeoSTAR demonstrator instrument," Proc. 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
63. Ridley, A.J., P. Drake, B. Gilchrist, T. Gombosi, M.W. Liemohn, N. Renno, C. Ruf and T.H. Zurbuchen, "The Space Weather Concentration at the University of Michigan," American Geophysical Union, San Francisco, CA, Abstract ED52B-02, Dec. 2006.
62. Lambrigtsen, B.H., S.T. Brown, S.J. Dinardo, T.C. Gaier, P.P. Kangaslahti, A.B. Tanner, J.R. Piepmeier, C.S. Ruf, S.M. Gross, S. Musko and S. Rogacki, "GeoSTAR: A Microwave Sounder for Geostationary Applications," Proc. SPIE, Vol. 6361, Oct. 2006.
61. Ruf, C., S. Misra, S. Gross and R. De Roo, "Detection of RFI by its Amplitude Probability Distribution," Proc. 2006 International Geoscience and Remote Sensing Symposium, Denver, CO, 31 Jul - 4 Aug 2006.
60. B.H. Lim and C.S. Ruf, "Calibration of a Fully Polarimetric Microwave Radiometer Using a Digital Polarimetric Noise Source," Proc. 2006 International Geoscience and Remote Sensing Symposium, Denver, CO, 31 Jul - 4 Aug 2006.
59. Tanner, A.B., W.J. Wilson, B.H. Lambrigtsen, S.J. Dinardo, S.T. Brown, P. Kangaslahti, T.C. Gaier, C.S. Ruf, S.M. Gross, B.H. Lim, S. Musko and S. Rogacki, "Initial Results of the

- Geosynchronous Thinned Array Radiometer (GeoSTAR),” Proc. 2006 International Geoscience and Remote Sensing Symposium, Denver, CO, 31 Jul - 4 Aug 2006.
58. Brown, S., S. Desai, S. Keihm and C. Ruf, “JMR Noise Diode Stability After Three Years On-Orbit and Recalibration Methodology,” 2006 Specialist Meeting on Microwave Radiometry, San Juan, PR, 28 Feb – 3 Mar 2006.
 57. Tanner, A.B., B. H. Lambrigsten, S. T. Brown, W. J. Wilson, J.R. Piepmeier, C.S. Ruf and B. Lim, “A Prototype Geostationary Synthetic Thinned Aperture Radiometer (GeoSTAR) for Atmospheric Temperature Sounding,” 2006 Specialist Meeting on Microwave Radiometry, San Juan, PR, 28 Feb – 3 Mar 2006.
 56. De Roo, R., C. Ruf, B. Lim, L. van Nieuwstadt, C. Wineland and R. Gandhi, “L-band and K-band Correlated Noise Calibration System (CNCS) Architecture,” 2006 Specialist Meeting on Microwave Radiometry, San Juan, PR, 28 Feb – 3 Mar 2006.
 55. Misra, S., C.S. Ruf and R. DeRoo, “Agile Digital Detector for RFI Mitigation,” 2006 Specialist Meeting on Microwave Radiometry, San Juan, PR, 28 Feb – 3 Mar 2006.
 54. Lambrigtsen, B.H., W. Wilson, A. Tanner, P. Kangaslahti, T. Gaier, S. Dinardo, S. Brown, J. Piepmeier, C. Ruf, “GeoSTAR: Developing a Microwave Sounder for Geostationary Weather Satellites,” American Geophysical Union, San Francisco, CA, Abstract IN13B-1087, Dec. 2005.
 53. Hilliard, L.M., N.L. Phelps, J.T. Riley, T.M. Markus, G.L. Bland, C.S. Ruf, R.W. Lawrence, S.C. Reising and R Pichel, “Prototype Cryospheric Experimental Synthetic Aperture Radiometer (CESAR),” Proc. 2005 International Geoscience and Remote Sensing Symposium, Seoul, KOREA, Vol. VII, 4925-4928, 25-29 July 2005.
 52. Ruf, C.S., “Ensemble Scattering and RFI Speckle Caused by Collision Avoidance Radar,” Proc. URSI National Radio Science Meeting, Boulder, CO, F/J1-7, 215, 5-8 Jan 2005.
 51. Bastian, T.S., R. Fisher, R. Bradley, D. Gary, G. Huford, S. White, A. Kerdraon, C. Ruf, “Low Frequency Solar Physics with the Frequency Agile Solar Radiotelescope,” Proc. URSI National Radio Science Meeting, Boulder, CO, J5-6, 446, 5-8 Jan 2005.
 50. Renno, N., C. Ruf, L. Thompson, M. Sander and T. Linick, “ENG 450: A Multidisciplinary Design Experience,” Proc. AIAA Space 2004 Conference, San Diego, CA, AIAA-2004-5924, 28-30 Sept. 2004.
 - 49 Ruf, C.S., S.T. Brown, Y. Hu and H. Kawakubo, “WindSat Calibration and Geophysical Parameter Estimation,” Proc. 2004 International Geoscience and Remote Sensing Symposium, Anchorage, AK, Vol. I, 379-382, 20-24 Sept. 2004.
 - 48 Brown, S.T. and C.S. Ruf, “Simultaneous Retrieval of Surface Wind Speed and Rain Rate using Radar and Radiometer Measurements,” Proc. 2004 International Geoscience and Remote Sensing Symposium, Anchorage, AK, Vol. II, 1252-1255, 20-24 Sept. 2004.
 - 47 W.J. Wilson, A.B. Tanner, B.H. Lambrigtsen, T.A. Doiron, J.R. Piepmeier and C.S. Ruf, “STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR),” Proc. 2004 International Geoscience and Remote Sensing Symposium, Anchorage, AK, Vol. II, 789-790, 20-24 Sept. 2004.
 - 46 Tanner, A., W.J. Wilson, P.P Kangaslahti, B.H. Lambrigtsen, S.J. Dinardo, J.R. Piepmeier, C.S. Ruf, S. Rogacki, S.M. Gross and S. Musko, “Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR,” Proc. 2004 International Geoscience and Remote Sensing Symposium, Anchorage, AK, Vol. II, 1256-1259, 20-24 Sept. 2004.
 - 45 Lambrigtsen, B., W. Wilson, A. Tanner, T. Gaier, C. Ruf and J. Piepmeier, “GeoSTAR – A Microwave Sounder for Geostationary Satellites,” Proc. 2004 International Geoscience and Remote Sensing Symposium, Anchorage, AK, Vol. II, 777-780, 20-24 Sept. 2004.

44. Ruf, C. and C. Principe, "X-Band Lightweight Rainfall Radiometer First Light," Proc. of the 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, ISBN 0-7803-7930-6, Cat. #03CH37477C, 21-25 July 2003.
43. Brown, S. and C. Ruf, "Using the Amazon Rainforest as a Blackbody Reference for the On-orbit Calibration of Microwave Radiometers," Proc. 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, ISBN 0-7803-7930-6, Cat. #03CH37477C, 21-25 July 2003.
42. Brown, S., C. Ruf, S. Keihm and A. Kitiyakara, "Jason Microwave Radiometer On Orbit Calibration, Validation and Performance" Proc. 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, ISBN 0-7803-7930-6, Cat. #03CH37477C, 21-25 July 2003.
41. Lindström, S. and C. Ruf, "WindSat SDR and EDR On Orbit Calibration and Validation," Proc. 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, ISBN 0-7803-7930-6, Cat. #03CH37477C, 21-25 July 2003.
40. Tran, N. E. Obligis, L. Eymard and C. Ruf, "Comparison of Microwave Radiometer Brightness Temperature over a Hot Reference Area.," Proc. 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, ISBN 0-7803-7930-6, Cat. #03CH37477C, 21-25 July 2003, 2003.
39. Principe, C. and C.S. Ruf, "Calibration Methodology for Lightweight Rainfall Radiometer STAR Aircraft Sensor," Proc. Second International Microwave Radiometer Calibration Workshop, Barcelona, Spain, 9-11 Oct 2002.
38. Ruf, C.S. and J. Li, "Evaluation of Correlation Radiometers using Programmable Correlated Noise," Proc. Second International Microwave Radiometer Calibration Workshop, Barcelona, Spain, 9-11 Oct 2002.
37. Ruf, C.S., S.J. Keihm and S.T. Brown, "Early On Orbit Performance of the Jason-1 Microwave Radiometer," Proc. 2002 Progress in Electromagnetics Research Symposium, 1-5 July 2002, Cambridge, MA, ISBN 0-9679674-2-2, 583, 2002.
36. Ruf, C., C. Principe, T. Dod, B. Gosselin, B. Monosmith, S. Musko, S. Rogacki, A. Stewart, Z. Zhang, "Lightweight Rainfall Radiometer STAR Aircraft Sensor," Proc. 2002 International Geoscience and Remote Sensing Symposium, Toronto, CA, 24-28 June 2002, II: 850-852, Cat. #02CH37380, 2002.
35. Jones, W.L., J.-D. Park, J. Zec, C.S. Ruf, M.C. Bailey and J.W. Johnson, "A Feasibility Study for a Wide-Swath, Airborne, Hurricane Imaging Microwave Radiometer for Operational Hurricane Measurements," Proc. 2002 International Geoscience and Remote Sensing Symposium, Toronto, CA, 24-28 June 2002, Cat. #02CH37380, 2002.
34. Gasiewski, A.J., C.S. Ruf, M. Younis and W. Wiesbeck, "Impacts of Mobile Radar and Telecommunications on Earth Remote Sensing in the 22-27 GHz Range," Proc. 2002 International Geoscience and Remote Sensing Symposium, Toronto, CA, 24-28 June 2002, III: 1679-1681, Cat. #02CH37380, 2002.
33. Jones, W.L., J. Zec, J.W. Johnson, C. S. Ruf and M.C. Bailey, "A Feasibility Study for a Wide-Swath, High Resolution, Airborne Microwave Radiometer for Operational Hurricane Measurements," Proc. 56th Interdepartmental Hurricane Conference, 11-15 March 2002, New Orleans, LA, 2002.
32. Ruf, C.S. and Li, J., "Environmental Testing of Correlation Radiometer Pairs with a Digital Noise Source," Proc. 7th Specialist Meeting on Microwave Remote Sensing, 5-9 November 2001, Boulder, CO, 9, 2001.

31. De Roo, R., A. England, C. Ruf, L. Van Nieuwstadt, P. Hansen, T. Rashid, J. Harvey, R. Miller and D. Boprie, "STAR-Light: An Airborne L-Band Synthetic Thinned Aperture Direct Sampling Digital Radiometer for Soil Moisture Monitoring in the Arctic," Proc. 7th Specialist Meeting on Microwave Remote Sensing, 5-9 November 2001, Boulder, CO, 28, 2001.
30. Vandemark, D., N. Tran, C. Ruf and B. Chapron, "Active/Passive Study of Wind-dependent Signatures in Nadir-viewing Ocean Microwave Sensors," Proc. 7th Specialist Meeting on Microwave Remote Sensing, 5-9 November 2001, Boulder, CO, 123, 2001.
29. Li, J. and C.S. Ruf, "Correlated Noise Calibration System for a Multichannel Interferometric Radiometer," Proc. First International Microwave Radiometer Calibration Workshop, Adelphi, MD, 30-31 Oct 2000.
28. Ruf, C.S., C.M. Principe and S.P. Neeck, "Enabling Technologies to Map Precipitation with Near-Global Coverage and Hour-Scale Revisit Times," Proc. 2000 International Geoscience and Remote Sensing Symposium, Honolulu, HI, Cat. #00CH37120, Vol. VII, 2988-2990, 2000.
27. Ruf, C.S., "Statistical Analysis of a Lower Bound on Microwave Radiometer Brightness Temperature from Space," Proc. 2000 International Geoscience and Remote Sensing Symposium, Honolulu, HI, Cat. #00CH37120, Vol. VII, 2825-2826, 2000.
26. Ruf, C.S., "Implications of an improved atmospheric absorption model on water vapor retrievals," Proc. 6th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment, 15-18 March 1999, ITALY, VSP BV, The Netherlands, 137-144, 2000.
25. Giampaolo J. and C.S. Ruf, "A Temperature Dependent Correction to the Model for Microwave Excess Emissivity of the Ocean due to Surface Winds," Proc. 1999 International Geoscience and Remote Sensing Symposium, Hamburg, GERMANY, Cat. #99CH36293, Vol. IV, 2312-2314, 1999.
24. Cruz Pol, S.L. and C.S. Ruf, "Calibration of the model for ocean surface emissivity at microwave frequencies," Proc. 1999 International Geoscience and Remote Sensing Symposium, Hamburg, GERMANY, Cat. #99CH36293, Vol. IV, 2318-2320, 1999.
23. Ruf, C.S. and J.C. Giampaolo, "Littoral antenna deconvolution for a microwave radiometer," Proc. 1998 International Geoscience and Remote Sensing Symposium, Seattle, WA, Cat. #98CH36174, 378-380, July 1998.
22. Ruf, C.S., "Polarimetric radiometry - Coherent vs. incoherent detection," Proc. 1998 International Geoscience and Remote Sensing Symposium, Seattle, WA, Cat. #98CH36174, 2181-2183, July 1998..
21. Albrecht, B.A., G.G. Mace, W.J. Syrett, D. Thomas, C. Ruf, and J. Bobak, "Continental stratus characteristics from surface-based remote sensing systems," Proc. 12th Intl. Conf. on Clouds and Precip., 9-23 August 1996.
20. Bobak, J.P. and C.S. Ruf, "Prediction of water vapor scale height from integrated water vapor measurements," Proc. 1996 International Geoscience and Remote Sensing Symposium, Lincoln, NE, Cat. #96CH35875, 1692-1694, July 1996.
19. Cruz-Pol, S.L., C.S. Ruf, and S.J. Keihm "Atmospheric microwave absorption parameter estimation near 22 GHz," Proc. 1996 International Geoscience and Remote Sensing Symposium, Lincoln, NE, Cat. #96CH35875, 1435-1437, July 1996.
18. Ruf, C. S. and S.E. Beus, "Estimation of the ocean/atmosphere boundary layer height of water vapor from space," Proc. 1996 International Geoscience and Remote Sensing Symposium, Lincoln, NE, Cat. #96CH35875, 1263-1265, July 1996.
17. Bobak, J.P. and C.S. Ruf, "An algorithm for improving the retrieval of cloud liquid water and water vapor using effective radiating temperature of clouds," Proc. Second Topical Symposium

- on Combined Optical-Microwave Earth and Atmosphere Sensing, Atlanta, GA, Cat. #95TH8015, 115-117, April 1995.
16. Ruf, C.S., K. Aydin, and S. Mathur, "Rain rate estimation from attenuation measurements using a 35 GHz dual polarization propagation link," Proc. 1994 International Geoscience and Remote Sensing Symposium, Pasadena, CA, #94-CH3378-7, Vol. IV, 1777-1779, August 1994.
 15. Ruf, C.S., W.J. Wilson, K.M. Chandra, and A.B. Tanner, "Digital correlator performance analysis for a synthetic aperture imaging radiometer," Proc. 1994 International Geoscience and Remote Sensing Symposium, Pasadena, CA, #94-CH3378-7, Vol. III, 1317-1319, August 1994.
 14. Ruf, C.S., S.J. Keihm, and B. Subramanya, "TOPEX Microwave Radiometer in-flight performance evaluation," Proc. 1993 International Geoscience and Remote Sensing Symposium, Tokyo, JAPAN, #93CH3294-6, Vol. IV, 1759-1761, August 1993.
 13. Ruf, C.S., "Improved array configurations for synthetic aperture interferometric radiometers," Proc. 1993 International Geoscience and Remote Sensing Symposium, Tokyo, JAPAN, #93CH3294-6, Vol. III, 1435-1437, August 1993.
 12. Keihm, S.J., C.S. Ruf, and M.A. Janssen, "The TOPEX Microwave Radiometer: Verification Phase Evaluation," Proc. AGU 1992 Fall Meeting, San Francisco, CA, 299, Dec. 1992.
 11. Janssen, M.A., S.J. Keihm, and C.S. Ruf, "The TOPEX microwave radiometer," Proc. Specialist Meeting on Microwave Radiometry and Remote Sensing, Boulder, Colorado, 1992.
 10. Ruf, C.S., "Error analysis of image reconstruction by a synthetic aperture interferometric radiometer," Proc. International Union of Radio Science (URSI) at IGARSS '92, Houston, TX, 96-97, May 1992.
 9. Le Vine, D.M., L.M. Hilliard, C.T. Swift, C.S. Ruf and L.B. Garrett, "A synthetic aperture microwave radiometer to measure soil moisture and ocean salinity from space," Proc. 1991 International Geoscience and Remote Sensing Symposium, Espoo, Finland, 975-978, June 1991.
 8. Wilson, W.J., C.S. Ruf, C.M. Satter and Y. Rahmat-Samii, "Design of a geostationary microwave precipitation radiometer," Proc. MTT-S International Microwave Symposium, Boston, MA, 1153-1156, June 1991.
 7. Ruf, C.S., "Antenna performance for a synthetic aperture microwave radiometer in geosynchronous earth orbit," Proc. 1990 International Geoscience and Remote Sensing Symposium, College Park, MD, #90CH2825-8, Vol. II, 1589-1592, May 1990.
 6. Ruf, C.S. and S.J. Keihm, "TOPEX/POSEIDON microwave radiometer - post-launch ground based calibration/validation," Proc. 1990 International Geoscience and Remote Sensing Symposium, College Park, MD, #90CH2825-8, Vol. I, 203-206, May 1990.
 5. Ruf, C.S., "Sparse aperture interferometric radiometry (SAIR) for the remote sensing of the earth," Proc. 1989 International Symposium on Antennas and Propagation, Tokyo, JAPAN, ISBN4-88552-079-7, Vol. I, 89-92, August 1989.
 4. Ruf, C.S., M.A. Janssen and S.J. Keihm, "TOPEX microwave radiometer system calibration; refining the SMMR heritage," Proc. 1989 International Geoscience and Remote Sensing Symposium, Vancouver, B.C., CANADA, #89CH2768-0, Vol. I, 271-272, July 1989.
 3. Ruf, C.S. and C.T. Swift, "Atmospheric profiling of water vapour with a 20.5-23.5 GHz autocorrelation radiometer," Proc. 1988 International Geoscience and Remote Sensing Symposium, Edinburgh, UK, #88CH2497-6, Vol. II, 957-960, August 1988.
 2. Swift, C.T., C. Ruf, A. Tanner and D. Le Vine, "The electronically steered thinned array radiometer (ESTAR)," Proc. 1986 International Geoscience and Remote Sensing Symposium, Zurich, SWITZ., 591-593, October 1986.

1. Ruf, C.S. and C.T. Swift, "Electronically steered thinned array radiometer, system design, performance and calibration," Proc. 1985 International Geoscience and Remote Sensing Symposium, Amherst, MA, 635-640, October 1985.

OTHER PUBLICATIONS

21. Ruf, C. S., "Editorial," IEEE Trans. Geosci. Remote Sens., **47**(1), 3, 10.1109/TGRS.2008.2010122, 2009.
20. Randa, J., J. Lahtinen, A. Camps, A. J. Gasiewski, M. Hallikainen, D. M. Le Vine, M. Martin-Neira, J. Piepmeier, P. W. Rosenkranz, C. S. Ruf, J. Shiue and N. Skou, "Recommended Terminology for Microwave Radiometry," National Institute of Standards and Technology Technical Note 1551, 40 pp., August 2008.
19. Ruf, C., S. Rogacki, C. Cooper, S. Misra, S. Gross, J. Johnson and J. Piepmeier, "Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers," Proc. of NASA Earth Science Technology Conference, College Pk., MD, 24 June 2008.
18. Ruf, C., A. Warnock and D. Boprie, Cover Figure, Geoscience and Remote Sensing Newsletter, **145**, ISSN 0274-6338, Dec. 2007.
17. Ruf, C.S., R. De Roo, S. Gross and S. Misra, "Radiometer Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers," Proc. of NASA Earth Science Technology Conference, College Pk., MD, 19 June 2007.
16. Smith, E.A., A. Mehta, S. Yang, E. Im and C. Ruf, "Current and Future Space Technologies for Measurement of Precipitation at Regional and Global Scales," Workshop on Monsoon Climate Variability and Change - Impacts on Water, Food, and Health in Western India, Ahmedabad, INDIA, 5-7 Feb 2007.
15. Ruf, C.S., S. Misra and R. De Roo, "Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers," Proc. of NASA Earth Science Technology Conference, College Pk., MD, 27-29 June 2006.
14. Lambrigtsen, B.H., S.T. Brown, S.J. Dinardo, T.C. Gaier, P.P. Kanagaslahti, A.B. Tanner, J.R. Piepmeier, C.S. Ruf, S.M. Gross, S. Musko and S. Rogacki, "GeoSTAR – A Breakthrough in Remote Sensing Technology," Proc. of NASA Earth Science Technology Conference, College Pk., MD, 27-29 June 2006.
13. Ruf, C.S., Review of "Introduction to Microwave Remote Sensing" by I.H. Woodhouse, The London Times Higher Education Supplement Textbook Guide, **24**(XII), 26 May 2006.
12. Gaiser, P.W., and C.S. Ruf, "Foreward to the Special Issue on the WindSat Spaceborne Polarimetric Radiometer – Calibration/Validation and Wind Vector Retrieval," Trans. Geosci. Remote Sens., **44**(3), 467-468, 2006.
11. Tanner, A.B., W.J. Wilson, P.P. Kangaslahti, B.H. Lambrigsten, S.J. Dinardo, J.R. Piepmeier, C.S. Ruf, S. Rogacki, S.M. Gross and S. Musko, "Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR," Proc. of NASA Earth Science Technology Conference, Palo Alto, CA, 22-24 June 2004.
10. Principe, C., J. Piepmeier and C. Ruf, "Low Power Digital Microwave Technologies," Proc. of NASA Earth Science Technology Conference, College Park, MD, 24-26 June 2003.
9. Ruf, C.S, C. Principe, T. Dod, B. Monosmith, S. Musko, S. Rogacki, D. Steinfeld, E. Smith, A. Stewart and Z. Zhang, "Synthetic Thinned Aperture Radiometer Technology Developments Enabling a GPM Lightweight Rainfall Radiometer," Proc. of NASA Earth Science Technology Conference, Pasadena, CA, 11-13 June 2002.

8. Ruf, C.S, C.D. Kummerow and C.M. Principe, "Enabling Technologies for the Global Precipitation Measurement Mission," Proc. of NASA Earth Science Technology Conference, College Park, MD, 28-30 August 2001.
7. Ruf, C.S, "Preface to Special Section: Microwave Radiometry and Remote Sensing of the Environment, Part 2" Radio Science, **33**(3), 637, 1998.
6. Ruf, C.S, "Preface to Special Section: Microwave Radiometry and Remote Sensing of the Environment, Part 1" Radio Science, **33**(2), 257-258, 1998.
5. Ruf, C.S. and T.K. Wu, "Piezoelectric Reflecting Array for Reflector Surface Distortion Compensation," NASA Tech Briefs, NPO-18538, Dec. 1992.
4. Ruf, C.S., "Synthetic Aperture Interferometric Radiometry Image Reconstruction Error Analysis," NASA Tech Briefs, NPO-18561, Dec. 1992.
3. Barron, E.J., J.D. Mathews, W.L. Meyers, G.W. Petersen, C.S. Ruf and D.W. Thomson, "Remote Sensing at The Pennsylvania State University," Geoscience and Remote Sensing Newsletter, **84**, ISSN 016, 17-21, Sep. 1992.
2. Ruf, C.S., "Improving Sparse-Aperture Interferometric Radiometry," NASA Tech Briefs, **15**(3), Item 29, 26-28, Mar. 1991.
1. Ruf, C.S., "Synthetic Aperture Interferometric Radiometer (SAIR)," Proceedings of the Earth Science Geostationary Platform Technology Workshop, NASA Langley Research Center, Hampton, VA, NASA Conf. Publ. 3040, 179-190, Sep. 1988.

ORAL PRESENTATIONS

- Invited paper*, "K-Band Radio Frequency Interference Survey of Southeastern Michigan," Proc. 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, pp. 2486-2489, 26-30 July 2010.
- Invited paper*, "From a Real Pencil to a Synthetic Broom: The Past, Present and Future of HIRAD," 2010 International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, 26-30 Jul 2010.
- Invited paper*, "Digital Radiometers for Earth Science," 2010 International Microwave Symposium, Anaheim, CA, 26 May 2010.
- Invited paper*, "Spectral Mapping of Radio Frequency Interference at K-Band Using a Kurtosis Spectrometer," 11th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment, Washington DC, 1-4 Mar 2010.
- Invited paper*, "Digital Microwave Radiometers: Instrument Capability v. Digital Technology," 11th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment, Washington DC, 1-4 Mar 2010.
- Invited paper*, "Detection of Lightning on Mars with a Digital Kurtosis Detector," URSI National Radio Science Meeting, Boulder, CO, J2-1, 6-9 Jan 2010.
- Invited Seminar*, "Hallway Conversations and the Discovery of Lightning on Mars," Atmos. Sci. Dept. Seminar, Texas A&M Univ., 22 Sep. 2009..
- Invited paper*, "Digital Microwave Radiometers: Digital Signal Processing Device Capabilities vs. Radiometer Sensor Performance," 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., 13-17 July 2009.
- Invited paper*, "The Hurricane Imaging Radiometer (Hirad): Instrument Status and Performance Predictions," 2009 International Geoscience and Remote Sensing Symposium, Cape Town, S.A., 13-17 July 2009.

- Guest Panelist*, “International Remote Sensing Publication Forum,” 30th Canadian Symposium on Remote Sensing, Lethbridge, Alberta CANADA, 24 June 2009.
- Invited paper*, “Discussions/Perspectives on International Collaboration on Radiometer Calibration,” 8th Global Precipitation Measurement Planning Workshop, Paris, FRANCE, 16-19 June 2009.
- Invited paper*, “Digital Correlators for Spaceborne Earth Remote Sensing - Current Status and Near Term Technology Development,” Keck Institute for Space Studies MMIC Array Receivers and Spectrographs Workshop, Pasadena, CA, 21-25 Aug. 2008.
- Invited paper*, “Design and Performance Considerations for a Spaceborne Digital Radiometer,” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Conference paper*, “Comparison of Pulsed Sinusoid Radio Frequency Interference Detection Algorithms Using Time and Frequency Sub-Sampling,” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Conference paper*, “Cross Calibration of Microwave Radiometers in the GPM Constellation,” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Conference paper*, “Vicarious Calibration of Global Precipitation Measurement Microwave Radiometers,” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Invited paper*, “Design and Development of the Hurricane Imaging Radiometer (HIRAD),” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Conference paper*, “Detectability of Radio Frequency Interference due to Spread Spectrum Communication Signals using The Kurtosis Algorithm,” 2008 International Geoscience and Remote Sensing Symposium, Boston, MA, 7-11 July, 2008.
- Conference paper*, “Characterization of the Aquarius and Juno Radiometers Using a Programmable Digital Noise Source,” 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
- Conference paper*, “Detection of Radio Frequency Interference with the Aquarius Radiometer” 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
- Conference paper*, “The Hurricane Imaging Radiometer – An Octave Bandwidth Synthetic Thinned Array Radiometer,” 2007 International Geoscience and Remote Sensing Symposium, Barcelona, SPAIN, 23-27 July, 2007.
- Conference paper*, “Detection of RFI by its Amplitude Probability Distribution,” 2006 International Geoscience and Remote Sensing Symposium, Denver, CO, 31 Jul - 4 Aug 2006.
- Conference paper*, “Agile Digital Detector for RFI Mitigation,” 2006 Specialist Meeting on Microwave Radiometry, San Juan, PR, 28 Feb – 3 Mar 2006.
- Conference paper*, “Wind Vector Retrieval with WindSat – Impact on Performance of Missing Channels,” 2005 International Geoscience and Remote Sensing Symposium, Seoul, KOREA, 25-29 July 2005.
- Conference paper*, “Calibrating a Polarimetric Radiometer with the Correlated Noise Calibration Standard,” 2005 International Geoscience and Remote Sensing Symposium, Seoul, KOREA, 25-29 July 2005.
- Conference paper*, “Ensemble Scattering and RFI Speckle Caused by Collision Avoidance Radar,” Proc. URSI National Radio Science Meeting, Boulder, CO, F/J1-7, 215, 5-8 Jan 2005.
- Conference paper*, “WindSat Calibration and Geophysical Parameter Estimation,” International Geoscience and Remote Sensing Symposium, Anchorage, AK, 20-24 Sept. 2004.

- Conference paper*, “Simultaneous Retrieval of Surface Wind Speed and Rain Rate using Radar and Radiometer Measurements,” International Geoscience and Remote Sensing Symposium, Anchorage, AK, 20-24 Sept. 2004.
- Conference paper*, “X-Band Lightweight Rainfall Radiometer First Light,” 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, July 2003
- Conference paper*, “WindSat SDR and EDR On Orbit Calibration and Validation,” 2003 International Geoscience and Remote Sensing Symposium, Toulouse, FRANCE, July 2003.
- Conference paper*, “Jason Microwave Radiometer On Orbit Calibration, Validation and Performance,” AGU Fall Meeting, San Francisco, CA, December 2002.
- Conference paper*, “Jason Microwave Radiometer On Orbit Calibration, Validation and Performance,” Jason-1/TOPEX/Poseidon Science Working Team Meeting New Orleans, LA, 21-23 Oct 2002.
- Conference paper*, “Evaluation of Correlation Radiometers using Programmable Correlated Noise,” Second International Microwave Radiometer Calibration Workshop, Barcelona, Spain, Oct 2002.
- Conference paper*, “Early On Orbit Performance of the Jason-1 Microwave Radiometer,” 2002 Progress in Electromagnetics Research Symposium, Cambridge, MA, July 2002.
- Invited panel member*, NPOESS Cal/Val Panel Discussion, IGARSS2002, Toronto, Canada, June 2002
- Conference paper*, “Lightweight Rainfall Radiometer STAR Aircraft Sensor,” International Geoscience and Remote Sensing Symposium, Toronto, CA, June 2002.
- Keynote speaker*, “Cal/Val Activities and Issues for SMOS,” 3rd ESA Soil Moisture and Ocean Salinity Workshop, Oberpfaffenhofen, Germany, 11 Dec 2001.
- Conference paper*, “Environmental Testing of Correlation Radiometer Pairs with a Digital Noise Source,” 7th Specialist Meeting on Microwave Remote Sensing, Boulder, CO, November 2001.
- Invited speaker*, “Design Features of a Boresighted Radiometer,” NASA Workshop on GPM Core Satellite Radiometer Improvements, NASA Goddard Space Flight Center, Greenbelt, MD, 31 August 2001.
- Invited speaker*, “Enabling Technologies for the Global Precipitation Measurement Mission,” NASA Earth Science Technology Conference, University of MD, College Park, MD, 29 August 2001.
- Conference paper*, “MMIC Receiver Modules for Digital Correlation Radiometry,” 2001 International Geoscience and Remote Sensing Symposium, Sydney, Australia, July 2001.
- Conference paper*, “The GPM Constellation Microwave Radiometer Testbed,” 2001 International Geoscience and Remote Sensing Symposium, Sydney, Australia, July 2001.
- Invited speaker*, “Rainfall Measurement Technology - Passive Systems,” Global Precipitation Mission Workshop, NASA Goddard Space Flight Center, 20 February 2001.
- Invited speaker*, “Large, Lightweight Deployable Antenna Session – Large Radiometer Arrays in Space: Science and Technology Issues,” Technology Planning Workshop, NASA Earth Science Enterprise New Millennium Program, Arlington, VA, 23-24 January 2001
- Invited speaker*, “Outstanding Issues - Calibration,” 2nd ESA Soil Moisture and Ocean Salinity Science Workshop, Toulouse CESBIO, FRANCE, 28-30 November 2000
- Plenary speaker*, “Using Vicarious Calibration to Diagnose a Drift in the TOPEX Microwave Radiometer” First International Microwave Radiometer Calibration Workshop, Adelphi, MD, 30 Oct 2000.

- Invited seminar*, “Diagnosis of the Evidence for and Cause of a Drift in the TOPEX Microwave Radiometer,” CETP/IPSL/CNRS, Université St Quentin-Versailles, FRANCE, 16 October 2000
- Conference paper*, “Enabling Technologies to Map Precipitation with Near-Global Coverage and Hour-Scale Revisit Times,” 2000 International Geoscience and Remote Sensing Symposium, Honolulu, HI, July 2000.
- Conference paper*, “Statistical Analysis of a Lower Bound on Microwave Radiometer Brightness Temperature from Space,” 2000 International Geoscience and Remote Sensing Symposium, Honolulu, HI, July 2000.
- Conference paper*, “Implications of an improved atmospheric absorption model on water vapor retrievals,” 6th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment, Florence, Italy, March 2000.
- Conference paper*, “A Temperature Dependent Correction to the Model for Microwave Excess Emissivity of the Ocean due to Surface Winds,” 1999 International Geoscience and Remote Sensing Symposium, Hamburg, GERMANY, July 1999.
- Conference paper*, “Calibration of the model for ocean surface emissivity at microwave frequencies,” 1999 International Geoscience and Remote Sensing Symposium, Hamburg, GERMANY, July 1999.
- Invited speaker*, “Polarization purity requirements for a polarimetric radiometer,” Workshop on Problems to be Addressed by Microwave Radiometers in the 21st Century, Rolighed, Denmark, September 1998
- Conference paper*, “Littoral antenna deconvolution for a microwave radiometer,” 1998 International Geoscience and Remote Sensing Symposium, Seattle, WA, July 1998.
- Conference paper*, “Polarimetric radiometry - Coherent vs. incoherent detection,” 1998 International Geoscience and Remote Sensing Symposium, Seattle, WA, July 1998..
- Conference paper*, “Prediction of water vapor scale height from integrated water vapor measurements,” 1996 International Geoscience and Remote Sensing Symposium, Lincoln, NE, July 1996.
- Conference paper*, “Estimation of the ocean/atmosphere boundary layer height of water vapor from space,” International Geoscience and Remote Sensing Symposium, Lincoln, NE, July 1996.
- Conference paper*, “An algorithm for improving the retrieval of cloud liquid water and water vapor using effective radiating temperature of clouds,” Second Topical Symposium on Combined Optical-Microwave Earth and Atmosphere Sensing, Atlanta, GA, April 1995.
- Conference paper*, “Rain rate estimation from attenuation measurements using a 35 GHz dual polarization propagation link,” 1994 International Geoscience and Remote Sensing Symposium, Pasadena, CA, August 1994.
- Conference paper*, “Digital correlator performance analysis for a synthetic aperture imaging radiometer,” 1994 International Geoscience and Remote Sensing Symposium, Pasadena, CA, August 1994.
- Conference paper*, “TOPEX Microwave Radiometer in-flight performance evaluation,” 1993 International Geoscience and Remote Sensing Symposium, Tokyo, JAPAN, August 1993.
- Conference paper*, “Improved array configurations for synthetic aperture interferometric radiometers,” 1993 International Geoscience and Remote Sensing Symposium, Tokyo, JAPAN, August 1993.
- Conference paper*, “The TOPEX Microwave Radiometer: Verification Phase Evaluation,” AGU 1992 Fall Meeting, San Francisco, CA, Dec. 1992.

- Conference paper*, "The TOPEX microwave radiometer," Specialist Meeting on Microwave Radiometry and Remote Sensing, Boulder, Colorado, 1992.
- Conference paper*, "Error analysis of image reconstruction by a synthetic aperture interferometric radiometer," 1992 International Geoscience and Remote Sensing Symposium, , Houston, TX, May 1992.
- Conference paper*, "Antenna performance for a synthetic aperture microwave radiometer in geosynchronous earth orbit," 1990 International Geoscience and Remote Sensing Symposium, College Park, MD, May 1990.
- Conference paper*, "TOPEX/POSEIDON microwave radiometer - post-launch ground based calibration/validation," 1990 International Geoscience and Remote Sensing Symposium, College Park, MD, May 1990.
- Conference paper*, "Sparse aperture interferometric radiometry (SAIR) for the remote sensing of the earth," 1989 International Symposium on Antennas and Propagation, Tokyo, JAPAN, August 1989.
- Conference paper*, "TOPEX microwave radiometer system calibration; refining the SMMR heritage," 1989 International Geoscience and Remote Sensing Symposium, Vancouver, B.C., CANADA, July 1989.
- Conference paper*, "Atmospheric profiling of water vapour with a 20.5-23.5 GHz autocorrelation radiometer," 1988 International Geoscience and Remote Sensing Symposium, Edinburgh, UK, August 1988.
- Conference paper*, "The electronically steered thinned array radiometer (ESTAR)," 1986 International Geoscience and Remote Sensing Symposium, Zurich, SWITZ., October 1986.
- Conference paper*, "Electronically steered thinned array radiometer, system design, performance and calibration," 1985 International Geoscience and Remote Sensing Symposium, Amherst, MA, October 1985.