Paul Siqueira

Professor of Electrical and Computer Engineering
Curriculum Vitae

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A. Professional Preparation:

Iowa State University, Ames IA	B.S. ECE	1982-1987
Iowa State University, Ames IA	M.S. ECE	1987-1989
University of Michigan, Ann Arbor, MI	Ph.D. ECE	1992-1996

B. Appointments:

4/2005 – present Professor, Department of Electrical and Computer Engineering, The University of Massachusetts, Amherst.
10/1996 – 3/2005 Senior Member, Engineering Staff, Radar Science and Engineering Section, Jet Propulsion Laboratory, California Institute of Technology
11/2000 – 3/2001 Visiting Scientist, Space Applications Institute, Joint Research Center, Commission of the European Communities, Ispra, Italy.
9/1992 – 9/1996 Graduate Research and Teaching Assistant, University of Michigan at Ann Arbor, MI.

C. Professional Activities and Memberships

• co-Director, Microwave Remote Sensing Laboratory, University of Massachusetts, Amherst
• Lead, Ecosystems development, NISAR Science Team (2016 – present)
• Member, Science Advisory Board, European Space Agency's Climate Change Initiative Biomass Project (2018 – present)
• Member and past Chair Alaska Satellite Facility User Working Group
• Member of the National Research Council's Committee on Radio Frequencies (2013 – 2019)
• Member of Kyoto and Carbon Cycle Initiative Science Team, Japanese Aerospace Agency (JAXA; 2005 – present)
• Charles Bullard Fellow for Forest Research at the Harvard Forest (2012 – 2013)

D. Project Development

• Principal Investigator – SNOWWI: Snow Water-equivalent Wide Swath Interferometer and Scatterometer
• Science lead – AVORES NASA CAN for advanced computing technology applications to SAR Interferometry and Imaging Science using two-season JERS-1 data over the Amazon rainforest

E1. Journal Publications, Book Chapters and Patents:

1. Polverari, F., A. Wineteer, E. Rodriguez, D. Perkovic-Martin, P. Siqueira, J.T. Farrar, M. Adam, M. Closa-Tarrés, J. Edson, "A Ka-Band Wind Geophysical Model Function Using Doppler Scatterometer Measurements from the Air-Sea Interaction Tower Experiment," Rem. Sens., 19 pp, accepted for publication, 2022.
2. Kraatz, S., L. Bourgeau-Chavez, M. Battaglia, A. Poley and P. Siqueira, "Mapping and scaling of in situ Above Ground Biomass to regional extent with SAR in the North American Boreal Region", *Earth and Space Sci.,* Accepted for publication 2022.
3. Kraatz, S. P. Siqueira, J. Kellendorfer, N. Torbick, X. Huang and M. Cosh, "Evaluating the robustness of NISAR's cropland product to time of observation, observing mode and dithering", *Earth and Space Sci.,* Accepted for publication 2022.
4. Rose, S., S. Kraatz, J. Kellndorfer, M.H. Cosh, N. Torbick, X. Huang, and P. Siqueira, "Evaluating NISAR's cropland mapping algorithm over the conterminous United States using Sentinel-1 data," *Rem. Sens. Env.,* 260, 112472, 2021.

5. Kraatz, S., S. Rose, M. Cosh, N. Torbick, X. Huang, & P. Siqueira, *"Performance evaluation of UAVSAR and simulated NISAR data for crop/noncrop classification over Stoneville, MS." Earth and Space Sci, 8(1), e2020EA001363.* https://doi.org/10.1029/2020EA001363, 2021.

6. Kraatz, S., N. Torbick, X. Jiao, X. Huang, L.D. Robertson, A. Davidson, H. McNairn, M.H. Cosh, P. Siqueira, "Comparison between Dense L-Band and C-Band Synthetic Aperture Radar (SAR) Time Series for Crop Area Mapping over a NISAR Calibration-Validation Site," *Agronomy*. 11(2), https://doi.org/10.3390/agronomy11020273, 2021.

7. Huang, X., M. Reba, A. Coffin, B.R.K. Runkle, Y. Huang, B. Chapman, B. Ziniti, S. Skakun, S. Kraatz, P. Siqueira, and N. Torbick, "Cropland mapping with L-band UAVSAR and development of NISAR products," *Rem. Sens. Env.*, doi.org/10.1016/j.rse.2020.112180, 2020.

8. Colliander, A., M.H. Cosh, V.R. Kelly, S. Kraatz, L. Bourgeau-Chavez, P. Siqueira, A. Roy, A.G. Konings, N. Holtzman, S. Misra and D. Entekhabi, "SMAP Detects Soil Moisture Under Temperate Forest Canopies," *Geophys. Res. Lett.*, 47(19), doi.org/10.1029/2020GL089697, 2020.

9. Siqueira, P., SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation. "CH4 –Forest Stand Height Estimation," Ed. Flores-Anderson, Herndon, Thapa and Cherrington, 307 pp., Apr. 2019, DOI: 10.25966/nr2c-s697.

10. Duncanson, L., Armston, J., Disney, M. et al. "The importance of consistent global forest aboveground biomass product validation", Surv. Geophys., 40(4), 979-999, July 2019, doi.org/10.1007/s10712-019-09538-8.

11. Lei, Y., P. Siqueira, N. Torbick, M. Ducey, D. Chowdhury, and W. Salas, "Generation of large-scale moderate-resolution forest height mosaic with spaceborne repeat-pass SAR interferometry and lidar," *IEEE Trans. Geosci. Rem. Sens*., 57(2) 770-787, 2019.

12. Li, J., Q. Yu, Y. Tian, B.L. Becker, P. Siqueira and N. Torbick "Spatio-temporal Variations of CDOM in Shallow Inland Waters from a Semi-analytical Inversion of Landsat-8," *Rem. Sens. Env.*, 218, 189-200, Dec. 2018.

13. Mandal, D., V. Kumar, A. Bhattacharya, Y. Subrahmanyeswara Rao, P. Siqueira and S. Bera, "Sen4Rice: A Processing Chain for Differentiating Early and Late Transplanted Rice Using Time-Series Sentinel-1 SAR data with the Google Earth Engine," *IEEE Geosci. Rem. Sens. Lett.*, 15(12), 1947-1951, 2018.

14. Lei, Y., R. Lucas, P. Siqueira, M. Schmidt, and R. Treuhaft, "Detection of forest disturbance with spaceborne repeat-pass SAR interferometry," *IEEE Trans. Geosci. Rem. Sens.*, 56(4), 2424-2439, Apr 2018.

15. Whelen, T. and P. Siqueira, "Coefficient of variation for use in crop area classification across multiple climates," *Int. J. Appl. Earth. Obs. & Geoinf.*, 67, 114-122, 2018.

16. Whelen, T. and P. Siqueira, "Time-series agricultural classification of Sentinel-1 data over North Dakota," *Rem. Sens. Lett*., 9(5), 411-420, 2018.

17. Cartus, O., P. Siqueira, J. Kellndorfer, "An Error Model for Mapping Forest Cover and Forest Cover Change Using L-Band SAR," *IEEE Geosci. Rem. Sens. Lett.*, 15(1), 107-111, Jan 2018.

18. Antonarakis, A.S., P. Siqueira, and J.W. Munger, "Using multi-source data from lidar, radar, imaging spectroscopy, and national forest inventories to simulate forest carbon fluxes," *Int. J. Rem. Sens.*, 38(19), 5464-5486, 2017.

19. Whelen, T. and P. Siqueira, "A Multi-season Study of L-band UAVSAR Observations for Agricultural Fields in the San Joaquin Valley," *Rem. Sens. Env.*, 193, 216-224, 2017.

20. Lei, Y., P. Siqueira, R. Treuhaft, "A physical scattering model of repeat-pass InSAR correlation for vegetation," *Wvs. Rand. Cmpx. Med.*, 27(1), 129-152, 2017.

21. Lei, Y., P. Siqueira, R. Treuhaft, "A dense-medium electromagnetic scattering model for the InSAR correlation of snow," *Rad. Sci.*, 51(5), 461-480, 2016.

22. Lei, Y., P. Siqueira, “An Automatic Mosaicking Algorithm for the Generation of a Large-Scale Forest Height Map Using Spaceborne Repeat-Pass InSAR Correlation Magnitude,” *Rem. Sens*., 7(5), 5639-5659, 2015.

23. Lei, Y., P. Siqueira, “Estimation of Forest Height Using Spaceborne Repeat-Pass L-Band InSAR Correlation Magnitude over the US State of Maine,” *Rem. Sens*., 6(11), 10252-10285, 2014.

24. Salazar-Cerreno, J., V. Chandrasekar, Jorge Trabal, P. Siqueira, R. Medina, E. Knapp and D. McLaughlin “A Drop Size Distribution (DSD) Based Model for Evaluating the Performance of Wet Radomes for Dual Polarized Radars,” J. Atmos. Ocean. Tech., 31(11), 2409-2430, 2014.

25. Insanic, E. and P. Siqueira, “System and method for generating derived products in a radar network,” US Patent 8,525,724 B2

26. Ahmed, R., P. Siqueira, and S. Hensley, “Analyzing the Uncertainty of Biomass Estimates from L-Band Radar Backscatter Over the Harvard and Howland Forests,” *IEEE Trans. Geosci. Rem. Sens*., 52(6), 3568 - 3586, 2014.

27. Ahmed, R., P. Siqueira, S. Hensley, and K. Bergen, “Uncertainty of Forest Biomass Estimates in North Temperate Forests Due to Allometry: Implications for Remote Sensing,” *Rem. Sens*., 5(6), 3007-3036, doi:10.3390/rs5063007, 2013.

28. Ahmed, R., P. Siqueira, and S. Hensley, “A combined study of forest biomass estimated from lidar at the Harvard and Howland forests,” *Rem. Sens. Env*., 130, 121-135, 2013.

29. Dickinson, C., P. Siqueira, D. Clewley, R. Lucas, “Characterization of forest structure using polarimetric segmentation in multiple landscapes,” *Rem. Sens. Env., 131, 206-214*, 2013.

30. Lu, J., P. Siqueira, V. Vijayendra, H. Chandrikakutty, and R. Tessier, “Real-Time Estimates of Differential Signal Phase for Spaceborne Systems using FPGAs,” *IEEE Trans. Aero. Electron. Syst.*, 49(2), 1192-1209, 2013.

31. St.Peter, B., S. Yngvesson, P. Siqueira, P. Kelly, A. Khan, S. Glick, and A. Karellas, “Frequency Domain Terahertz Imaging for Breast Cancer Detection,” *IEEE Trans. THz Tech.*, 3(4), 374-386, 2013.

32. Insanic, E. and P. Siqueira, “A Maximum Likelihood Approach to Estimation of Vector Velocity in Doppler Radar Networks,” *IEEE Trans. Geosci Rem. Sens*., 50(2), 553-567, 2012.

33. Insanic, E. and P. Siqueira, “Real-Time Vector Velocity Estimation in Doppler Radar Networks,” *IEEE Trans. Geosci. Rem. Sens.*, 50(2), 568-584, 2012.

34. Ahmed, R., P. Siqueira, S. Hensley, B. Chapman and K. Bergen, “A survey of temporal decorrelation from spaceborne repeat-pass InSAR,” *Rem. Sens. Env*., 115, 2887-2896, 2011.

35. Lucas, R., A.C. Lee, J. Armston, J. Carreiras, K. Viergever, P. Bunting, D. Clewley, M. Moghaddam, P. Siqueira, and I. Woodhouse, “Ch. 8: Quantifying Carbon in Savannas: The Role of Active Sensors in Measurements of Tree Structure and Biomass,” Ecosystem Functions in Savannas, M. Hill & N. Hannan, Ed., CRC Press, 623 pp, 2010.

36. Sexton, J.O., T. Bax, P. Siqueira, J.J. Swenson, S. Hensley, “A Comparison of Lidar, Radar, and Field Measurements of Canopy Height in Pine and Hardwood Forests in Southeastern North America,” *For. Ecol. Mgmt.*, 257, 1136-47, 2009.

37. Siqueira, P., R. Ahmed, J.Wirth, A. Bachmann, “Variable Precision Two-Channel Phase, Amplitude and Timing Measurements for Radar Interferometry and Polarimetry,” *IEEE Trans. Micrw. Theor. Tech.*, 55(10), 2248-2256, 2007.

38. Durden, S., P. Siqueira, and S. Tanelli, “On the use of multiantenna radars for spaceborne Doppler precipitation measurements,” *IEEE Geosci. Rem. Sens. Lett*, 4(1), 181-183, 2007.

39. Treuhaft, R. and P. Siqueira, "The Performance of Forest Structure and Biomass from Interferometric Radar", *Wav. Rand. Med.*, S345-S358, 2004.

40. Siqueira, P., B. Chapman and G. McGarragh, "The coregistration, calibration and interpretation of multiseason JERS-1 SAR data over South America," *Rem. Sens. Env.*, 87(4), 389-403, 2003.

41. Freeman, A., B. Chapman, and P. Siqueira, "The JERS-1 Amazon Multi-Season Mapping Study (JAMMS): science objectives and implications for future missions", *Int. J. Rem. Sensing***.** 23(7), 1447-1460, 2002.

42. Chapman,. P. Siqueira, and A. Freeman, "The JERS Amazon multi-season mapping study (JAMMS): observation strategies and data characteristics," *Int. J. Rem. Sens.* 23(7), 1427-1446, 2002.

43. Freeman, A., W.T.K. Johnson, B. Huneycutt, R. Jordan, S. Hensley, P. Siqueira, and J. Curlander, "The 'Myth' of the Minimum SAR Antenna Area Constraint," *IEEE Trans. Geosci. Rem. Sens.*, 38(6), 320-324, 2000.

44. Siqueira, P., S. Hensley, S. Shaffer, L. Hess, G. McGarragh, B. Chapman, and A. Freeman, "A Continental Scale Mosaic of the Amazon Basin Using JERS-1 SAR," *IEEE Trans. Geosci. Rem. Sens.*, 2638-44, 2000.

45. Treuhaft, R. and P. Siqueira, "The Vertical Structure of Vegetated Land Surfaces from Interferometric and Polarimetric Radar," *Rad. Sci.*, 35(1), 141-177, 2000.

46. Siqueira, P. and K. Sarabandi, "T-Matrix Determination of Effective Permittivity for Three-Dimensional Dense Random Media," *IEEE Trans. Ant. Prop.*, 48(2), 317-327, 2000.

47. Sarabandi, K., and P. Siqueira, "Numerical Scattering Analysis for Two-dimensional Dense Random Media: Characterization of Effective Permittivity," *IEEE Trans. Ant. Prop.*, 45(5), 858-867, 1997.

48. Siqueira, P. and K. Sarabandi, "Method of Moments Evaluation of the Two-Dimensional Quasi-Crystalline Approximation," *IEEE Trans. Ant. Prop.*, 44(8), 1067-1077. 1996.

49. Ulaby, F.T., P. Siqueira, A. Nashashibi, and K. Sarabandi, "Semi-Emperical Model for Radar Backscatter from Snow at 35 and 95 GHz," *IEEE Trans. Geosci. Rem. Sens.*, 34(5), 1059-1065, 1996.

50. Siqueira, P., K. Sarabandi, and F. Ulaby, "Numerical Simulation of Scatterer Positions in a Very Dense Medium with an Application to the Two-Dimensional Born Approximation," *Rad. Sci.*, 30(5), 1325-1339, 1995.

51. Dobson, M.C., F.T. Ulaby, L.E. Pierce, T.L. Sharik, K.M. Bergen, J. Kellnforfer, J.R. Kendra, E. Li, Y.C. Lin, A. Nashashibi, K. Sarabandi and P. Siqueira, "Estimation of Forest Biophysical Characteristics in Northern Michigan with SIR-C/X-SAR," *IEEE Trans. Geosci. Rem. Sens.*, 33(4), 877-895, 1995.

52. Appleton, P.N., P.R. Siqueira, J.P. Basart, "A Morphological Filter for Removing 'Cirrus-like' emission from Far-Infrared Extragalactic IRAS Fields," *Astron. J.* 1064), 1664-1678, 1993.

E2. Conference Publications

1. Chen, X. and P. Siqueira, "A Ground-based L-band Synthetic Aperture Radar System for Forest Temporal Dynamics Monitoring," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2017.

2. Deeb. E., H-P Marshall, R. Forster, C. Jones, C. Hiemstra and P. Siqueira, "Supporting NASA SnowEx remote sensing strategies and requirements for L-Band interferometric snow depth and snow water equivalent estimation," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2017.

3. Judge, J., L. Vanzee, W. Blackwell, S. Cruz-Pol, T.C. Gaier, N. Kassim, D. LeVine, A. Lovell, J. Moran, S. Ransom, G. Rebeiz, and P. Siqueira, "Potential impacts of WRC-2019 Agenda Items on Scientific Services", *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2017.

4. Lei, Y., P. Siqueira, N. Torbick, D. Chowdhury, W. Salas, and R. Treuhaft, "Large-Scale Product of Forest Height Using a New Approach from Spaceborne Repeat-Pass SAR Interferometry and Lidar," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2017.

5. Lei, Y., R. Treuhaft, R. Lucas, P. Siqueira, M. Keller, M. Schmidt, "Large-Scale Fine-Resolution Products of Forest Disturbance Using New Approaches from Spaceborne SAR Interferometry," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2017.

6. Whelen, T. and P. Siqueira, "Data Analysis Methods (Optical, Multispectral,Hyperspectral, SAR): SAR Imaging Techniques," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Dallas, 2016.
7. Lei, Y., P. Siqueira, D. Chowdhury, N. Torbick, "Generation of Large-Scale Forest Height Mosaic and Forest Disturbance Map Through the Combination of Repeat-Pass InSAR Coherence and Airborne Lidar," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Beijing, 2016.
8. Siqueira, P. and X. Chen, "An Above Canopy Radar Monitoring System at the Harvard Forest," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Beijing, 2016.
9. Ruiz-Carregal, G., T. Hartley, P. Siqueira, J-W, DeBleser, M.S. Haynes, D. Esteban-Fernandez, T. Millette, "A Calibrated 35 GHz Airborne Scatterometer for NASA's Surface Water and Ocean Topography Mission," *IEEE Geosci. Rem. Sens. Symp.*, 4pp., Milan, 2015.
10. Lei, Y., and P. Siqueira, "A Dense-Medium InSAR Correlation Model with its Application to the Problem of Snow Characteristics Retrieval, *IEEE Geosci. Rem. Sens. Symp*., Milan, 2015.
11. Siqueira, P. and Y. Lei, "Measures of Temporal Decorrelation from ALOS-2 and its Affects on Retrievals of Vegetation Physical Characteristics," IEEE Geosci. Rem. Sens. Symp., 4 pp., Milan, 2015.
12. Fu, K., P. Siqueira, R. Schrock, "A university-developed 35 GHz airborne cross-track SAR interferometer: Motion compensation and ambiguity reduction," *IEEE Geosci. Rem. Sens. Symp*., 2241-2244, Quebec, 2014.
13. Lei, Y., and P. Siqueira, "An automatic mosaicking algorithm for generating a large-scale forest stand height map using spaceborne repeat-pass InSAR coherence," *IEEE Geosci. Rem. Sens. Symp*., 84-87, Quebec, 2014.
14. Gorman, C, P. Siqueira, R. Tessier, "An open-source SATA core for Virtex-4 FPGA's," *IEEE Int. Conf. Field-Prog. Tech.*, 454-457, Kyoto, 2013.
15. Siqueira, P., R. Schrock, Y. Lei, T. Millette, T. Hartley, "An airborne 35 GHz radar interferometer development at the University of Massachusetts," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
16. Siqueira, P., R. Ahmed, S. Hensley, B. Chapman, "Characterization of repeat-pass airborne and spaceborne Insar observations over the Harvard forest," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
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18. Chapman, B., P. Siqueira, S. Hensley, R. Treuhaft, "A re-examination of SRTM coherence data for estimating forest structure," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
19. Lei, Y., P. Siqueira, D. Clewley, P. Siqueira, "Observation of vegetation vertical structure and disturbance using L-band InSAR over the Injune region in Australia," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
20. Neumann, M., S. Hensley, S. Saatchi, L. Ferro-Famil, A. Reigber, T. Michel, M. Lavalle, R. Ahmed, P. Siqueira, "Potentials and limitations of forest remote sensing from polarimetric SAR interferometery," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
21. Salazar, J., P. Siqueira, E. Knapp, J. Trabal, D. McLaughlin, "A concept for evaluating the performance of wet radomes for phased-array weather radars," *IEEE Symp. Geosci. Rem. Sens*., Munich, 2012.
22. Kelly, P., T. Sobers, B. St.Peter, P. Siqueira, and G. Capraro, "Microwave radiometric signatures of temperature anomalies in tissue," *SPIE Med. Imag*., 4 pp., San Diego, 2012.
23. Yngvesson, S.K., B. St. Peter, P. Siqueira, P. Kelly, S. Glick, A. Karellas, A. Khan, "Feasibility demonstration of frequency domain terahertz imaging in breast cancer margin determination," *SPIE THz Tech.*, 10 pp., San Francisco, 2012.
24. Siqueira, P., and A. Swochak, "A 13 and 35 GHz Interferometer for Hydrologic, Cryospheric and Vegetation Applications," Amer. Geophys. Union Fall Mtg., San Francisco, 2011.

25. Ahmed, R. and P. Siqueira, "Accuracy of biomass estimates from radar and lidar over temperate forests," Amer. Geophys. Union Fall Mtg., San Francisco, 2011.

26. Hensley, S., T. Michel, M. Neumann, M. Lavalle, S. Oveisgharan, B. Chapman, P. Siqueira, R. Ahmed, F. Lombardini, "Polarimetric interferometric studies of the Harvard Forest using L-band UAVSAR repeat-pass data," APSAR, Seoul, 2011.

27. Siqueira, P., R. Tessier, T. Hartley, B. Heavey, D. Esteban-Fernandez, M. Nakashima "A Ka-band to Baseband RF Testbed for the SWOT mission," NASA Earth Sci. Tech. Forum., Pasadena, 2011.

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30. Kelly, P., T. Sobers, B. St. Peter., P. Siqueira, and G. Capraro, "Temperature anomaly detection and estimation using microwave radiometry and anatomical information," *SPIE Med. Imag.*, Proc. SPIE 7961, 79614U, 12 pp., Orlando, 2011.

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32. Ahmed, R., P. Siqueira, K. Bergen, B. Chapman and S. Hensley, "A biomass estimate over the harvard forest using field measurements with radar and lidar data," *IEEE GRSS Proc*., Honolulu, 2010.

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38. McLinden, M., N. Majurec, and P. Siqueira, "Calibration of the UMass Advanced Multi-frequency radar (AMFR)," *IEEE GRSS Proc.*, Boston 2008.

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45. Zebker H., H. Shugart, and M. Fahrenstock,"Report of the July 16-19, 2007 Orlando Florida Workshop to assess the NRC decadal survey recommendation for the DESDynI Radar/Lidar space mission," Sept 2007.

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48. De Grandi, F., J.S. Lee, D. Schuler, P. Siqueira, T. Ainsworth and M. Simard, "Multi-resolution analysis of polarimetric SAR data using wavelets," *IEEE GRSS Proc.*, Toronto, 623-625, 2002.

49. Hensley, S., E. Chapin, Freedman, J.S. Le, S. Madsen, T. Michel, E. Rodriguez, P. Siqueira and K. Wheeler, "First P-band Results Using the GeoSAR Mapping System," *IEEE GRSS Proc.*, Sydney, 126-128, 2001.

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55. Siqueira, P., K. Sarabandi and F. Ulaby, "Numerical simulation of scatterer positions in a very dense media," *IEEE AP Proc.*, Seattle, 2342-2345, 1994.

56. Sarabandi, K. and P. Siqueira, "Numerical scattering analysis for two dimensional dense random media," *IEEE AP Proc.*, Seattle, 2346-2349, 1994.

57. Nashashibi, A., K. Sarabandi, S. Ciccarelli, F. Ulaby and P. Siqueira, "Backscatter measurements of soil surfaces at millimeter wave frequencies," *IEEE AP Proc.*, Ann Arbor, 1300-1303, 1993.

58. Basart, J.P., P.R. Siqueira, P.N. Appleton, "Morphological Filtering of Infrared Cirrus Emission from Extragalactic Fields," *ASP Conf.*, 25, 283-287, 1992.

E3. Invited Talks

Siqueira, Chapman, Hensley, "SAR, InSAR and lidar studies for measuring vegetation structure over the Harvard forest," AGU Fall meeting, San Francisco 2007.

Siqueira, Hensley, Chapman, Bergen, "Temporal Decorrelation Studies Relevant for a Vegetation InSAR Mission," NASA DESDynI workshop, Orlando, FL, July 2007.

Siqueira and Tope, "A High Performance Ku-band Two Channel Downconverter for Interferometric Radar Applications," NASA Earth Science Technology Conference (ESTC), College Park, Maryland, 6 pp, June 2006

Siqueira, Hensley, Chapman, Treuhaft, "AIRSAR Calibration & Tree Height Estimation at La Selva Biostation in Costa Rica," Roundtable on the evaluating the implementation of AIRSAR as an archelogical tool in Mexico and Central America, National Geographic Society, Washington DC, Nov. 2005.

Siqueira, Hensley, Chapman, Bergen, "Temporal Decorrelation Studies Relevant for a Vegetation InSAR Mission," NASA Joint Workshop on NASA Biodiversity, Terrestrial Ecology, and Related Applied Science, August 2006.

Siqueira, Hensley and Chapman, "Observations and Analysis of Temporal Decorrelation over the La Selva Biostation in Costa Rica," IEEE Symp. Geosci. Rem. Sens., Boulder CO, July 2006.

Siqueira, P. and A. Freeman, "Source Ambiguities for Imaging and Interferometric SAR," *IEEE GRSS Proc.,* Seattle, 478-480, 1998.

E4. Other Professional Works

Hartikka, R., A. Nashashibi, K. Sarabandi, P. Siqueira, F. Ulaby, P. Chang, S. Lohmeier, R. McIntosh, and J. Mead, "Handbook of Millimeter-wave polarimetric radar response of terrain," Radiation Laboratory Technical Report #924, 231 pp., 1995.

Judge, J., et al., "Handbook of frequency allocations and spectrum protection for scientific uses, 2nd Ed." National Academies Press, 280pp., 2015.

F. Grants, Contracts and Fellowships ($12.8M)

PI. NASA, "SNOWWI — Snow Water- equivalent Wide Swath Interferometer and Scatterometer", 2022-2025, $4,500K.

Co-I. Univ. of Maryland/NASA, "Biomass estimation with new spaceborne missions for MRV in Tropical Dry Forests and Savannas," 2021-2024, $271K.

PI. NASA, "Two-frequency methods for soil moisture and biomass estimation," 2020-2022, $105K.

PI. GSFC/NASA, "Processing of Ku-band Trail Valley Creek SAR data for snow studies," 2020-2022, $100K.

Co-I. Mich-Tech/NASA, "Understanding the Interactions between Wildfire Disturbance, Landscape Hydrology and Post-Fire Recovery in Boreal-Taiga Ecosystems," 2019-2022, $109K.

PI. JPL/NASA, "Ecosystems for SDC Mission Development," 2020, $25K.

PI. NASA, "Development of the NISAR Ecosystems Disciplines for calibration/validation and to meet mission goals and requirements," 2019-2022, $479K.

PI. NASA, "WHOI Air-Sea Interaction Tower Radar Experiment," 2019-2020, $77K.

PI. USDA, "NISAR Soil Moisture and Agriculture Applications Development," 2018-2023, $375K.

PI. JPL/NASA, "Ku-Band Interferometric Radar Imaging of Snow", 2018-2019, $75K.

PI. JPL/NASA, "Nadir-pointing 35 GHz data collections in support of the SWOT mission," 2016-2018, $175K.

PI. NASA Science Team for the NISAR Mission (NASA-ISRO SAR) "Development of NISAR Ecosystems applications for calibration/validation and to meet mission goals and requirements", 2016-2019, $550K.

Co-I. USDA & Applied GeoSolutions: "Operationalizing multiscale SAR metrics for rapid forest disturbance assessments," 2017 – 2018, $50K.

PI. JPL/NASA, "Reticulating Nadir-pointing 35 GHz scatterometer in support of the SWOT mission," 2017-2018, $175K.

PI. US Army Corps of Engineers, CRELL, "S-band SAR measurements of snow," 2016 – 2017, $55K.

PI. TetraTech/USAID, "SAR Task Force in Support of the Partnership for Land Use Science (Forest-PLUS)," 2016 – 2017, $78K.

PI. NASA JPL, "Wideband Radar Image Formation Using GPU's," 2015 – 2016, $76K.

PI. TetraTech/USAID, “Forest-Plus SAR Study Task Force,” 2015, $115K

PI. JPL/NASA, “Nadir-pointing 35 GHz data collections in support of the SWOT mission,” 2014-2015, $120K.

Subcontract PI. DoD-MDA/SSI, “Remote Sensing Estimation of Debris Cloud and Fragment Radar Cross-Section Properties,” 2015, $36K.

PI. NASA/NESSF, “Determination of Vegetation Vertical Structural Profile and Changes for DESDynI-like missions Utilizing InSAR and PolInSAR Techniques,” 2012-2015, $90K.

PI. NASA Program for Terrestrial Ecology, “Modeling and Evaluation of Polarimetric SAR and InSAR for Forest Structure Estimation,” 2013-2015, $320K.

PI. Harvard Forest Bullard Fellowship, “Measurement and Modeling of Forest Structure,” Harvard University, 2012-2013, $40K.

PI. NASA Science Definition Team for the DESDynI Mission (Deformation, Ecosystem Science, and the Dynamics of Ice), 2012-2015, $229K.

Co-I (PI: Sigfrid Yngvesson, UMass). NIH Developmental Research Grant, “Terahertz Imaging in Breast Cancer Detection,” 2010-2012, $250K.

PI. NASA Program for Terrestrial Ecology. “A Segmentation Approach for Combining Radar Backscatter, InSAR and Lidar Measurements to Determine Vegetation 3D Structure and Biomass from Space,” 2009-2012, $899K

PI. NASA Earth Science Technology Office, “A Low Power, High Bandwidth Receiver for Ka-band Interferometry,” Feb 2009 – Jan 2012, $1080 K.

Co-I (PI: Patrick Kelly, UMass). Baystate Collaborative Biomedical Research Program. “Passive microwave system development for emergency diagnosis,” 2009-2010, $25K.

PI. NASA Earth Science Technology Office, “Development of a two channel, two stage downconverter from Ku- and Ka-band to IF. Period of performance is Nov 2005 – Nov 2008, $722K.

PI. NASA Remote Sensing for Carbon and Climate: The Impact of Temporal Decorrelation on InSAR Vegetation 3D Structure Retrieval Algorithms.” July 2006-July 2009, $590K.

Co-I (PI: Prof Frasier, UMass). NSF: “Remote Sensing of Tornadoes and Storms with Mobile W-band Polarimetric and X-band Spaced Antenna and Phased Array Doppler Radar.” $650K.

Collaborator (PI: Prof. Mclaughlin, UMass). NSF: “CASA:Work with Edin Insanic and MC&C team on network based vector velocity estimates.

PI. NASA Cloudsat Ground Validation: “Triple-Frequency Radar Measurements for CloudSAT Validation and Precipitation Measurement Mission Science at the Canadian Centre for Atmospheric Research Experiments,” July 2006-July 2007, $185K.

Contract. Remote Sensing Solutions, Inc., “NASA phase 1 scanning radar study for UAV Platforms,” 2005-2006, $33K.

Contract. Remote Sensing Solutions, Inc, “NOAA studies for high altitude hurricane radar,” 2005-2006, $20K.

Director of the Biomedical Sensors and Signal Processing Center at UMass, 2008, $120K.

G1. MS and PhD students (supervised)

Ninoslav Majurec, PhD, currently at NASA/JPL, January 2008
Edin Insanic, PhD, May 2010
Razi Ahmed, MS, PhD, currently at NASA/JPL, March 2012
Karthik Srinivasan, MS, currently at NASA/JPL, Sept 2009
Harish Vedantham, MS August 2008
Matt McLinden, MS, currently at NASA/Goddard February 2010

Tony Swochak, MS, currently at Lincoln Labs August 2011
Benjamin St. Peter, MS, currently at Spectral Sciences Inc., 2012
Rockwell Schrock, MS, currently at National Instruments, 2012.
Kan Fu, PhD, currently at Delphi Electronics, 2017,
Yang Lei, PhD, currently at Chinese Academy of Sciences, 2016.
Gerard Ruiz Carregal, MS, February 2017.
Dustin Lagoy, MS, September 2016.
Gerard Masalias Huguet, MS, March 2019.
Xingjian Chen, PhD, proposal completed, fall 2021.
Qingchuan Wu, PhD, pre-qualifying exam, spring 2022.
Marc Closa Tarres, MS, expected graduation 2022.
Cristina Llop Vallverdú, visiting MS student, UPC 2012.
Bruno Galobart, visiting MS student, UPC 2011.

G2. MS and PhD students (committee member)

Fernando Rodriguez, PhD (2006)
Kery Hardwick, MS (2007)
Dragana Perkovic, PhD (2007)
Tao Chu, MS (2007)
Francesc Junyent-Lopez, PhD (2006)
Brian Donovan, PhD (2008), BBN Technologies
Gita Pathak, MS (2008), Northrup Grumman
Iva Kostadinova, MS (2009)
Brian Paulsen, MS (2011)
Jorge Salazar, PhD (2012)
Akshaya Shanmugam, MS (2012)
Tamara Sobers, MS (2012), currently a PhD at UMass
Jorge Trabal, PhD (2013)
Vijay Venkatesh, PhD (2013)
Cory Gorman, MS (2013)
Vishwas Vijayendra, MS (2011)
Chad Baldi, MS (2013)
Krysztof Orzel, PhD, 2017.