Stephen J. Frasier

Education
BEE, Electrical Engineering, University of Delaware, Newark, 1987
Ph.D., Electrical and Computer Engineering, University of Massachusetts Amherst, 1994

Appointments
Professor, 9/08–present, *Associate Professor,* 9/02–8/08, *Assistant Professor,* 4/97–8/02, University of Massachusetts Amherst, Department of Electrical and Computer Engineering.

Visiting Professor, 1/22-7/22, Dept. of Information Engineering, University of Florence, Florence, Italy.

Visiting Scientist, 1/12–7/12, National Center for Meteorological Research (CNRM) and Center for Radar Meteorology, Météo-France, Toulouse, France.

Visiting Professor, Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, 9/05-8/06. Dept. of Signal Theory and Communications, Electromagnetic and Photonics Engineering Group.

Director, Microwave Remote Sensing Laboratory (MIRSL), Department of Electrical and Computer Engineering, 6/03 to present.

Senior Research Fellow, University of Massachusetts, 9/96-3/97, *Research Engineer,* 9/94-9/96, Microwave Remote Sensing Laboratory, Department of Electrical and Computer Engineering.

Assistant Scientist, SciTec Inc. (a subsidiary of TRW Space and Defense), Princeton, NJ, 7/87-6/90.

Refereed Journal Publications (advisee authors underlined)

1. Heberling, W. and S. J. Frasier (2021), "On the Projection of Polarimetric Variables Observed by a Planar Phased Array Radar at X-band," *IEEE Trans. Geosci. Remote Sensing*, **59**(5), 3,891–3,903, https://doi.org/10.1109/TGRS.2020.3023640.

2. Venkatesh, V. S., K. A. Orzel, and S. J. Frasier (2021), "Spaced-antenna aperture synthesis using an X-band phased-array," *IEEE Geosci. Remote Sensing Lett.*, **18**(7), 1,194–1,198, https://doi.org/ 10.1109/LGRS.2020.2995360.

3. Sapp, J. W., A. Mouche, Z. Jelenak, P. S. Chang, S. J. Frasier (2020), "Comparision of the Sentinel-1B Synthetic Aperture Radar with Airborne Microwave Sensors in an Extra-Tropical Cyclone," *IEEE Trans. Geosci. Remote Sensing*, **58**(7), 4,721–4,729, https://doi.org/10.1109/TGRS.2020. 2966332.

4. Rocadenbosch, F., R. Barragan, S. Frasier, J. Waldinger, D. Turner, R. Tanamachi, D. Dawson (2020), "Ceilometer Based Rain-Rate Estimation: a Case-Study Comparison with S-

Band Radar and Disdrometer Retrievals in the Context of VORTEX-SE," *IEEE Trans. Geosci. Remote Sensing*, **58**(12), 8,268–8,284, https://doi.org/10.1109/TGRS.2020.2984458.

5. Tanamachi, R. L, S. J. Frasier, J. Waldinger, A. LaFleur, D. D. Turner, and F. Rocadenbosch (2019), "Progress toward Characterization of the Atmospheric Boundary Layer over Northern Alabama Using Observations by a Vertically Pointing, S-Band Profiling Radar during VORTEX-Southeast," *J. Atmos. Oceanic Technol.*, **36**(11), 2221–2246, https://doi.org/10.1175/JTECH-D-18-0224.1

6. Orzel, K. A. and S. J. Frasier (2018), "Weather Observation by an Electronically Scanned Dual-Polarization Phase-Tilt Radar," *IEEE Trans. Geosci. and Remote Sensing*, **56**(5), 2722-2734, https://doi.org/10.1109/TGRS.2017.2782480.

7. Guimond, S. R., J. A. Zhang, J. W. Sapp, S. J. Frasier (2018), "Coherent Turbulence in the Boundary Layer of Hurricane Rita (2005) during an Eyewall Replacement Cycle," *J. Atmos. Sci.*, **75**(9), 30713093, https://doi.org/10.1175/JAS-D-17-0347.1

8. Sapp, J. W., S. O. Alsweiss, Z. Jelenak, P. S. Chang, S. J. Frasier, J. Carswell (2016), "Airborne Co-polarization and Cross-polarization Observations of the Ocean Surface NRCS at C-Band," *IEEE Trans. Geosci. Remote Sensing*, **54**(10), 5975–5992.

9. Lange, D., F. Rocadenbosch, J. Tiana-Alsana, and S. Frasier (2015), "Atmospheric Boundary Layer Height Estimation using Kalman Filter and a Frequency-Modulated Continuous-Wave Radar," *IEEE Trans. Geosci. Remote Sensing*, **53**(6), 3338–3349.

10. Bluestein, H., R. Rauber, D. Burgess, B. Albrecht, S. Ellis, Y. Richardson, D. Jorgensen, S. Frasier, P. Chilson, R. Palmer, S. Yuter, W.-C. Lee, D. Dowell, P. Smith, P. Markowski, K. Friedrich, T. Weckwerth (2014), "Radar in Atmospheric Sciences and Related Research: Current Systems, Emerging Technology, and Future Needs," *Bull. Amer. Meteorol. Soc.*, **95**.

11. Guimond, S., L. Tian, G. Heymsfield, S. Frasier (2014), "Wind Retrieval Algorithms for the IWRAP and HIWRAP Airborne Doppler Radars with Applications to Hurricanes," *J. Atmos. Oceanic Technol.*, **31**(6), 1189–1215.

12. Al-Sakka, H., A.-A. Boumahmoud, B. Fradon, S. J. Frasier, P. Tabary (2013), "A new fuzzy logic hydrometeor classification scheme applied to the French X, C and S-band polarimetric radars," *J. Appl. Meteorol. Climatol.*, **52**(10), 2328–2344.

13. Tanamachi, R. L., H. B. Bluestein, M. Xue, W.-C. Lee, K. A. Orzel, S. J. Frasier, R. M. Wakimoto (2013), "Near-Surface Vortex Structure in a Tornado and in a Sub-Tornado-Strength, Convective-Storm Vortex Observed by a Mobile, W-Band Radar During VORTEX2," , *Mon. Wea. Rev.*, **141**(11), 3661–3690.

14. Farquharson, G., P. López-Dekker, and S. J. Frasier (2013), "Contrast-Based Phase Calibration for Remote Sensing Systems With Digital Beamforming Antennas," *IEEE Trans. Geosci. Remote Sensing*, **51**(3), 1744-1754.

15. Snyder, J. C., H. B. Bluestein, V. Venkatesh, and S. J. Frasier (2013), "Observations of Polarimetric Signatures in Supercells by an X-Band Mobile Doppler Radar," *Mon. Wea. Rev.*, **141**(1), 3–29.

16. Venkatesh, V. and S. J. Frasier (2013), "Simulation of Spaced Antenna Wind Retrieval Performance for an X-band Active Phased Array Weather Radar," *J. Atmos Oceanic Technol.*, **30**(7), 1447–1459.

17. Frasier, S. J., F. Kabeche, J. Figueras i Ventura, H. Al-Sakka, P. Tabary, J. Beck, and O. Bousquet (2013), "In-place Estimation of Wet Radome Attenuation at X-band," *J. Atmos. Oceanic Technol.*, **30**, 917–928.

18. Sapp, J. W., S. J. Frasier, J. Dvorsky, P. S. Chang, and Z. Jelenak (2013), "Airborne Dual-Polarization Observations of the Sea Surface NRCS at C-band in High Winds," *IEEE Geosci. Remote Sensing Lett.*, **10**(4), 726-730.

19. Rocadenbosch, F., S. Frasier, D. Kumar, D. Lange-Vega, E. Gregorio, and M. Sicard (2013), "Backscatter Error Bounds for the Elastic Lidar Two-Component Inversion Algorithm," *IEEE Trans. Geosci. Remote Sensing*, **50**(11), 4791-4803.

20. Sánchez-Barbetty, M., R. W. Jackson, S. J. Frasier (2012), "Interleaved Sparse Arrays for Polarization Control of Electronically Steered Phased Arrays for Meteorological Applications," *IEEE Trans. Geosci. & Remote Sensing*, **50**(4), 1283–1290.

21. Tanamachi, R. L., H. B. Bluestein, J. B. Houser, K. M. Hardwick, and S. J. Frasier (2012), "Mobile X-band polarimetric Doppler radar observations of the 4 May 2007 Greensburg, Kansas tornadic supercell," *Mon. Wea. Rev.*, **140**(7), 21032125.

22. Toporkov, J. V., P. A. Hwang, M. A. Sletten, G. Farquharson, D. Perkovic, S. J. Frasier (2011), "Surface Velocity Profiles in a Vessel's Turbulent Wake Observed by a Dual-Beam Along-Track Interferometric SAR", *IEEE Geosci. & Remote Sensing Lett.*, **8**(4), 602–606.

23. Snyder, J. C., H. B. Bluestein, G. Zhang, S. J. Frasier (2010), "Attenuation Correction and Hydrometeor Classification of High-Resolution, X-band, Dual-Polarized Mobile Radar Measurements in Severe Convective Storms," *J. Atmos. & Oceanic Tech.*, **27**, 1979–2001.

24. McLaughlin, D. and co-authors (2009), "Short-Wavelength Technology and the Potential for Distributed Networks of Small Radar Systems", *Bull. Amer. Meteorol. Soc.*, **90**(12), 1797–1817.

25. Perkovic, D., T. C. Lippmann, S. J. Frasier (2009), "Longshore Surface Currents Measured by Doppler Radar and Video PIV Techniques", *IEEE Trans. Geosci. & Remote Sensing*, **47**(8), 2787–2800.

26. Marmorino, G. O., G. B. Smith, J. V. Toporkov, M. A. Sletten, D. Perkovic, S. J. Frasier (2009), "Airborne imagery of ocean mixed-layer convective patterns", *Deep Sea Res., Part 1*, **56**, 435-441.

27. Contreras, R. F., S. J. Frasier (2008), "High Resolution Observations of Insects in the Atmospheric Boundary Layer", *J. Atmos. & Oceanic Tech.*, **25**, 2176–2187.

28. B. L. Cheong, T.-Y. Yu, R. D. Palmer, K.-F. Yang, M. W. Hoffman, S. J. Frasier, F. J. López-Dekker (2008), "Effects of Wind Field Inhomogeneities on Doppler Beam Swinging Revealed by an Imaging Radar," *J. Atmos. & Oceanic Tech.*, **25**, 1414–1422.

29. Marmorino, G. O., G. B. Smith, J. V. Toporkov, M. A. Sletten, D. Perkovic, S. J. Frasier (2008), "Evolution of ocean slicks under a rising wind", *J. Geophys. Res.*, **113**, C04030.

30. Marmorino, G. O., J. V. Toporkov, G. B. Smith, M. A. Sletten, D. Perkovic, S. J. Frasier, K. P. Judd (2007), "Ocean Mixed-Layer Depth and Current Variation Estimated from Imagery of Surfactant Streaks", *IEEE Geosci. & Remote Sensing Lett.*, **4**(3), 364-367.

31. Bluestein, H. B., M. M. French, R. L. Tanamachi, S. J. Frasier, K. Hardwick, F. Junyent, A. L. Pazmany (2007), "Close-Range Observations of Tornadoes in Supercells Made with a Dual-Polarization, X-Band, Mobile Doppler Radar", *Mon. Weather Rev.*, **135**(4), 1522-1543.

32. Bluestein, H. B., C. C. Weiss, M. M. French, E. M. Holthaus, R. L. Tanamachi, S. J. Frasier, A. L. Pazmany (2007) "The structure of tornadoes near Attica, Kansas on 12 May 2004: High-Resolution Mobile Doppler Radar Observations", *Mon. Weather Rev.*, **135**(2), 475-506.

33. Tulu, Z. C., S. J. Frasier, R. Janaswamy, D. J. McLaughlin (2006), "Considerations for bistatic probing of clear-air winds in the atmospheric boundary layer", *Radio Sci.*, **41**, RS3003.

34. Hao, Y., D. Goeckel, R. Janaswamy, and S. Frasier (2006), "Surface refractive index field estimation from multiple radars," *Radio Sci.*, **41**, RS3002.

35. Esteban-Fernandez, D., J. R. Carswell, S. J. Frasier, P. S. Chang, P. G. Black, F. D. Marks (2006) "Dual Polarized C- and Ku-band Ocean Backscatter Response to Hurricane Force Winds", *J. Geophys Res.*, **111**, C08013.

36. Cheong, B. L., M. W. Hoffman, R. D. Palmer, S. J. Frasier, F. J. López-Dekker, (2006), "Phased-Array Design for Biological Clutter Rejection: Simulation and Experimental Validation", *J. Atmos. & Oceanic Tech.*,**23**, 585-598.

37. Esteban-Fernandez, D., E. A. Kerr, A. Castells, J. R. Carswell, S. J. Frasier, P. Chang, P. Black, F. Marks (2005) "IWRAP: The Imaging Wind and Rain Airborne Profiler for Remote Sensing of the Ocean and Atmospheric Boundary Layer within Tropical Cyclones", *IEEE Trans. Geosci. & Rem. Sensing*, **43**(8), 1,775–1,787, doi:10.1109/TGRS.2005.851640.

38. Toporkov, J. V., D. Perkovic, G. Farquharson, M. A. Sletten, S. J. Frasier (2005) "Sea Surface Vector velocity Retrieval Using Dual-Beam Interferometry: First Demonstration", *IEEE Trans. Geosci. & Remote Sensing*, **43**(11), 2494–2502.

39. Farquharson, G., S. J. Frasier, B. Raubenheimer, and S. Elgar (2005) "Microwave radar cross sections and Doppler velocities measured in the surf zone", *J. Geophys. Res.*, **110**(C12024).

40. Palmer, R. D., B. L. Cheong, M. W. Hoffman, S. J. Frasier, F. J. López-Dekker (2005), "Observations of the Small-Scale Variability of Precipitation using an Imaging Radar", *J. Atmos. & Oceanic Tech.*, **22**(8), 1122-1137.

41. López-Dekker, P., S. J. Frasier (2004) "Radio-Acoustic Sounding with a Volume Imaging Radar", *J. Atmos. & Oceanic Tech.*, **21**(5), 766–776.

42. Farquharson, G., W. N. Junek, A. Ramanathan, S. J. Frasier, R. Tessier, D. J. McLaughlin, M. A. Sletten, J. Toporkov (2004) "A Pod-Based Dual-Beam SAR", *IEEE Geosci. & Remote Sensing Lett.*, **1**(2), 62–65.

43. Sun, J., D.H. Lenschow, S.P. Burns, R. Banta, R.K. Newsom, R. Coulter, S. Frasier, T. Ince, C. Nappo, B.B. Balsley, M. Jensen, L. Mahrt, D. Miller, B. Skelly (2004) "Atmospheric Disturbances that Generate Intermittent Turbulence in Nocturnal Boundary Layers", *Boundary Layer Meteorology*, **110**, 255-279.

44. Cheong, B. L., M. W. Hoffman, R. D. Palmer, S. J. Frasier, and F. J. López-Dekker (2004), "Pulse pair beamforming and the effects of reflectivity field variations on imaging radars", *Radio Sci.*, **39**, RS3014.

45. Puleo, J. A., G. Farquharson, S. J. Frasier, K. T. Holland (2003) "Comparison of optical and radar measurements of surf and swash zone velocity fields", *J. Geophys Res.*, **108**(C3), 3100.

46. Ince, T., S. J. Frasier, A. Muschinski, A. L. Pazmany (2003), "An S-band Frequency Modulated Continuous-Wave Boundary Layer Profiler: Description and Initial Results", *Radio Sci.*, **38**(4), 1072.

47. Camps, A., F. Torres, P. López-Dekker, and S. J. Frasier (2003) "Redundant Space Calibration of Hexagonal and Y-shaped Beamforming Radars and Interferometric Radiometers", *Int. J. Remote Sensing*, **20**(24), 5183-5196.

48. Eshbaugh, J. V., S. J. Frasier (2002) "Measurement of Sea Surface Displacement with Interferometric Radar", *J. Atmos. & Oceanic Tech.*, **19**, 1087-1095.

49. Frasier, S. J., A. J. Camps (2001) "Dual-Beam Interferometry for Ocean Surface Current Vector Mapping", *IEEE Trans. Geosci. & Rem. Sensing*, **39**(2), 401-414.

50. Moller, D., P. D. Mourad, S. J. Frasier (2000) "Field Observations of Radar Backscatter from the Ocean Surface under Low Wind Speed Conditions", *J. Geophys. Res.*, **105**(C10), 24,059-24,069.

51. Sun, J., S. P. Burns, D. H. Lenschow, R. Banta, R. Newsom, R. Coulter, S. Frasier, T. Ince, C. Nappo, J. Cuxart, W. Blumen, X. Lee, X-Z. Hu, (2000) "Intermittent Turbulence Associated with a Density Current Passage in the Stable Boundary Layer", *Boundary Layer Meteorology*, **105**, 199-219.

52. Pollard, B. D., S. Khanna, S. J. Frasier, J. C. Wyngaard, D. W. Thomson, R. E. McIntosh (2000) "Local Structure of the Convective Boundary Layer from a Volume-Imaging Radar", *J. Atmos. Sci.*, **57**, 2,281-2,296.

53. Frasier, S. J., Y. Liu, R. E. McIntosh (1998) "Space-time Properties of Radar Sea Spikes and their Relation to Wind and Wave Conditions", *J. Geophys. Res*, **103**(C9), 18,745-18,757.

54. Liu, Y., S. J. Frasier, R. E. McIntosh (1998) "Measurement and Classification of Low Grazing Angle Radar Sea-Spikes", *IEEE Trans. Antennas & Prop.*, **46**(1), 27–40.

55. Moller, D., S. J. Frasier, D. L. Porter, R. E. McIntosh (1998) "Radar-Derived Interferometric Surface Currents and their Relationship to Subsurface Current Structure", *J. Geophys. Res.*, **103**(C6), 12,839-12,852.

56. Frasier, S. J., R. E. McIntosh (1996) "Observed Wavenumber-Frequency Properties of Microwave Backscatter from the Ocean Surface at Near-Grazing Angles", *J. Geophys. Res.*, **101**(C8), 18,391–18,407.

57. Frasier, S., Y. Liu, D. Moller, R. E. McIntosh, and C. Long (1995) "Directional Ocean Wave Measurements in a Coastal Setting Using a Focused Array Imaging Radar," *IEEE Trans. Geosci. & Remote Sensing*, **33**(2), 428-440.

58. McIntosh, R. E., S. J. Frasier, and J. B. Mead (1995) "FOPAIR: A Focussed Phased Array Imaging Radar for Ocean Remote Sensing," *IEEE Trans. Geosci. & Remote Sensing*, **33**(1), 115-124.

Professional Activities

1. Senior Member, IEEE; Member, American Geophysical Union (AGU), International Union of Radio Science (URSI) Commission F, American Meteorological Society (AMS).

2. co-Chair, Airborne Phased Array Radar (APAR) Advisory Panel, National Center for Atmospheric Research, 2015-2018.

3. Member, AMS Committee on Radar Meteorology, 2008-2013; Member, Technical Program Committee, 36th Conference on Radar Meteorology, 2013; Topic Lead: New and Emerging Technology, 38th Conference on Radar Meteorology, 2017.

4. Chair, drafting committee for AMS Policy Statement on Radio Frequency Allocations for Meteorological Operations and Research, 2009.

5. Associate Editor,*IEEE Trans. Geosci & Remote Sensing* 2010-present; *Radio Science*, 2003-2010; IEEE Geoscience and Remote Sensing Society Newsletter, 2000-2004.

6. Member, Technical Program Committee, 2000 USNC/URSI National Radio Science Meeting.

7. Member, Technical Program Committee, 1996 International Geoscience and Remote Sensing Symposium (IGARSS'96).

8. Guest Associate Editor, *IEEE Trans. Geosci Remote Sensing* Special Issue: Remote Sensing for a Sustainable Future;

9. Reviewer for *IEEE Trans. Geosci. & Remote Sensing, IEEE Trans. Antennas & Propagation, IEEE J. Oceanic Eng., J. Geophys. Res., J. Atmos. & Oceanic Tech.*; Reviewer of proposals to NSF, NASA, DOE, USDA, National Oceanographic Partnership Program (NOPP), and US Civilian Research & Development Foundation (CRDF).

Honors and Awards

Army Research Office Young Investigator Program (YIP) Award, 1998.
NRL Alan Berman Research Publication Award for *Puleo et al., (2003)*.
NRL Alan Berman Research Publication Award for *Toporkov et al., (2005)*.
Keynote, 7th European Conference on Radar in Meteorology and Hydrology, 2012.
Provost Exceptional Merit Award, U. Massachusetts, 2013.

Ph.D. Dissertations Supervised (14)

1. James V. Eshbaugh (2000), now with MIT Lincoln Laboratories, Lexington, MA.

2. Jie Li (2001), now with Eaton VORAD Technologies.

3. Türker İnce (2001), now with Izmir University of Economics, Izmir, Turkey.

4. Francisco J. López-Dekker (2003), now with Technical University of Delft, Delft, NL.

5. Daniel Esteban-Fernandez (2004), now with NASA Jet Propulson Laboratory, Pasadena, CA.

6. Gordon Farquharson (2004), now with Capella Space, Palo Alto, CA.

7. Francesc Junyent-López (2007), now with Colorado State University, Ft. Collins, CO.

8. Dragana Perkovic (2008), now with NASA Jet Propulsion Laboratory, Pasadena, CA.

9. Vijay Venkatesh (2013), now with NASA Jet Propulsion Laboratory, Pasadena, CA.

10. Krzysztof Orzel (2014), now with Synspective, Tokyo, Japan.

11. Joseph Sapp (2015), now with Global Science and Technology, Inc., Greenbelt, MD.

12. Robert Palumbo (2016), now with Raytheon Technologies, Marlborough, MA.

13. William Heberling (2022), now with Crane Aerospace and Electronics, W. Caldwell, NJ.

14. Jezabel Vilardell Sanchez, in progress.

M.S. Theses Supervised (20)

Fei Kong (1999), Fei Wang (2000), Joan Capdevila (2001), Apoorva Bajaj (2003), William Junek (2003), Elizabeth Kerr (2005), Zeynep Tulu (2005), Kery Hardwick (2007), Gita Pathak (2008), Tao Chu (2008), John McManus (2008), Iva Kostadinova (2009), Brian Paulsen (2011), Jason Dvorsky (2012), Chad Baldi (2014), Lauren Masiunas (2014), Sheila Werth (2016), Joseph Waldinger (2018), Jezabel Vilardell Sanchez (2019), Casey Wolsieffer (2021).