CURRICULUM VITAE

James H. Churnside

NOAA Earth System Research Laboratory, CDS3
325 Broadway
Boulder, CO 80305[1]

phone: (303) 497-6744
fax: (303) 497-5318
email: james.h.churnside@noaa.gov

Education

Ph.D. - Physics, Oregon Graduate Center (now Oregon Health and Science University), Beaverton, Oregon 1978

B.S. - Physics, Mathematics and Computer Science, Whitworth College, Spokane, Washington 1974

Selected Awards

Atomic Energy Commission Fellowship, 1973
Magna Cum Laude, Whitworth College, 1974
Wilson Clark Fellowship, 1976-1977
Distinguished Authorship Award, U.S. Dept. of Commerce, 1989 and 1998
Howard Vollum Prize, Oregon Graduate Institute, 1990
US Department of Commerce Bronze Medal, 1996 and 2007
World Meteorological Organization Vilho Vaisala Award, 2001
NOAA Administrator's Award, 2002
US Department of Commerce Silver Award, 2004
SPIE George W. Goddard Award, 2011
NOAA Distinguished Career Award, 2020

Professional Societies

Fellow, Optical Society of America
Atmospheric and Oceanic Optics Technical Group Vice Chair, 1990-1991, Chair, 1992-1993; Allen Prize Committee Member, 1993-1995, Chair, 1995
Fellow, SPIE
Member, American Geophysical Union
Member, The Oceanographic Society

Recent Service Activities

Associate Editor, *Optics Express*, 2011 – 2014
Editorial Board, *Remote Sensing*, 2009 – 2014
Editorial Board, *Sensors*, 2009 – 2014
Guest Editor, Special Issue of *Sensors*, 2009
Session Co-Chair, Ocean Sciences Meeting, 2012
Program Committee, SPIE Conference Ocean Sensing and Monitoring, 2012-2015
Science Steering Group, US Navy Advanced Sensor Applications Program, 2006 – present
Co-chair, International Council for the Exploration of the Seas Study Group on Fisheries Optical Technologies, 2008 - 2010

Research Interests

The interaction light with geophysical fluids, and the applications of those interactions for remote sensing of the atmosphere and oceans. Of special interest are the characteristics of light scattered from the ocean surface and upper ocean and applications to remote sensing of phytoplankton, zooplankton, and epipelagic fish schools. Additional interests include the effects of subsurface phytoplankton layers on oceanic primary productivity and on the export of carbon to the deep ocean.

Experience

2019 to 2020 — Senior Research Scientist, Cooperative Institute for Research in the Environmental Sciences, University of Colorado and NOAA Earth System Research Laboratory

Continued work on airborne oceanographic lidar.

2001 to 2019 — Physicist
NOAA Earth System Research Laboratory (Environmental Technology Laboratory before October 1, 2005)

Developed airborne lidar for studies of ocean optics and for fisheries research, including detection of plankton. Made first comparisons of spatial distributions of several fish species made by airborne lidar with those made by standard ship-based techniques. Demonstrated that thin plankton layers can exist in the open ocean, including in the marginal ice zone in the Arctic. Documented the existence of high concentrations of debris in the North Pacific subtropical convergence zone.

1991 to 2001 — Chief, Ocean Remote Sensing Division
NOAA Environmental Technology Lab., Boulder, Colorado

Managed a division of approximately 35 scientific and support staff and

performed personal research in ocean optics. Made first optical measurements of the fractal dimension of sea-surface roughness. Made first measurements of high-resolution infrared spectral radiance in the tropics.

1985 to 1991 — Physicist
NOAA Wave Propagation Lab., Boulder, Colorado (CIRES Jan.-Aug., 1085)

Developed theory for probability-density function of optical irradiance in the turbulent atmosphere and verified experimentally. Measured enhanced backscatter effect in the turbulent atmosphere. Measured atmospheric turbulence effects on the risk of eye damage from lasers in the open atmosphere.

1979 to 1985 — Member of the Technical Staff
The Aerospace corporation, Los Angeles, California

Invented novel laser Doppler velocimeter. Developed and experimentally verified theory of laser speckle from a rotating target. Developed theory of second-harmonic generation on partially coherent light.

1978 to 1979 — Postdoctoral Research Associate
Oregon Graduate Center, Beaverton, Oregon

Measured statistics of irradiance for laser speckle plus glint after propagation through refractive turbulence in the atmosphere.

1974 to 1978 — Research Assistant - Ph.D. Thesis Research
Oregon Graduate Center, Beaverton, Oregon

Publications

1. James H. Churnside and Charles M. McIntyre, "Averaged Threshold Receiver for Direct Detection of Optical Communications through the Lognormal Atmospheric Channel," Appl. Opt. **16** 2669-2676 (1977).

2. James H. Churnside and Charles M. McIntyre, "Signal Current Probability Distribution for Optical Heterodyne Receivers in the Turbulent Atmosphere. 1: Theory," Appl. Opt. **17**, 2141-2147 (1978).

3. James H. Churnside and Charles M. McIntyre, "Signal Current Probability Distribution for Optical Heterodyne Receivers in the Turbulent Atmosphere. 2: Experiment," Appl. Opt. **17**, 2148-2152 (1978).

4. James H. Churnside and Charles M. McIntyre, "Partial Tracking Optical Heterodyne Receiver Arrays," J. Opt. Soc. Am. **68**, 1672-1675 (1978).

5. James H. Churnside and Charles M. McIntyre, "Joint Signal Current Probability Distribution for Optical Heterodyne Receiver Arrays in the Turbulent

Atmosphere," Appl. Opt. **18**, 2315-2322 (1979).

6. C. M. McIntyre, M. H. Lee, J. R. Kerr, and J. H. Churnside, "Enhanced Variance of Irradiance from Target Glint," Appl. Opt. **18**, 3211-3212 (1979).

7. James H. Churnside and Charles M. McIntyre, "Heterodyne Receivers for Atmospheric Optical Communications," Appl. Opt. **19**, 582-590 (1980).

8. C. M. McIntyre, M. H. Lee, and J. H. Churnside, "Statistics of Irradiance from a Diffuse Target Containing Multiple Glints," J. Opt. Soc. Am. **70**, 1084-1095 (1980).

9. James H. Churnside, "Optical Communications through a Dispersive Medium: A Performance Bound for Photocounting," Appl. Opt. **20**, 573-578 (1981).

10. J. H. Churnside and H. T. Yura, "Velocity Measurement using Laser Speckle Statistics," Appl. Opt. **20**, 3539-3541 (1981).

11. J. H. Churnside and H. T. Yura, "Laser Vector Velocimetry: A 3-D Technique." Appl. Opt. **21**, 845-850 (1982).

12. J. H. Churnside, "Speckle from a Rotating Diffuse Object," J. Opt. Soc. Am. **72**, 1464-1469 (1982).

13. J. H. Churnside and H. T. Yura, "Speckle Statistics of Atmospherically Backscattered Laser Light," Appl. Opt. **22**, 2559-2565 (1983).

14. James H. Churnside, "Laser Doppler Velocimetry by Modulating a CO_2 Laser with Backscattered Light," Appl. Opt. **23**, 61-66 (1984).

    also reprinted in *Selected Papers on Interference, Interferometry, and Interferometric Metrology*, P. Hariharan and D. Malacara, eds. (SPIE Optical Engineering Press, Bellingham, Washington, 1995).

15. James H. Churnside, "Signal-to-Noise in a Backscatter Modulated Doppler Velocimeter," Appl. Opt. **23**, 2097-2106 (1984).

16. James H. Churnside, "Second Harmonic Generation using Partially Coherent Light," Opt. Commun. **51**, 207-212 (1984).

    also reprinted in *Selected Papers on Resonant and Collective Phenomena in Quantum Optics*, G. S. Agarwal, ed. (SPIE Optical Engineering Press, Bellingham, Washington, 1994).

17. J. H. Churnside, M. T. Tavis, H. T. Yura, and G. A. Tyler, "Zernike Polynomial Expansion of Turbulence Induced Centroid Anisoplanatism," Opt. Lett. **10**, 258-

260 (1985).

18. James H. Churnside, "Speckle Correlation Measurements using Clipped Intensity Signals," Appl. Opt. **24**, 2488-2489 (1985).

19. James H. Churnside and R. J. Hill, "Probability Density of Irradiance Scintillations for Strong Path-Integrated Refractive Turbulence," J. Opt. Soc. Am. A, **4** 727-733 (1987).

20. S. F. Clifford and James H. Churnside, "Refractive Turbulence Profiling using Synthetic Aperture Spatial Filtering of Scintillation," Appl. Opt. **26**, 1295-1303 (1987).

21. James H. Churnside and Richard J. Lataitis, "Angle-of-Arrival Fluctuations of a Reflected Beam in Atmospheric Turbulence," J. Opt. Soc. Am. A **4**, 1264-1272 (1987).

22. James H. Churnside and Steven F. Clifford, "The Lognormal-Rician Probability Density Function of Optical Scintillations in the Turbulent Atmosphere," J. Opt. Soc. Am. A **4**, 1923-1930 (1987).

23. R. J. Hill and J. H. Churnside, "Measured Statistics of Optical Scintillation in Strong Refractive Turbulence Relevant to Laser Eye Safety," Health Phys. **53**, 639-647 (1987).

24. Reginald J. Hill and James H. Churnside, "Observational Challenges of Strong Scintillations of Irradiance, "J. Opt. Soc. Am. A **5**, 445-447 (1988).

25. James H. Churnside, Richard J. Lataitis, and Robert S. Lawrence, "Localized Measurements of Refractive Turbulence using Spatial Filtering of Scintillations," Appl. Opt. **27**, 2199-2213 (1988).

26. James H. Churnside and Steven F. Clifford, "Refractive Turbulence Profiling using Stellar Scintillation and Radar Wind Profiles," Appl. Opt. **27**, 4884-4890 (1988).

27. James H. Churnside, "Angle-of-Arrival Fluctuations of Retroreflected Light in the Turbulent Atmosphere," J. Opt. Soc. Am. A **6**, 275-279 (1989).

28. James H. Churnside, Reginald J. Hill, Giuliano Conforti, and Anna Consortini, "Aperture-Size and Bandwidth Requirements for Measuring Strong Scintillation in the Atmosphere," Appl. Opt. **28**, 4126-4132 (1989).

29. R. G. Frehlich and James H. Churnside, "Statistical Properties of Estimates of the Moments of Laser Scintillation," J. Mod. Opt. **36**, 1645-1659 (1989).

30. James H. Churnside and R. G. Frehlich, "Experimental Evaluation of the Log-Normally Modulated Rician and IK Models of Optical Scintillation in the Atmosphere," J. Opt. Soc. Am. A **6**, 1760-1766 (1989).

31. James H. Churnside, "Joint Probability Density Function of Irradiance Scintillations in the Turbulent Atmosphere," J. Opt. Soc. Am. **6**, 1931-1940 (1989).

32. James H. Churnside, "A Spectrum of Refractive Turbulence in the Turbulent Atmosphere," J. Mod. Opt. **37**, 13-16 (1990).

33. James H. Churnside and Richard J. Lataitis, "Wander of an Optical Beam in the Turbulent Atmosphere," Appl. Opt. **29**,926-930 (1990).

34. J. H. Churnside and E. P. Gordov, "Sensitive Absorption Measurements using Amplitude Squeezed Light," Atmos. Opt. **4**,131-136 (1991).

35. James H. Churnside, "Aperture Averaging of Optical Scintillations in the Turbulent Atmosphere," Appl. Opt. **30**, 1982-1994 (1991)

36. James H. Churnside and Phillip A. McGillivary, "Optical Properties of Several Pacific Fishes," Appl. Opt. **30**, 2925-2927 (1991).

37. James H. Churnside, Richard J. Lataitis, and James J. Wilson, "Two-Color Correlation of Atmospheric Scintillation," Appl. Opt. **31**, 4285-4290 (1992).

38. James H. Churnside and A. Jay Palmer, "Δk Lidar Sensing of Surface Waves in a Wave Tank," Appl. Opt. **32**, 339-342 (1993).

39. James H. Churnside and James J. Wilson, "Enhanced Backscatter of a Reflected Beam in Atmospheric Turbulence," Appl. Opt. **32**, 2651-2655 (1993).

40. E. P. Gordov, V. M. Orlovskii, A. G. Poteryaev, A. V. Khachaturyan, and J. H. Churnside, "Hybrid Autodyne Lidar," Atmos. Ocean. Opt. **6**, 267-269 (1993).

41. A. Consortini, F. Cochetti, J. H. Churnside, and R. J. Hill, "Inner-Scale Effect on Irradiance Variance Measured for Weak-to-Strong Atmospheric Scintillation," J. Opt. Soc. Am. A. **10**, 2354-2362 (1993).

42. J. H. Churnside, "Image Jitter, Blur, and Scintillation Regarding the Retinal Hazards of Lasers," Health Phys. **66**, 159-162 (1994).

43. J. H. Churnside, T. A. Stermitz, and J. A. Schroeder, "Temperature Profiling with Neural Network Inversion of Microwave Radiometer Data," J. Atmos. Oceanic. Technol. **7**, 105-109 (1994).

44. J. H. Churnside and S. G. Hanson, "Effect of Penetration Depth and Swell-Generated Tilt on Delta-k Lidar Performance," Appl. Opt. **33**, 2363-2368 (1994).

45. S. G. Hanson, J. H. Churnside, and J. J. Wilson, "Remote Sensing of Wind Velocity and Strength of Refractive Turbulence using a Two-Spatial-Filter Receiver," Appl. Opt. **33**, 5859-5868 (1994).

46. J. H. Churnside, S. G. Hanson, and J. J. Wilson, "Determination of Ocean Wave Spectra from Images of Backscattered Incoherent Light," Appl. Opt. **34**, 962-968 (1995).

47. J. A. Shaw, J. B. Snider, J. H. Churnside, and M. D. Jacobson, "Comparison of Infrared Atmospheric Brightness Temperatures Measured by a Fourier Transform Spectrometer and a Filter Radiometer," J. Atmos. Oceanic. Technol. **12**, 1124-1128 (1995).

48. Y. Han, J. A. Shaw, J. H. Churnside, P. D. Brown, and S. A. Clough, "Infrared Spectral Radiance Measurements in the Tropical Pacific Atmosphere," J. Geophys. Res. **102**, 4353-4356 (1997).

49. J. A. Shaw and J. H. Churnside, "Fractal Laser Glints from the Ocean Surface," J. Opt. Soc. Am. A **14**, 1144-1150 (1997).

50. J. A. Shaw and J. H. Churnside, "Scanning-Laser Glint Measurements of Sea-Surface Slope Statistics," Appl. Opt. **36**, 4202-4213 (1997).

51. J. H. Churnside, J. J. Wilson, and V. V. Tatarskii, "Lidar Profiles of Fish Schools," Appl. Opt. **36**, 6011-6020 (1997).

52. J. H. Churnside, V.V. Tatarskii, and J. J. Wilson, "Oceanographic Lidar Attenuation Coefficients and Signal Fluctuations Measured from a Ship in the Southern California Bight," Appl. Opt. **37**, 3105-3112 (1998).

53. C. M. R. Platt, S. A. Young, P. J. Manson, G. R. Patterson, S. C. Marsden, R. T. Austin, and J. H. Churnside, "The Optical Properties of Equatorial Cirrus from Observations in the ARM Pilot Radiation Observation Experiment," J. Atmos. Sci. **55**, 1977-1996 (1998).

54. E. R. Westwater, Y. Han, J. B. Snider, J. H. Churnside, J. A. Shaw, M. J. Falls, C. N. Long, T. P. Ackerman, K. S. Gage, E. Ecklund, and A. Riddle, "Ground-Based Remote Sensor Observations during PROBE in the Tropical Western Pacific," Bull. Am. Meteor. Soc. **80**, 257-270 (1999).

55. K. Mitra and J. H. Churnside, "Transient Radiative Transfer Equation Applied to Oceanographic Lidar," Appl. Opt. **38**, 889-895 (1999).

56. J. A. Shaw, J. J. Bates, H. M. Zorn, and J. H. Churnside, "Observations of Downwelling Infrared Spectral Radiance at Mauna Loa, Hawaii during the 1997-1998 ENSO Event," Geophys. Res. Lett. **26**, 1727-1730 (1999).

57. H. M. Zorn, J. H. Churnside, and C. W. Oliver, "Laser Safety Thresholds for Cetaceans and Pinnipeds," Marine Mammal Sci. **16**, 186-200 (2000).

58. N. C. H. Lo, J. R. Hunter, and J. H. Churnside, "Modeling Statistical Performance of an Airborne Lidar Survey for Anchovy", Fish. Bull. **98**, 264-282 (2000).

59. J. H. Churnside, J. J. Wilson, and V. V. Tatarskii, "Airborne Lidar for Fisheries Applications," Opt. Eng. **40**, 406-414 (2001).

60. J. H. Churnside, K. Sawada, and T. Okumura, "A Comparison of Airborne Lidar and Echo Sounder Performance in Fisheries," J. Marine Acoust. Soc. Jpn. **28**, 49-61 (2001).

61. J. A. Shaw, D. Cimini, E. R. Westwater, Y. Han, H. M. Zorn, and J. H. Churnside, "Scanning Infrared Radiometer for Measuring the Air-Sea Temperature Difference," Appl. Opt. **40**, 4807-4815 (2001).

62. E. D. Brown, J. H. Churnside, R. L. Collins, T. Veenstra, J. J. Wilson, and K. Abnett, "Remote Sensing of Capelin and Other Biological Features in the North Pacific Using Lidar and Video Technology," ICES J. Mar. Sci. **59**, 1120–1130 (2002).

63. J. H. Churnside, D. A. Demer, and B. Mahmoudi, "A Comparison of Lidar and Echosounder Measurements of Fish Schools in the Gulf of Mexico," ICES J. Mar. Sci. **60**, 147–154 (2003).

64. D. Cimini, J. A. Shaw, E. R. Westwater, Y. Han, V. Irisov, V. Leuski, and J. H. Churnside, "Air temperature profile and air/sea temperature difference measurements by infrared and microwave scanning radiometers," Radio Sci. **38**, 8045-8063. doi:10.1029/2002RS002632 (2003).

65. J. H. Churnside and J. J. Wilson, "Airborne lidar imaging of salmon," Appl. Opt. **43**, 1416-1424 (2004).

66. J. H. Churnside and L. A. Ostrovsky, "Lidar observation of a strongly nonlinear internal wave train in the Gulf of Alaska," Int. J. Remote Sens. **26**, 167-177 (2005).

67. J. A. Shaw, N. L. Seldomridge, D. L. Dunkle, P. W. Nugent, L. H. Spangler, J. J. Bromenshenk, C. B. Henderson, J. H. Churnside, and J. J. Wilson, "Polarization lidar measurements of honey bees in flight for locating land mines," Opt. Express **13**, 5853-5856 (2005).

68. E. J. Walsh, M. L. Banner, J. H. Churnside, J. A. Shaw, D. C. Vandemark, C. W. Wright, J. B. Jensen, and S. Lee, "Visual demonstration of three-scale sea-surface roughness under light wind conditions," IEEE Trans. Geosci. Remote Sens. **43**, 1751-1762 (2005).

69. J. H. Churnside and R. E. Thorne, "Comparison of airborne lidar measurements with 420 kHz echo-sounder measurements of zooplankton," Appl. Opt. **44**, 5504-5511 (2005).

70. E. Tenningen, J. H. Churnside, A. Slotte, and J. J. Wilson, "Lidar target-strength measurements on Northeast Atlantic mackerel (*Scomber scombrus*)," ICES J. Mar. Sci.

63, 677-682 (2006).

71. D. W. Fahey, J. H. Churnside, J. W. Elkins, A. J. Gasiewski, K. H. Rosenlof, S. Summers, M. Aslaksen, T. A. Jacobs, J. D. Sellars, C. D. Jennison, L. C. Freudinger, and M. Cooper, "Altair unmanned aircraft system achieves demonstration goals," EOS **87**, 197-201 (2006).

72. J. H. Churnside and J. W. Wilson, "Power spectrum and fractal dimension of laser backscattering from the ocean," J. Opt. Soc. Am. A **23**, 2829-2833 (2006).

73. P. Carrera, J. H. Churnside, G. Boyra, V. Marques, C. Scalabrin and A. Uriarte, "Comparison of airborne lidar with echosounders: a case study in the coastal Atlantic waters of southern Europe," ICES J. Mar. Sci. **63**, 1736-1750 (2006).

74. W. G. Pichel, J. H. Churnside, T. S. Veenstra, D. G. Foley, K. S. Friedman, R. E. Brainard, J. B. Nicoll, Q. Zheng, and P. Clemente-Colon, "Marine debris collects within the north Pacific subtropical convergence zone," Mar. Pollut. Bull. **54**, 1207-1211 (2007).

75. J. H. Churnside, "Polarization effects on oceanographic lidar," Opt. Express **16**, 1196-1207 (2008).

76. J. H. Churnside and J. J. Wilson, "Ocean color inferred from radiometers on low-flying aircraft," Sensors **8**, 860-876 (2008).

77. J. H. Churnside, H. E. Bravo, K. A. Naugolnykh, and I. M. Fuks, "Effects of underwater sound and surface ripples on scattered laser light," Acoustic. J. **54**, 244-250 (2008) (in Russian). *and* Acoust. Phys. 54, 204-209 (2008) (in English).

78. J. H. Churnside, L. Ostrovsky, and T. Veenstra, "Thermal footprints of whales," Oceanography **22**, 206-209 (2009).

79. J. H. Churnside and P. L. Donaghay, "Thin scattering layers observed by airborne lidar," ICES J. Mar. Sci. **66,** 778-789 (2009).

80. J. H. Churnside, E. Tenningen, and J. J. Wilson, "Comparison of data-processing algorithms for the lidar detection of mackerel in the Norwegian Sea," ICES J. Mar. Sci. **66,** 1023-1028 (2009). doi:10.1093/icesjms/fsp026

81. J. H. Churnside, D. A. Demer, D. Griffith, R. L. Emmett, and R. D. Brodeur, "Comparisons of lidar, acoustic and trawl data on two scales in the northeast Pacific Ocean," CalCOFI Rep. **50**, 118-122 (2009).

82. J. H. Churnside, "Lidar signature from bubbles in the sea," Opt. Express **18**, 8294-8299 (2010).

83. M. A. Montes-Hugo, J. H. Churnside, R. W. Gould, R. A. Arnone, and R. Foy, "Spatial coherence between remotely sensed ocean color data and vertical distribution of lidar

backscattering in coastal stratified waters," Remote Sens. Environ. **114,** 2584-2593 (2010). DOI: 10.1016/j.rse.2010.05.023.

84. J. H. Churnside, A. F. Sharov, and R. A. Richter, "Aerial surveys of fish in estuaries: a case study in Chesapeake Bay," ICES J. Mar. Sci. **68**, 239-244 (2011). doi:10.1093/icesjms/fsq138

85. J. H. Churnside, E. D. Brown, S. Parker-Stetter, J. K. Horne, G. L. Hunt Jr., N. Hillgruber, M. F. Sigler, and J. J. Vollenweider, "Airborne remote sensing of a biological hot spot in the southeastern Bering Sea," Remote Sens. **3**, 621-637 (2011).

86. M. A. Montes, J. H. Churnside, Z. Lee, R. Gould, R. Arnone, and A. Weidemann, "Relationships between water attenuation coefficients derived from active and passive remote sensing: a case study from two coastal environments," Appl. Opt. **50**, 2990-2999 (2011). *Reprinted in:* Virtual Journal for Biomedical Optics **6** (2011).

87. D. C. Reese, R. T. O'Malley, R. D., Brodeur, and J. H. Churnside, "Epipelagic fish distributions in relation to thermal fronts in a coastal upwelling system using high-resolution remote-sensing techniques," ICES J. Mar. Sci. **68**, 1865–1874 (2011).

88. M. Montes-Hugo, R. Arnone, J. Churnside, R. Gould, E. Jarosz, and A. Weidemann, "Ocean color patterns help to predict depth of optical layers in stratified coastal waters," J. Appl. Remote Sens. **5**, 053548 (2011). doi:10.1117/1.3634055

89. William G. Pichel, Timothy S. Veenstra, James H. Churnside, Elena Arabini, Karen S. Friedman, David G. Foley, Russell E. Brainard, Dale Kiefer, Simeon Ogle, Pablo Clemente-Colón, and Xiaofeng Li, "GhostNet marine debris survey in the Gulf of Alaska – Satellite guidance and aircraft observations," Mar. Pollut. Bull. **65**, 28-41 (2012).

90. Timothy S. Veenstra and James H. Churnside, "Airborne sensors for detecting large marine debris at sea," Mar. Pollut. Bull. **65**, 63-68 (2012).

91. J. H. Churnside, R. D. Marchbanks, J. H. Lee, J. A. Shaw, A. Weidemann, and P. L. Donaghay, "Airborne lidar detection and characterization of internal waves in a shallow fjord," J. Appl. Remote Sens. **6**, 063611 (2012). Top Download from SPIE Journals and Proceedings, Remote Sensing, April 5, 2013.

92. J. H. Lee, J. H. Churnside, R. D. Marchbanks, P. L. Donaghay, and J. M. Sullivan, "Oceanographic lidar profiles compared with *in situ* optical measurements," Appl. Opt. **52**, 786-794 (2013). *Reprinted in:* Virtual Journal for Biomedical Optics **8** (2013).

93. J. Churnside, B. McCarty and X. Lu, "Subsurface Ocean Signals from an Orbiting Polarization Lidar," Remote Sens. **5**(7), 3457-3475 (2013).

94. J. H. Churnside, "Review of profiling oceanographic lidar," Opt. Engineer. **53**, 051405-051405 (2014).

95. J. H. Churnside, J. M. Sullivan, and M. S. Twardowski, "Lidar extinction-to-backscatter ratio of the ocean," Opt. Express **22**, 18698-18706 (2014). *Reprinted in:* Virtual Journal for Biomedical Optics **9** (2014).

96. X. Lu, Y. Hu, C. Trepte, S. Zeng, and J. H. Churnside, "Ocean subsurface studies with the CALIPSO spaceborne lidar," J. Geophys. Res.: Oceans **119**, 4305-4317 (2014).

97. J. H. Churnside, K. Naugolnykh, and R.D. Marchbanks, "Optical remote sensing of sound in the ocean," J. Appl. Remote Sens. **9**, 096038-096038 (2015).

98. J.H. Churnside and R.D. Marchbanks, "Sub-surface plankton layers in the Arctic Ocean," Geophys. Res. Lett. **42**, 4896–4902 (2015).

99. J. H. Churnside, "Bio-optical model to describe remote sensing signals from a stratified ocean," J. Appl. Remote Sens. **9**, 095989-095989 (2015).

100. J. H. Churnside, R. D. Marchbanks, P. L. Donaghay, J. M. Sullivan, W. M. Graham and R. J. D. Wells, "Hollow aggregations of moon jellyfish (*Aurelia spp*.)," J. Plankton Res. **38**(1), 122-130 (2016).

101. M. R. Roddewig, N. J. Pust, J. H. Churnside, and J. A. Shaw, "Dual-polarization airborne lidar for freshwater fisheries management and research," Opt. Eng. **56**, 031221-031221 (2017).

102. J. H. Churnside, R. D. Marchbanks, C. Lembke, and J. Beckler, "Optical Backscattering Measured by Airborne Lidar and Underwater Glider," Remote Sens. **9**, 379 (2017).

103. J. H. Churnside, R. J. D. Wells, K. M. Boswell, J. A. Quinlan, R. D. Marchbanks, B. J. McCarty, and T. T. Sutton, "Surveying the distribution and abundance of flying fishes and other epipelagics in the northern Gulf of Mexico using airborne lidar," Bull. Mar. Sci. **93**, 591-609 (2017).

104. J. H. Churnside and R. D. Marchbanks, "Inversion of oceanographic profiling lidars by a perturbation to a linear regression," Appl. Opt. **56**, 5228-5233 (2017).

105. M. R. Roddewig, J. H. Churnside, and J. A. Shaw, "Airborne lidar detection of an underwater thermal vent," J. Appl. Remote Sens. **11**(3), 036014 (2017), doi: 10.1117/1.JRS.11.036014.

106. M. R. Roddewig, J. H. Churnside, F. R. Hauer, J. Williams, P. E. Bigelow, T. M. Koel, and J. A. Shaw, "Airborne lidar detection and mapping of invasive lake trout in Yellowstone Lake," Appl. Opt. **57**, 4111-4116 (2018).

107. J. H. Churnside, J. W. Hair, C. A. Hostetler and A. J. Scarino, "Ocean backscatter profiling using high-spectral-resolution lidar and a perturbation retrieval," Remote Sens. **10** (12), 2003 (2018).

108. T. S. Moore, J. H. Churnside, J. M. Sullivan, M. S. Twardowski, A. R. Nayak, M. N. McFarland, N. D. Stockley, R. W. Gould, T. H. Johengen, and S. A. Ruberg, "Vertical distributions of blooming cyanobacteria populations in a freshwater lake from LIDAR observations," Remote Sens. Environ. **225**, 347-367 (2019).

109. J. H. Churnside and R. D. Marchbanks, "Calibration of an airborne oceanographic lidar using ocean backscattering measurements from space," Opt. Express **27**, A536-A542 (2019).

110. Cédric Jamet, Amir Ibrahim, Ziauddin Ahmad, Federico Angelini, Marcel Babin, Michael J Behrenfeld, Emmanuel Boss, Brian Cairns, James Churnside, Jacek Chowdhary, Anthony Davis, Davide Dionisi, Lucile Dufôret-Gaurier, Bryan A Franz, Robert J Frouin, Meng Gao, Deric Gray, Otto Hasekamp, Xianqiang He, Chris Hostetler, Olga Kalashnikova, Kirk Knobelspiesse, Léo Lacour, Hubert Loisel, Vanderlei Martins, Eric Rehm, Lorraine Ann Remer, Idriss Sanhaj, Knut Stamnes, Snorre Stamnes, Stéphane Victori, Jeremy Werdell, Peng-Wang Zhai, "Going Beyond Standard Ocean Color Observations: Lidar and Polarimetry," Frontiers in Marine Science **6**, 251 (2019).

111. J. H. Churnside and J. A. Shaw, "Lidar remote sensing of the aquatic environment: invited," Appl. Opt. **59,** C92-C99 (2020).

112. M. R. Roddewig, J. H. Churnside, and J. A. Shaw, "Lidar measurements of the diffuse attenuation coefficient in Yellowstone Lake," Appl. Opt. **59,** 3097-3101 (2020).

113. J. H. Churnside, R. D. Marchbanks, S. Vagle, S. W. Bell, and P. J. Stabeno, "Stratification, plankton layers, and mixing measured by airborne lidar in the Chukchi and Beaufort seas." Deep Sea Res. II **177,** 104742 (2020).

Book Chapters

1. J. H. Churnside, "Optical Remote Sensing," in *Wave Propagation in Random Media (Scintillation)* V. I. Tatarskii, A. Ishimaru, and V. U. Zavorotny, eds. (SPIE, Bellingham, Washington and Techno House, Bristol, England, 1993) pp. 235-247.

2. J. H. Churnside and A. V. Smirnov, "Remote Sensing of Internal Waves in the Ocean," in *The Oceans: Physical-Chemical Dynamics and Human Impact*, S. K. Majumdar, E. W. Miller, G. S. Forbes, R. F. Schmaltz, and A. A. Panah, eds. (Pennsylvania Academy of Science, Easton, Pennsylvania, 1994) pp. 146-156.

3. D. Killinger, J. H. Churnside, and L. S. Rothman, "Atmospheric Optics," in *Handbook of Optics*, M. Bass, ed. (McGraw-Hill, New York, 1995) chap. 44.

4. Churnside, J. H., J. Horne, P. Adam, R. D. Brodeur, D. Reese, E. Brown, K. J. Benoit-Bird, and A. Kaltenberg (2009) "Combining techniques for remotely assessing pelagic nekton: getting the whole picture," in *The Future of Fisheries Science in North America*,

R. J. Beamish and B. R. Rothschild eds. Springer, Berlin, pp. 345-356.

5. D. Killinger, J. H. Churnside, and L. S. Rothman, "Atmospheric Optics," in *Handbook of Optics, Third Edition, Volume V*, M. Bass, ed. (McGraw-Hill, New York, 2010) chap. 3.

Patents

1. J. H. Churnside, S. F. Clifford, and S. G. Hanson, "Single-Ended Dual Spatial Filter Detector for the Passive Measurement of Winds and Turbulence Aloft," U.S. Patent 5159407 (1992).

2. A. J. Bedard, Jr., J. H. Churnside, and R. T. Nishiyama, "Apparatus and Method for Reducing Acoustic or Electromagnetic Energy in the Vicinity of a Source," U.S. Patent 5393940 (1995).

3. J. H. Churnside, E. P. Gordov, and V. M. Orlovskii, "Autodyne Lidar System Utilizing a Hybrid Laser," U.S. Patent 5778019 (1998).

4. J. R. Jordan, J. H. Churnside, and P. E. Johnston, “Detection of transient signals in Doppler spectra,” U.S. Patent 8022864 (2011).

Conference Presentations

1. James H. Churnside and Charles M. McIntyre, "Joint Signal Probability Distribution of an Optical Heterodyne Array," SPIE Technical Symposium East '78, Washington, D.C. March 28-31, 1978.

2. Charles M. McIntyre and James H. Churnside, "Heterodyne Receiver for Visible Radiation Transmitted through the Atmosphere," SPIE Technical Symposium East '78, Washington, D.C., March 28-31, 1978.

3. Charles M. McIntyre and James H. Churnside, "Diversity Arrays for Optical Communications through Atmospheric Turbulence," SPIE 22nd Annual International Technical Symposium, San Diego, California, August 28-31, 1978.

4. James H. Churnside, Charles M. McIntyre, and Myung Hun Lee, "Statistics of Irradiance from Coherently Illuminated Targets in the Atmosphere," Annual Meeting of the Optical Society of America, San Francisco, California, October 31-November 3, 1978.

5. J. H. Churnside and H. T. Yura, "Atmospheric Modulation Noise in Coherent Lidar Systems," Topical Meeting on Coherent Laser Radar for Atmospheric Sensing, Aspen, Colorado, July 15-17, 1980.

6. J. H. Churnside and H. T. Yura, "Transverse Velocity Measurements using Coherent Lidar," SPIE 25th Annual International Technical Symposium, San Diego, California, August 24-28, 1981.

7. J. H. Churnside and H. T. Yura, "Speckle Phenomena in Laser Remote Sensing," Topical Meeting on Optical Techniques for Remote Probing of the Atmosphere, Incline Village, Nevada, January 10-12, 1983.

8. J. H. Churnside, "Laser Doppler Velocimetry by Backscatter Modulation of the Source," 2nd Topical Meeting on Coherent Laser Radar: Technology and Applications, Aspen, Colorado, August 1-4, 1983.

9. H. T. Yura and J. H. Churnside, "Speckle Statistics of Atmospherically Backscattered Light," 2nd Topical Meeting on Coherent Laser Radar: Technology and Applications, Aspen, Colorado, August 1-4, 1983 (invited).

10. James H. Churnside, "Second-Harmonic Generation by Partially Coherent Light," Annual Meeting of the Optical Society of America, San Diego, California, November 29-December 2, 1984.

11. J. H. Churnside, R. J. Hill, and G. R. Ochs, "Yet Another Probability Distribution for Intensity Fluctuations in Strong Turbulence," International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere, Florence, Italy, May 27-30, 1986.

12. R. J. Hill and J. H. Churnside, "Measurements of Laser Scintillation in Strong Turbulence Relevant to Laser Eye Safety," International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere, Florence, Italy, May 27-30, 1986.

13. S. F. Clifford and J. H. Churnside, "Synthetic Aperture Spatial Filtering of Scintillation: A New Technique for Measuring Optical Refractive Turbulence Profiles," International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere, Florence, Italy, May 27-30, 1986 (invited).

14. James H. Churnside and Richard J. Lataitis, "Image Motion of a Laser-Illuminated Object in the Turbulent Atmosphere," Conference on Lasers and Electro-Optics, San Francisco, California, June 9-13, 1986.

15. James H. Churnside, "Phenomenological Probability Density Function of Turbulence-Induced Intensity Fluctuations," Annual Meeting of the Optical Society of America, Seattle, Washington, October 19-25, 1986 (invited).

16. S. F. Clifford and James H. Churnside, "Synthetic Aperture Spatial Filtering of Scintillation: A New Technique for Measuring Optical Refractive Turbulence Profiles," Annual Meeting of the Optical Society of America, Seattle, Washington, October 19-25, 1986.

17. Reginald J. Hill and James H. Churnside, "Joint Statistics of Irradiance and its Duration Measured in Strong Refractive Turbulence," Annual Meeting of the Optical Society of America, Seattle, Washington, October 19-25, 1986.

18. James H. Churnside, "Remote Sensing of Refractive Turbulence with Optical Spatial Filters," Topical Meeting on Laser and Optical Remote Sensing: Instrumentation and Techniques, North Falmoth, Massachusetts, September 28-October 1, 1987 (invited).

19. James H. Churnside and Steven F. Clifford, "The Lognormal-Rician Probability Density Function of Optical Irradiance Scintillations in the Turbulent Atmosphere," Eighth Annual Electro-Optical Systems Atmospherics Library and Tactical Weather Intelligence Conference, Las Cruces, New Mexico, December 1-3, 1987.

20. James H. Churnside, "Two-Point Probability Density Function of Irradiance in the Turbulent Atmosphere," European Conference on Optics, Optical Systems, and Applications, Birmingham, United Kingdom, March 22-25, 1988.

21. J. H. Churnside, R. J. Hill, G. Conforti, and A. Consortini, "How Small a Receiver Aperture is Needed to Imitate a Point Receiver for Measuring Scintillation?" European Conference on Optics, Optical Systems, and Applications, Birmingham, United Kingdom, March 22-25, 1988.

22. R. G. Frehlich and James H. Churnside, "Probability Density Function for Estimates of the Moments of Laser Scintillation," 1988 Technical Symposium on Optics, Electro-Optics, and Sensors, Orlando, Florida, April 4-8, 1988.

23. James H. Churnside and R. G. Frehlich, "Probability Density Function Measurements of Optical Scintillations in the Atmosphere," 1988 Technical Symposium on Optics, Electro-Optics, and Sensors, Orlando, Florida, April 4-8, 1988.

24. Kamran Shaik and J. H. Churnside, "Laser Communications through the Atmosphere," Twelfth NASA Propagation Experimenters Meeting, Syracuse, New York, June 9-10, 1988.

25. G. Conforti, A. Consortini, J. H. Churnside, and R. J. Hill, "Effects of the Receiving Aperture Size on Atmospheric Laser Scintillation Measurements," International Congress on Optical Science and Engineering, Hamburg, West Germany, September 19-23, 1988.

26. James H. Churnside, "Joint PDF of Optical Scintillation," Annual Meeting of the Optical Society of America, Santa Clara, California, October 30-November 4, 1988.

27. Reginald J. Hill, James H. Churnside, R. G. Frehlich, A. Consortini, and G. Conforti, "Detection Effects on Measurements of Atmospheric Scintillation," Annual Meeting of the Optical Society of America, Santa Clara, California, October 30-November 4, 1988.

28. Steven F. Clifford and James H. Churnside, "Refractive Turbulence and Inner Scale Profiling using Combined Stellar Scintillation and Radar Wind Profilers," First European Wind Profiler Workshop, Versailles, France, March 6-8, 1989.

29. James H. Churnside and Steven F. Clifford, "Optical Scintillometer / Doppler Radar

Instrument for Profiling Turbulence," 1989 Technical Symposium on Aerospace Sensing, Orlando, Florida, March 27-31, 1989.

30. James H. Churnside, "Approximate Refractive Turbulence Spectrum," Annual Meeting of the Optical Society of America, Orlando, Florida, October 15-20, 1989.

31. James H. Churnside, "Geometric Optics Approach to Beam Wander in the Turbulent Atmosphere," Annual Meeting of the Optical Society of America," Orlando, Florida, October 15-20, 1989.

32. James H. Churnside, Steen G. Hanson, and Steven F. Clifford, "Optical Remote Sensing of Wind and Turbulence using Double Spatial Filtering of Scintillations," Topical Meeting on Optical Remote Sensing of the Atmosphere," Incline Village, Nevada, February 12-15, 1990.

33. James H. Churnside, "A Hybrid Lidar for Pollutant Flux Measurements," Fifteenth International Laser Radar Conference, Tomsk, USSR, July 23-27, 1990.

34. James H. Churnside, "Aperture Averaging of Scintillation," Annual Meeting of the Optical Society of America, Boston, Massachusetts, November 4-9, 1990.

35. S. Alekseev, E. Gordov, V. Orlovskii, A. Khachaturyan, J. Churnside, and V. Shcheglov, "Hybrid Pulsed-CW Autodyne Lidar," Eleventh All-Union Symposium on Propagation of Laser Radiation in the Atmosphere and Water Media, Tomsk, USSR, June 24-26, 1991.

36. J. Churnside, E. Gordov, A. Khachaturyan, V. Shcheglov, V. Orlovskii, and S. Alekseev, "Hybrid CW-Pulsed Autodyne Doppler Lidar," Topical Meeting on Coherent Laser Radar: Technology and Applications, Snowmass, Colorado, July 8-12, 1991.

37. Joseph A. Shaw, James H. Churnside, and Ed R. Westwater, "An Infrared Spectrometer for Ground-Based Profiling of Atmospheric Temperature and Humidity," SPIE Annual Meeting, San Diego, California, July 22-26, 1991.

38. James H. Churnside, "A Physical Model of Optical Scintillation," ICO Topical Meeting on Atmospheric, Volume and Surface Scattering and Propagation, Florence, Italy, August 27-30, 1991 (invited).

39. Anna Consortini, Fausto Cochetti, James H. Churnside, and Reginald Hill, "Laser Scintillation, C_n^2, l_0 measurements in Evolving Atmospheric Turbulence," ICO Topical Meeting on Atmospheric, Volume and Surface Scattering and Propagation, Florence, Italy, August 27-30, 1991.

40. E. R. Westwater and J. H. Churnside, "Ground-Based Remote Sensing of Atmospheric Water Vapor," Lower Tropospheric Profiling: Needs and Technologies, Boulder, Colorado, September 10-13, 1991 (invited).

41. James H. Churnside and Evgenii P. Gordov, "Sub-Poisson Photoelectron Statistics from a

Semiconductor Laser with Electronic Feedback," Annual Meeting of the Optical Society of America, San Jose, California, November 3-8, 1991.

42. James H. Churnside and Joseph A. Shaw, "Infrared Emission Measurements as Part of an Integrated Weather Sounding System," Workshop on Infrared Emission Measurements by FTIR, Quebec, Quebec, February 12-14, 1992.

43. J. H. Churnside, "Optical Remote Sensing," Scintillation, Seattle, Washington, August 3-7, 1992. (invited)

44. A. Consortini, F. Cochetti, J. H. Churnside, and R. J. Hill, "Inner Scale Effect on Laser Intensity Variance through Atmospheric Turbulence," Scintillation, Seattle, Washington, August 3-7, 1992.

45. J. H. Churnside and J. A. Shaw, "Infrared Spectra of Atmospheric Emission," Annual Meeting of the Optical Society of America, Albuquerque, New Mexico, September 20-25, 1992.

46. A. J. Palmer and J. H. Churnside, "Δk-Lidar Sensing of the Ocean Surface," Oceans 92, Newport, Rhode Island, October 26-29, 1992.

47. S. Y. Matrosov, D. K. Lynch, and J. H. Churnside, "Possibilities of Using IR Spectrometer for Sizing Cirrus Cloud Particles," SPIE Symposium on Passive Infrared Remote Sensing of Clouds and the Atmosphere, Orlando, Florida, April 13-15, 1993.

48. A. Consortini, F. Cochetti, J. H. Churnside, and R. J. Hill, "Measured Inner Scale Effect in Laser Atmospheric Scintillation," 16th Congress of the International Commission for Optics, Budapest, Hungary, August 9-13, 1993.

49. J. H. Churnside, "Delta-k Lidar for Measurements of Sea-Surface Waves," Annual Meeting of the Optical Society of America, Toronto, Canada, October 3-8, 1993.

50. B. B. Stankov, E. R. Westwater, J. B. Snider, and J. H. Churnside, "Combined Ground- and Satellite-Based Profiling of Temperature and Water Vapor," Third Atmospheric Radiation Measurement (ARM) Science Team Meeting, Norman, Oklahoma, March 1-4, 1993.

51. E. R. Westwater, J. H. Churnside, J. B. Snider, and Y. Han, “Ground-Based Microwave and Infrared Radiance Observations during PROBE,” Eighth Conference on Atmospheric Radiation, Nashville, Tennessee, January 23-28, 1994.

52. E. R. Westwater, Y. Han, J. H. Churnside, and J. B. Snider, "Preliminary Analysis of Ground-Based Microwave and Infrared Radiance Observations During the Pilot Radiation Observation Experiment," Fourth Atmospheric Radiation Measurement (ARM) Science Team Meeting, Charleston, South Carolina, February 28-March 3, 1994.

53. E. R. Westwater, J. H. Churnside, J. A. Shaw, J. B. Snider, K. S. Gage, Y. Han, W.

Ecklund, A. Riddle, and C. Williams, “Ground-Based Remote Sensor Observations during the PROBE Experiment in the Tropical Western Pacific,” IGARSS’95, Florence, Italy, July 10-14, 1995.

54. J. H. Churnside, “Ocean Remote Sensing at ETL,” U.S.-Japan Workshop of Arctic Research, February 6-8, 1996.

55. J. A. Shaw and J. H. Churnside, "Ocean Ripple Statistics Measured with a Scanning-Laser Glint Sensor," IGARSS’96, Lincoln, Nebraska, May 27-31, 1996.

56. G. P. Kokhanenko, M. M. Krekova, I. E. Penner, V. S. Shamanaev, and J. H. Churnside, Search of Schools of Fish by Polarization Lidar from on Board of a Plane, Internation Airborne Remote Sensing Conference and Exhibition, San Francisco, California, June 24-27, 1996

57. J. H. Churnside, “Lidar Observations of Fish in the Southern California Bight,” Pacific Ocean Remote Sensing Conference, Victoria, British Columbia, August 13-16, 1996.

58. J. A. Shaw, J. H. Churnside, Y. Han, E. R. Westwater, and J. B. Snider, “Field Measurements of Infrared Spectral Radiance from the Tropical Atmosphere,” International Radiation Symposium, Fairbanks, Alaska, August 19-24, 1996.

59. J. H. Churnside, “Measurements of the Attenuation Coefficient of a Lidar in the Southern California Bight,” Ocean Optics XIII, Halifax, Nova Scotia, October 22-25, 1996.

60. J. A. Shaw, Y. Han, J. H. Churnside, R. O. Knuteson, H. E. Revercomb, and F. A. Best, “Comparison of Atmospheric Radiances Measured by Two FTIR Spectro-Radiometers in the Tropical Pacific,” Optical Remote Sensing of the Atmosphere, Santa Fe, New Mexico, February 10-14, 1997.

61. J.A. Shaw, J.H. Churnside, and Y. Han, “Shipborne Fourier Transform Interferometric Radiometer Measurements of Tropical Atmospheric Spectral Radiance,” Seventh Atmospheric Radiation measurement Science Team Meeting, San Antonio, Texas, March 3-7, 1997.

62. J. H. Churnside, “HF Radar for Surface Winds and Currents,” International Workshop of the Arctic Atmospheric Environment,” Tokyo, Japan, March 17-19, 1997.

63. J. A. Shaw and J. H. Churnside, “Laser-Glint Techniques for Sensing Sea-Surface Roughness,” Advances in Laser Remote Sensing for Terrestrial and Oceanographic Applications, Orlando, Florida, April 21-22, 1997.

64. J. H. Churnside, “Lidar Detection of Fish Schools,” IGARSS’98, Seattle, Washington, July 6-10, 1998.

65. J. R. Hunter and J. H. Churnside, “ An Evaluation of the Potential use of Airborne Lidar for Inventorying Epipelagic Fish Schools,” Annual Meeting of the American Fisheries

Society, Hartford, Connecticut, August 23-27 , 1998.

66. N. C. H. Lo, J. R. Hunter, and J. H. Churnside, "Modeling Properties of Airborne Lidar Surveys for Epipelagic Fish," Annual Meeting of the American Fisheries Society, Hartford, Connecticut, August 23-27 , 1998.

67. J. J. Bates, J. A. Shaw, J. H. Churnside, and H. M. Zorn, "Satellite and In-Situ Observations of Extraordinary Drying of the Subtropics During the1997-1998 ENSO Event," Third Symposium on Integrated Observing Systems, Dallas, Texas, January 10-15, 1999.

68. J. H. Churnside, "Can We See Fish from an Airplane?" SPIE Conference on Airborne and Underwater Imaging, Denver, Colorado, July 21-22, 1999.

69. J. H. Churnside, "Airborne Lidar," Joint Session of the ECES Working Groups on Fisheries Acoustic Science and Technology (FAST) and Fishing Technology and Fish Behaviour (FTFB), Ijmuiden, The Netherlands, April 12, 2000.

70. A. Uriarte, Y. Sagarminaga, V. Valencis, C. Scalabrin, J. H. Churnside, J. J. Wilson, J. A. Gomez, C. Porteiro, G. Pestana, V. Marques, and M. Santos, "Application of Lidar, Acoustic, Remote Sensing, and GIS Techniques in the Framework of JUVESU Project (FAIR CT-97-3374)", Working Group on Fisheries Acoustics Science and Technology, Seattle, Washington, April 24-27, 2001.

71. J. H. Churnside, "Relationship Between Ocean Color and Lidar Penetration in the Gulf of Alaska," 2002 Ocean Sciences Meeting, Honolulu, Hawaii, February 11-15, 2002.

72. A. Uriarte, G. Boyra, J. H. Churnside, P. Carrera, C. Scalabrin, and V. Marques, "Comparison Between the Performance in Detecting Fish from Airborne (Lidar) and Ship (Echo Sounder) Devices. A Study Case in SW Europe (The Bay of Biscay and Atlantic Waters of the Iberian Peninsula)." ICES Symposium on Acoustics in Fisheries and Aquatic Ecology, Montpellier, France, June 10-14, 2002.

73. R. L. Collins, K. A. Abnett, J. H. Churnside, J. J. Wilson, E. D. Brown, E. O. Rogers, and P. K. Simpson, "Lidar Studies of the Marine Environment in the Gulf of Alaska," International Laser Radar Conference 21, Quebec, Canada, July 8-12, 2002.

74. E. D. Brown, M. A. Montes Hugo, and J. H. Churnside, "Spatial Variability in Biological Standing Stocks and Sea Surface Temperature Across the Gulf of Alaska Basin and Adjacent Continental Shelves," Marine Science in the Northeast Pacific, Anchorage, Alaska, January 13-17, 2003.

75. J. H. Churnside, "Airborne Lidar Measurements of Springtime Distributions of Herring in Prince William Sound and Kodiak," Marine Science in the Northeast Pacific, Anchorage, Alaska, January 13-17, 2003.

76. E. D. Brown, M. A. Montes, J. H. Churnside, and C. O. Coyle, "Using Airborne Remote

Sensing to Map Spatial Variability in Zooplankton Patch Size, Standing Stocks, Associated Oceanographic Conditions, and to Identify Zooplankton Communities by Optical Signatures," Third Internaltional Zooplankton Production Symposium, Gijon, Spain, May 20-23, 2003

77. J. H. Churnside, "Strong Internal Waves Observed with an Airborne LIDAR," Oceanology International 2003, New Orleans, Louisiana, June 4-6, 2003.

78. J. H. Churnside, "Recent Advances in Airborne Lidar," ICES Working Group on Fisheries Acoustics Science and Technology, Bergen Norway, June 18-21, 2003.

79. W. G. Pichel, T. Veenstra, J. H. Churnside, E. Arabini, D. Foley, R. Brainard, D. Kiefer, S. Ogle, P. Clemente-Colon, K. S. Friedman, X. Li, and J. Nicoll, "GhostNet-Driftnet Detection and Tracking in the North Pacific using Satellite and Airborne Remote Sensing and Surface Drifters," International Geoscience and Remote Sensing Symposium, Toulouse, France, 21-25 July, 2003.

80. E. Tenningen, J. H. Churnside, and A. Slotte, "Lidar TS Measurements on Northeast Atlantic Mackerel (*Scomber Scombrus*)," ICES CM, Tallinn, Estonia, 21 September 21-October 1, 2003.

81. W. G. Pichel, T. Veenstra, J. Churnside, E. Arabini, K. S. Friedman, D. Foley, R. Brainard, D. Kiefer, S. Ogle, P. Clemente-Colon, "Ghost Net – Derelict Net Detection in the North Pacific and Alaska Waters using Satellite and Airborne Remote Sensing and Surface Drifters," Thirtieth International Symposium on Remote Sensing of the Environment, Honolulu, Hawaii, 10 – 14 November, 2003.

82. J. H. Churnside and R. E. Thorne, "Aerial Observations of Zooplankton using LIDAR," Marine Science in Alaska, Anchorage, Alaska, January 12-14, 2004.

83. T. S. Veenstra, J. H. Churnside, W. G. Pichel, and D. Foley, "High Seas Driftnet Detection in the North Pacific using Remote Sensing Technologies," AGU 12th Ocean Sciences Meeting, Portland Oregon, January 26-30, 2004.

84. J. H. Churnside, D. A. Demer, J. R. Hunter, Jr., and D. A. Grifith, "Results of a Large-Area Fish LIDAR survey in the NE Pacific," ASLO/TOS Ocean Research Conference, Honolulu, Hawaii, February 15-20, 2004.

85. J. H. Churnside and E. D. Brown, "Future Trends in Fish Lidar," ASPRS 2004 Annual Conference, Denver, Colorado, May 23-28, 2004.

86. J. H. Churnside and J. J. Wilson, "Ocean Color Measurements from a Low-Flying Aircraft: Atmospheric Correction," Ocean Optics XVII, Fremantle, Australia, October 25-29, 2004.

87. J. H. Churnside, D. A. Demer, J. R. Hunter, D. A. Grifith, R. D. Brodeur, and R. E. Emmett, "Sardine Detection by Airborne Lidar, "California Cooperative Oceanic

Fisheries Investigations Annual Conference and Trinational Sardine Forum, San Diego, California, November 15-18, 2004.

88. J. H. Churnside, J. J. Wilson, A. Slotte, and E. Tenningen, "LIDAR Target Strength Measurements of Atlantic Mackerel," ICES Working Group on Fisheries Acoustics Science and Technology, Rome, Italy, April 19-22, 2005.

89. J. H. Churnside, "Airborne LIDAR Measurements," 52nd Annual Eastern Pacific Ocean Conference, Fallen Leaf Lake, California, September 27-30, 2005.

90. D. W. Fahey, A. J. Gasiewski, M. Aslaksen, S. Summers, C. D. Jennison, N. Trongale, J. H. Churnside, J. W. Elkins, D. Hurst, T. Jacobs, M. Klein, S. J. Oltmans, B. W. Orr, and J. D. Sellears, "The NOAA unmanned Aerial Vehicle (UAV) Demonstration Project using the General Atomics Altair UAV," American Institute of Aeronautics and Astronautics Infortech@Aerospace Conference, Arlington, Virginia, September 26-29, 2005.

91. S. Parker-Setter, M. Benfield, E. Brown, J. Churnside, N. Hillgruber, S. Johnson, C. Kenaley, M. Sigler, J. Thedinga, and J. Vollenweider, "Survey Strategies for Assessment of Bering Sea Forage Species," Marine Science in Alaska 2006 Symposium, Anchorage, Alaska, January 22-25, 2006.

92. J. H. Churnside, "2000 Kilometers of Thin Layers," Ocean Sciences, Honolulu, Hawaii, February 20-24, 2006. (invited)

93. A. M. Kaltenberg, K. J. Benoit-Bird, R. D. Brodeur, J. K. Horne, and J. H. Churnside, "A Study of Sardines in the NE Pacific Using Multiple Platforms and Technologies," Ocean Sciences, Honolulu, Hawaii, February 20-24, 2006.

94. E. D. Brown and J. H. Churnside, "Documenting and Describing Ephemeral Foraging Events Using Aerial Surveys and Remote Sensing," Ocean Sciences, Honolulu, Hawaii, February 20-24, 2006.

95. J. K. Horne, J. H. Churnside, and P. Adam, "Potential Integration of Acoustic and LIDAR Backscatter Data," Ocean Sciences, Honolulu, Hawaii, February 20-24, 2006.

96. W. G. Pichel, P. Clemente-Colon, T. Veenstra, J. H. Churnside, J. J. Wilson, D. Foley, K. S. Friedman, R. Brainard, J. Nicoll, and Q. Zheng, "Multi-platform Satellite Observations of the North Pacific Subtropical Frontal Zone and their Utility to Marine Debris Detection," International Geoscience and Remote Sensing Symposium, Denver, Colorado, 31 July – 4 August, 2006.

97. D. C. Reese, R. D. Brodeur, J. H. Churnside, and R. T. O'Malley, "Identifying the relationship between sea surface temperature and nekton distributions in the northern California Current," American Fisheries Society Annual Science Meeting, Lake Placid, New York, September 10-14, 2006.

98. S. Parker-Stetter, J. Horne, and J. Churnside, "Acoustic and optic characterization of forage fish distribution in the Bering Sea," Fourth Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, Honolulu, Hawaii, November 28 – December 2, 2006.

99. J. H. Churnside, J. Horne, P. Adam, R. D. Brodeur, D. Reese, E. Brown, K. J. Benoit-Bird, and A. Kaltenberg, "Combining techniques for remotely assessing pelagic nekton: getting the whole picture," American Institute of Fishery Research Biologist Symposium on The Future of Fishery Science in North America, Seattle, Washington, February 13-15, 2007.

100. P. M. Adam, J. K. Horne, and J. H. Churnside, "Unveiling time: using optics to quantify movement effects on acoustic abundance estimates," American Institute of Fishery Research Biologist Symposium on The Future of Fishery Science in North America, Seattle, Washington, February 13-15, 2007.

101. W. G. Pichel, T. Veenstra, J. H. Churnside, D. Foley, K. S. Friedman, R. Brainard, J. Nicoll, and P. Clemente-Colon, "GhostNet – Marine debris detection in the North Pacific and Gulf Of Alaska," North Pacific Environmental Satellite Workshop for Coastal and Marine Applications, Juneau, Alaska, May 29-30, 2007.

102. J. H. Churnside, "LIDAR detection of plankton in the ocean, "International Geoscience and Remote Sensing Symposium, Barcelona, Spain, July 23-27, 2007. (invited)

103. D. C. Reese, R. D. Brodeur, J. H. Churnside, and R. T. O'Malley, "Identifying spatial relationships between marine biological hotspots and fronts in the Northern California Current using remote-sensing techniques," ESA/SER Joint Meeting, San Jose, California, August 5-10, 2007.

104. D. C. Reese, R. D. Brodeur, J. H. Churnside, and R. T. O'Malley, "Using lidar and satellite imagery to identify the spatial relationship between nekton 'hotspot' areas and surface water conditions in the northern California Current," American Fisheries Society Annual Meeting, San Francisco, California, September 2-6, 2007.

105. A. Sharov, J. H. Churnside, C. Tipton, C Bonzek, and R. Latour, "Lidar survey of menhaden population in Chesapeake Bay," American Fisheries Society Annual Meeting, San Francisco, California, September 2-6, 2007.

106. J. H. Churnside, "Hot spot observations in the SE Bering Sea," Alaska Marine Science Symposium, Anchorage, Alaska, January 20-23, 2008.

107. J. H. Churnside, "Birds disrupt thin zooplankton layers at the surface," 2008 Ocean Sciences meeting, Orlando, Florida, March 2-7, 2008.

108. P. M. Adam, J. K. Horne, and J. H. Churnside, "Temporal variability in acoustic and optical backscatter measurements: implications for survey design," Symposium on the Ecosystem Approach with Fisheries Acoustics and Complementary Technologies, Bergen, Norway, June 16-20, 2008.

109. J. H. Churnside, E. Tenningen, and J. J. Wilson, "Comparison of data processing algorithms for fish LIDAR detection of mackerel in the Norwegian Sea," Symposium on the Ecosystem Approach with Fisheries Acoustics and Complementary Technologies, Bergen, Norway, June 16-20, 2008.

110. J. A. Shaw, J. H. Churnside, J. J. Wilson, N. E. Lerner, R. R. Tiensvold, P. E. Bigelow, and T. M. Koel, "Airborne lidar mapping of invasive lake trout in Yellowstone Lake," 24th International Laser Radar Conference, Boulder, Colorado, June 23-27, 2008.

111. J. H. Churnside, "Dual-polarization backscatter lidar in the ocean," 24th International Laser Radar Conference, Boulder, Colorado, June 23-27, 2008.

112. J. H. Churnside and P. L. Donaghay, "Spatial variability of the optical backscatter from thin layers," Ocean Optics XIX, Barga, Italy, October 6 – 10, 2008.

113. J. H. Churnside, "Lidar: Aerial surveys of menhaden in the Chesapeake Bay," NOAA Chesapeake Bay Office Fisheries Science Symposium, Laurel, Maryland, April 21-22, 2009.

114. M. A. Montes-Hugo, R. Gould, Z. Lee, R. Arnone, D. Gray, and J. Churnside, "Spectral variability of airborne ocean color data linked to variations in lidar backscattering profiles," SPIE Symposium on Ocean Remote Sensing: Methods and Applications, San Diego, California, August 2, 2009.

115. Y. Hu, R. A. Arnone, and J. H. Churnside, "An overview of ocean lidar studies at NRL Stennis, NOAA ESRL, and NASA LaRC," AGU Fall Meeting, San Francisco, California, December 14-18, 2009. (invited)

116. J. H. Churnside, P. L. Donaghay, R. E. Rines, J. M. Sullivan, M. McFarland, R. Marchbanks, and A. Weidemann, "Tracking the progression of a diatom bloom with airborne lidar," AGU Fall Meeting, San Francisco, California, December 14-18, 2009.

117. J. H. Churnside, "Variability in Near-Surface Lidar Returns," Ocean Sciences Meeting, Portland, Oregon, February 22-26, 2010.

118. J. Rines, M. McFarland, P. L. Donaghay, J. M. Sullivan, J. H. Churnside, and A. Weidemann, "Characterization of a Novel Diatom Bloom with Scanning, In-line Flow Cytometry," Ocean Sciences Meeting, Portland, Oregon, February 22-26, 2010.

119. M. A. Montes-Hugo, R. W. Gould, Z. Lee, J. H. Churnside, and R. A. Arnone, "Vertical structure of Lidar backscattering is connected to above-surface ocean color variability," Ocean Sciences Meeting, Portland, Oregon, February 22-26, 2010.

120. P. L. Donaghay, J. H. Churnside, J. Sullivan, J. Rines, and A. Weidemann, "Quantifying The Temporal and Spatial Evolution of the Fine-Scale Vertical Structure of a Submesoscale Diatom Bloom Using Real-Time Data from Airborne Lidar and Autonomous Profilers to Guide Ship-Based Sampling," Ocean Sciences Meeting,

Portland, Oregon, February 22-26, 2010.

121. J. H. Churnside, "Lidar measurements along the food chain," Ocean Optics XX, Anchorage, Alaska, September 27 – October 1, 2010. (invited)

122. M. Montes-Hugo, A. Weideman, R. Gould, J. Jason, R. Arnone, and J. Churnside, "Ocean color patterns help to predict depth of optical layers in coastal marine waters," Ocean Optics XX, Anchorage, Alaska, September 27 – October 1, 2010.

123. J. H. Churnside, D. A. Hanan, Z. D. Hanan, and R. D. Marchbanks, "Lidar as a tool for fisheries management," SPIE Symposium on Lidar Remote Sensing for Environmental Monitoring XII, San Diego, California, August 21 – 22, 2011.

124. B. McCarty and J. Churnside, "Latitudinal trends of chlorophyll-a concentration and aerosol optical depth in the mid-Pacific Ocean," World Climate Research Programme Climate Research in Service to Society, Denver, Colorado, October 24-28, 2011.

125. Churnside, J. H., Brown, E. D., Parker-Stetter , S., Horne, J. K., Hunt, Jr., G. L., Hillgruber, N., Sigler, M. F., and Vollenweider, J. J., "Adaptive sampling of a biological hot spot in the Bering Sea using aerial surveillance," Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

126. Trees, C., Arnone, R., et al., "Lidar observations of optical and physical properties (LOOPP) workshop," Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

127. Weidemann, A., Churnside, J., Donaghay, J., Sullivan, J., Hulbert, M., Quaid, A., and Goode, W., "It's a big pond out there: use of multiple assets and sampling strategies to investigate transient patchy bio-optical layers," Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

128. J. H. Churnside, R. D. Marchbanks, J. H. Lee, J. A. Shaw, A. Weidemann, and P. L. Donaghay, "Airborne lidar sensing of internal waves in a shallow fjord," SPIE Conference on Ocean Sensing and Monitoring IV, Baltimore, Maryland, April 24-26, 2012. (invited)

129. J. M. Sullivan, M. S. Twardowski, P. L. Donaghay, J. Rines, M. N. McFarland, S. Talapatra, J. Katz, J. H. Churnside, and A. Weidemann, "Biological thin layers: history, ecological significance, and consequences to oceanographic sensing systems," SPIE Conference on Ocean Sensing and Monitoring IV, Baltimore, Maryland, April 24-26, 2012. (invited)

130. R. M. Hardesty, R. J. Alvarez II, R. M. Banta, W. A. Brewer, J. H. Churnside, A. O. Langford, R. D. Marchbanks, B. J. McCarty, Y. L. Pichugina, S. P. Sandberg, C. J. Senff, and A. M. Weickmann, "Mobile lidars for climate, air quality and wind energy research," 26th International Laser Radar Conference, Porto Heli, Greece, June 25-29, 2012.

131. J. H. Churnside, H. E. Bravo, K. A. Naugolnykh, and I. M. Fuks, "Effects of underwater sound and surface ripples on scattered laser light," 11th European Conference on Underwater Acoustics, Edinburgh, Scotland, July 2-6, 2012.

132. J. H. Churnside, "Effect of surface roughness on lidar overlap function," SPIE Conference on Ocean Sensing and Monitoring V, Baltimore, Maryland, April 29-May 3, 2013.

133. J. Rines, M. McFarland, P. Donaghay, J. Sullivan, and J. Churnside, "A massive and unusual diatom bloom: Ecology and oceanography of a rarely reported planktonic *Haslea* in East Sound, Washington, USA," 10th International Phycological Congress, Orlando, Florida, August 4-10, 2013.

134. J. H. Churnside, P. L. Donaghay, A. Weidemann, J. Sullivan, and R. Marchbanks, "Lidar profiles of the aquatic environment," 2014 Ocean Sciences Meeting, Honolulu, Hawaii, February 23-28, 2014.

135. B. Penta, A. Weidemann, J. Wesson, D. Gray, and J. Churnside, "Characterization of subsurface layers and their planktonic community composition in a coastal marine ecosystem via a mutli-scale, multi-sensor approach," 2014 Ocean Sciences Meeting, Honolulu, Hawaii, February 23-28, 2014.

136. J. H. Churnside, K. Naugolnykh, R. D. Marchbanks, "Optical remote sensing of sound in the ocean," SPIE Conference on Ocean Sensing and Monitoring V, Baltimore, Maryland, May 3-9, 2014.

137. J. H. Churnside, "Ecosystem studies using profiling polarization lidar," International Geoscience and Remote Sensing Symposium, Quebec City, Quebec, July 13-18, 2014. (invited)

138. J. H. Churnside, "Bio-optical model of remote sensing signals in a stratified ocean," SPIE Conference on Ocean Sensing and Monitoring VII, Baltimore, Maryland, April 20-24, 2015.

139. Y. Hu, M. J. Behrenfeld, C. A. Hostetler, J. W. Hair, X. Lu, S. D. Rodier, J. H. Churnside, and W. H. Hunt, "Development and validation of the CALIPSO ocean subsurface data record," 2016 Ocean Sciences Meeting, New Orleans, Louisiana, February 21-26, 2016.

140. J. H. Churnside, "Characteristics of airborne lidar profiles of the Arctic Ocean," 2016 Ocean Sciences Meeting, New Orleans, Louisiana, February 21-26, 2016.

141. J. H. Churnside, "Airborne lidar estimates of photosynthesis profiles," International Geoscience and Remote Sensing Symposium, Beijing, China, July 10-15, 2016. (invited)

142. J. H. Churnside, "Airborne ocean profiling lidar," International Ocean Colour Science

Meeting, Lisbon, Portugal, May 15-19, 2017. (invited)

143. J. H. Churnside, “Lidar profiles of Arctic plankton layers and their dependence on sea ice conditions,” Ocean Sciences Meeting, Portland, Oregon, February 12-16, 2018.

144. J. H. Churnside, “Airborne lidar characterization of oceanic phenomena,” OSA Imaging and Applied Optics Congress, Orlando, Florida, June 25-28, 2018. (invited)

145. M. R. Roddewig, J. H. Churnside, and J. A. Shaw, Mapping the attenuation coefficient in Yellowstone Lake, Yellowstone National Park, USA,” OSA Imaging and Applied Optics Congress, Orlando, Florida, June 25-28, 2018.

146. J. H. Churnside, “Can we use satellites to calibrate airborne lidar?” Ocean Optics XXIV, Dubrovnik, Croatia, October 8-12, 2018.

147. T. Moore, J. Churnside, J. Sullivan, M. Twardowski, M. McFarland, and A. Nayak, “Impacts of the distributions of cyanobacteria populations in Lake Erie on remote sensing,” Ocean Optics XXIV, Dubrovnik, Croatia, October 8-12, 2018.

148. J. H. Churnside, R. D. Marchbanks, S. Vagle, S. W. Bell, and P. J. Stabeno, “The effect of upwelling on turbulence in Barrow Canyon,” Alaska Marine Science Symposium 2020, Anchorage, Alaska, January 27-30, 2020.

November, 2020