JOHN E. FREDERICK
Department of the Geophysical Sciences
The University of Chicago

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PRESENT POSITION: Professor Emeritus
The University of Chicago, 2015-Present

PREVIOUS POSITIONS:

- 1985-2015: Professor of Atmospheric Science, The University of Chicago

- 2006-2012: Associate Dean, Physical Sciences Division and the College, The University of Chicago

- 2006-2012: Master of the Physical Sciences Collegiate Division, The University of Chicago

- 1994-1997: Chairman, Department of the Geophysical Sciences, The University of Chicago

- 1977-1985: Space Scientist, Laboratory for Atmospheres, NASA/Goddard Space Flight Center

- 1976-1977: Assistant Research Scientist, Department of Atmospheric & Oceanic Science, University of Michigan

EDUCATION:
- B. A. (magna cum laude) Hanover College, 1971, Major: Physics
- Ph.D. University of Colorado-Boulder, 1975, Department of Astro-Geophysics
- Postdoctoral Scholar, 1975-1976, University of Michigan-Ann Arbor Dept. of Atmospheric & Oceanic Science

CURRENT RESEARCH INTERESTS: Radiative transfer in the earth's atmosphere, radiation measurements, the atmospheric energy budget, effects of urbanization on the physical and chemical environments, solar-terrestrial couplings.

SAMPLE OF INVITED PRESENTATIONS

-Yale University, Global change seminar series, 1987
-World Resources Institute, Washington, DC, 1988
-National Science Foundation, Workshop on Ultraviolet Radiation and Biological Research in Antarctica, 1988
-COSPAR XXVII Plenary Meeting, Helsinki, Finland, 1988

-Argonne National Laboratory, Sigma Xi Scientific Society, 1988
-Central States Universities/Argonne National Laboratory, Annual Meeting, 1988
-Chemical Manufacturers Association, UV-B Monitoring Workshop, Washington, DC, 1988
-U. S. Department of Agriculture, Workshop on Interactions of UV-B and Plants, Gainesville, FL, 1989
-Oberlin College, Department of Physics, March 1989
-American Society for Photobiology, Annual Meeting, Boston, July 1989
-University of Alaska, Geophysical Institute, September 1989
-National Science Foundation, Geosciences Directorate Quarterly Review to the Director of NSF, October 1989
-University of Minnesota, Distinguished Speaker Colloquium Series of the Theoretical Physics Institute, November 1989
-University of Chicago, Department of Astronomy and Astrophysics, January 1990
-Scripps Institution of Oceanography, Workshop on Marine Phytoplankton and Solar UV-B, April 1990
-University of Illinois at Chicago, Department of Chemistry, April 1990
-University of California-San Diego, California Space Institute, May 1990
-University of Michigan-Ann Arbor, Dept. of Atmospheric, Oceanic & Space Sciences, June 1990
-U. S. Environmental Protection Agency, Risk Assessment Conference, Chicago, June 1990
-Science Museum of Minnesota, Antarctic Institute, St. Paul, MN, June 1990
-Sunset Meeting of the Fluorocarbon Program Panel, Chemical Manufacturers Association, Wiesbaden, FRG, September 1990
-University of Colorado at Boulder, Dept. of Astrophysical, Planetary, and Atmospheric Sciences, April 1991
-University of Illinois at Chicago, Dept. of Geological Sciences, May 1991
-Second International Conference on the Biologic Effects of UV-A Radiation, San Antonio, TX, June 1991
-Rhodes College and Schering-Plough, Inc., Memphis, TN, September 1991
-Yerkes Observatory, Williams Bay, WI, December 1991
-UV-B Monitoring Workshop, U. S. Dept. of Agriculture, Washington, D. C., March 1992
-Enrico Fermi Institute, University of Chicago, April 1992
-State University of New York at Stony Brook, May 1992
-Centro Austral de Investigaciones Cientificas, Ushuaia, Argentina, August 1992
-North Carolina State University, Dept. of Marine, Earth & Atmospheric Sciences, Raleigh, February 1993
-UV-B Critical Issues Workshop, U. S. Department of Energy, Cocoa Beach, FL, February 1993
-Argonne National Laboratory, Environmental Research Division, March 1993
-NOAA/Air Resources Laboratory, Boulder, May 1993
-American Society for Photobiology Annual Meeting, Chicago, June 1993
-University of Wisconsin, Dept. of Atmospheric & Oceanic Science, January 1994
-Argonne National Laboratory, Physics Division, February 1994

-Workshop on UV radiation and the spread of infectious disease, Miami, March 1994
-World Meteorological Organization, Workshop on UV-B and the Americas, Buenos Aires, August 1994
-American Society for Photobiology Annual Meeting, Washington, DC, June 1995
-Centro Austral de Investigaciones Cientificas, Ushuaia, Argentina, August 1995
-Institute of Genetics and Molecular Biology, University of Buenos Aires, August 1995
-Society of the Plastics Industry, Polyurethanes Annual Meeting, Chicago, September 1995
-Purdue University, Department of Earth & Atmospheric Science, November 1995.
-University of Arizona, Department of Atmospheric Sciences, April 1996
-American Society for Photobiology Annual Meeting, Atlanta, June 1996
-American Meteorological Society, Conference on Atmospheric Radiation, Long Beach, CA, February 1997
-Natural Resource Ecology Laboratory, Colorado State University, February 1997
-American Society for Photobiology Annual Meeting, St. Louis, July 1997
-PPG Industries, Inc., Chemicals Technical Center, Monroeville, PA, August 1997
-Workshop on Aviation and the Global Atmosphere, Port of Spain, Trinidad, February 1998
- Institute of Mathematical Statistics, National Meeting, Baltimore, August 1999.
- Global Change Education Program, Final Workshop, Argonne National Laboratory, August 1999
- Department of Physics and Astronomy, University of Georgia, September 1999
- Space Physics Research Laboratory, University of Michigan, May 2000
- Tulane University, Department of Energy Global Change Education Program, June 2000
- Institute for Environmental Science & Policy, University of Illinois at Chicago, June 2000
- University of Illinois-Urbana, Department of Atmospheric Science, September 2000
- James Franck Institute, The University of Chicago, January 2001
- Dept. of Marine. Earth & Atmospheric Science, North Carolina State University, April 2001
- Department of Energy, Global Change Education Program, Indiana University, June 2001.
- Department of Energy, Global Change Education Program, Arlington, VA, June 2003.
- SPIE Conference on Ultraviolet Ground- and Space-based Measurements, Models, and Effects, San Diego, August 2003.
- Chicago Conference on the Environment, Chicago, IL, April 2004.
- Department of Energy, Global Change Education Program, Argonne, IL, June 2004.
- Loyola University Chicago, Department of Chemistry, April 2005.
- City of Chicago, Science in the City presentation, October 2007
- University of Chicago, Graduate School of Business, October 2007
- St. Olaf College, Northfield, MN, March 2008
- University of Illinois-Chicago, June 2008

- Argonne National Laboratory, Urban Landscapes and Climate Change Workshop,

August 2013.
- Paulson Institute, Beijing Mayors Delegation, Urban Sustainability Senior Leadership Program, September 2013.
- Paulson Institute, China Association of Mayors, Urban Sustainability Program, September 2014.

SAMPLE OF ADDITIONAL ACTIVITIES & AWARDS

- Quantrell Award for Excellence in Undergraduate Teaching - The University of Chicago, 1989
- Co-chairman, Atmospheric Modeling Group, NASA Stratosphere Assessment, 1979-
- Chairman, Solar Irradiance Working Group, NASA Stratosphere Assessment, 1981
-Chairman, Middle Atmosphere Program Study Group on the Interaction of Solar Radiation With the Earth's Atmosphere, 1982-1983
-Associate Editor, Journal of Geophysical Research-Atmospheres, 1983-1987
-Chairman, Working Group on Solar Radiation and its Transfer in the Earth's Atmosphere, NASA Stratosphere Assessment, 1985
-Associate Editor, Reviews of Geophysics, 1985-1987, in charge of the aeronomy section of the U. S. National Report to IUGG
-Co-chairman, Global Trends Working Group, UNEP International Ozone Assessment required by the Montreal Protocol, 1988-1989
-Member, External Review Panel for the Middle Atmosphere Research Program of NASA/Langley Research Center, June 1991
- Lead Author, Chapter 11 in the United Nations Environment Programme Scientific Assessment of the Ozone Layer, 1991
-Chairman, SBUV/2 Review Panel, NOAA/NESDIS, 1992
-Organizer and Chair of symposium entitled "The Sensitivity of Natural Ecosystems to Changing Ultraviolet Radiation Levels", Marco Is., FL, June 1992
-Delivered testimony on potential effects of ozone depletion, Legislature of the Argentine Province of Tierra del Fuego, August 1992
-Co-Author, Ch. 9, UNEP/WMO Scientific Assessment of Ozone Depletion, 1994
-Member, External Review Panel for the Environmental Research Division, Argonne National Laboratory, 1995-1998
-Coordinating Lead Author of Chapter 5 in the IPCC Special Report on Aviation and the Global Atmosphere, 1997-1999
- Founder and Co-Director, Environmental Science and Policy Program, The University of Chicago, 1999-2014.
- Hanover College Alumni Achievement Award, May 2000
- Chairman, Review Committee of the Environmental Research Division, Argonne National Laboratory, 2001
- Recipient of the EPA “2005 Stratospheric Ozone Protection Award” for work by the Ozone Science Tiger Team, 2005.
- Listed in Marquis “Who's Who in America” and “Who’s Who in Science & Technology”, 2007 and later editions.
- Member, Executive Committee of the Midstates Consortium for Mathematics and

Science, 2006-2012.
- Member, Board of Directors, Center for Transformation of Waste Technology, 2010-2013.
- Acknowledged by the Intergovernmental Panel on Climate Change for contributions leading to the 2007 Nobel Peace Prize.
- Arthur L. Kelly Award for Exceptional Faculty Service, The University of Chicago, June 2013

PUBLICATIONS (46 publications prior to 1985 are not listed)

47. "Satellite Observations of the Nitric Oxide Dayglow: Implications for the Behavior of Mesospheric and Lower Thermospheric Odd Nitrogen", J. E. Frederick and G. N. Serafino, J. Geophys. Res., 90, 3821, 1985.

48. "The Detection of Long-Term Changes in Stratospheric Ozone: Scientific Requirements and Current Results from Satellite-Based Measurements Systems", J. E. Frederick and G. N. Serafino, J. Climate Appl. Meteor., 24, 904, 1985.

49. "Dissociation of metastable O_2 as a Potential Source of Atmospheric Odd Oxygen", J. E. Frederick and R. J. Cicerone, J. Geophys. Res., 90, 10733, 1985.

50. "In-Situ Measurements of Nitric Oxide in the High Latitude Upper Stratosphere", J. J. Horvath and J. E. Frederick, Geophys. Res. Lett., 12, 495, 1985.

51. "Instrument Characterization for the Detection of Long-Term Changes in Stratospheric Ozone: An Analysis of the SBUV/2 Radiometer", J. E. Frederick, R. P. Cebula, and D. F. Heath, J. Atmos. Ocean. Tech., 3, 472, 1986.

52. "Excess Odd Oxygen Production Due to the Photodissociation of Isotopic Molecular Oxygen", K. Omidvar and J. E. Frederick, Planet. Space Sci., 35, 769, 1987.

53. "Reply", J. E. Frederick, Mon. Wea. Rev., 115, 625, 1987.

54. "Aeronomy 1983-1987: An Overview", J. E. Frederick, Rev., Geophys., 25, 417, 1987.

55. "The Ultraviolet Spectral Albedo of Planet Earth", J. E. Frederick and G. N. Serafino, Tellus, 39B, 261, 1987.

56. "The Budget of Biologically Active Ultraviolet Radiation in the Earth-Atmosphere System", J. E. Frederick and D. Lubin, J. Geophys. Res., 93, 3825, 1988.

57. "Possible Long-Term Changes in Biologically Active Ultraviolet Radiation Received at the Ground" J. E. Frederick and D. Lubin, Photochem. Photobiol., 47, 571, 1988.

58. "Ultraviolet Radiation Levels During the Antarctic Spring", J. E. Frederick and H. E. Snell, Science, 241, 438, 1988.

59. "Calibration of Long-Term Data Sets from Operational Satellites Using the Space Shuttle", E. Hilsenrath, D. Williams, and J. Frederick, Proc. SPIE, 924, Recent Advances in Sensors, Radiometry, and Data Processing for Remote Sensing, 215, 1988.

60. "The Ultraviolet Radiation Environment of Antarctica: McMurdo Station During September-October 1987", D. Lubin, J. E. Frederick, and A. J. Krueger, J. Geophys. Res., 94, 8491, 1989.

61. "The Detection and Interpretation of Long-Term Changes in Ozone from Space", J. E. Frederick, X. Niu, and E. Hilsenrath, Adv. Space Res., 9, 317-321, 1989.

62. "Ultraviolet Solar Radiation at the Earth's Surface", J. E. Frederick, H. E. Snell, and E. K. Haywood, Photochem. Photobiol., 50, 443-450, 1989.

63. "Response to: Enhanced Ultraviolet Levels Under Sea Ice During the Antarctic Spring by H. J. Trodahl and R. G. Buckley", J. E. Frederick, Science, 1989.

64. "Measurements of Enhanced Springtime Ultraviolet Radiation from Palmer Station, Antarctica", D. Lubin, J. Frederick, R. Booth, T. Lucas, and D. Neuschuler, Geophys. Res. Lett., 16, 783, 1989.

65. "Skin cancers and ultraviolet radiation", J. A. H. Lee, J. E. Frederick, E. K. Haywood, and R. G. Stevens, Medical Journal of Australia, 150, 540, 1989.

66. "Tropospheric influence on solar ultraviolet radiation: The role of clouds", J. E. Frederick and H. E. Snell, J. Climate, 3, 373, 1990.

67. "An approach to the detection of long-term changes in upper stratospheric ozone from space", J. E. Frederick, X. Niu, and E. Hilsenrath, J. Atmos. Ocean Tech., 7, 734, 1990.

68. "Column ozone measurements from Palmer Station, Antarctica: Variations during the Austral springs of 1988 and 1989", D. Lubin and J. E. Frederick, J. Geophys. Res., 95, 13883, 1990.

69. "Trends in atmospheric ozone and ultraviolet radiation: Mechanisms and observations for the Northern Hemisphere", J. E. Frederick, Photochem. Photobiol., 51, 757, 1990.

70. "Uncertainties in total ozone amounts inferred from zenith sky observations: Implications for ozone trend analyses", K. Stamnes, S. Pegau, and J. Frederick, J. Geophys. Res., 95, 16523, 1990.

71. "Biologically effective doses of sunlight for immune suppression at various latitudes

and their relationship to changes in stratospheric ozone", E. C. DeFabo, F. P. Noonan, and J. E. Frederick, Photochem. Photobiol., 52, 811, 1990.

72. "The ultraviolet radiation environment of the Antarctic peninsula: The roles of ozone and cloud cover", D. Lubin and J. E. Frederick, J. Appl. Meteor., 30, 478, 1991.

73. "Atmospheric ozone and the ultraviolet radiation environment of the earth", J. E. Frederick, Chapter 6 in Trends in Theoretical Physics, Vol. 2, edited by P. J. Ellis and Y. C. Tang, Addison-Wesley, pp. 123-139, 1991.

74. "Long-term variations in ultraviolet sunlight reaching the biosphere: Calculations for the past three decades", J. E. Frederick, E. C. Weatherhead, and E. K. Haywood, Photochem. Photobiol., 54, 781-788, 1991.

75. "Prolonged enhancement in surface ultraviolet radiation during the Antarctic spring of 1990", J. E. Frederick and A. D. Alberts, Geophys. Res. Lett., 18, 1869-1871, 1991.

76. "A contribution toward understanding the biospherical significance of Antarctic ozone depletion", D. Lubin, B. G. Mitchell, J. E. Frederick, A. D. Alberts, C. R. Booth, T. Lucas, and D. Neuschuler, J. Geophys. Res., 97, 7817, 1992.

77. "An assessment of the Robertson-Berger ultraviolet meter and measurements: Introductory comments", J. E. Frederick, Photochem. Photobiol., 56, 113, 1992.

78. "Temporal changes in surface ultraviolet radiation: A study of the Robertson-Berger meter and Dobson data records", J. E. Frederick and E. C. Weatherhead, Photochem. Photobiol., 56, 123, 1992.

79. "Trends in column ozone based on TOMS data: Dependence on month, latitude, and longitude", X. Niu, J. E. Frederick, M. L. Stein, and G. C. Tiao, J. Geophys. Res., 97, 14661, 1992.

80. "The Halogen Occultation Experiment", J. M. Russell III, L. L. Gordley, J. H. Park, S. R. Drayson, W. D. Hesketh, R. J. Cicerone, A. F. Tuck, J. E. Frederick, J. E. Harries, and P. J. Crutzen, J. Geophys. Res., 98, 1993.

81. "The natural UV-A radiation environment", J. E. Frederick and A. D. Alberts, in Biological Responses to Ultraviolet A Radiation, edited by F. Urbach, Valdemar Pub. Co., 1992, pp. 7-18.

82. "Ultraviolet sunlight reaching the earth's surface: A review of recent research", J. E. Frederick, Photochem. Photobiol., 57, 175, 1993.

83. "Solar ultraviolet irradiance at Palmer Station, Antarctica", J. E. Frederick and D.

Lubin, Ultraviolet Radiation in Antarctica: Measurements and Biological Effects, AGU Antarctic Research Series, 62, 43-52, 1994.

84. "Solar ultraviolet irradiance observed from southern Argentina: September 1990 to March 1991", J. E. Frederick, P. F. Soulen, S. B. Diaz, I. Smolskaia, C. R. Booth, T. Lucas, and D. Neuschuler, J. Geophys. Res., 98, 8891, 1993.

85. "Empirical studies of tropospheric transmission in the ultraviolet: Broadband measurements, J. E. Frederick, A. E. Koob, A. D. Alberts, and E. C. Weatherhead, J. Appl. Meteor., 32, 1883, 1993.

86. "Ozone within the el Chichon aerosol cloud inferred from SBUV continuous scan measurements, G. Wen and J. E. Frederick, J. Geophys. Res., 99, 1263, 1994.

87. "Ultraviolet solar radiation in the high latitudes of South America", J. E. Frederick, S. B. Diaz, I. Smolskaia, W. Esposito, T. Lucas, and C. R. Booth, Photochem. Photobiol., 60, 356, 1994.

88. "Significant enhancement of solar UV-B by cumulus clouds", F. M. Mims III and J. E. Frederick, Nature, 371, 291, 1994.

89. "The effects of horizontally extended clouds on backscattered ultraviolet sunlight", G. Wen and J. E. Frederick, J. Geophys. Res., 100, 16,387, 1995.

90. "Pinatubo aerosols and associated behavior of ozone inferred from backscatter ultraviolet measurements on the Space Shuttle", G. Wen and J. E. Frederick, J. Geophys. Res., 100, 18,855, 1995.

91. "Trends and interannual variations in erythemal sunlight, 1978-1993", J. E. Frederick and C. Erlick, Photochem. Photobiol., 62, 476-484, 1995.

92. "The transmission of sunlight through cloudy skies: An analysis based on standard meteorological information, J. E. Frederick and H. D. Steele, J. Appl. Meteorol., 34, 2755, 1995.

93. "Solar ultraviolet radiation and the risk of infectious disease: Summary of a workshop", R. S. Chapman et al., Photochem. Photobiol., 61, 223-247, 1995.

94. "Validation of nitric oxide and nitrogen dioxide measurements made by the Halogen Occultation Experiment for UARS platform", J. M. Russell III et al., J. Geophys. Res., 101, 10,241-10,266, 1996.

95. "A new approach to the characterization of long-term changes in total atmospheric ozone: Determination and application of frequency distributions", R. A. Reck, B. L. Weinberg, R. M. Bornick, G. Wen, and J. E. Frederick, Atmospheric Environment, 30, 2627-2636, 1996.

96. "Solar ultraviolet irradiance at Tierra del Fuego: Comparison of measurements and calculations over a full annual cycle", S. B. Diaz, J. E. Frederick, T. Lucas, C. R. Booth, and I. Smolskaia, Geophys. Res. Lett., 23, 355-358, 1996.

97. "Analysis of long-term behavior of ultraviolet radiation measured by Robertson -Berger meters at 14 sites in the United States", E. C. Weatherhead, G. C. Tiao, G. C. Reinsel, J. E. Frederick, J. J. DeLuisi, D. Choi, and W. Tam, J. Geophys. Res., 102, 8737-8754, 1997.

98. "The attenuation of sunlight by high latitude clouds: Spectral dependence and its physical mechanisms", J. E. Frederick and C. Erlick, J. Atmos. Sci., 54, 2813-2819, 1997.

99. "Evolution of chlorine and nitrogen species in the lower stratosphere during Antarctic spring: Use of tracers to determine chemical change", L. J. Mickley, J. P. D. Abbatt, J. E. Frederick, and J. M. Russell III, J. Geophys. Res., 102, 21,479-21,491, 1997.

100. "Response of summertime odd nitrogen and ozone at 17 mb to Mount Pinatubo aerosol over the southern mid-latitudes: Observations from the Halogen Occultation Experiment", L. J. Mickley, J. P. D. Abbatt, J. E. Frederick, and J. M. Russell III, J. Geophys. Res., 102, 23,573-23,582 , 1997.

101. "Impacts of solar UVR on aquatic microorganisms", C. R. Booth et al., Photochem. Photobiol., 65, 252-269, 1997.

102. “The effects of aerosols on the wavelength dependence of atmospheric transmission in the ultraviolet and visible, Part I: A “single scattering separate” delta-Eddington model”, C. Erlick and J. E. Frederick, J. Geophys. Res., 103, 11,465-11,472, 1998.

103. “Factors affecting the detection of trends: Statistical considerations and applications to environmental data”, E. C. Weatherhead et al., J. Geophys. Res., 103, 17,149-17,161, 1998.

104. “Ultraviolet radiation at sites on the Antarctic coast”, J. E. Frederick, Z. Qu, and C. R. Booth, Photochem. Photobiol., 68, 183-190, 1998.

105. “The effects of aerosols on the wavelength dependence of atmospheric transmission in the ultraviolet and visible, Part II: Typical continental and urban aerosols in clear skies”, C. Erlick and J. E. Frederick, J. Geophys. Res., 103, 23,275-23,285, 1998.

106. “Atmospheric transmission in the ultraviolet and visible: Aerosols in cloudy atmospheres”, C. Erlick, J. E. Frederick, V., K. Saxena, and B. N. Wenny, J. Geophys. Res., 103, 31,541-31,556, 1998.

107. “Estimating biologically active UV-irradiance from satellite radiance measurements: A sensitivity study”, P. F. Soulen and J. E. Frederick, J. Geophys. Res.,

104, 4117-4126, 1999.

108. "Solar Ultraviolet Irradiance at the Ground", K. R. Ryan, J. E. Frederick, A. F. Bais, J. B. Kerr, and B. Wu, Chapter 5 in Aviation and the Global Atmosphere, Cambridge University Press, pp. 165-183, 1999.

109. "Detecting the recovery of total column ozone", E. C. Weatherhead et al., J. Geophys. Res., 105, 22,201-22,210, 2000.

110. "Annual and interannual behavior of solar ultraviolet irradiance revealed by broadband measurements, J. E. Frederick, J. R. Slusser, and D. S. Bigelow, Photochem. Photobiol., 72, 488-496, 2000.

111. "An empirical method for the determination of the complex index of refraction of size-fractionated atmospheric aerosols for radiative transfer calculations", N. A. Marley, J. S. Gaffney, C. Baird, C. A. Blazer, P. J. Drayton, and J. E. Frederick, Aerosol Sci. Technol.,24, 535-549, 2001.

112. "Aerosol optical depth measurements and their impact on surface levels of ultraviolet-B radiation", B. N. Wenny, V. K. Saxena, and J. E. Frederick, J. Geophys. Res., 106, 17,311, 2001.

113. "Interannual variability in solar ultraviolet irradiance over decadal time scales at latitude 55^{o} South", J. E. Frederick, V. W. Manner, and C. R. Booth, Photochem. Photobiol., 74, 771-779, 2001.

114. "Ozone as a UV filter", J. E. Frederick, in *Encyclopedia of Atmospheric Sciences*, 1st edition, edited by J. R. Holton, J. Pyle, and J. Curry, Elsevier Science Ltd, 1621-1627, 2003.

115. "Behavior of solar ultraviolet irradiance at high southern latitudes over a decadal timescale", J. E. Frederick and Y. Liao, Proc. SPIE, 5156, 37-47, 2003.

116. "The ultraviolet radiation environment of high southern latitudes: Behavior over a decadal timescale", Yixiang Liao and John E. Frederick, Photochem. Photobiol., 81, 320-324, 2005.

117. "Standard ultraviolet daylight for non-extreme exposure conditions", Christiaens, F. J., A. Chardon, A. Fourtanier, and J. E. Frederick, Photochem. Photobiol., 81, 874-878, 2005.

118. "Photosynthetically active sunlight at high southern latitudes", John E. Frederick and Yixiang Liao, Photochem. Photobiol., 81,603-608, 2005.

119. “Ultraviolet radiation and clouds: Couplings to tropospheric air quality”, Shelby Winiecki and John E. Frederick, J. Geophys. Res.-Atmospheres, 110, doi:10.1029/2005JD006199, 2005.

120. Frederick, J. E., Principles of Atmospheric Science, J. E., Jones and Bartlett Publishers, 211 pp, ISBN 978-0-7637-4089-4, 2008.

121. “A Semi-Empirical Microscale Model of the Surface Energy Balance and its Application to Two Urban Rooftops”, Timothy M. Barzyk and John E. Frederick, Journal of Applied Meteorology and Climatology, 47, 819-834, 2008.

122. “Measurements of aerosol absorption and scattering in the Mexico City Metropolitan Area during the MILAGRO field campaign: A comparison of results from the T0 and T1 sites”, Marley, N. A., J. S. Gaffney, T. Castro, A. Salcido and J. E. Frederick, Atmos. Chem. Phys, 9, 189-206, 2009.

123. “Space-Time Modeling of 20 Years of Daily Air Temperature in the Chicago Metropolitan Region”, Im, H.K; Rathouz, P.; Frederick, J., Environmetrics, 20, 494-511, 2009.

124. Frederick, J. E. and Hodge, A. L.: Solar irradiance at the earth's surface: long-term behavior observed at the South Pole, Atmos. Chem. Phys., 11, 1177-1189, doi:10.5194/acp-11-1177-2011, 2011.

125. Frederick, J. E. : Sciences de L’Atmosphere: Une Introduction, Groupe de Boeck, Brussels, 238 pp., ISBN 978-2-8041-6330-3, 2011.

126. Gaffney, J. S., N. A. Marely and J. E. Frederick, “Climate Impacts from Agricultural Emissions: Greenhouse Species and Aerosols”, in Understanding Greenhouse Gas Emissions from Agricultural Management Systems, American Chemical Society, Chapter 15, pp 275-295, DOI: 10.1021/bk-2011-1072.ch015, 2011.

127. Christiaens, F., D. Moyal, S. Seité and J. Frederick: Comments to the Article by Kollias, Ruvolo and Sayre Entitled “The value of the Ratio of UVA to UVB in Sunlight”, Photochem. Photobiol., 87, 1476-1477, 2011.

128. Frederick, J. E. and S. K. De: Radiative exchange across a window and links to indoor energy demand, Energy and Buildings, 51, 21-28, DOI: 10.1016/ j.enbuild.2012.04.009, 2012.

129. Frederick, J. E.: The energy budget of single and double-pane windows subject to wintertime environmental radiation, Journal of Building Physics, 38, 214-233, 2014, DOI: 10.1177/1744259113501628.

130. Frederick, J. E, and R. Khosla.: The energy balance of an urban rooftop: A case study addressing cloudiness and evaporative cooling, Advances in Building Energy Research, 8, 97-115, 2014, DOI: 10.1080/17512549.2014.901187.

131. "Ozone as a UV filter", J. E. Frederick, in *Encyclopedia of Atmospheric Sciences*, 2nd edition, Elsevier Science Ltd, editors: G. R. North, J. A. Pyle and F. Zhang, released: November 2014, ISBN 9780123822253.

132. Frederick, J. E., Solar irradiance observed at Summit, Greenland: Possible links to magnetic activity on short timescales, J. Atmos. Solar-Terrest. Physics, 147, 59-70, 2016, doi:10.1016/j.jastp.2016.07.001.

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