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Science Directorate Publications and Presentations January 1 – December 31, 1999

Compiled by
F.G. Summers
Marshall Space Flight Center, Marshall Space Flight Center, Alabama

National Aeronautics and
Space Administration

Marshall Space Flight Center • MSFC, Alabama 35812

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2. MHD Streamer Structure, Slow Solar Wind, and the Streamer Brightness Boundary. ESA SP–448, 1999, S.T. Suess and S. Nerney.

Conference Publications

1. NASA Microgravity Materials Science Conference. NASA/CP—1999–209092, February 1999. Compiled by D.C. Gillies and D.E. McCauley.

2. Eleventh International Conference on Atmospheric Electricity, NASA/CP—1999–209261, June 1999, edited by H.J. Christian.

3. Fourth United States Microgravity Payload: One Year Report. NASA/CP—1999–209628, 1999. E.C. Ethridge, D.E. McCauley, and P.A. Curreri.

4. Tenth Biennial Coherent Laser Radar Technology and Applications Conference, NASA/CP—1999–209758, November 1999. Compiled by M.J. Kavaya

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1. A Photometric Technique for Determining Fluid Concentration Using Consumer-Grade Hardware. NASA/TM—1999–209091, January 1999. F.W. Leslie and N. Ramachandran.

2. Space Sciences Laboratory Publications and Presentations—January 1–December 31, 1998. NASA/TM—1999–209425, June 1999. Compiled by F.G. Summers.

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1. The Geophysical Fluid Flow Cell Experiment. NASA/TP—1999–209576, September 1999. J.E. Hart, D. Ohlsen, S. Kittleman, N. Borhani, F.W. Leslie, and T.L. Miller.

OPEN LITERATURE

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1. 3D-Stereoscopic Analysis of Solar Active Region Loops: I. SOHO/EIT Observations at Temperatures of (1.0–1.5)×106 K. *Astrophys. J., 515*, 842–867, April 20, 1999. M.J. Aschwander, J. Newmark, J.-P. Delaboudiniere & EIT Team, W. Neupert, F. Portier-Fozzani, G.A. Gary, and A. Zucke.

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24. On the Relationship of Solar Wind Pressure Enhancements and Subsequent Dayside Auroral Activity. 1999 Fall Meeting of the American Geophysical Union, San Francisco, CA, December 13–17, 1999; *Eos, 80(46)*, F884, 1999. J.F. Spann, Jr., G.A. Germany, D. Chua, M.J. Brittnacher, and G.K. Parks.

25. Outbursts from 4U 1145–619: A Transient X-Ray Pulsar. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999; *Bull. AAS, 31(2)*, 714, 1999. C.A. Wilson, M.H. Finger, and D.M. Scott.

26. POLAR Magnetosheath Observations on May 4, 1998. 1999 Spring Meeting of the American Geophysical Union, Boston, MA, May 31–June 4, 1999; *Eos, 80(17)*, S288, 1999. J.U. Kozyra, P. Song, M.O. Chandler, and C.T. Russell.

27. POLAR/TIDE Observations of Field Aligned O+ Flows at 5000 km Altitude Over the Auroral Regions in Comparison to UVI Auroral Images. 1999 Spring Meeting of the American Geophysical Union, Boston, MA, May 31–June 4, 1999; *Eos, 80(17)*, S292, 1999. B.A. Stevenson, J.L. Horwitz, P.D. Craven, M.O. Chandler, T.E. Moore, B.L. Giles, G.K. Parks, and C.J. Pollock.

28. Preview of the BATSE Earth Occultation Catalog of Low Energy Gamma Ray Sources. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999; *Bull. AAS, 31(2)*, 728, 1999. B.A. Harmon, C.A. Wilson, G.J. Fishman, M.L. McCollough, C.R. Robinson, M. Sahi, W.S. Paciesas, and S.N. Zhang.

29. Rayleigh Convection in a Rotating Magnetic Field. American Physical Society 1999 Centennial Meeting, Atlanta, GA, March 20–26, 1999; *Bull. APS, 44 (1)*, 1844, 1999. M.P. Volz and K. Mazuruk.

30. The Rondonia Lightning Detection Network: Network Description, Science Objectives, Data Processing/Archival Methodology, and First Results. 1999 Fall Meeting of the American Geophysical Union, San Francisco, CA, December 13–17, 1999; *Eos, 80(46)*, 176, 1999. R.J. Blakeslee, J. Bailey, and W.J. Koshak.

Published Abstracts (Continued)

31. A Search for Short-Period Accreting Pulsars with BATSE. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999; *Bull. AAS, 31(2)*, 714, 1999. R.B. Wilson, M.H. Finger, D.M. Scott, and C.A. Wilson.

32. Solar Cycle Predictions. 1999 Fall Meeting of the American Geophysical Union, San Francisco, CA, December 13–17, 1999; *Eos, 80(46)*, F825, 1999. D.H. Hathaway.

PRESENTATIONS

1. III–V Crystal Growth Under Microgravity. A Short Review of Previous Results and Experiences (III–V Kristallzuchtung Unter Mikrogravitation, Eine Kurze Ubersicht Bisheriger Ergebnisse Und Erfahrungen). III–V Crystal Growth, Freiberg, Germany, October 27, 1999. A. Croell.

2. Aerosol Backscatter From Airborne Continuous Wave CO_2 Lidars Over Western North America and the Pacific Ocean. Tenth Biennial Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28, 1999. M.A. Jarzembski, V. Srivastava, and J. Rothermel.

3. Anticipating HESSI's View of Spectral Evolution in Flare Hard X-Ray Emission. HESSI Science Workshop, Goddard Space Flight Center, Greenbelt, MD, October 18–20, 1999. E.K. Newton and J.A. Miller.

4. Application of Linear Analytic Techniques for Lightning Location Retrieval for Advanced Lightning Direction Finder (ALDF) Networks. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. R.J. Blakeslee, W.J. Koshak, and J. Bailey.

5. An Application of the Direct Coulomb Electron Pair Production Process to the Energy Measurement of the "VH–Group" in the "Knee" Region of the "All-Particle" Energy Spectrum. 26th International Cosmic Ray Conference, Salt Lake City, UT, August 17–25, 1999. J.H. Derrickson, J. Wu, M.J. Christl, W.F. Fountain, and T.A. Parnell.

6. Beta-Adrenergic Receptor Expression in Muscle Cells. Signal Transduction and Therapeutic Strategies, Houston, TX, February 6, 1999. R.B. Young, K. Bridge, and J.R. Vaughn.

7. Biotechnology Science Experiments on Mir. AIAA Microgravity Science and Space Processing Symposium, Reno, NV, January 11–14, 1999. R.L. Kroes.

8. Buffer Effects in the Nucleation and Growth of Chicken Egg White Lysozyme. American Crystallographic Association, Buffalo, NY, May 24, 1999. U. Gibson, E. Horrell, and M. Pusey.

9. Characterization of Human Bone Alkaline Phosphatase in Pichia Pastoris. Union of Crystallography Conference, Glasgow, Scotland, August 6, 1999. C.C. Malone, E. Ciszak, and L.J. Karr.

10. Cloud-to-Ground Lightning Characteristics of a Major Tropical Cyclone. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. E.W. McCaul, Jr., D. Buechler, and S.J. Goodman.

PRESENTATIONS (Continued)

11. Coherence Between QPOs in X-Ray Pulsars. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999. M.H. Finger.

12. Coherent Doppler Wind Lidar Technology for Space-Based Wind Measurements Including SPARCLE. Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science, Baltimore, MD, May 23–28, 1999. M.J. Kavaya and U.N. Singh.

13. A Comparison Between Lightning Activity and Passive Microwave Measurements. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. K.T. Driscoll, H.J. Christian, and S.J. Goodman.

14. Comparison of CO_2 Lidar Backscatter with Particle Size Distribution and GOES–7 Data in Hurricane Juliette. Tenth Biennial Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28, 1999. M.A. Jarzembski, G.J. Jedlovec, R.F.Pueschel, V. Srivastava, E.W. McCaul, D.R. Cutten, and R.J. Atkinson.

15. Comparison of Continuous Wave CO_2 Doppler Lidar Calibration Using Earth Surface Targets in Laboratory and Airborne Measurements. Tenth Biennial Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28, 1999. M.A. Jarzembski and V. Srivastava.

16. Comparison of Ground-Based 3-Dimensional Lightning Mapping Observations with Satellite-Based LIS Observations in Oklahoma. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. R.J. Thomas, P.R. Krehbiel, W. Rison, T. Hamlin, D. Boccippio, S.J. Goodman, and H.J. Christian.

17. Comparisons of the Vertical Development of Deep Tropical Convection and Associated Lightning Activity on a Global Basis. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. E. Williams, S. Lin, C. Labrada, H.J. Christian, S.J. Goodman, D. Boccippio, and K. Driscoll.

18. Consistency Between Tropical Divergent Circulations From Reanalysis Data Sets and Satellite-Derived Precipitation, Radiation, and Surface Fluxes. IUGG 1999 Symposia, Birmingham, England, July 18–30, 1999. F.R. Robertson, J. Roads, and E.W. McCaul, Jr.

19. Constitutive and Stability Behavior of Granular Materials Under Very Low Effective Stresses. ASCE Alabama Section, Gulf Shores, AL, August 5, 1999. K.A. Alshibli, S. Sture, N.C. Costes, S.N. Batiste, R.A. Swanson, and M.R. Lankton.

20. Control of Meridional Flow by a Non-Uniform Rotational Magnetic Field. AIAA Aerospace Sciences Meeting, Reno, NV, January 11–16, 1999. K. Mazuruk and N. Ramachandran.

21. Control of Meridional Flow in Circular Cylinders by a Travelling Axial Magnetic Field. AIAA Meeting, Reno, NV, January 11–14, 1999. K. Mazuruk, N. Ramachandran, and M.P. Volz.

PRESENTATIONS (Continued)

22. Coronally Fluoresced Stellar Photospheric X-Ray Spectra. AAS/HEAD, Charleston, SC, April 12–15, 1999. J.J. Drake and D.A. Swartz.

23. Correlation Between Radio-Millimeter and Gamma Ray Fluxes From Blazars. 193rd Meeting of the American Astronomical Society, Austin, TX, January 5–9, 1999. K.K. Ghosh, B.D. Ramsey, and C. Sivaram.

24. Coupled Land Atmosphere Predictability. NASA Land Surface Hydrology Program Workshop, Columbia, MD, November 1, 1999. J. Roads, F.R. Robertson, R. Oglesby, and S. Marshall.

25. Current Status of Airwatch–OWL Optics. Airwatch–OWL Technical Meeting, Palermo, Italy, December 13–15, 1999. D.J. Lamb.

26. Darwinian Spacecraft. JPL/MSFC/AIAA Advanced Propulsion Conference, Huntsville, AL, April 6, 1999. D.A. Noever.

27. The Design of a Remote Sensing Data Acquisition Campaign for Precision Agriculture and Some Early Results. 1999 National Sensing Application Conference and Workshop, Auburn University, AL, November 15–17, 1999. D. Rickman, J.C. Luvall, J.M. Wersinger, P. Mask, and D.E. Kissel.

28. Detached Growth of Germanium and Germaniumsilicon. ACCGE–11, Tucson, AZ, August 1–6, 1999. P. Dold, M. Schweizer, F.R. Szofran, and K.W. Benz.

29. Determination of the Solid/Liquid Interface Shape and Resultant Radial Homogeneity in Directionally Solidified Hg0.89Mn0.11Te. ACCGE–11, Tucson, AZ, July 31–August 1, 1999. M.W. Price, R.N. Scripa, S.L. Lehoczky, F.R. Szofran, and B. Hanson.

30. Determination of the Wetting Angle of Germanium and Germanium-Silicon Melts on Different Substrate Materials. ACCGE–11 Conference, Tucson, AZ, August 1–6, 1999. N. Kaiser, A. Croell, F.R. Szofran, S.D. Cobb, P. Dold, and K.W. Benz.

31. Determination of Thunderstorm Anvil Ice Contents and Other Cloud Properties From Satellite Observations of Lightning. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. A.M. Blyth, H.J. Christian, and J. Latham.

32. Determining the Molecular Growth Mechanisms of Protein Crystal Faces by Atomic Force Microscopy. American Crystallographic Association, Buffalo, NY, May 24, 1999. A. Nadarajah, H. Li, and M. Pusey.

33. Development of Remote Sensing and Microgravity Student GAS Payload. NASA GSFC 99 SSPPO Symposium, Annapolis, MD, September 1999. R. Branly, J. Ritter, R. Friedfeld, E. Ackerman, C. Carruthers, and J. Faranda.

PRESENTATIONS (Continued)

34. A Diagnostic Analysis of the Kennedy Space Center LDAR Network. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D.J. Boccippio, G. Heckman, and S.J. Goodman.

35. Distance Estimates for High Redshift Clusters from SZ and X-Ray Measurements. 194th Meeting of the American Astronomical Society, Chicago, IL, May 30–June 4, 1999. M.K. Joy.

36. Double Diffusive Convection in Materials Processing. 37th AIAA Aerospace Sciences Meeting, Reno, NV, January 11–14, 1999. N. Ramachandran and K. Mazuruk.

37. Droplet Growth in Undercooled Cu-Co Alloys. 128th TMS Annual Meeting, San Diego, CA, February 28–March 4, 1999. M.B. Robinson, D. Li, T.J. Rathz, and G.A. Williams.

38. Dynamics of the Auroral Luminosity Boundary of the Polar Cap During Substorms. The 22nd General Assembly of the International Union of Geodesy and Geophysics, University of Birmingham, UK, July 18–30, 1999. M.J. Brittnacher, D. Chua, M.O. Fillingim, G.K. Parks, J.F. Spann, Jr., and G.A. Germany.

39. The Earth Occultation Technique with the Burst and Transient Source Experiment. Astronomical Data Analysis Software & Systems IX Conference, Kamuela, HI, October 4, 1999. C.A. Wilson, B.A. Harmon, G.J. Fishman, S.N. Zhang, W.S. Paciesas, and M.L. McCollough.

40. Education and Public Outreach for MSFC's Ground-Based Observations. AAS Meeting, Chicago, IL, May 30–June 3, 1999. M.L. Adams, M.J. Hagyard, E.K. Newton, E. Bero, E. Simmons, and A. Whitt.

41. Effect of a Nonplanar Melt-Solid Interface on Lateral Compositional Distribution During Uni-directional Solidification of a Binary Alloy with a Constant Growth Velocity V–Part I, Theory. Proceedings of the SPIE International Symposium on Optical Science, Denver, CO, July 19, 1999. J.-C. Wang, D.A. Watring, S.L. Lehoczky, C.-H. Su, D.C. Gillies, and F.R. Szofran.

42. Effect of Interface Shape and Magnetic Field on the Microstructure of Bulk Ge:Ga. ACCGE–11 Conference, Tucson, AZ, August 6–11, 1999. S.D. Cobb, F.R. Szofran, and M.P. Volz.

43. Effects of an Applied Magnetic Field on the Directional Solidification of Hg1–xZnxSe Alloys. 1999 Gordon Research Conference, Henniker, NH, June 27–July 2, 1999. S.D. Cobb, F.R. Szofran, K.S. Jones, and S.L. Lehoczky.

44. Effects of Gravity on the Double-Diffusive Convection During Directional Solidification of a Non-Dilute Alloy with Application to the HgCdTe. SPIE 44th Annual Meeting, The International Symposium on Optical Science, Engineering, and Instrumentation, Denver, CO, July 18–23, 1999. A. Bune, D.C. Gillies, and S. Lehoczky.

PRESENTATIONS (Continued)

45. Electrical Stimulation Decreases Coupling Efficiency Between Beta-Adrenergic Receptors and Cyclic AMP Production in Cultured Muscle Cells. The Congress on In Vitro Biology, New Orleans, LA, June 6, 1999. R.B. Young and K.Y. Bridge.

46. Empirical Modeling of the Plasmasphere. URSI/COSPAR International Reference Ionosphere Workshop, Lowell, MA, August 12, 1999. D.L. Gallagher, P.D. Craven, and R.H. Comfort.

47. Energy Minimization of Molecular Features Observed on the (110) Face of Lysozyme Crystals. American Crystallographic Association, Buffalo, NY, May 24, 1999. M.A. Perozzo, J.H. Konnert, H. Li, A. Nadarajah, and M. Pusey.

48. Environmental and Archaeological Research in the Petén, Guatemala. Society of American Archaeology, Chicago, IL, March 26, 1999. T.L. Sever.

49. Evidence For the Absence of Conductivity Variations Above Thunderstorms. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. J. Bailey, R.J. Blakeslee, and K. Driscoll.

50. Evolution of Local Microstructures: Spatial Instabilities of Coarsening Clusters. Containerless Processing of Materials Conference, San Diego, CA, March 1–4, 1999. D.O. Frazier.

51. Evolution of Plasmaspheric Refilling: A Comparison of Measurements with an Interhemispheric Plasmasphere Model. 22nd General Assembly of the International Union of Geodesy and Geophysics (IUGG99), Birmingham, UK, August 18–30, 1999. R.H. Comfort, P.G. Richards, J.-H. Liao, and P.D. Craven.

52. Experimental Study of Dust Grain Charging. 2nd International Conference on the Physics of Dusty Plasmas, Hokone, Kanagawa, Japan, May 24, 1999. J.F. Spann, Jr., C.C. Venturini, R.H. Comfort, M.M. Abbas.

53. A Few Good Crystals Please. ACA Annual Meeting, Buffalo, NY, May 22, 1999. R.A. Judge and E.H. Snell.

54. Flight- and Ground-Based Materials Science Programs at NASA. 23rd Annual American Ceramic Society Meeting, Cocoa Beach, FL, January 25–29, 1999. D.C. Gillies.

55. Fluorescence Studies of Protein Crystal Nucleation. 18th IUCR General Assembly and Congress, Glasgow, Scotland, August 4–13, 1999. M.L. Pusey.

56. Fluorescence Studies of Protein Crystallization Interactions. American Crystallographic Association, Buffalo, NY, May 24, 1999. M. Pusey, L. Smith, and E. Forsythe.

PRESENTATIONS (Continued)

57. Global Frequency and Distribution of Lightning as Observed by the Optical Transient Detector (OTD).11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. H.J. Christian, Jr., D.J. Boccippio, W.L. Boeck, D. Buechler, K. Driscoll, S.J. Goodman, J. Hall, W.J. Koshak, Jr., and M.F. Stewart.

58. Gravitational Acceleration Effects on Macrosegregation—Experiment and Computational Modeling. TMS Annual Meeting, San Diego, CA, February 28, 1999. J. Leon-Torres, D.M. Stefanescu, S. Sen, and P.A. Curreri.

59. GRO 2058+42 Observations with BATSE and RXTE. 5th Compton Symposium, Portsmouth, NH. September 15, 1999. C.A. Wilson, M.H. Finger, and D.M. Scott.

60. Growth of Homoepitaxial ZnO Semiconducting Films. Electronic, Photonic, Electro-Optical, and Electro-Magnetic Materials Workshop, RSA, AL, October 6–7, 1999. S. Zhu, C.-H. Su, S.L. Lehoczky, M.T. Harris, M.A. George, and P. McCarty.

61. Growth of II–VI Solid Solutions in the Presence of a Rotating Magnetic Field. 1999 TMS Annual Meeting, San Diego, CA, February 28–March 4, 1999. D.C. Gillies, S. Motakef, M. Dudley, R. Matyi, and H. Volz.

62. High Energy Properties of Galactic Superluminals. NRAO Colloquium, Socorro, NM, February 12, 1999. B.A. Harmon.

63. High-Altitude Aircraft-Based Electric-Field Measurements Above Thunderstorms. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. M.G. Bateman, R.J. Blakeslee, J. Bailey, M.F. Stewart, and A.K. Blair.

64. A High-Pressure Gas-Scintillation-Proportional Counter for the Focus of a Hard-X-Ray Telescope. SPIE International Symposium on Optical Science, Denver, CO, July 18–23, 1999. R.A. Austin, B.D. Ramsey, and C.L. Tse.

65. History and Observation of Gamma-Ray Bursts. APS Centennial Meeting, Atlanta, GA, March 20–25, 1999. G.J. Fishman.

66. Impact of Assimilating GOES-Derived Land Surface Variables into the PSU/NCAR MM5. MM5 Land Surface Modeling Workshop, Boulder, CO, June 21–15, 1999. W.M. Lapenta, R.J. Suggs, G.J. Jedlovec, and R.T. McNider.

67. Influence of Applied Thermal Gradients and a Static Magnetic Field on Bridgman-Grown GeSi Alloys. SPIE 44th Annual Meeting, Denver, CO, July 18–23, 1999. M.P. Volz, F.R. Szofran, S.D. Cobb, and T.M. Ritter.

PRESENTATIONS (Continued)

68. In Situ Optical Determination of Thermomechanical Properties of ZnSe and ZnTe Crystals. 44th SPIE Annual Meeting, Denver, CO, July 18–23, 1999. A. Burger, J.-O. Ndap, K. Chattopadhyay, X. Ma, E. Silberman, S. Feth, W. Palosz, and C.-H. Su.

69. In Situ Production of Solar Power Systems for Exploration. STAIF–99, Albuquerque, NM, January 31–February 4, 1999. P.A. Curreri and D.R. Criswell.

70. Interaction of Porosity With an Advancing Solid/Liquid Interface: A Real Time Investigation. 4th Pacific Rim International Conference on Modeling of Casting and Solidification Processes, Seoul, S. Korea, September 5, 1999. S. Sen, W.F. Kaukler, A. Catalina, D.M. Stefanescu, and P. Curreri.

71. Interactive Sectoring and Animation of Global Change Data. American Meteorological Society, Dallas, TX, January 10–15, 1999. P.J. Meyer, A.R. Guillory, R.J. Atkinson, and G.J. Jedlovec.

72. Interference of Backscatter from Two Droplets in a Focused Continuous Wave CO_2 Doppler Lidar Beam. Tenth Biennial Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28, 1999. M.A. Jarzembski and V. Srivastava.

73. Ion Transport in the September 24, 1998 CME Event. IGPP Conference, Yellowstone, WY, September 19–25, 1999. M.O. Chandler and P.D. Craven.

74. A Laboratory Study of the Charging/Discharging Mechanisms of a Dust Particle. IPELS '99 in Kreuth, Germany, August 11, 1999. C.C. Venturini, J.F. Spann, Jr., and R.H. Comfort.

75. A Laboratory Study of the Charging/Discharging Mechanisms of a Dust Particle. American Physical Society, Division of Plasma Science, Meeting in Seattle, WA, November 16, 1999. C.C. Venturini, J.F. Spann, Jr., and R.H. Comfort.

76. Land-Ocean Differences in LIS and OTD Tropical Lightning Observations. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D.J. Boccippio, W.J. Koshak, H.J. Christian, and S.J. Goodman.

77. Large-Scale Coronal Heating from the Solar Magnetic Network. American Astronomical Society (AAS) Meeting, Chicago, IL, May 30, 1999. D.A. Falconer, R.L. Moore, J.G. Porter, and D.H. Hathaway.

78. Large-Scale Sakharov Condition. 35th AIAA Joint Propulsion Conference, Los Angeles, CA, June 21, 1999. D.A. Noever and C. Bremner.

79. Leonid's Particle Analyses From Stratospheric Balloon Collection on Xerogel Surfaces. International Leonids Multi-Instrument Aircraft Campaign Workshop, NASA Ames Research Center, Moffett Field, CA, April 12–15, 1999. D.A. Noever, T. Phillips, J.M. Horack, L.Z. Porter, and E. Myszka.

PRESENTATIONS (Continued)

80. Lightning Variations in the Southeastern United States Related to the Winter 1997–1998 El Niño Event. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D. Buechler, S.J. Goodman, K. Knupp, and E.W. McCaul, Jr.

81. Localized Upper Tropospheric Warming During Tropical Depression and Storm Formation Revealed by the NOAA–15 AMSU. American Meteorological Society, Dallas, TX, January 10–15, 1999. R.W. Spencer and W.D. Braswell.

82. Low-Density Silica Xerogel Capture of Leonids Meteor Storm Dust Candidates by Stratospheric Balloon Return. Leonids Meteor International Conference, Santa Clara, CA, April 12, 1999. D.A. Noever, T. Phillips, J.M. Horack, E. Myszka, L.Z. Porter, and G. Jerman.

83. Macrosegregation of GeSi Alloys Grown in a Static Magnetic Field. American Physical Society Meeting, Atlanta, GA, March 21–26, 1999. T.M. Ritter, M.P. Volz, S.D. Cobb, and F.R. Szofran.

84. Major Optical Outburst of Two Blazars: 3C66A and OJ287. AAS Meeting, Chicago, IL, May 30–June 3, 1999. K.K. Ghosh, B.D. Ramsey, S. Soundararajaperumal, S. Pukalenthi, and M.J. Rosario.

85. Material Science Experiments on Mir. AIAA Microgravity Science and Space Processing Symposium, Reno, NV, January 11–14, 1999. R.L. Kroes.

86. Materials Science Experiments on the International Space Station. The Pittsburgh Conference, Orlando, FL, March 3–7, 1999. D.C. Gillies.

87. Measurement of Temperature Fluctuations and Microscopic Growth Rates in a Silicon Floating Zone under Microgravity. American Association for Crystal Growth, Tucson, AZ, August 2, 1999. A. Croell, P. Dold, Th. Kaiser, M. Lichtensteiger, and K.W. Benz.

88. Measuring Thermal Characteristics of Urban Landscapes. 1999 AAG Annual Meeting, Honolulu, HI, March, 23, 1999. J.C. Luvall, D.A. Quattrochi, and D. Rickman.

89. Measuring Tropospheric Winds from Space Using a Coherent Doppler Lidar Technique. 50th International Astronautical Congress, Amsterdam, The Netherlands, October 4–8, 1999. T.L. Miller, M.J. Kavaya, and G.D. Emmitt.

90. Melt Growth of a Nonlinear Optical Crystal Triethylphosphine Sulfide Using Modified Bridgman-Stockbarger Technique. International Symposium on Optical Science, Denver, CO, July 19, 1999. K. Curry, M.D. Aggarwal, J. Choi, W.S. Wang, R.B. Lal, B.G. Penn, and D.O. Frazier.

91. MHD Streamer Structure, Slow Solar Wind, and the Streamer Brightness Boundary. European Solar Physics Meeting, Florence, Italy, September 1999. S.T. Suess and S. Nerney.

PRESENTATIONS (Continued)

92. Microflaring in Low-Lying Core Fields and Extended Coronal Heating in the Quiet Sun. AAS Meeting, Chicago, IL, May 30–June 3, 1999. J.G. Porter, D.A. Falconer, and R.L. Moore.

93. The Multi-Center Airborne Coherent Atmospheric Wind Sensor: Recent Measurements and Future Applications. 10th Coherent Laser Radar Conference, Mount Hood, OR, June 28–July 2, 1999. J. Rothermel, L.S. Darby, D.R. Cutten, J.N. Howell, R.M. Hardesty, and D.M. Tratt.

94. Multi-Wavelength Analysis of the March 26, 1991 Solar Flare. High Energy Solar Physics Workshop, Goddard Space Flight Center, MD, October 18, 1999. V.G. Kurt, V.V. Akimov, M.J. Hagyard, and D.H. Hathaway.

95. The NASA Coherent Lidar Technology Advisory Team. Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28–July 2, 1999. M.J. Kavaya.

96. NASA's Biological Crystal Growth Program on the International Space Station. 18th IUCR General Assembly and Congress, Glasgow, Scotland, August 4–13, 1999. C.E. Kundrot.

97. A New Era in Global Temperature Monitoring With the Advanced Microwave Sounding Unit (AMSU). American Meteorological Society, Dallas, TX, January 10–15, 1999. R.W. Spencer, W.D. Braswell, and J.R. Christy.

98. Novel Technique for Performing Space Based Radiation Dosimetry Using DNA-Results from GraDEx–I and the Design of GraDEx–II. SSPPO Conference, "Shuttle Small Payloads Project Office," Annapolis, MD, September 1999. J. Ritter, R. Branly, C. Theodorakis, J. Bickham, C. Swartz, R. Friedfeld, E. Ackerman, C. Carruthers, A. Diirolamo, J. Faranda, E. Howard, and C. Bruno.

99. Numerical Analysis of Temperature Gradients and Interface Shape During Directional Solidification of AL and AL-Cu Alloy Under Microgravity Conditions. 3rd International Conference on Solidification and Gravity, Miskolc, Hungary, April 26–29, 1999. A.V. Bune, S. Sen, D.M. Stefanescu, and P.A. Curreri.

100. Numerical Analysis of Temperature Gradients and Interface Shape During Directional Solidification of Al and Al-Cu Alloy Under Microgravity Conditions. Eleventh American Conference on Crystal Growth and Epitaxy, Tucson, AZ, August 2, 1999. A.V. Bune, S. Sen, R. Mukherjee, A. Catalina, and D.M. Stefanescu.

101. Numerical Modeling of Crystal Growth of ZnSe by Physical Vapor Transport—Towards a More Comprehensive Formulation. 3rd International Conference on Solidification and Gravity, Miskolc, Hungary, April 26, 1999. N. Ramachandran.

102. Observational Review of Gamma-Ray Bursts. Results and Perspectives in Particle Physics, La Thuile, Italy, February 28–March 6, 1999. G.J. Fishman.

PRESENTATIONS (Continued)

103. Observational Review of Gamma-Ray Bursts. Space Telescope Science Institute Conference, Baltimore, MD, May 3–6, 1999. G.J. Fishman.

104. Observations of Gamma-Ray Bursts. The Neutron Star—Black Hole Connection/NATO Advanced Study Institute, Crete, Greece, June 16, 1999. G.J. Fishman.

105. Observations of Hurricane Georges During the Third Convection and Moisture Experiment (CAMEX–3). 53rd Interdepartmental Hurricane Conference, Biloxi, MS, February 8–12, 1999. A.R. Guillory and R.E. Hood.

106. The Observed Spectral Evolution of Solar Flare Hard X-Ray Emission. American Astronomical Society (AAS), Chicago, IL, June 3, 1999. E.K. Newton and T. Giblin.

107. On Heating Large Bright Coronal Loops by Magnetic Microexplosions at Their Feet. 194th Meeting of the American Astronomical Society, Chicago, IL, May 30–June 3, 1999. R.L. Moore, D.A. Falconer, and J.G. Porter.

108. On the Linearly-Balanced Kinetic Energy Spectrum. 12th Conference on Atmospheric and Oceanic Fluid Dynamics, Columbia University, New York, NY, June 7–11, 1999. H.-I. Lu and F.R. Robertson.

109. Optical Observations of Lightning in Northern India Himalayan Mountain Countries and Tibet. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. W.L. Boeck, D.M. Mach, S.J. Goodman, and H.J. Christian.

110. Optical Transient Detector (OTD) Observations of a Tornadic Thunderstorm. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D. Buechler, S.J. Goodman, H.J. Christian, and K. Driscoll.

111. Optical Variability of Blazars. Submitted to Astrophys. J., 1999. K.K. Ghosh, B.D. Ramsey, A.C. Sadun, and S. Soundararajaperumal.

112. Orientation Effects in ZnO Films Using Off-Axis Sputtering Deposition. 5th IUMRS, Beijing, China, June 13–18, 1999. S Zhu, C.-H. Su, S.L. Lehoczky, and M.A. George.

113. Outbursts from 4U 1145–619: A Transient X-Ray Pulsar. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999. C.A. Wilson, M.H. Finger, and D.M. Scott.

114. Overview of the Microgravity Science Glovebox (MSG). American Glovebox Society Conference, San Francisco, CA, July 19–21, 1999. M.E. Wright.

115. An Overview of the MSFC Electrostatic Levitation Facility. 128th TMS Annual Meeting, San Diego, CA, February 28–March 5, 1999. J.R. Rogers, M.B. Robinson, L. Savage, W. Soeliner, and D. Huie.

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116. Overview of the Third Convection and Moisture Experiment (CAMEX–3). 23rd AMS Conference on Hurricanes and Tropical Meteorology, Dallas, TX, January 9–15, 1999. R.E. Hood and R. Kakar.

117. The Photospheric Convection Spectrum. Stanford University, Stanford, CT, July 12, 1999. D.H. Hathaway.

118. The Plasmasphere as "Seen" by the IMAGE Mission. International Union of Radio Science, Toronto, Canada, August 14, 1999. D.L. Gallagher, J.L. Green, S.F. Fung, R.F. Benson, B.R. Sandel, and D.L. Carpenter.

119. Pre-Launch End-To-End Testing Plans for the SPAce Readiness Coherent Lidar Experiment (SPARCLE). Coherent Laser Radar Technology and Applications Conference, Mount Hood, OR, June 28–July 2, 1999. M.J. Kavaya.

120. Preliminary Concepts for the Materials Science Research Facility on the International Space Station. Space Technology and Applications International Forum (STAIF–99), Albuquerque, NM, January 31–February 4, 1999. S.D. Cobb, F.R. Szofran, and D.A. Schaefer.

121. Preliminary Performance of CdZnTe Imaging Detector Prototypes. International Workshop on Room Temperature Semiconductor X- and Gamma-Ray Detectors and Associated Electronics, Vienna, Austria, October 11–15, 1999, International Atomic Energy Agency. B.D. Ramsey, D. Sharma, D.P. Meisner, J. Gostilo, V. Ivanov, V. Loupilov, A. Sikolov, and H. Sipila.

122. Preliminary Results from a Laboratory Study of Charging Mechanisms in a Dusty Plasma. Auburn University, Auburn, AL, April 8, 1999. J.F. Spann, Jr., and C.C. Venturini.

123. Preview of the BATSE Earth Occultation Catalog of Low Energy Gamma Ray Sources. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999; Bull. AAS, 31(2), 728, 1999. B.A. Harmon, C.A. Wilson, G.J. Fishman, M.L. McCollough, C.R. Robinson, M. Sahi, W.S. Paciesas, and S.N. Zhang.

124. Processing of Bulk Yba2Cu307–x High Temperature Superconductor Materials for Gravity Modification Experiments and Performance Under AC Levitation. AIAA/AASME/ASEE Joint Propulsion Conference and Exhibit, Los Angeles, CA, June 1, 1999. D.A. Noever, R.J. Koczor, and R. Hiser.

125. Project ATLANTA (Atlanta Land Use Analysis: Temperature and Air Quality)—Use of Remote Sensing and Modeling to Analyze How Urban Land Use Change Affects Meteorology and Air Quality Through Time. 1999 AAG Annual Meeting, Honolulu, HI, March 23, 1999. D. Quattrochi, J.C. Luvall, and M. Estes.

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126. Prospects of Measuring Atmospheric Winds With a 2-Micron Coherent Doppler Lidar From the International Space Station. Conference on International Space Station Utilization, Albuquerque, NM, January 31–February 4, 1999. T.L. Miller, M.J. Kavaya, and G.D. Emmitt.

127. Quantitative Computer Tomography for Determining Composition of Microgravity and Ground Based Solid Solutions. 1999 TMS Annual Meeting, San Diego, CA, February 28–March 4, 1999. D.C. Gillies and H.P. Engel.

128. Rayleigh Convection in a Rotating Magnetic Field. American Physical Society Meeting, Atlanta, GA, March 21–26, 1999. M.P. Volz and K. Mazuruk.

129. A Real Time Investigation of Morphological Evolution During Solidification of Different Alloy Systems. Asian Foundry Congress, Calcutta, India, January 22, 1999. S. Sen, W.F. Kaukler, P.A. Curreri.

130. Real Time Optima Tracking Using Harvesting Models of the Genetic Algorithm. Advanced Space Propulsion Workshop, Huntsville, AL, April 5, 1999. S. Baskaran and D.A. Noever.

131. Real-Time Investigation of Solidification of Metal Matrix Composites. International Conference on Composite Engineering, Orlando, FL, June 27, 1999. W.F. Kaukler and S. Sen.

132. Reciprocal Space Mapping of Macromolecular Crystals in the Home Laboratory. American Crystallographic Association 1999 Meeting, Buffalo, NY, May 23, 1999. E.H. Snell, P.F. Fewster, N. Andrew, T.J. Boggon, R.A. Judge, and M.L. Pusey.

133. Reducing and Inducing Convection in Ge-Si Melts. Grodon Research Conference, Henniker, NH, June 27–July 2, 1999. F.R. Szofran.

134. Remote Sensing in Geography in the New Millennium: Prospects, Challenges, and Opportunities. 1999 AAG Annual Meeting, Honolulu, HI, March 23, 1999. D. Quattrochi, J.R. Jensen, S.A. Morain, S.J. Walsh, and M.K. Ridd.

135. Remote Sensing of Urban Thermal Landscape Characteristics and Their Affects on Local and Regional Meteorology and Air Quality: An Overview of NASA EOS–IDS Project ATLANTA. 1999 National Remote Sensing Application Conference, Auburn University, AL, November 15–17, 1999. D.A. Quattrochi, J.C. Luvall, and M.G. Estes, Jr.

136. Rendering Three-Dimensional Solar Coronal Structures of Active Region 8227. American Astronomical Society, Chicago, IL, May 30–June 3, 1999. G.A. Gary and D.A. Alexander.

137. Role of Instabilities in Plasmaspheric Heating, Flux Tube Refilling, and the Development of Spatial Structures. International Union of Radio Science, Toronto, Canada, August 14, 1999. D.L. Gallagher and G.V. Khazanov.

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138. The Rondonia Lightning Detection Network: Network Description, Science Objectives, Data Processing/Archival Methodology, and First Results. 6th International Congress of the Brazilian Geophysical Society, Rio de Janeiro, August 15–19, 1999. R.J. Blakeslee.

139. Satellite Derived Land Surface Temperature for Model Assimilation. 79th American Meteorological Society Annual Meeting, Dallas, TX, January 10–15, 1999. R.J. Suggs, G.J. Jedlovec, and W. Lapenta.

140. Satellite-Derived Water Vapor Winds for Regional Climate Studies. AGU, Chapman Conference on Water Vapor on Climate System, Potomac, MD, October 12, 1999. G.J. Jedlovec, J.A. Lerner, and S.L. Haines.

141 The Scintillating Optical Fiber Calorimeter Instrument Performance (SOFCAL). 26th International Cosmic Ray Conference, Salt Lake City, UT, August 17–25, 1999. M.J. Christl, C.M. Benson, F.A. Berry, W.F. Fountain, J.C. Gregory, J.S. Johnson, R.B. Munroe, T.A. Parnell, Y. Takahashi, and J.W. Watts.

142. Searching for the Best Protein Crystals: Synchroton-Based Measurement of Protein Crystal Quality. American Crystallographic Association 1999 Meeting, Buffalo, NY, May 23, 1999. G. Borgstahl, E.H. Snell, H. Bellamy, W. Pangborn, C. Nelson, A. Arvai, J. Ohren, and M. Pokross.

143. Simulated Surface Energy Budgets Over the Southeastern U.S.: The GHCC Satellite Assimilation System and the NCEP Early Eta. NASA LSHP PI Meeting, Columbia, MD, November 2–3, 1999. W.M. Lapenta, R.J. Suggs, R.T. McNider, and G.J. Jedlovec.

144. Simulation of Dynamics of PVT Growth: ZnSe. ACCGE–11, Tucson, AZ, August 1–6, 1999. A. Worlikar, M. Overholt, S. Motakef, C.-H. Su, and N. Ramachandran.

145. Simulation of the Universal-Time Diurnal Variation of the Global Electric Circuit Charging Rate. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D. Mackerras, M. Darvenzia, R.E. Orville, E. Williams, and S.J. Goodman.

146. Solar Flares and Their Prediction. University of Memphis, Memphis, TN, January 27, 1999. M.L. Adams.

147. A Spherical Earth Solution for TOA Lightning Location Retrieval.11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. W.J. Koshak.

148. Structure and Morphology of Phthalocyanine Films Grown in Electrical Fields by Vapor Deposition. Fifth IUMRS International Conference on Advanced Materials Symposium J: Advanced Information Recording Materials & Processing, Beijing, China, June 13–18, 1999. S. Zhu, C.E. Banks, D.O. Frazier, B.G. Penn, H.A. Abdeldayem, and R.M. Hicks.

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149. The Study of Neutron Stars with the Chandra X-Ray Observatory. The Neutron Star—Black Hole Connection/NATO Advanced Study Institute, Crete, Greece, June 10, 1999. M.C. Weisskopf.

150. Subresolution Fibrillation in X-Ray Microflares Observed by Yohkoh SXT. Institute of Space and Astronautical Science, Sagamihara, Tokyo, Japan, December 6, 1999. R.L. Moore, D.A. Falconer, and J.G. Porter.

151. Substrate Effects in Growth of Epitaxial ZnO Films. International Workshop on ZnO, Dayton, OH, October 7–8, 1999. S. Zhu, C.-H. Su, S.L. Lehoczky, M.T. Harris, M.A. George, and P. McCarty.

152. A Summary of Biases in the BATSE Burst Trigger. 1999 Meeting of the AAS High Energy Astrophysics Division, Charleston, SC, April 12–15, 1999. C.A. Meegan, G.N. Pendleton, and R.S. Mallozzi.

153. The Sun in Time. Southeastern Planetarium Association Annual Conference, Jacksonville, FL, June 25, 1999. M.L. Adams, E. Bero, and T.L. Sever.

154. Superconductor-Mediated Modification of Gravity? AC Motor Experiments with Bulk YBCO Disks in Rotating Magnetic Fields. Proceedings, 1998 AIAA/ASME,SAE/ASEE Joint Propulsion Conference, Cleveland, OH, July 13–15, 1998. D.A. Noever and R.J. Koczor.

155. Systematic Differences Between Satellite-Based Precipitation Climatologies Over the Tropical Oceans. 79th American Meteorological Society Annual Meeting, Dallas, TX, January 10–15, 1999. F.R. Robertson, D. Fitzjarrald, and E.W. McCaul.

156. Temperature Crosstalk Sensitivity of the Kummerow Rainfall Algorithm. 6th Specialist Meeting on Microwave Radiometry, Florence, Italy, March 16–18, 1999. R.W. Spencer and B. Petrenko.

157. Tetragonal Lysozyme Interactions Studied by Site Directed Mutagenesis. American Crystallographic Association, Buffalo, NY, May 24, 1999. L. Crawford, L. Karr, A. Nadarajah, and M. Pusey.

158. Theories of the Universe: A One Semester Course for Honors Undergraduates. Fourth Biennial History of Astronomy Workshop, University of Notre Dame, July 2, 1999. J.O. Dimmock, M.L. Adams, and T.L. Sever.

159. Thermal Remote Sensing: A Powerful Tool in the Characterization of Landscapes on a Functional Basis. 1999 National Sensing Application Conference and Workshop, Auburn University, AL, November 15–17, 1999. J.C. Luvall, J. Kay, and R. Fraser.

160. Time of Arrival Retrievals on an Oblate Spheroidal Earth. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. R.J. Solakeiwicz, and W.J. Koshak.

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161. Total Lightning Activity Associated with Tornadic Storms. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. S.J. Goodman, D. Buechler, S. Hodanish, D. Sharp, E. Williams, R. Boldi, A. Matlin, and M. Weber.

162. The Unit of Lightning. 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999. D.M. Mach, W.L. Boeck, and H.J. Christian.

163. Use of Traveling Magnetic Fields to Control Melt Convection. SPIE International Symposium on Optical Science, Engineering and Instrumentation, Denver, CO, July 18–23, 1999. N. Ramachandran and K. Mazuruk.

164. Using Remote Sensing as a Plasma Diagnostic. 5th IPELS Conference, Kreuth, Germany, August 1999. J.F. Spann, Jr., G.K. Parks, M.J. Brittnacher, G.A. Germany, S. Mende, H. Frey, D. Chenette, M. Schulz, and S. Petrinec.

165. Using Remote Sensing Data and Research Results for Urban Heat Island Mitigation. National Conference on Environmental Decision Making, Knoxville, TN, April 11–14, 1999. M. Estes, D. Quattrochi, and J.C. Luvall.

166. The Variability of Upper-Tropospheric Precipitable Water from Satellite and Model Reanalysis Datasets. 14th Conference on Hydrology, Dallas, TX, January 10–15, 1999. G.J. Jedlovec and H. Iwai.

167. Viscosity Measurement of Highly Viscous Liquids Using Drop Coalescence in Low Gravity. 37th AIAA Aerospace Sciences Meeting, Reno, NV, January 11–14, 1999. B.N. Antar, E. Ethridge, and D. Maxwell.

168. Volume Diffusion Growth Kinetics and Step Geometry in Crystal Growth. AIAA Aerospace Sciences Meeting, Reno, NV, January 11–16, 1999. K. Mazuruk and N. Ramachandran.

169. X-Ray Astronomy Research at the Marshall Space Flight Center. Kazan State University, Kazan Russian Federation, March 12, 1999. R.A. Austin.

170. X-Ray Observations With the Chandra X-Ray Observatory (CXO). High Energy Astrophysics Division '99, Charleston, SC, April 11–14, 1999. M.C. Weisskopf.

APPENDIX—SCIENCE DIRECTORATE PREPRINTS

1. The 1997–1998 El Niño Event and Related Lightning Variations in the Southeastern United States. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 519–522, June 7–11, 1999. D.E. Buechler, S.J. Goodman, E.W. McCaul, and K. Knupp.

2. An Intercomparison of Ground, Airborne, and Space Instrumentation Definitions of the Lightning Element. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 166–169, June 7–11, 1999. D.M. Mach, W.L. Boeck, and H.J. Christian.

3. Cloud-to-Ground Lightning Characteristics of a Major Tropical Cyclone Tornado Outbreak. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 511–514, June 7–11, 1999. E.W. McCaul, D.E. Buechler, and S.J. Goodman.

4. Comparisons of Ground-Based 3-Dimensional Lightning Mapping Observations with Satellite-Based LIS Observations in Oklahoma, Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 172–175, June 7–11, 1999. R.J. Thomas, P.R. Krehbiel, W. Rison, T. Hamlin, D.J. Boccippio, S.J. Goodman, and H.J. Christian.

5. A Diagnostic Analysis of the Kennedy Space Center LDAR Network. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 254–257, June 7–11, 1999. D.J. Boccippio, S. Heckman, and S.J. Goodman.

6. Diurnal Lightning Distribution as Observed by the Optical Transient Detector (OTD). Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 742–745, June 7–11, 1999. R.J. Blakeslee, K.T. Driscoll, D.E. Buechler, D.J. Boccippio, W.L. Boeck, H.J. Christian, S.J. Goodman, J.M. Hall, W.J. Koshak, D.M. Mach, and M.F. Stewart.

7. Evidence for the Absence of Conductivity Variations Above Thunderstorms. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 646–649, June 7–11, 1999. J.C. Bailey, R.J. Blakeslee, and K.T. Driscoll.

8. Global Frequency and Distribution of Lightning as Observed by the Optical Transient Detector (OTD). Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 726–729, June 7–11, 1999. H.J. Christian, R.J. Blakeslee, D.J. Boccippio, W.L. Boeck, D.E. Buechler, K.T. Driscoll, S.J. Goodman, J.M. Hall, W.J. Koshak, D.M. Mach, and M.F. Stewart.

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9. Global Lightning Variations Caused by Changes in Flash Rate and by Changes in Number of Thunderstorms. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 750–753, June 7–11, 1999. E. Williams, K. Rothkin, D. Stevenson, and D.J. Boccippio.

10. High-Altitude Aircraft-Based Electric Field Measurements Above Thunderstorms. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 527–529, June 7–11, 1999. M.G. Bateman, R.J. Blakeslee, J.C. Bailey, M.F. Stewart, and A.K. Blair.

11. Initial Comparison of the Lightning Imaging Sensor (LIS) with Lightning Detection and Ranging (LDAR). Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 738–741, June 7–11, 1999. T. Ushio, K.T. Driscoll, S. Heckman, D.J. Boccippio, W.J. Koshak, and H.J. Christian.

12. Land-Ocean Differences in LIS and OTD Tropical Lightning Observations. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 734–737, June 7–11, 1999. D.J. Boccippio, W.J. Koshak, H.J. Christian, and S.J. Goodman.

13. The Lightning Imaging Sensor. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 746–749, June 7–11, 1999. H.J. Christian, R.J. Blakeslee, S.J. Goodman, D.M. Mach, M.F. Stewart, D.E. Buechler, W.J. Koshak, J.M. Hall, W.L. Boeck, K.T. Driscoll, and D.J. Boccippio.

14. Optical Detection of Lightning from Space. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 715–718, June 7–11, 1999. H.J. Christian.

15. Optical Observations of Lightning in Northern India, Himalayan Mountain Countries, and Tibet. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 420–423, June 7–11, 1999. W.L. Boeck, D.M. Mach, S.J. Goodman, and H.J. Christian.

16. Optical Transient Detector (OTD) Observations of a Tornadic Thunderstorm. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 722–725, June 7–11, 1999. D.E. Buechler, S.J. Goodman, H.J. Christian, and K.T. Driscoll.

17. The Relationship Between the Background and Transient Signals in Schumann Resonances. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 758–761, June 7–11, 1999. E. Williams, D. Castro, R. Boldi, T. Chang, E. Huang, V. Mushtak, W. Lyons, T. Nelson, S. Heckman, and D.J. Boccippio.

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18. Simulation of the Universal-Time Diurnal Variation of the Global Electric Circuit Charging Rate. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 634–637, June 7–11, 1999. D. Mackerras, M. Darveniza, R.E. Orville, E.R. Williams, and S.J. Goodman.

19. A Spherical Earth Solution for TOA Lightning Location Retrieval. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 192–195, June 7–11, 1999. W.J. Koshak and R.J. Solakiewicz.

20. Total Lightning Activity Associated with Tornadic Storms. Preprints, 11th International Conference on Atmospheric Electricity, edited by H.J. Christian, NASA/CP—1999–209261, Guntersville, AL, pp. 515–517, June 7–11, 1999. S.J. Goodman, D.E. Buechler, S. Hodanish, D. Sharp, E. Williams, R. Boldi, A. Matlin, and M. Weber.

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13. ABSTRACT *(Maximum 200 words)*

This document lists the significant publications and presentation of the Science Directorate during the period January 1–December 31, 1999. Entries in the main part of the document are categorized according to NASA Reports (arranged by report number). Open Literature, and Presentations (arranged alphabetically by title). Most of the articles listed under Open Literature have appeared in refereed professional journals, books, monographs, or conference proceedings. Although many published abstracts are eventually expanded into full papers for publication in scientific and technical journals, they are often sufficiently comprehensive to include the significant results of the research reported. Therefore, published abstracts are listed separately in a section under Open Literature. Questions or requests for additional information about the entries in this report should be directed to M. Franklin Rose (SD01; (256) 544–7721) or to one of the authors.

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