

CURRICULUM VITA
ERNEST M. AGEE, Professor
Department of Earth, Atmospheric & Planetary Sciences
Purdue University

Education:

- PhD, University of Missouri-Columbia, 1968 (Atmospheric Science)
- BS, Eastern Kentucky University, 1964 (Mathematics and Physics)

Professional Experience:

- Professor of Earth and Atmospheric Sciences, Purdue University, 1978-present
- Associate Professor (1972-78); Assistant Professor (1968-72), Purdue University
- Department Head, Earth and Atmospheric Sciences (1990-96), Acting Head (2004-05); Associate Head (2005-09); Interim Head (2009-10)
- Summer 1984 Invited Distinguished Scientist, Dept. of Physics, Institute of Meteorology and Oceanography, Utrecht University, The Netherlands
- Summer, 1983 Invited Distinguished Scientist, NOAA Environmental Research Labs, Boulder, CO
- Summer 1981 Invited Lecturer, Max-Planck Institute for Meteorology, University of Hamburg and Convener, IAMAP Special Assembly, Hamburg
- Summer, 1980 Visiting Senior Scientist, National Center for Atmospheric Research (NCAR), Boulder, CO
- Summer, 1979 Lecturer, NCAR's Advanced Study program for Women and Minorities, Boulder, CO
- Feb. 1974, 75 Scientific Participant, The Air Mass Transformation Experiment - a meteorology/oceanography field expedition over the East China Sea, invited by the Japanese government
- Aug. 1974, 75 Invited lecturer, Japan Meteorological Agency and University of Tokyo, sponsored by the USA-Japan Cooperative Science program

Professional memberships:

- American Meteorological Society, Fellow
- American Association for the Advancement of Science
- American Geophysical Union
- Meteorological Society of Japan
- Indiana Academy of Science, Fellow

Awards, Honors and Appointments:

- Graduate School Distinguished Alumnus Award, Univ. of Missouri, 2011.
- Cleveland Abbe Award, American Meteorological Society, 2010.
- Science Advocate Award, University Corporation for Atmospheric Research, 2005-12
- Graduate Student Mentoring Award, College of Science, Purdue University, 2007; and EAPS Undergraduate Mentoring Award, 2014.
- Outstanding Teacher Award, Department of Earth and Atmospheric Sciences, 2004
- Sagamore of the Wabash, (State of Indiana), 1990.
- Purdue University's Scientific Member Representative to UCAR (University Corporation for Atmospheric Research, Boulder, Colorado), 1970-80; 1984-present.
- Member, Board on Oceans and Atmosphere, National Association of State Universities and Land Grant Colleges, 1993-98. Elected to 3-year term on the Executive Committee, 1995-98.
- USA representative, The International Association of Meteorology and Atmospheric Physics (IAMAP); Chairman - USA IAMAP; Member - IAMAP Cloud Dynamics Group; 1980-88.
- Member, The United States National Committee, International Union of Geodesy and Geophysics; nominated by the American Geophysical Union and appointed by the National Academy of Sciences, 1982-85 and 1985-88.
- Member, AMS-STAC Committee on Mesoscale Meteorology, American Meteorological Society (AMS), 1985-88.
- Trustee, The University Corporation for Atmospheric Research (UCAR), elected to the Board of Trustees by the member university consortium, 1979-83.
- Member, UCAR Nominating Committee, 1988-89; chairman, 1990.
- Vice Chairman UNIDATA Policy Committee and Executive Committee, appointed by UCAR President, 1983-88.
- Member, NOAA Profiler Committee, appointed by Director of NOAA-ERL, 1987-88.

- Member, STORM Program Scientific Steering Committee and Data Management Working Group, appointed by UCAR and NOAA, 1983-88.
- Chairman, UCAR Personnel Policy Committee, 1981-83.
- Member, Education and Manpower Commission, AMS, 1976-80.
- Eastern Kentucky University: Distinguished Alumnus Award, 1987

Abstract of Research and Engagement

E. Agee and his students have a long track record of studying convective phenomena in the atmosphere, both shallow and deep convective systems. Fundamental discovery has been made in the manner that microscale convective structures in the surface boundary layer develop and subsequently organize into larger mesoscale convective patterns of 2-d and 3-d geometry. This work has focused on field investigation of wintertime cold-air outbreaks over warm ocean currents as well as the USA-Canada Great Lakes. Intensive field observation from aircraft platforms have been undertaken over the East China Sea, the Kuroshio and Gulf Stream currents, and Lake Michigan. Self-organizing convective patterns, observed and measured, have also been numerically simulated through Large Eddy Simulation (LES) models. This work has been extensively supported by the NSF and DOD. Deep convective systems, particularly severe thunderstorms and tornadoes, have also been studied both observationally and through laboratory investigation with a focus on vortex breakdown (a phenomenon in fluid mechanics that leads to turbulent vortex flows that bifurcate into multiple vortex phenomena). Professor Agee has also published papers in the areas of climate change, solar variability, statistical meteorology, chaos theory, satellite meteorology, and radioisotope analyses of convective rainfall. His research has been funded by NSF, DOD, NOAA, IBM, NASA and computer software companies.

Professor Agee and associates have also had several successful partnerships with the corporate world, including funding from IBM, Bell Labs, Microsoft, Monsanto, Alden Electronics and the UNISYS Corporation. These awards supported a Center for Climate Research, an Environmental Science and Engineering Lecture Series, and development of the commercial software package known as the Weather Processor (WXP).

Mentoring of Students, Postdoctoral and Research Associates

Undergraduate Research and Honors Students:

- Jennifer Spinsky (1998)
- Dan Dawson (1999-2002)
- Paige Sweeney (2000-2002)
- Kent Knopfmeier (2002-2004)
- Rebecca Boltz (2003-2007)
- Emily Cornett (2007-2010)
- Kandace Gleason (2009-2011)
- Megan Varcie (2016-present)
- Andrea Orton (2010-2013)
- Alyssa Hendricks (2010-2013)
- Jonathan Rogers (2010-2012)
- Alex Marmo (2011-2015)
- Sam Childs (2012-2015)
- Natalie Vezina (2012-2015)
- Jake Elliott (2014-2015)
- Gillian Ferguson (2016-present)

Graduate Students:

- Andrea Orton (2016-present) PhD student
- 11 PhDs and 28 MS degrees supervised as Major Professor
- Approximately 100 MS and PhD Advisory Committees

Postdoctoral Associates and Visiting Scientists:

- Dr. Joseph Tribbia (Univ. of Michigan), 1976-78
- Dr. Kenneth Heikes (UCLA), 1978-79
- Dr. Fred Leslie, (Univ. of Oklahoma), 1979-80
- Professor Dang (Nanjing University, PROC), 1980-81
- Professor Ozturk (Izmir University, Turkey), 1981-82
- Dr. Marina Zivkovic (U. Maryland-Belgrade/Yugoslavia), 1986-89
- Dr. Lawrence Buja (Univ. of Utah), 1989-90
- Dr. Alan Howsmon (Purdue Univ.), 1989-91
- Dr. Alexander Gluhovsky (USSR Academy of Sciences-Moscow), 1992-1995

Reviewed Publications:

79. Agee, Ernest and Lindsey Taylor, 2018: Historical Analysis of U.S. Tornado Fatalities (1808-2017): Population, Science and Technology. *J. Wea. Clim & Soc. Amer. Met. Soc* **11**, 355-368.
78. Agee, Ernest and Jennifer Larson, Samuel Childs and Alexandra Marmo, 2016: Spatial Redistribution of U.S. Tornado Activity between 1954 and 2013. *J. Appl. Meteor. & Clim.*, **55**, 1681-1697.
77. Agee, Ernest and Andrea Orton, 2016: An Initial Laboratory Prototype Experiment for Sequestration of Atmospheric CO₂. *J. Appl. Meteor. & Clim.*, **55**, 1763-1770.
76. Agee, Ernest, 2014: A Revised Tornado Definition and Changes in Tornado Taxonomy. *Wea. Forecasting*, **29**, 1256-1258.
75. Agee, Ernest and Samuel Childs, 2014: Adjustments in Tornado Counts, F-scale Intensity, and Path Width for Assessing Significant Tornado Destruction. *J. Appl. Meteor. and Clim.*, **53**, 1494-1505.
74. Agee, Ernest, Andrea Orton and John Rogers, 2013: CO₂ Snow Deposition in Antarctica to Curtail Anthropogenic Global Warming. *J. Appl. Meteor. & Clim.* **52**, 281-288.
73. Agee, Ernest, Kandace Kiefer and Emily Cornett, 2012: Relationship of Lower Trop Cloud Cover and Cosmic Rays: An Updated Perspective. *J. Clim.*, **25**, 1057-1060.
72. Agee, Ernest Agee and Alyssa Hendricks, 2011: An Assessment of the Climatology of Florida Hurricane-Induced Tornadoes: Tech. vs Meteorology, *J. Clim.*, **24**, 5218-5222.
71. Agee, E. M., E. Cornett, and K. Gleason, 2010: An extended solar cycle 23 with deep minimum transition to cycle 24: Assessments and climate ramifications. *J. Climate*, **23**, 6110-6114.
70. Agee, E., and E. Jones, 2010: Reply. *Wea. Forecasting*, **25**, 341-342.
69. Gluhovsky, A., and E. Agee, 2009: Estimating higher-order moments of nonlinear time series. *J. Appl. Meteor. Climatol.*, **48**, 1948-1954.
68. Agee, E., and E. Jones, 2009: Proposed conceptual taxonomy for proper identification and classification of tornado events. *Wea. Forecasting*, **24**, 609-617.
67. Gluhovsky, A., and E. Agee, 2007: On the analysis of atmospheric and climatic time series. *J. Appl. Meteor. Climatol.*, **46**, 1125-1129.
66. Zurn-Birkhimer, S., E. M. Agee, and Z. Sorbjan, 2005: Convective structures in cold air outbreak over Lake Michigan during Lake-ICE. *J. Atmos. Sci.*, **62**, 2414-2432.
65. Gluhovsky, A., C. Tong, and E. M. Agee, 2002: Selection of modes in convective low-order models. *J. Atmos. Sci.*, **59**, 1383-1393.
64. Gluhovsky, A., and E. M. Agee, 2002: Improving the statistical reliability of data analysis from atmospheric measurements and modeling. *Mon. Wea. Rev.*, **130**, 761-765.

63. Agee, Ernest M., 2000: Shallow convection workshop held at Purdue University. *Bull. Amer. Meteor. Soc.*, **81**, 1370.
62. Agee, Ernest and Alexander Gluhovsky, 1999: Further aspects of large eddy simulation model statistics and inconsistencies with field data. *J. Atmos. Sci.*, **56**, 2948-2950.
61. Agee, Ernest and Alexander Gluhovsky, 1999: LES model sensitivities to domains, grids and large eddy time Scales. *J. Atmos. Sci.*, **56**, 599-604.
60. Gluhovsky, Alexander and Ernest Agee, 1997: An interpretation of atmospheric low-order models. *J. Atmos. Sci.*, **54**, 768-773.
59. Rao, Guan-Shu and Ernest M. Agee, 1996: Large eddy simulation of turbulent flow in a marine convective boundary layer with snow. *J. Atmos. Sci.*, **53**, 86-100.
58. Agee, E. M., B. A. Hall, E. McCallum, G. A. Monk and A. J. Waters, 1995: Convection initiated over oceans. *Images in Weather Forecasting*. M. J. Bader, J. R. Grant, R. B. E. Lilley and A. J. Waters (Europe) and G. S. Forbes (North America), Eds., Cambridge University Press, 362-375.
57. Gluhovsky, Alexander and Ernest Agee, 1995: Reply to "Comments on „A definitive approach to turbulence statistical studies in planetary boundary layers.” *J. Atmos. Sci.*, **52**, 3197-3198.
56. Knies, D.L., D. Elmore, P. Sharma, S. Vogt, R. Li, M.E. Lipschutz, G. Petty, J. Farrell, M.C. Monaghan, S. Fritz, E. Agee, 1994: ⁷Be, ¹⁰Be, and ³⁶Cl in precipitation. *Nucl. Instr. and Meth. in Phys. Res.*, **B 92**, 340-344.
55. Gluhovsky, Alexander and Ernest Agee, 1994: A definitive approach to turbulence statistical studies in planetary boundary layers. *J. Atmos. Sci.*, **51**, 1682-1690.
54. Przybylinski, Ron W., John T. Snow, Ernest M. Agee and John T. Curran, 1993: The use of volumetric radar data to identify supercells: A case study of June 2, 1990. *The Tornado: Its Structure, Dynamics, Prediction, and Hazards*, C. Church, D. Burgess, C. Doswell and R. Davies-Jones, Eds., American Geophysical Union, 241-250.
53. Agee, Ernest M., 1993: Comparison of 1988 and 1991 precipitation deficiencies with corn yield in the U.S.A. Midwest. *Proc. Indiana Acad. Sci.*, **102**, 247-256.
52. Agee, Ernest M., Daniel M. Rozema and Guan-Shu Rao, 1993: Mean and turbulence statistics in a wintertime convectively-mixed boundary layer over Lake Michigan. *J. Great Lakes Res.*, **19(2)**, 453-469.
51. Agee, E.M., 1991: Trends in cyclone and anticyclone frequency and comparison with periods of warming and cooling over the Northern Hemisphere. *J. Climate*, **4**, 263-267.
50. Agee, E.M. and Mary L. Hart, 1990: Boundary layer and mesoscale structure over Lake Michigan during a wintertime cold air outbreak. *J. Atmos. Sci.*, **47**, 2293-2316.

49. Agee, E.M. and Steven R. Gilbert, 1989: An aircraft investigation of mesoscale convection over Lake Michigan during the 10 January 1984 cold air outbreak. *J. Atmos. Sci.*, **46**, 1877- 1897.
48. Rothermel, Jeffry and Ernest Agee, 1989: Comments on "A note on the numerical computation of two-dimensional convective flows". *J. Atmos. Sci.*, **46**, 2745-2746.
47. Agee, E.M. and James J. Lidrbauch, 1989: An observational case study of a continental mesoscale vortex. *Tellus*, **41A**, 222-245.
46. Zivkovic, Marina and Ernest Agee, 1988: Further aspects of transitions in two-dimensional thermal convection. *J. Atmos. Sci.*, **45**, 3983-3995.
45. Agee, E.M., 1987: Mesoscale cellular convection over the oceans. *Dyn. Atmos. Oceans*, **10**, 317-341.
44. Rothermel, Jeffry and Ernest M. Agee, 1986: Numerical study of atmospheric convective scaling. *J. Atmos. Sci.*, **43**, 1185-1197.
43. Agee, E.M., 1985: Extratropical cloud-topped boundary layers over the oceans. Modeling of Cloud-topped Boundary Layers, WMO Technical Report No. 75-WCP 106, Geneva, pp. 34-45.
42. Ross, Becky and Ernest Agee, 1985: Aircraft investigation of wintertime convection and non-convective boundary layers over the East China Sea. *J. Meteor. Soc. Japan*, **63**, 405-417.
41. Rokosz, Steve D. and Ernest M. Agee, 1984: Cold air outbreaks over Lake Michigan during the 1982-83 winter season. *Proc. Ind. Acad. Sci.*, **65**, 938-949.
40. Agee, E.M., 1984: Observations from Space and thermal convection - A historical perspective. *Bull. Amer. Meteor. Soc.*, **65**, 938-949.
39. Agee, E.M., 1982: An introduction to deep convective systems. *Cloud Dynamics*, E. M. Agee and T. Asai, Eds., D. Reidel Publishing Company, 195-232.
38. Agee, E.M., 1982: An introduction to shallow convective systems. *Cloud Dynamics*, E. M. Agee and T. Asai, Eds., D. Reidel Publishing Company, 3-30.
37. Agee, E.M., 1982: A diagnosis of twentieth century temperature records at West Lafayette, Indiana. *Climatic Change*, **4**, 399-418.
36. Agee, E.M., 1982: Terrestrial cooling and solar variability. NASA Technical Report, CR-161985. (Universities Space Research Association), Marshall Space Flight Center, Alabama, 52 pp.
35. Sheu, P.J., E.M. Agee and J.J. Tribbia, 1981: A numerical study of physical processes affecting convective cellular geometry. *J. Meteor. Soc. Japan*, **58**, 489-499.

34. Agee, E.M., et al., 1981: Scientific results of the air mass transformation experiment. GARP Publication No. 24, World Meteorological Organization and International Council of Scientific Unions, Geneva Switzerland, 236 pp.
33. Rothmel, Jeffry and Ernest M. Agee, 1980: Aircraft investigation of mesoscale cellular convection during AMTEX 75. *J. Atmos. Sci.*, **37**, 1027-1040.
32. Agee, E.M., 1980: Present climatic cooling and a proposed causative mechanism. *Bull. Amer. Meteor. Soc.*, **61**, 1356-1367.
31. Agee, E.M., 1979: Results of AMS questionnaire on role of undergraduate education in Meteorology. *Bull. Amer. Meteor. Soc.*, **60**, 973-977.
30. Church, C.R., J.T. Snow, G.L. Baker and E.M. Agee, 1979: Characteristics of tornado-like vortices as a function of swirl ratio: A laboratory investigation. *J. Atmos. Sci.*, **36**, 1755-1776.
29. Jensen, Niels O. and Ernest M. Agee, 1978: Vortex cloud street during AMTEX 75. *Tellus*, **30**, 517-523.
28. Agee, E.M. and Francis E. Lomax, 1978: Structure of the mixed layer and inversion layer associated with patterns of MCC during AMTEX 75. *J. Atmos. Sci.*, **35**, 2281-2301.
27. Van der Borgh, R. and E.M. Agee, 1978: Non-linear convection in a moist atmospheric layer heated from below. *J. Meteor. Soc. Japan*, **56**, 284-292.
26. Agee, E.M., 1978: Observations of the Malaspina Glacier. *Bull. Amer. Meteor. Soc.*, **59**, 1612-1613 (with cover photo).
25. Agee, E.M. and P.J. Sheu, 1978: MCC and gull flight behavior. *Bdry. Layer Meteor.*, **13**, 45-47.
24. Church, C.R., J.T. Snow and E.M. Agee, 1977: Tornado vortex simulation at Purdue University. *Bull. Amer. Meteor. Soc.*, **58**, 900-908.
23. Mitchell, David L. and Ernest M. Agee, 1977: A theoretical investigation of atmospheric convective modes as a function of Rayleigh Number, Prandtl Number and Eddy Anisotropy. *J. Meteor. Soc. Japan*, **55**, 341-363.
22. Burt, Wayne V. and Ernest M. Agee, 1977: Buoy and satellite observations of mesoscale cellular convection during AMTEX 75. *Bdry. Layer Meteor.*, **12**, 3-24.
21. Sheu, P.J. and E.M. Agee, 1977: Kinematic analysis and air-sea heat flux associated with mesoscale cellular convection during AMTEX 75. *J. Atmos. Sci.*, **34**, 793-801.
20. Agee, E.M., D. Keyser and C. Church, 1977: The modern climatology of Indiana tornadoes. *Proc. Indiana Acad. Sci.*, **86**, 380-390.
19. Agee, E.M. and R.P. Howley, 1977: Latent and sensible heat flux calculations at the air- sea

- interface during AMTEX 74. *J. Appl. Meteor.*, **16**, 443-447.
18. Agee, E.M., J.T. Snow, F.S. Nickerson, C.R. Church and L.A. Schaal, 1977: An observational study of the West Lafayette, Indiana, tornado of 20 March 1976. *Mon. Wea. Rev.*, **105**, 893-907.
 17. Lenschow, D.H. and E.M. Agee, 1976: Preliminary results from the Air Mass Transformation Experiment (AMTEX). *Bull. Amer. Meteor. Soc.*, **57**, 1346-1355.
 16. Agee, E.M., J.T. Snow and P.R. Clare, 1976: Multiple vortex features in the tornado cyclone and the occurrence of tornado families. *Mon. Wea. Rev.*, **104**, 552-563.
 15. Agee, E.M., 1976: Observational evidence of cell flatness as a function of convective depth and eddy anisotropy. *J. Meteor. Soc. Japan*, **54**, 68-71.
 14. Agee, E.M., 1975: Some inferences of eddy viscosity associated with instabilities in the atmosphere. *J. Atmos. Sci.*, **32**, 642-646.
 13. Agee, E.M., C. Church, C. Morris and J. Snow, 1975: Some synoptic aspects and dynamic features of vortices associated with the tornado outbreak of 3 April 1974. *Mon. Wea. Rev.*, **103**, 318-333.
 12. Agee, E.M. and K.E. Dowell, 1974: Observational studies of mesoscale cellular convection. *J. Appl. Meteor.*, **13**, 46-53.
 11. Lenschow, D.H. and E.M. Agee, 1974: The Air Mass Transformation Experiment - Preliminary results from 1974 and plans for 1975. *Bull. Amer. Meteor. Soc.*, **55**, 1228-1235.
 10. Agee, E.M., D. Brown, T. Chen and K. Dowell, 1973: A height-dependent model of eddy viscosity in the planetary boundary layer. *J. Appl. Meteor.*, **12**, 409-412.
 9. Agee, E.M., T.S. Chen and K.E. Dowell, 1973: A review of mesoscale cellular convection. *Bull. Amer. Meteor. Soc.*, **54**, 1004-1012.
 8. Agee, E.M. and T.S. Chen, 1973: A model for investigating eddy viscosity effects on mesoscale cellular convection. *J. Atmos. Sci.*, **30**, 180-189.
 7. Agee, E.M., 1972: Note on ITCZ wave disturbances and the formation of Tropical Storm Anna. *Mon. Wea. Rev.*, **100**, 733-737.
 6. Agee, E.M., 1971: Purdue tornado project activities - Part III. *Bull. Amer. Meteor. Soc.*, **52**, 575.
 5. Agee, E.M., 1971: An artificially induced local snowfall. *Bull. Amer. Meteor. Soc.*, **52**, 557-560.
 4. Geddes, J., T. Zimmerman, T. Schroeder, E. Agee and D. Schmidt, 1970: Preliminary design of tornado probe. *IEEE Trans. Geos. Elect.*, **8**, 279-284.

3. Agee, E.M., 1970: Purdue tornado project activities - Part II. *Bull. Amer. Meteor. Soc.*, **51**, 951.
2. Agee, E.M., 1970: The climatology of Indiana tornadoes. *Proc. Ind. Acad. Sci.*, **79**, 299-308.
1. Agee, E.M., 1969: Tornado project activities at Purdue University. *Bull. Amer. Meteor. Soc.*, **50**, 806-807.

Conference Proceedings, Abstracts and Reports

Approx. 100 conference proceedings, abstracts & reports

Invitations, and Talks

Over 75 talks and invited presentations since 1980.

Research Grants

- Co-Principal Investigator (with Alexander Gluhovsky) – January 2011 to December 2013.
Taming Complexity of Mesoscale Dynamics with Low-Order Models . NSF (\$429,712)
- Co-Principal Investigator (with Alexander Gluhovsky) – September 2005 to August 2009.
Modeling Coherent Structure in Convective Boundary Layers. National Science Foundation (\$407,724).
- Co-Principal Investigator (with Alexander Gluhovsky) - October 2004 - October 2005:
Modeling Mesoscale Circulations by Coupled Nonlinear Systems. NSF (\$60,000)
- Co-Principal Investigator (with Alexander Gluhovsky) - February 2000 to January 2004.
Modeling Mesoscale Convection by Coupled Nonlinear Systems. National Science Foundation (\$255,071).
- Principal Investigator - January 1999 to December 2002. Microscale and Mesoscale Structures in Convective Marine Boundary Layers. National Science Foundation (\$318,193).

- Co-Principal Investigator (with Alexander Gluhovsky) - December 1995 to December 1998: Modeling Mesoscale Convection by Coupled Nonlinear Systems. National Science Foundation (\$210,340).
- Principal Investigator - January 1995 to December 1998. Microscale and Mesoscale Structures in Convective Marine Boundary Layers. National Science Foundation (\$318,193).
- Co-Principal Investigator (with Professors Leap, Oglesby and Sun) - January 1993 to December 1997: Modeling the Effects of Climatic Changes on Availability and Quality of Water. IBM (\$2,479,335 includes \$2 million computer equipment award).
- Co-Principal Investigator (with Michael Sabones and Michelle Akridge) - April 1995 to April 1996. The Pulaski County and West Lafayette Indiana Tornadoes, April 26-27, 1994 A Case of Supercell (Mesocyclone) and Squall Line Bow-Echo Interaction. COMET Partners Project (\$5,000).
- Co-Principal Investigator (with Professor Ogg) - August 1992 to July 1996. Earth System Science Education Curriculum Development at Purdue University. USRA (\$75,000).
- Principal Investigator - December 1991 to May 1995: Mesoscale-Microscale Convective Structures in Type I Cloud-Topped Boundary Layers. National Science Foundation, Grant ATM-9111197 (\$344,400).
- Principal Investigator - May 1986 to December 1992: Convective Marine Boundary Layers. DOD-ONR, Marine Meteorology Program (\$865,230).
- Principal Investigator - May 1991 to August 1992: Collaboration with Unidata Project Center to Modify Scientific Data Management Software Version 3.0. UCAR/NSF (\$30,000).
- Principal Investigator - August 1987 to January 1992: Observational and Theoretical Study of Convective Boundary Layers. National Science Foundation, Grant ATM-8711611 (\$382,600).
- Principal Investigator - November 1989 to January 1992: Meteorological Software in Distributed AIX Environments. IBM (\$118,000).
- Co-Principal Investigator (with Judith A. Curry) - November 1988 to May 1991: Port of Climate Model to IBM-3090 at PUCC. IBM (\$133,098 in cash and \$372,000 for Vector facility).

- Principal Investigator - February 1990 to September 1990: Collaboration with Unidata Project Center to Modify Scientific Data Management Software Version 1.0. UCAR/NSF (\$30,086).
- Principal Investigator - January 1990 to June 1990: Advanced Function Workstation/Peripherals. IBM-ACIS (\$112,000).
- Co-Principal Investigator (with Judith Curry) - January 1989 to June 1990: A Distributed Computer Facility in Support of the Atmospheric Sciences at Purdue. NSF-ATM (\$174,300).
- Principal Investigator - November 1988: Research Special Bid for IBM 9370 Computer System. IBM-ACIS (\$260,707 in computer hardware and software).
- Principal Investigator - October 1987 to September 1989: Innovative Application of the IBM-RT PC in the Atmospheric Sciences. IBM-ACIS (\$209,000 in cash and \$120,000 in computer hardware and software).
- Principal Investigator - November 1986 to January 1988: UNIDATA Project Phase III and Phase IV. University Corporation for Atmospheric Research, S8704 (\$87,581).
- Principal Investigator - July 1985 to December 1987: Modification of Polar Air Masses Over the Great Lakes Region. National Science Foundation, Grant ATM-8505477 (\$234,400).
- Principal Investigator - August 1986 to July 1987: Advanced Computer Workstation Award/Peripherals. IBM-ACIS (\$56,000).
- Principal Investigator - August 1985 to July 1986: A Local Network for Meteorological Data Acquisition, Processing and Display. National Science Foundation, Grant ATM-8506124 (\$72,600).
- Principal Investigator - November 1984 to April 1986: Communications System for Minicomputer. National Science Foundation, Grant ATM-8410560 (\$26,500).
- Principal Investigator - July 1983 to December 1985: Modification of Polar Air Masses Over the Great Lakes Region. National Science Foundation, Grant ATM-83-04336 (\$168,000).
- Equipment Award - November 1983: Data General Minicomputer System and AFOS Graphics Terminal. National Science Foundation (\$165,000).
- Principal Investigator - April 1980 to March 1983: Microscale-Mesoscale Convection. National Science Foundation, GARP Grant ATM 79-27149 (\$205,000).

- Principal Investigator - September 1978 to September 1982: Severe Local Storms. National Oceanic and Atmospheric Administration, Grant 04-5-022-15 (\$26,000).
- Faculty Associate - June 1980 to June 1982: Laboratory Study of Tornado-Like Vortex Features. National Science Foundation, Grant ATM 80-03403 (\$52,000).
- Principal Investigator - March 1978 to December 1980: Mesoscale Cellular Convection. National Science Foundation, GARP Grant ATM 78-00609 (\$129,000).
- Principal Investigator - March 1976 to August 1978: Mesoscale Cellular Convection. National Science Foundation, GARP Grant ATM 76-00211 (\$118,000).
- Principal Investigator - November 1969 to February 1977: Mesoscale Cellular Convection. National Science Foundation, GARP Grants GA-24136 #1, #2, #3 and #4, ATM 76-00211 (\$310,000).
- Principal Investigator - September 1972 to August 1978: Severe Local Storms. National Oceanic and Atmospheric Administration, Grants 04-3-022015 #1, #2, #3, #4, #5, #6 and #7 (\$48,000).
- Co-Principal Investigator - December 1977 to December 1979: Laboratory Study of Tornado-Like Vortex Features. National Science Foundation, Grant ATM 77-16955 (\$122,000).
- Co-Principal Investigator - September 1975 to December 1977: Laboratory Study of Tornado-Like Vortex Features. National Science Foundation, Grant ATM 75-15526 (\$68,736).
- Co-Director - September 1968 to August 1970: Purdue Tornado Research Project. National Aeronautics and Space Administration, Grant NGR-15-005-029 (\$75,000).

Broad and Distinguished Impacts of a Multi-dimensional Career

When Professor Agee received the prestigious Cleveland Abbe Award on January 20, 2010, at the 90th Annual Meeting of the American Meteorological Society in Atlanta he was cited for "nearly 40 years of contributions and service to atmospheric science at the local, national and international levels." These contributions are represented by a solid research record and reputation, visionary leadership in the atmospheric science profession, key participant and leader in the planning of national and international field programs, distinguished service to UCAR and the AMS, and to the state of Indiana; co-founder of the

atmospheric science program at Purdue University, and educator and mentor to hundreds of undergraduate and graduate students (and recipient of mentoring and teaching awards).

Early in his career, Professor Agee's research was featured on the cover of the 1976 NSF Annual Report to President Gerald Ford. This work was a part of an international field program, held over the East China Sea, organized by the Japan Meteorological Agency. Agee visited Japan many times and gave talks (sometimes partly in Japanese) and published several papers on air-sea interaction. Later, this work paved the way for understanding the scientific relationship of classical thermal convection studies to convective marine boundary layers in the atmosphere. The late Jerry Namias, a member of the National Academy of Sciences, wrote to Agee in 1984 to compliment his work and to identify its importance in the study of air-sea interaction and climate. Also in 1984, Professor Agee was invited to Utrecht University in the Netherlands, where he joined another visiting scientist (G. Nicolis), to discuss the self-organization of convective patterns in the atmosphere (especially over the North Sea). Agee's summer leave to Utrecht followed four years of service to the nation as a member of UCAR's Board of Trustees (elected by the national membership in the university consortium). Agee also later served a term on NASULGC's Board on Oceans and Atmospheres.

Professor Agee's research on shallow marine convective layers over the Earth's major ocean currents also ran in parallel with studies of deep convection systems in the troposphere, particularly thunderstorms and the associated development of tornadoes. Agee and associates built the world's largest laboratory simulator for the experimental study of tornado-like vortices. Field observations of multiple vortex tornadoes in the Midwest, and particularly in Indiana, provided key evidence for simulating vortex breakdown and subsequent bifurcation into multiple vortex events. From the early field study of waterspouts in the Florida Keys, to ground and aerial surveys of major tornado events in the Midwest, to laboratory investigation with colleagues Chris Church and John Snow, several advances were made to understand the development, structure and behavior of tornadoes (including an explanation and documentation of Fujita's proposed parallel-mode tornado family). Agee's knowledge of tornadoes was brought into consideration by the state of Indiana when he proposed increased safety measures for nerve gas cylinders stored at the Newport Army facility. These recommendations were adopted (after a major tornado passed within one mile of the nerve gas facility) and Governor of Indiana recognized Agee's service by naming him a "Sagamore of the Wabash." Professor

Agee has also spoken to many service groups, and in particular, schools and classrooms on tornado safety, as well as safety practices at the nuclear power plant facilities of Commonwealth Edison (west of Chicago), now Exelon.

A review paper by Atkinson and Zhang (1996) entitled "Mesoscale Shallow Convection in the Atmosphere" published in *Reviews of Geophysics* highlighted the earlier pioneering work by Agee and his students. This highly cited review paper included references to 22 separate publications by Agee's group (more than any of the other cited authors), which largely addresses the onset of convection, preferred geometry, aspect ratio and circulation direction for geometric arrays of mesoscale cellular convection in marine boundary layers. These arrays occur in Type I and Type II Cloud-Topped Boundary Layers that form respectively over warm and cold ocean currents (to the east of continents in the winter and to the west of continents in the summer).

From 1996 to 2005, Agee and his associates undertook a new approach to study organized convection in marine boundary layers using Large Eddy Simulation (LES). His first paper was with PhD student Guan-Shu Rao in 1996, which simulated the modulating effects of snow precipitation on the fields of turbulence, and was the first LES model to incorporate cold cloud microphysics. Later, publications by Agee and Gluhovsky examined the sensitivity of turbulence fields to LES model parameters, including a determination of the number of "Large Eddy Turnover Times" for achieving steady-state higher-order turbulence statistics. His latest LES investigation was with PhD student Suzanne Zurn-Birkhimer, and their 2005 publication addressed the combined effects of buoyancy and shear in determining the preferred convection geometry in cold air outbreaks over warmer water. Agee's more recent research has focused on a variety of topics from the analysis of weather and climate data, to development of a tornado taxonomy, to solar variability and its relationship to climate, as well as a proposed mechanism for CO₂ sequestration. Research funds garnered by Agee as PI and co-PI totals approximately \$10M, all awarded to Purdue University.