

January 2006

BIOGRAPHICAL SKETCH

Arthur A. Few, Jr.

Personal Data:

Birthplace: Jasper, Texas
Birth date: November 30, 1939

Education:

Southwestern University
Georgetown, Texas
B.Sc., Physics and Math, 1962
University of Colorado
Boulder, Colorado
M.B.S., Astro-Geophysics & Physics, 1965
Rice University
Houston, Texas
Ph.D., Space Science & Physics, 1969
Dissertation: "Thunder"

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Houston TX 77251
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700 Hill St
Gold Hill
Boulder, CO 80302
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Positions Held:

2006 Professor of Physics and Astronomy, Rice University
2005 Visiting Scientist, University Corporation for Atmospheric
Research
2000 Professor and Master of Martel College
2000 Professor and Interim Master Baker College
1999 Visiting Scientist, University Corporation for Atmospheric
Research
1994 Professor and Master of Baker College
1984 Professor
1978 Associate Professor
1975 Adjunct Associate Professor
1970 Adjunct Assistant Professor

1968 Research Associate, Rice University
1962-63 Systems Analyst
Tenneco, Inc., Houston, Texas

**Research and Teaching
Interests:**

Earth System Science, Atmospheric Electricity, Thunder,
Lightning, Thunderstorms, Meteorology, climatology.

Memberships:

American Geophysical Union
American Meteorological Society
Society of Sigma Xi
American Association for the Advancement of Science
American Institute of Physics
Association of Mitchell Prize Laureates

Awards:

EDUCOM Award 1993
Mitchell Prize, 1979
Citation of Merit Award for Scientific Research
Southwestern Univ. Alumni Association, 1970
Rice Graduate Fellowship, 1965-1968
NCAR Assistantship 1963
Jesse Jones Scholarship, 1958-1960

**Editorial/Journal
Affiliations:**

Geophysical

Geophysical Research Letters, Associate Editor, 1974-77
Journal of Geophysical Research, Assistant Editor, 1973-75
Journal of the Atmospheric Sciences, Editorial Board, 1979-82
Space Solar Power Review, Associate Editor, 1980-1985
Journal of Atmospheric and Oceanic Technology, Associate
Editor, Advisory and Editorial Board, 1983-1987
Reviewer, Review of Scientific Instruments, American Institute of
Physics, (January 2000).
Reviewer, Journal of Geophysical Research, American
Union, (2000).
Reviewer, Holt Physics, Holt, Rinehart and Winston, (2000).

**Scientific Advisory
Committees:**

UCAR Membership Committee, Chair 2003
Earth Science Advisory Council/Universities Space Research
Association, 1991-1997, Convener 1996-97
Global Change Instruction Program
National Center for Atmospheric Research, 1988-present
National Research Council Advisory Panel for AFSRO, 1990
Earth Observing System Instrument Panel
National Aeronautics and Space Administration, 1988
Committee on Atmospheric and Space Electricity of the

American Geophysical Union, 1977-1998
 Chairman, 1977-1984
 University Corporation for Atmospheric Research
 Members Representative, 1977-78, 1983-present
 University Relations Committee, 1986-1989
 Nominating Committee, 1999-2000
 Members Committee, 2000-2003; Chair 2001-2002
 Working Group IIA - Electrodynamics of the Middle Atmosphere,
 International Association of Geomagnetism
 and Aeronomy, 1983-1986
 Program Review Panel, Goddard Space Flight Center, 1983
 Program Review Panel, Marshall Space Flight Center, 1984
 Committee on Atmospheric Electricity of the American
 Meteorological Society 1974-1980, Chairman, 1976-1977
 Intn'l Commission on Atmospheric Electricity of the
 Intn'l Association of Meteorology & Atmospheric Physics
 Sub-Commission I 1976-84, Sec. '76-84
 Sub-Commission V 1976-84
 Sub-Commission VI 1976-84
 Panel on the Earth's Electrical Environment of the National
 Research Council, 1983-1984
 Search Committee for Editor of the *Journal of Geophysical
 Research - Atmospheres*, 1983
 USA-USSR Bilateral Symposium on The Effects of Solar
 Variability on Climate, Delegate, 1981
 Rice Center for Community Design and Research,
 Climatological Consultant, 1973-80
 The Society of the Sigma Xi, Rice University and Texas Medical
 Center Chapter, Secretary/Treasurer, 1974-75; President
 Elect, 1981; President, 1982; Program Chairman, 1983
 The American Meteorological Society-Houston Chapter,
 Vice Chairman, 1975
 Biomass Energy Task Force, Texas Energy Advisory Council,
 1978
 Universities Space Research Association, Atmospheric
 Electricity Panel 1978-79

Courses Taught:

Acoustics F73, F74, S76, S77, S78, S79, S81
 Fundamentals of Air Pollution S75, F75, F76, F78
 Planetary Atmospheres Fall 1972
 Atmospheric Dynamics F75, S76, S78, S80, S82, S84
 Introduction to Atmospheric Science S72, S73, S74, F77,
 F79, F81, F83, F85, F87, F89, S96, F97, F98, F00, F01, F02,
 F03, F04
 Thermodynamics and Statistical Physics F70

Undergraduate Physics Lab F70, S71
Technical Physics, Fall 1980
Electrical Discharges, Fall 1980
Cloud Physics Spring 1981
Atmospheric Electricity, Fall 1984, Spring 1987
Ionospheric Physics, Spring 1985, Fall 1986
Atmosphere, Weather and Climate, S88, S89, S90, S91, S92, S93,
S94, S95, S96, S97, S98, S99, S02, S03, S04, S05, S06
Climate Dynamics, Fall 1988, F97
Foundations in Natural Science Tutorial, F88, S89
Foundations in Natural Science, F90, F92, F93
Global Change Issues, S90, F97, F98
Earth System Dynamics, F92, F94, S98
Space Science Instrumentation, Fall 96, F98
Sabbatical, F1982-S1983, F1991, F1999-S2000, F2005
Martel College Courses, S01, S02, F02, S03, S04, S04, F04, S05

**Specialized
Research Areas:**

Thunderstorms, Thunder, Lightning, Atmospheric
Electricity, Meteorology, climatology, Acoustics,
Earth System Science, Systems Modeling

**Grants and
Contracts:**

National Science Foundation
Office of Naval Research
National Aeronautics & Space Administration
National Center for Atmospheric Research
Universities Space Research Association
Department of Energy
Charles L Conly Research Fund
Global Change Studies. Hans Jahns & Exxon.

Invited Lectures:

Westinghouse Research Laboratory, Pittsburgh
State University of New York, Albany
Space Science Dept., Rice University
Society of Physics Students, Rice University
Society of Sigma Xi, Houston Chapter
Acoustical Society of America, Austin Chapter
Cooling Tower Institute; Annual Meeting
Faculty Women's Club; Rice University
Space Physics & Astronomy Dept., Rice University
University of Houston; Houston
University of Wyoming; Laramie

National Center for Atmospheric Research; Boulder
American Meteorological Society, Houston Chapter
Corporate Associates; Rice University
Space Physics & Astronomy Dept., Rice University
University of Iowa, Iowa
University of Wisconsin, Madison
American Meteorological Society, Chicago Chapter
University of Chicago, Chicago
Chicago Acoustical and Audio Group; Chicago
The Society of Rice University Women, Houston
Wiess College Lecture Series, Rice University
American Meteorological Society, Houston Chapter
American Geophysical Union, San Francisco
Space Physics and Astronomy Dept., Rice University
American Assn. of Retired Persons, Lake Jackson
American Meteorological Society, Houston Chapter
Society of Sigma Xi, Rice-Texas Med.
University of Houston, Electrical Engr. Dept.
Environmental Science & Engineering Dept., Rice University
Naval Arctic Research Laboratory, Barrow, AK
Corporate Associates, Rice University
Space Physics & Astronomy Dept., Rice University
Workshop on the Need for Lightning Observations from
Space - Tenn. Space Institute
Naval Research Laboratory, Washington, DC
Third Biennial Woodlands Conference on Growth Policy
Rice Alumni Institute
Sigma Xi - Pullman-Kellogg Chapter
American Red Corps Water Safety Training Inst.
6th Int'l Conf. on Atmospheric Electricity
State University of New York at Albany
Space Physics & Astronomy Dept., Rice University
Texas A & M University, Meteorology Dept.
American Meteorological Soc., College Station Chapter
University of Houston, Student Colleaguecon
Society of Rice University Women
Power Engineering Society of IEEE, Houston Section
American Geophysical Union, National Meeting
Space Physics & Astronomy Dept., Rice University
Southwestern University
Current Study Club, Houston
American Geophysical Union, National Meeting
Texas A & M University, Meteorology Dept.
Weather-Wise Seminar, NWS Houston
American Geophysical Union, National Meeting
Houston Chapter American Meteorological Society

Rice University - Texas Medical Center Chapter - Sigma Xi
 Space Physics & Astronomy Dept., Rice University
 Earth Systems Institute, Rice University
 University of Houston, Downtown
 University of Houston, Main Campus
 Society of Rice University Women
 Clear Lake Women's Group
 NCAR Directors, 7/91
 Space Physics and Astronomy Dept., Rice University, 2/92
 College of Natural Resources, Utah State University, 3/92
 Environmental Health and Safety, Texaco, Inc., 4/92
 Complex Systems Research Center, University of New
 Hampshire, 5/92
 Workshop on Computer Modeling in the Classroom, University
 of Colorado, 7/92
 Sigma Xi, Joint Meeting Houston Chapters, 11/92
 Brazoria Museum of Natural Science, 1/93
 Earth Systems Division, EESI 3/93
 Earth and Atmospheric Sciences, Purdue University, 4/93
 Workshop on Modeling, Purdue University, 4/93
 Lanier Middle School, Houston, 4/93, 11/93
 Rice University Summer School, Houston, 6/93
 PBS Monitor Radio, national broadcast 5/93
 IAMAP - IAHS Joint International Conference, Yokohama, 7/93
 EDUCOM '93, Cincinnati, 10/93
 AGU Fall Meeting, San Francisco, 12/93
 ESSE - USRA Summer Meeting, College Park, 6/94
 AMS Houston Chapter, Houston, 5/94
 Television Interview Ch 45, 6/94
 Associates Lecture Series Baker College, Houston, 2/95
 Workshop on Modeling Gonzaga University, Washington DC, 6/95
 Workshop on Modeling, U. of Oklahoma, Norman, 4/96
 Houston Industry Meeting on Meteorological Hazards, 12/96
 Families Weekend Masters Lectures, Houston, 10/98
 Physics Colloquium Univ. of New Mexico, Albuquerque, NM
 11/99
 The North American Institute Workshop on Trade Corridors in
 North America, San Antonio, TX 10/99.
 Program for Advancement of Geoscience Education, UCAR, 6/99.
 Groundbreaking for the Marian and Speros Martel College, Rice
 University, 4/00.
 Earth System Science Education (ESSE) Program Annual Meeting,
 College Park, Maryland 6/00.
 Global Warming: Science and Policy Conference, Baker Institute,
 Houston, Texas 9/00
 Rice Alumni in Salt Lake City, Climate Change, October, 2003

Alumni College at Rice, Ben Franklin and Electricity, March 2004

University Service:

Master of Martel College 2000 - 2005
Master of Baker College Fall 2000
Master of Baker College 1994 - 1999
Committee of Masters 1994-1999, 2000 - 2005
Environmental Programs Steering Committee 1998 - present
Crisis Management Team; Student Focus 1998 - present
Science Subcommittee, Environmental Strategic Planning 1997-98
Associate of Brown College, 1988-1994
Student Financial Aid Committee, 1990-1992
First DeLange Conference Organizing Committee, 1990-1991
University Representative to University Corporation for
Atmospheric Research, 1977-78, 1983-present
Environmental Health and Safety Working Group, 1991-present
Dean's Ad Hoc Committee to Evaluate the Foundation Courses,
1989-1990
Dean's Ad Hoc Undergraduate Studies Committee, 1989-1990
Undergraduate Admissions Committee, 1983-1989
Chair, 1987-1989
Minority Recruitment, 1986-1987
Earth Systems Science Curriculum Committee, 1988-1989
Faculty Club Board of Directors, 1973-1977, 1986-1989
Chair, 1974-1975, 1986-1987
University Safety Committee, 1986-1987
Program Chair, Society of Sigma Xi, 1983-1984
Awards Committee, Society of Sigma Xi, 1983-1984
Delegate, National Annual Meeting, Society of Sigma Xi, 1981
President, Society of Sigma Xi, 1981-1982
University Marshalls' Committee, 1976-1980
Chief Marshall, 1978-1979
Associate of Wiess College, 1977-1979
Student Engineering Design Review Panel, 1974-1975

Department Service:

Undergraduate Curriculum Committee 1997-98
Assistant Chair, 1989-1991
Faculty Search Committee, 1990-1991
Heads and Chairs Representative to American Meteorological
Society, 1984-present
Student Affairs Committee, 1989-1991
Faculty Search Committee, 1985-1986, 2000 - 2001
Colloquium Chairman, 1972-1973, 1981, 1983-1984
Assistant Director, Space Solar Power Research Program,
1978-1980

Teaching Awards: Brown College Outstanding Teaching Award in the Sciences, 1989, 1990
Brown College Outstanding Faculty Associate Award, 1989

Theses Supervised:

Teer, T. L., Acoustic profiling - A lightning reconstruction technique, M.S. Thesis, Rice University, 1972.

*Teer, T. L., Lightning channel structure inside an Arizona thunderstorm, Ph.D. Thesis, Rice University, 1973. (now with Geco US.)

Burke, H. K., Atmospheric conduction current: Observations with a new method of measurement, M.S. Thesis, Rice University, 1975.

Arnold, J. A., The use of an ion mobility spectrum analysis to determine air pollution, M.S. Thesis, Rice University, 1974.

Christian, H. J., Design and evaluation of a balloon-borne electric field sensor, M.S. Thesis, Rice University, 1975.

Burke, H. K., Large scale atmospheric electric fields: Comparisons with balloon data, Ph.D. Thesis, Rice University, 1975. (Now with MIT-Lincoln Laboratory).

*Christian, H. J., Vector electric field measurements inside a New Mexico thunderstorm, Ph.D. Thesis, Rice University, 1975. (Now with Marshall Space Flight Center, NASA.)

MacGorman, D. R., Lightning location in a Colorado thunderstorm, M.S. Thesis, Rice University, 1977.

MacGorman, D. R., Lightning location in a storm with a strong wind shear, Ph.D. Thesis, Rice University, 1978. (Now with National Severe Storms Laboratory, NOAA.)

Weber, M. E., Two balloon borne experiments to measure electric field structure inside thunderclouds, M.S. Thesis, Rice University, 1978.

**Bohannon, J. L., Infrasonic pulses from thunderstorms, M.S. Thesis, Rice University, 1978.

Weinheimer, A. J., Design and preliminary evaluation of a balloon-borne instrument for measuring atmospheric electrical profiles, M.S. Thesis, Rice University, 1979.

Weber, M. E., Thundercloud electric field soundings with instrumented free balloons, Ph.D. Thesis, Rice University, 1979. (Now with MIT-Lincoln Laboratory.)

**Bohannon, J. L., Infrasonic thunder: Explained, Ph.D. Thesis, Rice University, 1980. (Now with Shell Oil Company.)

*Weinheimer, A. J., The rotational dynamics of atmospheric ice: electrical and aerodynamical torques, Ph.D. Thesis, Rice University, 1980. (Now with National Center for Atmospheric Research.)

***Byrne, G. J. (with A. A. Few and M. E. Weber), Altitude, thickness and charge concentration of charged regions of four thunderstorms during TRIP 1981 based upon in situ balloon electric field measurements, *Geophys. Res. Lett.*, **10**, 39-42, 1983.

Conrad, A. C., Jr., Synthesis of atmospheric electricity observations: A thunderstorm on July 22, 1977 in Florida; day 77203 TRIP 77, Kennedy Space Center, Ph.D. Thesis, Rice University, 1985. (Consulting Physicist)

*Byrne, G. J., In situ measurements of the charge structure of two severe storms in Oklahoma, Ph.D. Thesis, Rice University, 1985. (Now with NASA/JSC.)

Stansbery, E. K., A global model of thunderstorm electricity and the prediction of whistler duct formation, Ph.D. Thesis, Rice University, 1989. (Now with NASA/JSC)

Geis, P. B., An analysis of lightning and the limitations it imposes on a global model of thunderstorm electricity M.S. thesis, 1990.

Morris, G. A., Background and early results for the atmospheric electric current sensor project, M.S. thesis, 1992.

Geis, P. B., The Electrical Environment of Thunderstorms, Models and Measurements, Ph. D. Thesis, 1994.

Morris, G. A., A Demonstration and Evolution of Trajectory Mapping, Ph. D Thesis, 1995. (Now with GSFC and Rice University)

Cleary, E. N., Statistics and Trends of Global Atmospheric Electricity Measurements, M. S. Thesis, 1995.

***David Richard Streutker, "Houston Heat Island, Satellite Observations", M.S. Thesis, 2000.

**Almaguer-Reisdorf, Joyce, "Carbon Sequestration in the Forests of East Texas," M.A. Thesis, 2003.(Dr. Paul Harcombe, Co-advisor)

**Streutker, David Richard, "A Study of the Urban Heat Island of Houston, Texas," Ph.D. Thesis, 2003. (William F. Marlar Scholar, Dr. Patricia Reiff, Co-advisor)

*Received Thesis Award - Society of Sigma Xi

**With another faculty member.

***The Department allows the submission of a paper to a reviewed journal in lieu of the M.S. Thesis for admission to Ph.D. candidacy.

Patents:

Few, A. A., H. Kuo, and W. A. Smith, Atmospheric electrical current detector (Patent No. 3,916,205), *Official Gazette of the U.S. Patent Office*, **2220**, October 28, 1975.

Few, A. A., T. L. Teer, and W. A. Smith, Electric field change meter (Patent No. 3,919,635), *Official Gazette of the U.S. Patent Office*, **1047**, November 11, 1975.

Few, A. A., H. J. Christian, and W. A. Smith, Electric field sensor (Patent No. 3,925,726), *Official Gazette of the U.S. Patent Office*, **956**, December 9, 1975.

Papers Presented: (Published abstracts are listed when available)

Few, A. A., A. J. Dessler, A theoretical discussion of the acoustic energy of thunder, Fourth International Conference on the Universal Aspects of Atmospheric Electricity, Tokyo, Japan, May, 1968.

Few, A. A., Using thunder to study the structure of the lightning channel (abstract), *EOS Trans. AGU*, **49**, 688, 1968.

Few, A. A., Acoustic measurements of lightning return stroke energy (abstract), *EOS Trans. AGU*, **50**, 167, 1969.

Few, A. A., Lightning channel length (abstract), *EOS Trans. AGU*, **50**, 619, 1969.

Few, A. A., Special added session: The Apollo 12 lightning incident (abstract, chairman), *EOS Trans. AGU*, **51**, 200, 1970.

Few, A. A., Rocket-produced, hydrodynamic disturbances in clouds (abstract), *EOS Trans. AGU*, **51**, 300, 1970.

Krider, E. P., D. D. Arabian, R. H. Manka, A. E. Potter, and A. A. Few, The Apollo 12 lightning (abstract, invited paper), *EOS Trans. AGU*, 300, 1970.

Teer, T. L., and A. A. Few, Lightning channel reconstruction from acoustic profiles (abstract), *EOS Trans. AGU*, **52**, 841, 1971.

Few, A. A., and T. L. Teer, Electrical evolution of a thunderstorm (abstract), *EOS Trans. AGU*, **52**, 841, 1971.

Few, A. A., Lightning channel structure, Workshop in Atmospheric Acoustics, Boulder, Colorado, July, 1972.

- Few, A. A., The signature of thunder and the structure of lightning (abstract), *EOS Trans. AGU*, **53**, 1005, 1972.
- Kuo, H.-H. and A. A. Few, Determination of the atmospheric electric current through the use of a conducting hemisphere pair suspended in an electric field (abstract), *EOS Trans. AGU*, **53**, 1005, 1972.
- Teer, T. L. and A. A. Few, Lightning channel structure (abstract), *EOS Trans. AGU*, **54**, 1101, 1973.
- Few, A. A., T. L. Teer, and D. R. MacGorman, Advances in a decade of thunder research, Fifth Int'l. Conf. on Atm. Electricity, Garmisch-Partenkirchen, Fed. Rep. Germany, 1974.
- Christian, H. J. and A. A. Few, The measurements of atmospheric electric fields using a newly developed balloon borne sensor, Fifth Int'l. Conf. on Atm. Electricity, Garmisch-Partenkirchen, Fed. Rep. Germany, 1974.
- Few, A. A., Lightning sources in severe thunderstorms (abstract), *Bull. Am. Meteorol. Soc.*, **55**, 693, 1974.
- Few, A. A., Acoustic wave propagation in the Martian atmosphere (abstract), *EOS Trans. AGU*, **55**, 1130, 1974.
- Few, A. A., Acoustic techniques for locating intracloud lightning, presented at a special meeting on coordinated thunderstorm research held in conjunction with the 16th Radar Meteorology Conference 1975.
- Burke, H. K., R. H. Manka, A. A. Few, and F. S. Mozer, Thundercloud electric field models - Comparison with balloon electric field measurements (abstract), *EOS Trans. AGU*, **56**, 368, 1975.
- Burke, H. K., R. H. Manka, and A. A. Few, Lightning events observed from balloon electric field measurements at 28 km (abstract), *EOS Trans. AGU*, **56**, 992, 1975.
- Christian, H. J. and A. A. Few, The measurement of vector electric fields inside the Langmuir thunderstorm of 12 August 1975 (abstract), *EOS Trans. AGU*, **56**, 991-992, 1975.
- MacGorman, D. R. and A. A. Few, Lightning location in Langmuir storm of 12 August 1975 (abstract), *EOS Trans. AGU*, **56**, 992, 1975.
- Bohannon, J. L., A. A. Few, and A. J. Dessler, Infrasonic emissions from the Langmuir storm of 12 August 1975 (abstract), *EOS Trans. AGU*, **56**, 992, 1975.
- Few, A. A., Atmospheric electricity from the ground up (abstract, invited paper), *EOS Trans. AGU*, **57**, 965, 1976.

- Few, A. A., and D. R. MacGorman, Lightning location at KSC-1976, acoustic techniques (abstract), *EOS Trans. AGU*, **57**, 923, 1976.
- Bohannon, J. L., A. A. Few, and A. J. Dessler, Infrasonic emissions from electrostatic processes observed during TRIP-1976, (abstract), *EOS Trans. AGU*, **57**, 922, 1976.
- Few, A. A., Lightning source locations - TRIP-76 (abstract), *EOS Trans. AGU*, **58**, 814-815, 1977.
- Few, A. A., Opportunities for research in atmospheric electricity, presented at a National Science Foundation and American Meteorological Society joint workshop, Boston, 1977.
- MacGorman, D. R., J. L. Bohannon, and A. A. Few, Lightning location in a storm on 2 July during TRIP-77, (abstract), *EOS Trans. AGU*, **58**, 1139, 1977.
- Freeman, J. W., and A. A. Few, The solar power satellite: A challenge for geophysicists (abstract), *EOS Trans. AGU*, **59**, 338, 1978.
- MacGorman, D. R. and A. A. Few, Correlations between radar reflectivity contours and lightning channels for a Colorado storm on 25 July 1972 (abstract), *Bull. Am. Meteorol. Soc.*, **59**, 539-540, 1978.
- Few, A. A., M. E. Weber, and H. J. Christian, Vector electric field measurements inside thunderstorms - Vertical profiles with electric field sensors (abstract), *Bull. Am. Meteorol. Soc.*, **59**, 540, 1978.
- Few, A. A., D. R. MacGorman, and J. L. Bohannon, Thundercloud charge distributions, inferences from the intracloud structure of lightning channels (abstract), *Bull. Am. Meteorol. Soc.*, **59**, 539, 1978.
- Few, A. A., Comparisons between large-scale solar energy conversion systems, presented at Department of Energy Regional Solar Energy Policy Forum, Dallas, June, 1978.
- Few, A. A., Rice University research relating to the electrodynamics of the middle atmosphere, presented at the Planning Group Meeting on the Role of Electrodynamics of the Middle Atmosphere on Solar-Terrestrial Coupling, NASA-GSFC, Greenbelt, Md., Sept. 1978.
- Few, A. A. and J. W. Freeman, Introduction and overview of the Space Solar Power Research Program, presented at the First Annual Review of the SSPRP, Rice University, 1-7, Houston, September, 1978.
- Few, A. A., Lightning protection for SPS rectenna, presented at the First Annual Review of the SSPRP, Rice University, 20-24, Houston, September, 1978.
- Few, A. A., Electrostatic protection of the solar power satellite and rectenna, presented at NASA-MSFC, Huntsville, Ala., Sept., 1978.

- Few, A. A., Large-scale use of solar energy, presented at the Rice University Corporate Associates Seminar, Houston, Nov., 1978.
- Weinheimer, A. J., A. A. Few, and H. J. Christian, Atmospheric electrical measurements and the solar magnetic sector structure (abstract), *EOS Trans. AGU*, **59**, 1087, 1978.
- MacGorman, D. R., and A. A. Few, Lightning structure relative to reflectivity contours in a Colorado storm (abstract), *EOS Trans. AGU*, **59**, 1088, 1978.
- Weber, M. E., A. A. Few, M. F. Stewart, H. J. Christian, and C. R. Holmes, Measurement of lightning induced field changes from a balloon electric field sensor (abstract), *EOS Trans. AGU*, **59**, 1088, 1978.
- Few, A. A., Definition of the lower boundary to the electrodynamics of the middle atmosphere, presented at the Workshop on the role of the electrodynamics of the middle atmosphere on solar terrestrial coupling, NASA-GSFC, Reston, Virginia, Jan., 1979.
- Few, A. A., A summary of the Reston Workshop on the role of electrodynamics of the middle atmosphere on solar terrestrial coupling (invited paper), presented at the Workshop on the Need for Lightning Observations from Space, NASA-MSFC, Tullahoma, Tenn., February, 1979.
- Few, A. A., and A. J. Weinheimer, Preliminary assessment of atmospheric electrical mechanisms for solar-terrestrial coupling, presented at the Critical Review Meeting of the Solar-Terrestrial Relationship Studies, NASA-MSFC, Huntsville, Alabama, April, 1979.
- Conrad, A. C., T. B. Reinhardt, J. L. Bohannon, A. A. Few, and D. R. MacGorman, An analysis relating thunder ranging observations to the lightning detection and ranging (LDAR) data and weather radar pictures for the July 22, 1977 storm at KSC during TRIP-77 (abstract), *EOS Trans. AGU*, **60**, 271, 1979.
- Bohannon, J. L., D. C. O'Gwynn, and A. A. Few, Evaluation of lightning hazards to very large solar power arrays (abstract), *EOS Trans. AGU*, **60**, 272, 1979.
- Few, A. A. and A. J. Weinheimer, Preliminary assessment of atmospheric electrical mechanisms for solar-terrestrial coupling (invited seminar), Naval Research Laboratory, Washington, D. C., June 1, 1979.
- Few, A. A., Electrostatic protection of the solar power satellite and rectenna - part 2, The Department of Energy, Washington, D. C., June 5, 1979.
- Few, A. A., An assessment of atmospheric electrical mechanisms for coupling solar activity with weather, Summary of the NASA/MSFC FY-79 Severe Storms and Local Weather Review, NASA CP-2105, 11-12, Sept. 1979.

- Few, A. A., Solar energy-utilization on Earth, Rice Alumni Institute, Rice University, Houston, Texas, October 16, 1979.
- Few, A. A., Social, environmental, and economic implications of widespread conversion to biomass-based fuels, Third Biennial Woodlands Conference on Growth Policy, The Woodlands, Texas, October 29, 1979.
- Conrad, A. C., M. E. Weber, M. F. Stewart, A. A. Few, and J. L. Bohannon, Acoustic reconstructions and in situ electric field measurements during a thunderstorm on August 18, 1979, at Langmuir Laboratory (abstract), *EOS Trans. AGU*, **60**, 835, 1979.
- Weinheimer, A. J. and A. A. Few, Electric field alignment of ice crystals (abstract), *EOS Trans. AGU*, **60**, 835, 1979.
- Few, A. A., and A. J. Weinheimer, Atmospheric electrical coupling mechanisms between solar activity and weather, paper presented at the XVII General Assembly of IUGG, Canberra, Australia, December 1979.
- Few, A. A., Review of SPS rectenna environmental interactions, Review paper at NASA-DOE SPS Assessment, Johnson Space Center NASA, Houston, Jan. 17-18, 1980.
- Few, A. A., Lightning safety considerations, invited lecture, Red Cross Training Institute, Houston, February 23, 1980.
- Few, A. A., The energy problem in the long term, invited lecture, The Discussion Group, Houston, Feb. 27, 1980.
- Few, A. A., The silvicultural potential for biomass energy, NSF-AAAS short course on industrial chemicals from biomass, Oregon Graduate Center, Portland, Oregon, March 3, 1980.
- Few, A. A. Preliminary requirements - Science and applications team, lightning mapper assessment, MSFC-NASA, Huntsville, Alabama, March 6, 1980.
- Few, A. A., Solar energy conversion using biomass, TEXPIRG Solar Energy Conference, Rice Univ., March 15, 1980.
- Few, A. A., Science and application needs for a lightning mapper satellite, NASA Headquarters presentation, April 21, 1980.
- Few, A. A., Review of science and applications considerations for the lightning mapper satellite, NASA-MSFC Annual Research Review Meeting, Huntsville, Ala., June 3-5, 1980.
- Few, A. A. and A. J. Weinheimer, Results of a general survey on the possibility of atmospheric electric links between solar events and terrestrial weather, invited paper presented at the VI International Conference on Atmospheric Electricity, Manchester, England, July, 1980.

- Few, A. A., R. E. Orville, M. Brook, J. T. Schaefer, W. W. Vaughan, H. J. Christian, and W. Wagon, A proposed satellite system for lightning observations from space, Huntsville, Ala., June 3-5, 1980.
- Conrad, A. C. and A. A. Few, A dendritic branching model of lightning channels, VI International Conference on Atmospheric Electricity, Manchester, England, July, 1980.
- Weber, M. E., A. J. Weinheimer, and A. A. Few, Possible influences of hydrometer corona on the propagating cloud streamer, VI International Conference on Atmosphere Electricity, Manchester, England, July, 1980.
- Weinheimer, A. J. and A. A. Few, Electric field alignment of ice particles and effects on cloud microphysics, VI International Conference on Atmospheric Electricity, Manchester, England, July, 1980.
- Christian, H. J., M. E. Weber, M. F. Stewart and A. A. Few, Balloon measurements of electric fields inside thunderstorms, VI International Conference on Atmospheric Electricity, Manchester, England, July, 1980.
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