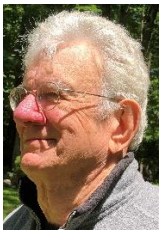
This document was initiated in 1971 at the Naval Weapons Center, China Lake CA using Dr. Pierre St.-Amand's vitae as a template. He was my supervisor. It was typed on the first IBM word-processor, a magnetized 'punch card' per page. The document has been expanded throughout my vagabond professional life.



6 July 2020

CURRICULUM VITAE

Edward Evans Hindman
aka Ward and Edward E. Hindman II

Born: Los Angeles, California, 26 September 1942
Married: Nancy Ann Maxson, 17 June 1967 to 15 June 1985
Martha Lynn Crowner, 30 April 2011
Children: Kathryn Cecilia (2 Mar 71), Andrew Asa (24 Sept 72), Joseph Edward (5 May 75), Children

Education:

High school diploma, Lutheran High School, Loa Angeles CA	1956-1960
El Camino College, Torrance CA	1960-62
B. Sc. Meteorology, University of Utah	1965
M. Sc. Atmospheric Science, Colorado State University	1967
Snow crystal and ice nuclei concentrations in orographic snowfall.	
L. O. Grant, supervisor (died 2013)	
Postgraduate Studies in Oceanography, Old Dominion University	1969-71
Ph. D. Atmospheric Science, University of Washington	1975
The nature of aerosol particles from a paper mill and their effects on clouds and precipitation	
P. V. Hobbs, supervisor (died 2005)	

Training:
Letters and Reports in Government, 20 hrs, 1968, NAS, Norfolk, VA.
Altitude Physiological Training, 8 hrs, 1970, Langley AFB, VA.
Clear Writing Seminar, 8 hrs, 1971, NWC, China Lake, California.
Electro-optic, Infrared and Laser Systems, 40 hrs, 1976, NWC.
Effective Presentations, 40 hrs, 1976, NWC
UPWARD Seminar, 24 hrs, 1976, NWC
Leadership Assessment and Development Program, 50 hrs, 1976, NWC
Better Briefings, 16 hrs, 1977, NWC
Management Improvement Training, Part 1, 40 hrs, 1977, NWC.
Altitude Physiological Training, Ejection Seat Training, 8 hrs, 1977, NAS, Lemoore, CA.
Assertion Training, 27 hrs, 1978, NWC
Aerosol Measurement, 20 hrs, 1978, University of Minnesota, Minneapolis, Minnesota.
Altitude Physiological Training, 8 hrs, 1979, Peterson AFB, CO.
Meetings and Decision-Making Workshop, 20 hrs, 1981, Colorado State University, Fort Collins, CO
Professional Development Institute, 16 hrs, 1983, CSU.
Professional Development Institute, 12 hrs, 1984, CSU.
Sailing and Seamanship, 18 hrs, 1984, U.S. Coast Guard, Annapolis, MD

Sailing Instruction, 21 hrs, 1985, U.S. Naval Academy, Annapolis, MD
Board-sailing Instruction, 8 hrs, 1985, U.S. Naval Academy.
Off-Shore Sail Training Squadron, 1985-1987, U.S. Naval Academy.
Unidata Workshop, 1998, UCAR, Boulder, CO

Employment record:

Frameman (summers), Pacific Telephone and Telegraph Co., Los Angeles, CA	1960-61
Research Assistant (school breaks), Meteorology Research Inc., Altadena, CA	1962-64
Laboratory Assistant (part time), University of Utah, Salt Lake City, UT	1962-65
Graduate Research Assistant, Colorado State University, Fort Collins, CO	1965-67
Research Meteorologist, Navy Weather Research Facility (NWRF), Norfolk, VA	1967-70
Research Meteorologist, Acting Head, Physical Meteor. and Wea. Modif. Branch, NWRF	1970-71
Resch. Meteor., Sect. Head, Atmos. Appl. Br., Naval Weapons Cent. (NWC), China Lake, CA	1971-72
NWC Fellow, University of Washington, Seattle, Washington.	1972-74
Research Meteorologist, Head, Atmos. Interaction Sect., Atmos. Appl. Br., NWC,	1974-78
Instructor in Meteorology, Cerro Coso Community College, Ridgecrest, California.	1978
Research Associate, Colorado State University (CSU), Fort Collins, Colorado.	1978-88
Research Scientist, Research Institute of Colorado, Fort Collins, Colorado.	1981-83
Instructor in Meteorology, Div. Continuing Ed., CSU	1983-84
Visiting Research Professor, U.S. Naval Academy, Annapolis, Maryland.	1984-86
Visiting Associate Professor, U.S. Naval Academy, Annapolis, Maryland.	1986-87
Instructor in Meteorology, Anne Arundel Community College, Arnold, Maryland.	1986
Visiting Associate Professor, Drexel University, Philadelphia, Pennsylvania.	1988
Associate Professor, The City College of the CUNY, NYC, NY (Tenure, Sept. 1993)	1988-93
Professor, The City College of the CUNY, New York City, NY	1994-2007
Doctoral Faculty, Earth & Env. Sci., CUNY Grad. Ctr., New York City, NY	1995-2007
Visiting Scholar, Dept. Hydrology and Meteorology, Tribhuvan University, Kathmandu, Nepal	1995-96
Visiting Scholar, Dept. Atmospheric Science, Colorado State University, Ft. Collins CO USA	2005-06
Emeritus Professor, CCNY-CUNY	2007

Employment activities:

Research Associate Representative, Department Atmospheric Science, CSU	1980
Off-Shore Sail Training Squadron, U.S. Naval Academy, Annapolis, Maryland.	
Yawl Assistant Officer in Charge	1986
Yawl Officer in Charge	1987
Mentorship Program, U.S. Naval Academy.	1985-87
Speakers Bureau, U.S. Naval Academy.	1985-87
Oceanography Curriculum Review Committee, Naval Academy.	1984-85
International Host Program, City College (CCNY), New York City, New York.	1988-89
Conversation Circle Facilitator, English as a Second, Language Dept., CCNY.	1989-92
Graduate Studies Committee, EAS Dept., CCNY,	1989-07
Faculty Senate Discipline Committee, CCNY	1989-92
Chair, Faculty-Student Discipline Committee hearing	1990
Science Research Training/Young Scholars Program, NYAS, New York City, NY	1989-92
Session Chair, Student Scholars Day, CCNY	1992
Faculty Senate Judiciary Committee, CCNY	1993-96
Faculty Senate Administration Committee, CCNY	1993-96
Master Planning Committee, CCNY	1996-97
Academic Program Planning Committee, CCNY	1996-97
University Committee on Research Awards, CUNY	1998-01
Earth and Environmental Science Program Liaison	1998-01

Vice-Chair	2000-01

Teaching activities:

Cerro Coso Community College, Ridgecrest, California: General Meteorology, (3-0-3)	1978
Colorado State University, Fort Collins, Colorado	
Co-Instructor of Graduate Cloud Physics Course	1980
Guest Lecturer, Graduate Weather Modification Course	1979-81
Weather and Climates of the West (2 CEU)	1983-84
U.S. Naval Academy, Annapolis, Maryland	
General Meteorology (3-0-3)	1984-85
Atmospheric Effects on Electro-Magnetic Energy (3-0-3)	1985
Waves and Tides (3-0-3)	1986-87
General Oceanography (3-2-4)	1986-87
Oceanic and Atmospheric Processes (3-0-3)	1986-87
Synoptic Meteorology (2-2-3)	1987
Principles of Meteorology (3-2-4)	1987
Anne Arundel Community College, Arnold, Maryland	
Meteorology for Pilots of Sail and Aircraft (2 CEU)	1986
Drexel University, Philadelphia, Pennsylvania	
Elementary Meteorology (3-0-3)	1988
Atmospheric Physics III (graduate) (3-0-3)	1988
Introduction to Meteorology (3-0-3)	1988
City College, New York, NY	
The Atmosphere (3-0-3) (EAS 101)	1988-95
Introduction to Meteorology (3-3-4) (EAS 107, 72715)	1988-95
Introduction to Oceanography (3-0-3) (EAS 264, 72762)	1990
Synoptic Meteorology I, II (2-3-4)	1988-95
Microcomputers in Meteorology (1-2-2) (EAS 347)	1991
Measurements and Instruments in Meteorology (1-2-2) (EAS 473)	1992-95
Selected Topics in Meteorology (EAS 316.3, 317.1)	1991-92
Independent Study (undergraduate)(EAS 310.1)	1991-
Physical Meteorology (graduate) (4-0-4) (EAS 1789)	1990-95
Weather Analysis (graduate) (2-3-4) (EAS 1667)	1990-95
Independent Study (graduate) (EAS 1796.3)	1989
Elementary Geology (3-0-3) (EAS 100)	1996-07
Modeling and Data Bases of Earth Systems (2-1-3) (EAS 308)	1997-07
Freshman Orientation (1-0-1)	1997
Coast and Ocean Processes (3-0-3) (EAS 365, EAS 1768)	1998-07
Introduction to Earth Systems Sciences (3-3-4) (EAS 106)	1998-07
Physical Oceanography (3-0-3) (EES U799.03)	1998-07
Environmental Field Project (0-6-4) (EAS 472/1788)	1997-07
Climate and climate change (3-2-4) (EAS488/B8800, EES766)	2002-07
Science 1 (3-2-3) (SCI103)	2002-07
Science 2 (3-2-3) (SCI104)	2003-07

Undergraduate students mentored:

- James Spear (Hindman, E. E., and J. Spear, 1980: An evaluation of some ultra-long-range weather predictions. *Bull. Am. Meteor. Soc.*, **61**, 321-328 (Hindman, E. E., 1981: Reply to comments, *BAMS*)
- David Watts and Richard Ewing (Hindman, E. E., MIDNS 2/C D. Watts and R. Ewing, 1985: "Cloud-busters" at Mt. Washington. *MWO News Bulletin*, **26**(1) and Oceanography Department Seminar, USNA, Annapolis, Maryland, April 1985)

- Neal Phillip (Hindman, E. E. and N. Phillip, 1990: Droplet variations within continental, winter, mountain clouds. *Preprints Fifth Conference on Mt. Meteorology*, Boulder CO, 25-28 June 1990, Am. Meteor. Soc., Boston, pp. 147-153).
- Richard Hogen (Hogen, R. and E. E. Hindman, 1991: Factors governing marine stratocumulus droplet spectra. Presented at the *Symposium on Aerosol-Cloud-Climate Interactions*, XX General Assembly, IUGG, 13-20 August 1991, Vienna, Austria (abstract appears in the *IAMAP Program and Abstracts*, pg. 40)
- Kwan Yin Kong (Hindman, E. E., K. Y. Kong and R. D. Borys, 1992: Initiation of long-term cloud droplet measurements for climate-change studies. *Preprints, Symposium on Planned and Inadvertent Weather Modification*, American Meteorological Society, 9 January 1992, Atlanta, GA, 108-113)
- Michelle Campbell (Hindman, E. E., M. A. Campbell and R. D. Borys 1994: A ten-winter record of cloud droplet physical and chemical properties at a mountain-top site in Colorado, USA. *J. Appl. Meteor.*, **33**, 797-807)
- Robert Bodowski (Hindman, E. E. and R. Bodowski, 1996: A marine stratus layer modified by nuclei from a ship plume. *J. Appl. Meteor.*, **35**, 1596-1600)
- Freda Ponce (Ponce, F. N. and E. E. Hindman, 2001: Wintertime cloud water pH increased between 1984 and 2000 in the northern Colorado Rockies. Appears in *Extended Abstracts Second Intl. Conf. on Fog and Fog Collect.*, 15-20 July 2001, St. John's, Newfoundland, Canada, 61-64)
- Scott Dias (Dias, S. A., E. E. Hindman and T. J. Bandosz, 2002: Condensation nucleus and trace-gas concentrations in air arriving at Storm Peak Laboratory, Colorado during an east-wind event. In *Ppts. 11th Conference on Cloud Physics CD*, 3-7 June 2002, Ogden, UT, American Meteorological Society, Boston)
- Kamal Thapa (Thapa, K., E. E. Hindman and Y. N. Rosoff, 2002: Thunderstorms of the Mt. Everest Region: Spring 1999, 2000. In *Ext. Abs. 10th Conference on Mountain Meteorology*, American Meteorological Society, 17-21 June 2002, Park City, UT, 233-236)

Graduate Student advising:

- Member M. A. committee, R. Blake, CCNY, graduated Spring 1990
- Member M. A. committee, R. Arnold, graduated Fall 1991
- Member Ph. D. committee, C. Pabon-Ortiz, graduated Spring 1994
- Member M. A. committee, X. Zhang, graduated Spring 1995
- Mentor M. A., T. Najita, graduated Summer 1995, Thesis: *An empirically-derived remote-sensing technique for the determination of cloud droplet effective radius in ship-track clouds*.
- Mentor M. A., M. Meyer, graduated Spring 2000, Thesis: *Towards an understanding of an acidic cloud episode in the northern Colorado Rockies*. (Meyer, M. C., E. E. Hindman, S. D. Gedzelman and T. J. Bandosz, 2000: Investigation of a wintertime acidic cloud episode in the northern Colorado Rockies. In *Proc. 13th Intl. Conf. Clouds & Precip.*, 14-18 August 2000, Reno, NV, pp. 972-975)
- Mentor M. A., H. Wee, graduated Summer 2004, Thesis: *Wintertime aerosol particle nucleation events in the northern Colorado Rockies*. (Wee, Hunjung (Maria), E. E. Hindman and R. D. Borys, 2004: Wintertime aerosol particle nucleation events in the northern Colorado Rockies, USA. Presented at *8th Intl. Global Atmospheric Chemistry Conference*, Christchurch, NZ, 4-9 September 2004).
- Mentor M. A., M. Yapur, graduated Summer 2004, Thesis: *A study of space-borne passive, microwave radiometer measurements and coincident snowfall rates at Storm Peak Laboratory, Steamboat Springs, Colorado*. (Yapur, Martin and Edward Hindman, 2004: A study of space-borne passive, microwave radiometer measurements and coincident snowfall rates at Storm Peak Laboratory, Steamboat Springs, Colorado. *CREST Publication Series*, 2 (04-2004), 64 pp.)
- Mentor M. A., T. Battle, graduated Summer 2004, Thesis: *Transport of atmospheric dust from the Bodele Depression, Chad, Africa*.
- Member Ph. D. committee, H. Jin Ahn, graduated Fall 2007.

Civic Activities:

Kindergarten Superintendent, Christ Lutheran Church, Norfolk, Virginia.	1970-71
Church Council, Grace Lutheran Church, Ridgecrest, CA	1976-78

Adult Education Committee Chair, Trinity Lutheran Church, Fort Collins, Colorado.	1980-81
"Single-Again", Prince of Peace Church, Crofton, Maryland.	
Group Leader	1986-87
Board of Directors	1987
Team Member, "Beginning Experience", Baltimore, Maryland.	1986-88
Treasurer, Cornerstone Center, New York City, NY	1989-92
Cornerstone Choral, New York City, NY	1990-2013
Treasurer	1992-94
Larimer Choral, Ft. Collins, CO	2005-06
Council, OSA Lutheran Church, New York City, NY	1997-00
Secretary	1997-99
President	1999-00
Choir, OSA Lutheran Church, New York City, NY	1988-2015
Choir, St. Peter's Lutheran Church, Port Jervis, NY	2015-
Middletown Concert Chorale, Middletown, NY	2017-
Second Sunday Concert Society, Leonia, NJ	
Board of Directors	2002-2009
Treasurer	2006-2009

Scientific and professional societies:

Soaring Society of America	1962-
Tidewater Soaring Society	1970-71
Northern Colorado Soaring Society	1982-86
Colorado Soaring Association	2005-
Organisation Scientifique et Technique Internationale du vol a'Voile (OSTIV)	1983-
Session Chair, XXIII Congress, Borlange, Sweden	1993
Chief Editor, Editor "Technical Soaring"	2006-2012
On-line Manager and Archivist, "Technical Soaring"	2012-2015
Board	2007-2015
Session Chair, Meteorological Panel Meeting, XXXIII Congress, Benalla Australia	2017
Elected Honorary Member, XXXIII Congress, Benalla, Australia	2017
Mid-Atlantic Soaring Association	1984- 88
Valley Soaring Club, Middletown NY	2008-
American Meteorological Society	1961-
Secretary, Hampton Roads Chapter	1970-71
Program Committee, 3rd Conf. Wea. Analysis and Forecasting, Virginia Beach, Virginia.	1969
Committee on Cloud Physics	1979-82
Committee on Planned and Inadvertent Weather Modification	1983-86
Session Chair, 8th Conference on Weather Modification, Reno, Nevada	1981
Program Chair, 9th Conference on Weather Modification, Park City, Utah	1984
Session Chair, Conference on Cloud Physics, San Francisco, CA	1990
Session Chair, Conference on Cloud Physics, Dallas, TX	1995
Fellow	2002
Royal Meteorological Society (Foreign member, 2007 FRMetS Concessionary)	1967-
Weather Modification Association	1967-
Standard and Ethics Committee	1983-85
Chair, Certification Committee	1985-88
Certification Committee	1988-95
Trustee	1989-92
Honorary member	2015
Sigma Xi (Full Member)	1966-

American Geophysical Union	1977-
Mobile and Remote Monitoring Technical Coordinating Committee, APCA	1977-82
JANNAF Safety and Environmental Protection Sub-Committee	1979-82
Mount Washington Observatory	1985-
American Association for Aerosol Research	1985-07
Appalachian Mountain Club	1986-
Resident Naturalist	1987-05
Explorers Club (Fellow, FR '86)	1986-
New York Academy of Sciences	1988-2006
Vice-chair, Atmospheric Sciences Section	1997-2001
Chair	2001-04
CUNY Academy for the Humanities and Sciences	1988-2007

Honors and awards:

USMC 'Devil Pups' Certificate of Good Conduct	1958
Eagle Scout	1959
Bank of America Achievement Award in Laboratory Science	1960
American Meteorological Society, Father James B. Macelwane Undergraduate Award:	
1st submission	1963
Honorable Mention	1964
Third Place	1965
First Place	1966
SHARU-University of Utah Residence Hall Leadership Honorary	1965
Amateur Bicycle League of America, Colorado State Championships, Third place	1964
NCAA Intermountain Cycling Championships, CSU, Ft. Collins CO, Best overall rider	1966
Sigma Xi, Research Honorary, Elected Full Member	1966
AIAA, Rocky Mountain Section, Graduate Paper Contest, Second place	1967
Slide Rule Paper Contest (CSU Student Engineering Publication), First place	1967
Naval Weapons Center Fellow, University of Washington	1972-74
Lutheran High School, Los Angeles, California Distinguished Alumni Award	1977
Naval Weapons Center, China Lake, California Superior Achievement Award	1978
Soaring Soc. Am.-Fed. Aero. Intl. Silver Badge #4144	1981
Soaring Soc. Am.-Fed. Aero. Intl. Gold Badge #1452 (Two Diamonds (missing altitude Diamond))	1998
Soaring Soc. Am. Symons Wave Memorial, One Lennie Pin #1142	1984
Soaring Soc. Am. Tuntland Award	2003
Meteorology Research Chair, U.S. Naval Academy	1984-86
Explorers Club, Elected Fellow	1986
Flag Award #117, Level III Sponsorship	1995-96
Flag Award #117	2004
President's Award for Innovation and Excellence in Teaching (CCNY)	1993
President's "Teach 21" Award (CCNY)	1999
Bogie Award, Mid-Atlantic Soaring Assoc., Fairfield PA	1999
Elected Fellow, American Meteorological Society	2002
Paul E. Tuntland Award, Soaring Society of America	2003
OSTIV Diploma for best meteorological paper at 27th Congress	2006
OSTIV Special Recognition, *Technical Soaring* editor	2008
OSTIV Diploma for best meteorological paper at 31st Congress	2014
OSTIV Honorary Member	2017

Biographical citations:

Who's Who in the West, Vol. 15, 1976-1977, Vol. 16, 1978-1979; Vol. 18, 1982-1983. Cross-referenced in

Who's Who in America, 40th Edition, 1978-1979.
Men of Achievement, Vol. 4, 1977, Vol. 6, 1979, Vol. 9, 1982.
Dictionary of International Biography, Vol. 15, 1978-1979 Edition, Vol. 18, 1983.
American Men and Women of Science, 1979, 14th Edition; 1982, 15th Edition; 1985, 16th Edition
Who's Who in California, 1979
Personalities of America, 1978, 1982
Notable Americans of 1978-1979
The Directory of Distinguished Americans, 2nd Edition, 1982-1983
Personalities of the West and Midwest, 8th Edition, 1984
The International Who's Who of Contemporary Achievement, 1984 Edition
Colorado Who's Who - 1984
Who's Who in the East, 21st Edition, 1987-88, 24th Edition, 1993-94
Who's Who in Science and Engineering, 1st Edition, 1992-93, 2nd Edition, 1994-1995

Licenses:
Commercial Pilot, Glider, Cert. No. 2055427, 1977-present, ~1543 total flight hours
Flight Instructor, Glider, Cert. No. 2055427CFI, 2010-present, ~100 flight hours
California Community College Instructor Credential, No. 269HIN001CC
Certified Consulting Meteorologist, #183, 1978-2017, American Meteorological Society.
Certified Weather Modification Manager, #9, 1983-2012, Weather Modification Association.
Skipper (D), U.S. Navy Sailing (off-shore, coastal waters), 1986.

Degree of clearance: Secret (On file with Defense Industrial Security Clearance Office (DISCO), PO Box 2499, Columbus, OH 43216)

Professional referee/reviewer:
Aerosol Science and Technology
Applied Optics
Atmospheric Research
Bull. Am. Meteor. Soc.
Geophysical Research Letters
J. of Applied Meteorology
J. of Atmospheric Sciences
J. Atmospheric and Oceanic Technology
J. of Geophysical Research
J. Optical Soc. America
J. Weather Modification
Nature
Science
Tellus
Technical Soaring
The National Science Foundation
The National Aeronautics and Space Administration
The Department of Energy
National Research Council, Army Basic Research Committee
National Oceanic and Atmospheric Admin., Environmental Research Laboratories
Science Institute for Public Information, New York City
Electric Power Research Institute, Inc.
U.S. Army Research Office

Details of positions held:
1957-1961 - Lived in Los Angeles, California; participated as an observer in a field experiment to determine the effects of jet airliners on meteorological measurements made near runways. The experiment was conducted by the U.S. Weather Bureau at LAX, summer 1959. I was turned down for a weather data clerk job at United Airlines Meteorological Office, LAX, because I was too young (not yet 18). Attended El Camino College. Worked summers (1960 and 1961) as a Frameman at the Pacific Telephone Company wiring telephone numbers.

1962-1965 - Attended the University of Utah and studied meteorology under the supervision of Prof. J. Vern Hales. I worked part-time at Meteorology Research, Inc. (MRI) during summers and holidays for Drs. MacCready and Smith, and Mr. Clement Todd. Assisted MRI in designing, constructing and testing the airborne continuous particle sampler for replicating cloud particles (MacCready, P. B., Jr. and C. J. Todd, 1964: Continuous particle sampler, *J. Appl. Meteor.*, **3**, 450-460). Designed, constructed and tested a continuous particle collector for measuring ice crystals in cloud chambers. Carried out, with the instrument, basic studies on the development of ice crystals in a cloud of supercooled water drops upon artificial nucleation of the drops. The particle collector and studies were published in *J. Rech. Atmos.* and *J. Atmos. Sci.*, respectively. Participated in Project Baton, Flagstaff, Arizona; responsible for development, maintenance, reduction and analysis of data for the continuous particle sampler. Participated in Dr. V. J. Schaefer's Yellowstone Field Research Expeditions III and IV, carried out basic studies with the continuous particle collector. Designed, serviced, and organized meteorological lab equipment while a student at the University of Utah. Awarded B. Sc. degree in meteorology in 1965. Won AMS Macelwane award and published winning paper in *Bull. Am. Met. Soc.*

1965-1967 - Attended Colorado State University, Fort Collins, Colorado. I studied for the M. Sc. degree under the supervision of Prof. Lewis O. Grant. Designed, constructed and tested continuous particle sampler for obtaining measurements from a kite. Designed, constructed (along with R. L. Rinker) and tested a continuous snowflake sampler. Utilized the instrument for research on Colorado mountain snowfall and reported results in *J. Appl. Meteor*. Found a one-to-one correspondence between measured ice nucleus and snow crystal concentrations. Served as a radar observer and aircraft ground controller during N. E. Colorado field experiment investigating hail suppression. M. Sc. degree in Atmospheric Sciences awarded in 1967.

1967-1971 - Research Meteorologist. Worked at the Navy Weather Research Facility, Norfolk, Virginia, with Mr. Clement Todd and Dr. Earl C. Kindle. Initiated numerical studies into growth of ice crystals, graupel and hail using field and lab measurements and theoretical relationships; produced a numerical model which simulated the development of these particles in a supercooled cloud; the results are presented in *J. Atmos. Sci.* Participated in Project STORMFURY. Was part of the 1969 *Debbie* seedings, flew into the eye (100+mph winds), was responsible for the collection of cloud particle and precipitation particle data from this hurricane and in tropical cumulus cloud lines. This work resulted in the first particle samples in hurricanes. Developed a computer assisted system for reducing and analyzing precipitation particle data. The first ice water content values in tropical cumulus were determined from these measurements. The response of these clouds to AgI nuclei was detected from these measurements. NWRF was disestablished in June 1971 and I transferred to the Naval Weapons Center, China Lake, California.

1971-1972 - Head of Plans, Analysis and Reports Section of the Atmos. Applications Branch, Earth and Planetary Sciences Division, Research Department, Naval Weapons Center, China Lake, California. Worked as research meteorologist with Drs. P. St. Amand and W. C. Finnegan; was project scientist during a field experiment to clear warm fog in northern California (Project Foggy Cloud IV); was project meteorologist during an expedition to Barbados and Puerto Rico to evaluate cloud seeding pyrotechnics; learned how to seed cumulus clouds. Reduced and analyzed the data collected from a field experiment to investigate the modification of maritime warm cumulus, the fog clearing project and the cloud seeding expedition; wrote up the findings in project final reports. Discovered evidence of sinking air in the center of a mountain valley, theoretically predicted but not observed on the small scale; published the evidence in *Mo. Wea. Rev.*

1972-1974 - Naval Weapons Center Fellow, Seattle Washington. Lived in Seattle, Washington, as a result of being awarded an NWC Fellowship for advanced study at the University of Washington. I studied for the Ph. D. degree under the supervision of Prof. Peter V. Hobbs. Designed and executed a field experiment to determine the effect of cloud condensation nuclei (CCN) from a paper mill on clouds and rainfall. Developed portions of an instrumented aircraft (results presented in *J. Aerosol Sci.*), served as flight scientist, gathered aerosol particle, CCN and cloud particle data in and out of paper mill plumes, reduced and analyzed data (reported in *J. Air Pol. Cont. Assn.*). Achieved Ph. D. candidate status.

1974-1975 - Returned to China Lake and completed studies initiated at University of Washington. Determined from observations, measurements and calculations that CCN from a paper mill can explain the altered cloud drop sizes in clouds downwind and calculated that these particles cannot alone account for showers observed downwind (observations reported in *J. Wea. Modif.*). But, the particles plus heat and moisture from the mills can account for the showers. The results of the measurements and calculations of CCN from a paper mill and their effect on clouds and rainfall reported in *J. Appl. Met.* Part I and Part II The measurements of CCN and cloud droplets showed that giant CCN are not important in broadening cloud drop size distributions but total drop concentration is controlling factor; this result supported by calculations using the measurements and the results reported in *J. Atmos. Sci.*, *J. Appl. Meteor.* Awarded Ph. D. in December 1975.

1976-1977 - Head of Atmospheric Interactions Section, Atmospheric Applications Branch, Research Department, NWC. Section responsible for originating, executing and evaluating Branch basic and applied research in atmospheric sciences and for interaction with other government civilian agencies in atmospheric research. Served as consultant in atmospheric sciences to other NWC activities. Was acting Branch Head on occasion. Conducted field experiment in Merced, California, January 1976; collected data to determine the feasibility of improving visibility in fog by altering industrial processes. Organized and directed intra-Navy aerosol particle characterization workshop at Trinidad, California, July 1976 (*Bull. AMS*, *Atmos. Env.*). Made first measurements of solid rocket motor exhaust products which established the Space Shuttle as a potential weather modifier. Originated and directed a program to characterize man-made fog (effluent from hygroscopic flares) for screening electromagnetic radiation and evaluating performance of seekers of fuzes (*J. Wea. Modif.*). This seminal paper led to development of hygroscopic seeding of clouds in the min-1990's.

1977-1978 - Principal investigator/Flight scientist for NASA, NOAA, DoD study to determine the potential for exhausts from Titan III and Space Shuttle launches to modify weather. Principal investigator of program to generate and characterize hygroscopic nuclei and the resultant water droplet fogs (results in *Optica Acta*, *J. Rech. Atmos.*). Taught an introductory course in Meteorology at Cerro Coso Community College, Ridgecrest, California. Co-Director of cumulus characterization experiment, Precipitation Augmentation for Crops Experiment, Champaign, Illinois, June 1978, NOAA sponsored. Resigned from NWC, December 1978.

1979-1980 - Research Associate, Colorado State University, Fort Collins, Colorado. Principal Scientist of NASA sponsored lab and field investigation of cloud nuclei and aerosol particles from rocket exhausts (results reported in *J. Wea. Modif.* 1980, 1982, *J. Appl. Meteor.* 1980, 1980a, 1982, 1983). Host and Editor of Proceedings of NOAA sponsored workshop on Concepts and Approaches for Beneficial Modification of Summer Convective Clouds. Evaluated an ultra-long range weather prediction scheme (*Bull. AMS*). Co-Chair and Host of the 1st Intl. Workshop on Light Absorption by Aerosol Particles, July-August, 1980, Colorado State University, Fort Collins, Colorado (*Bull. AMS*, *Appl. Opt.* 1982, 1982a, *Light Absorption by Aerosol Particles*). Co-Investigator in ONR/SRO program at Colorado State University investigating anomalous gray shades in satellite images; preliminary results in *Naval Res. Rev.*

1981-1983 - Research Scientist, Research Institute of Colorado, Fort Collins and Res. Assoc., CSU. Co-Principal Investigator with Prof. Lewis O. Grant on NSF sponsored mountain meteorological research project; developed mountain-top rime-ice collection network for determining amount of liquid water flowing over mountain barriers during storm periods (*J. Clim. Appl. Meteor.*) Founded Storm Peak Laboratory, Steamboat Springs, CO for cloud

physical and chemical studies (*Water Res. Bull.*, *Weatherwise*). Principal Co-Investigator (Science Team Leader) with Prof. Thomas Vonder Haar on a ONR sponsored project to integrate remotely-sensed and *in situ* measurements with numerical simulations of marine boundary layer processes; determined that variations in aerosol particles in the boundary layer may account for anomalous gray shades in satellite images (*Intl. J. Remote Sensing*); successfully simulated marine hazes and clouds in the CSU slow-expansion cloud chamber (*J. Atmos. Sci.*). Co-Investigator on a NOAA sponsored cumulus dynamics and microphysics project; determined that present 3-D numerical simulations of cloud and graupel water contents are accurate but calculated rainwater contents are significantly greater than measured values. Co-Principal Investigator with Prof. W. Cotton on AFGL radar reflectivity investigation. Found reflectivities from 3-D cumulus numerical simulations are in reasonable agreement with measured reflectivities.

1983-1984 - Research Associate, Colorado State University, Fort Collins, Colorado. Co-Principal Investigator with Prof. T. Vonder Haar on ONR sponsored satellite detection of marine aerosol particles for application to electromagnetic energy propagation and boundary layer forecasting (*J. Rech. Atmos.*1981, 1985, *Idojo'ra's*, *J. Geophys. Res.*), with Prof. L. Grant on NSF sponsored basic research of physical properties of winter mountain clouds for weather modification applications and with Prof. W. Cotton on AFGL sponsored investigation of measured and modeled cloud microphysical properties. Reported unique, winter-time sailplane flight (*Aero-Rev.*).

1984-1986 - Visiting Research Professor, U.S. Naval Academy, Annapolis, Maryland. Awarded Naval Air Systems Command Meteorology Chair in the Dept. of Oceanography. Taught an introductory meteorology course and an upper division course on electro-optical meteorology. Conducted mountaintop rime ice (*MWO*) and water-balance studies (*J. Clim. Appl. Meteor.*). Investigated potential soaring ascent of Mt. Everest (*Tech. Soar.*).

1986-1988 - Visiting Associate Professor, U.S. Naval Academy, Annapolis, MD. Filled a temporary position while a senior faculty member was on extended leave. Taught upper-division oceanography and meteorology courses. Conducted research on physical and chemical properties of cloud drops (*J. Atmos. Chem.*, *J. Atmos. Ocean. Tech.*). Served the Academy in the Off-Shore Sail Training Squadron, in the Mentorship Program, and as an academic advisor to midshipmen.

1988 - Visiting Associate Professor, Drexel University, Philadelphia, Pennsylvania. Taught undergraduate meteorology and graduate cloud physics courses. Continued mountain-cloud studies of physical and chemical properties.

1988-2007 - Professor, The City College, New York City, New York
Teaching: Taught full course loads each semester distributed among undergraduate and graduate meteorology and oceanography courses. Developed a unique field meteorology course which is a model for the College (*Bull. AMS*, *Weatherwise*). With primarily outside support, developed a state-of-the-art, computer-based meteorological laboratory for teaching and research activities; supervised the system-engineer and lab technician. The laboratory was a show-piece of the Science Division.

Research: Invented unique cloud droplet collectors (*J. Atmos. Ocean. Tech.*) and has used them to obtain long-term measurements of cloud droplet physical and chemical properties (*J. Appl. Meteor.*) with application to climate-change studies (*World Res. Rev.*, *Atmos. Res.*, *J. Wea. Modif.*). Helped initiate the ONR ship-produced cloud research and was a member of the Monterey-Area Ship Track experiment science team (*Atmos. Environ.*, *Global Atmos.*, *J. Appl. Meteor.* 1996, 1999, *J. Wea. Modif.*). Mentored numerous undergraduate and graduate research assistants. At CCNY, he earned and administered about $800,000 of research awards (ONR, NSF, CUNY). In part, because of the computer-assisted laboratory, another $1.5 million was awarded to the Science Division for undergraduate marine and atmospheric research education and for helping educate NY city school children in meteorology and oceanography. During his 1995/96 sabbatical, he conducted a unique, trans-Himalayan, international expedition to Mt. Everest to study air pollution and to determine the feasibility of ascending Everest with a sailplane (*Atmos. Environ.*, *Tech. Soar.*). Afterward, he and collaborators continued to

study the weather of the Himalayas with the goal to predict severe weather events (Rosoff and Hindman, Thapa, et al.). During his 2005/06 sabbatical, he studied in William Cotton's group in the Department of Atmospheric Science at Colorado State University. He with Stephen Saleeby (of Cotton's group) and Olivier Liechti (of Switzerland) created an on-line glider weather forecasting system (*Tech. Soar.*). In 2007, he completed his studies, begun in 1981, of the human effects on winter mountain clouds at Storm Peak Laboratory, Steamboat Springs CO (*J. Wea. Modif.*).

Service: He has served CCNY as an International Student Host, English as a Second Language conversation circle facilitator, Faculty Senate committee member, has taught a section of Freshman Orientation and as Science Faculty Advisor. He has been EES Liaison to the CUNY University Committee on Research Awards and Vice-chair of the UCRA. In 2006, he became the OSTIV (international organization for the science and technology of gliders) Chief Editor and Editor of the organizations journal *Technical Soaring* and served through 2011. He led the journal into the electronic-age. Then, he became the Journal's on-line manager (journals.sfu.ca/ts/). He served as flight instructor for the Valley Soaring Club of Middletown NY between 2010 and 2016.

2007 – Present – Emeritus professor, The City College, New York City, New York

Teaching: 2007-2013, Marine Training Center, Stamford CT (MTC, SailMet).

Research: Conducting weather forecasting research for glider operations (SoarMet).

Service: Member of choirs, church (OSA, St. Peter's) and community (Cornerstone, Middletown).

Invited conferences:

- Gordon Research Conference, Environmental Sciences: Air, New Hampton, NH, 17-22 August 1975.
- Space Shuttle and Inadvertent Weather Modification, Estes Park, Colorado, 6-8 July 1977.
- NAVAIRSYSCOM Energy Conversion and Biomedical Research Program Reviews, Monterey, CA, 8-10 November 1977.
- Seminar on the Possibility of Inadvertent Weather Modifications from Shuttle's Stabilized Ground Cloud, NASA, Johnson Space Center, Houston, Texas, 6-7 December 1977.
- WMO Informal Meeting of Experts on Aircraft Instrumentation for Cloud Physics Research and Weather Modification Programs, NOAA/ERL, Boulder, Colorado, 6-10 February 1978.
- Tri-Service Technical Coordinating Panel (Pyrotechnics), Aberdeen Proving Ground, Maryland, 9-11 May 1978.
- JANNAF 1979 Propulsion Meeting, Anaheim, California, 6-8 March 1979.
- DoD Space Transportation System Meteorology Planning Conference, Offutt AFB, Nebraska, 29 May - 1 June 1979.
- EPA/NOAA Workshop for Assessment of Chemicals as Modifiers of Clouds and Precipitation, Boulder, Colorado, 24-25 September 1979.
- Workshop on Vertical Structure of Aerosols in the Boundary Layer: Application to Lidar Returns, San Diego, California, 13-15 September 1983.
- Army Research Office Fog Workshop, Boone, NC, 27-29 August 1986.
- NSF-Community Workshop on Airborne Instrumentation, Boulder, CO, 19-21 October 1988.
- International Workshop on Space Observations of Tropospheric Aerosols and Complementary Measurements, 15-18 November 1989, Hampton, VA.
- ONR Ship-track Workshop, 26 May 1993, Baltimore MD.

Consultations:

- Atmospherics, Inc., Fresno, California, May 1981, Rime Ice Measurement Analyses.
- NOAA-ERL-WPL, Boulder, Colorado, September 1981, Sizing Glass Beads.
- Sky Ranch Lutheran Camp, Inc., Fort Collins, Colorado, June 1982, Staff Trainer.

- Sky Ranch Lutheran Camp, Inc., Fort Collins, Colorado, June 1983, Staff Trainer.
- Colorado Soaring Association, Black Forest, Colorado, September 1983, Contest Meteorologist.
- Sky Ranch Lutheran Camp, Inc., Fort Collins, Colorado, June 1984, Staff Trainer.
- Anne Arundle County Schools, Gifted and Talented Program, Annapolis, MD, Nov. 1987, Substitute teacher.
  City College, Select Program in Science and Engineering, NYC, NY, Dec. 1988, Substitute teacher.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1992, Guest lecturer.
- City College, Diamond Fellow program, New York City, NY, July 1993, Guest lecturer.
- Binghamton Ferry, August 1993, Edgewater, NJ, Weather analysis for storm damage claim (11 Dec 92).
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1993, Guest ecturer.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1994, Guest lecturer.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1995, Guest lecturer.
- RF/CUNY, NASA teacher-training project, New York City, NY, July 1996, Guest lecturer.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1996, Guest lecturer.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1997, Guest lecturer.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1998, Guest lecturer.
- City College, Select Program in Science and Engineering, NYC, NY, Spring 1998, Substitute teacher.
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 1999, SSA Region 4N Contest Meteorologist.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 1999, Guest lecturer.
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 2000, SSA Region 4N Contest Meteorologist.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 2000, Guest lecturer.
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 2001, SSA Region 4N Contest Meteorologist.
- RF/CUNY, Project WeatherWatch, New York City, NY, July 2001, Guest lecturer.
- City College, Select Program in Science and Engineering, NYC, NY, Spring 2002, Substitute teacher.
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 2002, SSA Region 4N Contest Meteorologist.
- Sugarbush Soaring Society, Warren, VT, June 2002, SSA Region 1 Contest Meteorologist
- Sugarbush Soaring Society, Warren, VT, June 2003, SSA Region 1 Contest Meteorologist
- Caesar Creek Soaring, Waynsville, OH, July 2003, SSA 1-26 Championships Contest Meteorologist
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 2004, SSA Region 4N Contest Meteorologist.
- Benz Aviation, Ionia MI, June 2004, SSA Sports Class Nationals Contest Meteorologist
- Mid-Atlantic Soaring Association, Fairfield PA, May-June 2005, SSA Region 4N Contest Meteorologist.
- Sugarbush Soaring Society, Warren, VT, June 2005, SSA Region 1 Contest Meteorologist
- Benz Aviation, Ionia MI, June 2005, SSA Region 6N Contest Meteorologist
- Marine Training Center, Stamford CT, April 2007, Basic and Intermediate Sailing Weather courses
- Cremer, Kopon, Shaughnessy & Spina, LLC, Chicago IL, June 2007, Forensic meteorological study
- Mid-Atlantic Soaring Association, Fairfield PA, October 2007, SSA Region 4N Contest Meteorologist.
- Marine Training Center, Stamford CT, March 2008, Basic and Intermediate Sailing Weather courses
- Sugarbush Soaring Society, Warren, VT, June 2008, SSA Region 1 Contest Meteorologist
- Mid-Atlantic Soaring Association, Fairfield PA, October 2008, SSA Region 4N Contest Meteorologist
- Mid-Atlantic Soaring Association, Fairfield PA, October 2009, SSA Region 4N Contest Meteorologist
- Lawrence S. Lewis, Attorney at Law, New York, NY, January 2010, Forensic meteorological study
- Marine Training Center, Stamford CT, April 2010, Basic and Intermediate Sailing Weather courses
- Bermuda High Soaring Inc., Jeffersonville SC, June 2010, SSA 1-26 Championships Contest Meteorologist
- Mid-Atlantic Soaring Association, Fairfield PA, October 2010, SSA Region 4N Contest Meteorologist
- Marine Training Center, Stamford CT, March 2011, Basic and Intermediate Sailing Weather courses
- Llano Estacado Soaring Society, Hobbs NM, June 2011, SSA 18m Nationals Contest Meteorologist
- Marine Training Center, Stamford CT, April 2012, Basic and Intermediate Sailing Weather courses
- Bermuda High Soaring Inc., Jeffersonville SC, May 2013, SSA 18m Nationals Contest Meteorologist
- Marine Training Center, Stamford CT, April 2013, Basic and Advanced Sailing Weather courses