

# Academician Pao-Kuan Wang 王寶貫院士



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## EDUCATION

Ph.D.(Atmospheric Sciences), 1978 -- University of California-Los Angeles  
M.S.(Atmospheric Sciences), 1975 -- University of California-Los Angeles  
B.S.(Atmospheric Sciences), 1971 -- National Taiwan University

## PROFESSIONAL SOCIETY MEMBERSHIP

American Meteorological Society  
American Geophysical Union  
European Geophysical Union

## EMPLOYMENT

2020-Date Distinguished Visiting Chair, RCEC, AS  
2021-2022 Visiting Distinguished Chair Professor, Dept. of Aeronautics and  
Astronautics, National Cheng Kung University  
2013-2019 Director and Distinguished Research Fellow, Research Center for  
Environmental Changes, Academia Sinica  
1988-2016 Professor, University of Wisconsin-Madison  
1984-1988 Associate Professor, University of Wisconsin-Madison  
1980-1984 Assistant Professor, University of Wisconsin-Madison  
1980 Adjunct Assistant Professor, UCLA  
1978-1980 Research Atmospheric Physicist, UCLA  
1973-1978 Graduate Research Meteorologist, UCLA

## UNIVERSITY ADMINISTRATIVE POSITIONS

Chairman, Air Resources Management Program, UW-Madison (1998-2002)  
Chairman, Fellowship Committee (Physical Sciences Division), UW-Madison (1997-  
2002)  
Chairman, Dept. of Atmospheric and Oceanic sciences, UW-Madison (1994-1997)  
Associate Chair, Undergrad. Affairs, Dept. of Meteorology, UW-Madison (1990-1992)

Associate Chair, Graduate Affairs, Dept. of Meteorology, UW-Madison (1986-1988)

## PROFESSIONAL ASSOCIATIONS

Advisory Committee, Research Center for Environmental Change, Academia Sinica  
Principal Lecturer, EUMETSAT Deep Convective Storms Workshop, Istanbul, Turkey  
(May 2012)

Principal Lecturer, EUMETSAT Deep Convective Storms Workshop, Prague, Czech  
Republic (August 2010)

Research Chair Professor, National Taiwan University (summer 2005, 2007, 2008)

Chairman, Cloud Physics Committee, American Meteorological Society (1991-1993)

Visiting Professor, UCLA (Spring 1988)

Visiting Professor, J. Gutenberg University of Mainz-Germany (Spring 1993)

Visiting Professor, National Taiwan University (Fall 1993)

Visiting Professor, MIT (Fall 1997)

Visiting Professor, University of Ferrara-Italy (2001)

Visiting Professor, Max-Planck Institute for Chemistry-Germany (2003)

Advisory Committee, Interactions in Cosmic and Atmospheric Particle Systems  
(ICAPS), European Space Agency

Advisory Committee, Research Center of Ocean Margin (RCOM), University of  
Bremen, Germany

Advisory Committee, Center for Marine Environmental Sciences (MARUM),  
University of Bremen, Germany

Panelist, NSF Major Research Instrumentation Program

Panelist, EPA Scientific Review Panel - Atmospheric Physics & Chemistry (since  
1982)

U.S. delegation, US-China Cooperation Program for Climate Studies, 1987.

NOAA Review Panel for Weather Modification Program

Technical Consultant (filtration technology), Nelson Industries/Fleetguard-Cummins  
Filtration

## EDITORSHIP

Associate Editor, *Atmospheric Research*

Editor, *European Physical Journal Plus*

Editor (Geophysics), *Il Nuovo Cimento C*

International Advisory Board, *Terrestrial, Atmospheric and Oceanic Sciences*

Editorial advisory board, Versita Publishing (*Environmental Studies*), UK

Consulting Editor, McGraw-Hill *Encyclopedia of Science and Technology*

## AWARDS AND HONORS

Nikolai Dotzek Award, European Severe Storm Laboratory, 2023.

Samuel C. Johnson Distinguished Fellowship, 1992  
Teaching Excellence, Dept. of Meteorology, UW-Madison, 1992  
Alexander von Humboldt Senior Research Award (Germany), 1993  
Fellow, American Meteorological Society, 2005  
Fellow, Taiwan (ROC) Meteorological Society, 2008  
**Academician, Academia Sinica, Taiwan (ROC), 2018**  
中國時報 1996 開卷十大好書 (天與地, 牛頓出版), 1996  
第一屆吳大猷科普著作獎佳作 (洞察, 天下文化), 2002  
行政院新聞局金鼎獎佳作 (洞察, 天下文化), 2002  
行政院新聞局金鼎獎佳作 (微塵大千, 經典雜誌), 2005

## PUBLICATIONS

### BOOKS

1. Wang, Pao K., 2002: Ice Microdynamics. *Academic Press*, 273pp.
2. Wang, Pao K., 2013: Physics and Dynamics of Clouds and Precipitation. *Cambridge University Press*, 467pp.
3. Wang, Pao K., 2021: Motions of Ice Hydrometeors in the Atmosphere Numerical Studies and Implications. *Springer Nature*, 176 pp. (ISBN 978-981-334-431-0)

### BOOK CHAPTERS

1. Wang, Pao K., 1985: Air Pollutant Measurements. Chap. 22 in *Handbook of Applied Meteorology*, Houghton, D. D., ed., *Wiley Interscience*, 667-678.
2. Wang, Pao K. and Zhang, De'er, 1991: Reconstruction of the 18th Century Precipitation of Nanjing, Suzhou, and Hangzhou using the Clear and Rain Records. in *Climate Since 1500 AD*, Bradley R. S. and Jones, P. D., Eds., *Routledge, London*, 184-209.
3. Winkler, M. and Wang, Pao K., 1994: The late Pleistocene and Holocene climate of China: A Review of Biogeologic Evidence and a Comparison with GCM Climate Simulations. in *Global Climates Since Last Glacial Maximum*, Wright et al., eds, *Univ. of Minnesota Press*, 221-264.
4. Wang, Pao K., 2003: Acid Rain and Precipitation Chemistry. *Encyclopedia of Water Science*, Marcel-Dekker.
5. Wang, Pao K., 2004: Atmospheric Water Vapor. *McGraw-Hill Year Book of Science & Technology, 2004*, 14-16. McGraw-Hill.
6. Wang, Pao K., 2005: Isentropic Modeling of Atmospheric Motions. in *2005 Yearbook of Science and Technology*, McGraw-Hill (in press)
7. Wang, Pao K., 2007: The Wisconsin Dynamical/Microphysical Model (WISCDYMM) and the Use of It to Interpret Satellite-observed Storm Dynamics, in *Measuring*

*Precipitation from Space EURAINSAT and the Future*. Edited by Levizzani, V., Bauer, Peter and Turk, F. J., Springer, 435-446.

8. Wang, Pao K., 2009: Jumping Cirrus above Severe Storms. In *2009 Yearbook of Science and Technology, McGraw-Hill*, 187-190.
9. Wang, Pao K., Lin, Hsinmu, Liu, Hui-Chun, Mihai, Chiruta and Schlesinger, Robert E. 2009: Recent Advances in Research on Micro- to Storm-scale Ice Microphysical Processes in Clouds. In *Recent Progress in Atmospheric Sciences*, Liou, K. N. and Chou, M. D., Ed., 419-437.

#### PAPERS PUBLISHED IN REFEREED JOURNALS

1. Wang, Pao K. and Pruppacher, H. R., 1977a: Acceleration to Terminal Velocity of Cloud and Rain Drops. *J. Appl. Meteor.*, 16, 275-280.
2. Wang, Pao K. and Pruppacher, H. R., 1977b: An Experimental Determination of the Efficiency with which Aerosol Particles Are Collected by Water Drops in Subsaturated Air. *J. Atmos. Sci.*, 34, 1664-1669.
3. Wang, Pao K., Grover S. N. and Pruppacher, H. R., 1978: On the Effect of Electric Charges on the Scavenging of Aerosol Particles by Cloud and Small Rain Drops. *J. Atmos. Sci.*, 35, 1735-1743.
4. Wang, Pao K., 1979a: Particular Solutions to the Steady-state Diffusion Equation and their Application to Aerosol Scavenging Problems. *Papers Meteor. Res.*, 2, 37-42.
5. Wang, Pao K., 1979b: Meteorological Records from Ancient Chronicles of China. *Bull. Amer. Meteor. Soc.*, 60, 313-317.
6. Martin, J. J., Wang, Pao K. and Pruppacher, H. R., 1980a: On the Efficiency with Which Aerosol Particles of Radius Larger than 0.1 Micron are Collected by Simple Ice Plates. *Pure Appl. Geophys.*, 118, 1109-1129.
7. Martin, J. J., Wang, Pao K. and Pruppacher, H. R., 1980b: A Theoretical Determination of the Efficiency with Which Aerosol Particles Are Collected by Simple Ice Plates. *J. Atmos. Sci.*, 37, 1628-1638.
8. Martin, J. J., Wang, Pao K. and Pruppacher, H. R., 1980c: A Theoretical Study of the Effect of Electric Charges on the Efficiency with which Aerosol Particles Are Collected by Ice Crystal Plates. *J. Colloid Interf. Sci.*, 78, 44-56.
9. Wang, Pao K., 1980: On the Possible Relationship between Winter Thunder and Climatic Changes in China over the Past 2,200 years. *Climatic Change*, 3, 37-46.
10. Wang, Pao K., 1980b: A Special Solution of the Classical Diffusion Equation for Fully Ionized Plasma. *IEEE Trans. Plasma Sci.*, PS-8, 227-228.
11. Wang, Pao K. and Siscoe, G. L., 1980: The Ancient Chinese Observations on the Physical Phenomena Attending Total Solar Eclipse. *Solar Phys.*, 66, 187-193.
12. Wang, Pao K. and Pruppacher, H. R., 1980a: The Effect of an External Electric Field on the Scavenging of Aerosol Particles by Clouds and Small Rain Drops. *J. Coll. Interf. Sci.*, 75, 286-297.

13. Wang, Pao K. and Pruppacher, H. R., 1980b: On the Efficiency with Which Aerosol Particles of Radius Less Than One Micron Are Collected by Columnar Ice Crystals. *Pure Appl. Geophys.*, 118, 1090-1108.
14. Walcek, C., Wang, Pao K., Topalian, J. H., Mitra, S. K. and Pruppacher, H. R. 1981: An Experimental Test of a Theoretical Model Designed to Determine the Rate at which Freely Falling Water Drops Scavenge SO<sub>2</sub> in Air. *J. Atmos. Sci.*, 38, 871-876.
15. Martin, J. J., Wang, Pao K., Pruppacher H. R. and Pitter, R. L., 1981: A Numerical Study of the Effect of Electric Charges on the Efficiency with which Planar Ice Crystals Collect Supercooled Water Drops. *J. Atmos. Sci.*, 38, 2462-2469.
16. Wang, Pao K., 1982: Mathematical Description of the Shape of Conical Hydrometeors. *J. Atmos. Sci.*, 39, 2615-2622.
17. Wang, Pao K. and Chu, J. H., 1982: Some Unusually Lightning Events Reported in Ancient Chinese Literature. *Weatherwise*, 35, 119-122.
18. Wang, Pao K., 1983a: On the Definition of Collision Efficiency of Atmospheric Particles. *J. Atmos. Sci.*, 40, 1051-1052.
19. Wang, Pao K., 1983b: Collection of Aerosol Particles by Conducting Spheres in an External Electric Field - Continuum Regime Approximation. *J. Coll. Interf. Sci.*, 94, 301-318.
20. Wang, Pao K. and Denzer, S. M., 1983: Mathematical Description of the Shape of Plane Hexagonal Snow Crystals. *J. Atmos. Sci.*, 40, 1024-1028.
21. Wang, Pao K., 1984: An Investigation of the Relationship between Climatic Conditions and the Occurrence of Flying Locusts Infestation in China in Historical Time. *Abst. 10th Int. Congress Biometeor.*, Tokyo, Japan, July 26-30, 1984, 246.
22. Wang, Pao K., 1984: An Eulerian Variational Principle for Atmospheric Motions in Rotating Coordinates. *Atmosphere-Ocean*, 22, 387-392.
23. Wang, Pao K., 1984: Calculation of the Electrostatic Field Surrounding Finite Circular Cylindrical Conductors. *IEEE Trans. Antenna Propag.*, AP-32, 956-962.
24. Rasmussen, R., C. Walcek, H. R., Pruppacher, S., Lew, Mitra, J., Levizzani, V., Wang, Pao K. and Barth, U., 1985: A Wind Tunnel Investigation of the Effect of an External, Vertical Electric Field on the Shape of Electrically Uncharged Rain Drops. *J. Atmos. Sci.*, 42, 1647-1652.
25. Wang, Pao K., 1985: Air Pollutant Measurements. in *Handbook of Applied Meteorology*, D. D. Houghton, Ed., Chap.22, 667-678. Wiley Interscience, New York.
26. Wang, Pao K., 1985a: A Potential and Stream Function Analysis of Two-dimensional Steady-state Convective Diffusion Equations Involving Laplace Fields. *Int. J. Heat Mass Transfer*, 28, 1089-1095.
27. Wang, Pao K., 1985b: A Convective Diffusion Model for the Scavenging of Submicron Particles by Snow Crystals of Arbitrary Shapes. *J. de Rech. Atmos.*, 19, 185-191.

28. Wang, Pao K., 1985c: Brownian Diffusion of Charged Fine Particles Surrounding a Conducting Cylinder in the Presence of an External Electric Field. *J. Aerosol Sci.*, 17, 201-209.
29. Wang, Pao K., Chuang, C. H. and Miller, N. L., 1985: Electrostatic, Temperature and Vapor Density Fields Surrounding Stationary Columnar Ice Crystals. *J. Atmos. Sci.*, 42, 2371-2379.
30. Wang, Pao K., 1987: Two Dimensional Characterizations of Polygonally Symmetric Particles. *J. Colloid Interf. Sci.*, 117, 271-281.
31. Wang, Pao K., Greenwald T. J. and Wang, Jianlu, 1987: A Three Parameter Representation of the Shape and Size Distributions of Hailstones - A Case Study. *J. Atmos. Sci.*, 44, 1062-1070.
32. Wang, Pao K., 1988: A Convective Diffusion Model for the Scavenging of Submicron Particles by Snow Crystals of Arbitrary Shapes- some Comments and Corrections. *Atmos. Res.* 23, 195-198.
33. Wang, Pao K. and Zhang, De'er, 1988: An Introduction of some Historical Governmental Weather Records in the 18th and 19th centuries of China. *Bull. Amer. Meteor. Soc.*, 69, 753-758.
34. Wang, Pao K., with COHMAP Members, 1988: Climatic Changes of the Last 18,000 years: Observations and Model Simulations. *Science*, 241, 1043-1052.
35. Ji, Wusheng and Wang, Pao K., 1989: Numerical Simulation of Three Dimensional Unsteady Viscous Flow Past Hexagonal Ice Crystals in the Air-Preliminary Results. *Atmos. Res.* 25, 539-557
36. Miller, N. L. and Wang, Pao K., 1989: A Theoretical Determination of the Efficiency with which Aerosol Particles are Collected by Falling Columnar Ice Crystals. *J. Atmos. Sci.*, 46, 1656-1663.
37. Peng, G. and Wang, Pao K., 1989: Influence of the Antarctic Sea-ice on the Northwest Pacific Subtropical High and its Ocean-atmosphere Circulation Background. *Kexue Tongbao*, 1989, 1, 56-58.
38. Sauter, D. P. and Wang, Pao K., 1989: An Experimental Study of the Scavenging of Aerosol Particles by Natural Snow Crystals. *J. Atmos. Sci.*, 46, 1650-1655.
39. Zhang, De'er and Wang, Pao K., 1989: Reconstruction of the 18th Century Summer Precipitation Series of Nanjing, Suzhou, and Hangzhou using the Clear and Rain Records of Qing Dynasty. *Acta Meteor. Sinica*, 3, 261-278.
40. Wang, Pao K. and Zhang, De'er, 1990: Use of Historical Documents of China to Reconstruct Past Climate. *World Resource Rev.*, 2, 1-14.
41. Ji, W. and Wang, Pao K., 1991: Numerical Simulation of Three-dimensional Unsteady Viscous Flow Past Finite Cylinders in an Unbounded fluid at Low Intermediate Reynolds Numbers. *Theor. Compu. Fluid Dynam.*, 3, 43-59.
42. Miller, N. L. and Wang, Pao K., 1991: Comparison of the Efficiencies with which Aerosol Particles are collected by Planar and Columnar Ice Crystals. *Atmos. Environ.*, 25A, 2593-2606.

43. Wang, Pao K. and Zhang, De'er, 1991: Reconstruction of the 18th Century Precipitation of Nanjing, Suzhou, and Hangzhou Using the Clear and Rain Records. in *Climate Since 1500 AD*, Bradley, R. S. and Jones, P. D., Eds., Routledge, London, 184-209.
44. Wang, Pao K. and Jaroszczyk, T., 1991: The Grazing Collision Angle of Aerosol Particles Colliding with Infinitely Long Circular Cylinders, *Aerosol Sci. Tech.*, 15, 149-155.
45. Zhang, De'er and Wang, Pao K., 1991: A Study on the Reconstruction of the 18th Century Meiyu (plum rains) Activity of Lower Changjiang (Yangtze) Region of China. *Science in China (B)*, 34, 1237-1245.
46. Wang, Pao K., 1992: Theoretical Studies on the Convective Diffusion around Two- and Three-dimensional Objects. *Trends in Heat and Mass Transfer*, 2, J. Menon, ed., 173-186.
47. Wang, Pao K. and Zhang, De'er, 1992: Recent Studies of the Reconstruction of East Asian Monsoon Climate in the Past Using Historical Literature of China. *J. Meteor. Soc. Japan*, 70, 423-446.
48. Johnson, D. E., Wang, Pao K. and Straka, J. M., 1993: Numerical Simulation of the 2 August 1981 CCOPE Supercell Storm with and without Ice Microphysics. *J. Appl. Meteor.*, 32, 745-759.
49. Winkler, M. and Wang, Pao K., 1994: The Late Pleistocene and Holocene Climate of China: A Review of Biogeologic Evidence and a Comparison with GCM Climate Simulations. in *Global Climates Since Last Glacial Maximum*, Wright et al., eds, Univ. of Minnesota Press, 221-264.
50. Johnson, D. E. and Wang, Pao K. and J. M. Straka, 1995: A Study of Microphysical Processes in the 2 August 1981 CCOPE Supercell Storm. *Atmos. Res.* 33, 93-123.
51. Magradze, G. J. and Wang, Pao K., 1995: A Note on the Closed-form Mathematical Description of the Volume of Conical Hydrometeors. *Atmos. Res.* 39, 275-278.
52. Wang, Pao K. and G. L. Siscoe, 1995: Some Early Descriptions of Aurorae in China. *Annal. Geophys.*, 13, 517-521
53. Wang, Pao K. and Lin, Ho, 1995: Comparison between the Collection Efficiency of Aerosol Particles by Individual Water Droplets and Ice Crystals in a Subsaturated Atmosphere. *Atmos. Res.* 38, 381-390.
54. Liu, G. Z. and Wang, Pao K., 1996: Numerical Investigation of Viscous Flow Fields around Multi-fiber Filters. *Aerosol Sci. and Tech.*, 25, 375-391.
55. Liu, G. Z. and Wang, Pao K., 1997: Pressure Drop and Interception Efficiency of Multi-fiber Filters. *Aerosol Sci. and Tech.*, 25, 375-391.
56. Lin, Hsin-Mu and Wang, Pao K., 1997: A Numerical Study of Microphysical Processes in the 21 June 1991 Northern Taiwan Mesoscale Precipitation System. *Terres. Atmos. Oceanic Sci.*, 8, 385-404.

57. Wang, Pao K., 1997: Characterization of Ice Particles in Clouds by Simple Mathematical Expressions Based on Successive Modification of Simple Shapes. *J. Atmos. Sci.* 54, 2035-2041.
58. Wang, Pao K. and Ji, Wusheng, 1997: Simulation of Three-dimensional Unsteady Flow Past Ice Crystals *J. Atmos. Sci.*, 54, 2261-2274.
59. Ji, Wusheng and Wang, Pao K., 1998: On the Ventilation Coefficients of Falling Ice Crystals at Low-intermediate Reynolds Numbers. *J. Atmos. Sci.*, 56, 829-836.
60. Wang, Pao K., 1999: Three-dimensional Representations of Hexagonal Ice Crystals and Hail Particles of Elliptical Cross-sections, *J. Atmos. Sci.*, 56, 1089-1093.
61. Wang, Pao K. and Ji, Wusheng, 2000: Collision Efficiencies of Ice Crystals at Low-Intermediate Reynolds Numbers Colliding with Supercooled Cloud Droplets: A Numerical Study. *J. Atmos. Sci.*, 57, 1001-1009.
62. Wang, Pao K., 2002: Shape and Microdynamics of Ice Particles and Their Effects in Cirrus Clouds. Invited monograph in *Advances in Geophysics*, Vol. 45, Academic Press, 1-265.
63. Wang, Pao K., 2002: The Kansas Green Thunderstorm of 4 October 1998. *Bull. Amer. Meteor. Soc.*, 83, 355-357.
64. Chiruta, M. and Wang, Pao K., 2003: On the Capacitance of Bullet Rosette Crystals. *J. Atmos. Sci.*, 60, 836-846.
65. Liu, H. C., Wang, Pao K. and Schlesinger, R. E., 2003a: A Numerical Study of Cirrus Clouds. Part I: Model Description. *J. Atmos. Sci.*, 60, 1075-1084.
66. Liu, H. C., Wang, Pao K. and Schlesinger, R. E., 2003b: A Numerical Study of Cirrus Clouds. Part II: Effects of Ambient Temperature and Stability on Cirrus Evolution. *J. Atmos. Sci.*, 60, 1097-1119.
67. Wang, Pao K., 2003: Moisture Plumes above Thunderstorm Anvils and Their Contributions to Cross Tropopause Transport of Water Vapor in Midlatitudes. *J. Geophys. Res.*, 108(D6), 4194, doi: 10.1029/2003JD002581, 2003.
68. Wang, Pao K. 2004: A Cloud Model Interpretation of Jumping Cirrus above Storm Top, *Geophys. Res. Lett.*, 31, L18106, doi:10.1029/2004GL020787
69. Chiruta, M., and Wang, Pao K., 2005: The Capacitance of Solid and Hollow Hexagonal Ice Columns. *Geophys. Res. Lett.*, VOL. 32, L05803, doi:10.1029/2004GL021771, 2005.
70. Lin, Hsin-mu, Wang, Pao K. and Schlesinger, Robert E., 2005: Three-Dimensional Nonhydrostatic Simulations of Summer Thunderstorms in the Humid Subtropics versus High Plains. *Atmos. Res.*, 78, 103-145.
71. Wang, Pao K., 2005: The Wisconsin Dynamical/ Microphysical Model (WISCDYMM) and the Use of It to Interpret Satellite-observed Storm Dynamics., in *MEASURING PRECIPITATION FROM SPACE EURAINSAT AND THE FUTURE*. Edited by Levizzani, V., et al., bibl. (in press by Kluwer Academic Publishers)



72. Setvak, M., Robin, R. M. and Wang, Pao K., 2007: Contribution of MODIS Instrument to the Observations of Deep Convective Storms and Stratospheric Moisture Detection in GOES and MSG Imagery (accepted for publication in *Atmospheric Research*)
73. Wang, Pao K. 2007: The Thermodynamic Structure atop a Penetrating Convective Thunderstorm. *Atmospheric Research*, 83, 254-262.
74. Setvak, M., Lindsey, D. T., Rabin R. and Wang, Pao K., 2008: Indication of Water Vapor Transport into the Lower Stratosphere above Midlatitude Convective Storms: Meteosat Second Generation Satellite Observations and Radiative Transfer Model Simulations, *Atmos. Res.*, 89, 170-180.
75. Chen, Chiou-Jiu and Wang, Pao K., 2009: Diffusion Growth of Solid and Hollow Hexagonal Ice Columns. *Il Nuovo Cimento*, 124, 87-97.
76. Wang, Pao K., Setvak, M., Lyons, W., Schmid W. and Lin, H., 2009: Further Evidence of Deep Convective Vertical Transport of Water Vapor through the Tropopause, *Atmos. Res.*, 94, 400-408.
77. Flossmann, A. I., Levizzani V. and Wang, Pao K., 2010: On the Fundamental Role of Hans Pruppacher for Cloud Physics and Cloud Chemistry. *Atmos. Res.*, 97, 393-395.
78. Setvák, Martin, Lindsey, Daniel T., Novák, Petr, Wang, Pao K., Radová, Michaela, Kerkmann<sup>5</sup>, Jochen, Grasso<sup>2</sup>, Louie, Su<sup>3</sup>, Shih-Hao, Rabin<sup>6,7</sup>, Robert M., Šástka, Jindich, Charvat, Zdeněk and Kyznarová, Hana, 2010: Cold-ring-shaped Cloud Top Features atop Convective Storms, *Atmospheric Research*, 97, 80-96.
79. Wang, Pao K., Su, Shih-Hao, Setvak, M., Lin, H. M. and Rabin, R., 2010: Ship Wave Signature at the Cloud Top of Deep Convective storms, *Atmos. Res.* 97, 294-302.
80. Wang, Pao K., Lin, Hsin-Mu and Su, Shih-Hao, 2010: The Impact of Ice Microphysical Processes on the Life Span of a Midlatitude Supercell Storm, *Atmos. Res.* 97, 450-461.
81. Wang, Pao K., Su, S. H., Charvat, Z., Stastka, J. and Lin, H., 2011: Cross Tropopause Transport of Water by Mid-latitude Deep Convective Storms: A Review. *Terr. Atmos. Ocean. Sci.*, 22, 447-462.
82. Kubicek, A. and Wang, Pao K., 2012: A Numerical Study of the Flow Fields around a Typical Conical Graupel Fallin at Various Inclination Angles. *Atmos. Res.*, 118, 15-26.
83. Setvak, M., Bedka, K., Lindsey, D. T., Sokol, A., Charvat, Z., Stastka J. and Wang, Pao K., 2013: A-Train Observations of Deep Convective Storm Tops. *Atmos. Res.*, 123, 229-248.
84. Wang, Pao K. and Kubicek, A. 2013: Flow Fields of Graupel Falling in Air. *Atmos. Res.*, 124, 158-169.
85. Cheng, K. Y. and Wang, Pao K., 2013: A Numerical Study of the Flow Fields around Falling Hails. *Atmos. Res.*, 132-133, 253-263.
86. Panda, J., Singh, H., Wang, Pao K., Giri, R. K. and Routray, A., 2014: A Qualitative Study of Some of the Meteorological Features during Tropical Cyclone PHET Using Satellite Observations and WRF Modeling System. *J. Indian Soc. Remote Sensing*, 11 July 2014, DOI: 10.1007/s12524-014-0386-4

87. Cheng, K. Y., Wang, Pao K. and Wang, C. K., 2014: A Numerical Study on the Ventilation Coefficients of Falling Hailstones. *J. Atmos. Sci.*, 71, 2625-2634.
88. Hashino, T., Chiruta, M., Polzin, D., Kubicek A. and Wang, Pao K., 2014: Numerical Simulation of the Flow Fields around Falling Ice Crystals with Inclined Orientation and the Hydrodynamic Torque. *Atmos. Res.*, 150, 79-96.
89. Chueh, Chi-Cheh and Wang, Pao K., 2015: A Numerical Study of Flow Fields of Lobed Hailstones Falling in Air. *Atmos. Res.*, 160, 1-14.
90. Cheng, K. Y., Wang, Pao K. and Hashino, T., 2015: A Numerical Study on the Attitudes and Aerodynamics of Freely Falling Hexagonal Ice Plates. *J. Atmos. Sci.*, 72, 3685-3698.
91. Hernandez-Gonzalez, S., Wang, Pao K., Gascon, E., Valero, F. and Sanchez, J. L., 2016: Latent Cooling and Microphysics Effects in Deep Convection, *Atmos. Res.*, 180, 189-199.
92. Wang, Pao K., Cheng, K. Y., Setvak, M. and Wang, C. K., 2016: The Origin of the Gullwing-shaped Cirrus above an Argentinian Thunderstorm as seen in CALIPSO Images. *J. Geophys. Res. Atmos.*, 121, doi:10.1002/2015JD024111
93. Hashino, T., Cheng, K. Y., Chueh, C. C. and Wang, Pao K., 2016: Numerical Study of Motion and Stability of Falling Columnar Crystals. *J. Atmos. Sci.*, 73, 1923-1942.
94. Chueh, C.-C., Wang, Pao K. and Hashino, T., 2017: A Preliminary Numerical Study on the Time-varying Fall Attitudes and Aerodynamics of Freely Falling Conical Graupel Particles. *Atmospheric Research*, 183, 58-72.
95. Balaji Kumar, S., Janapati, J., Lin, Pay-Liam, Reddy, K. Krishna, Shirooka, R. and Wang, Pao K., 2017: A Comparison Study of Summer Season Raindrop Size Distribution between Palau and Taiwan, Two Islands in Western Pacific. *J. Geophys. Res.*, 122, 11787-11805.
96. Kant, S., Panda, J., Gautam, R., Wang, Pao K. and Singh, S. P., 2017: Significance of Aerosols Influencing Weather and Climate over Indian Region. *Int. J. Earth and Atmos. Sci.*, 4, 1-20.
97. Huang, Y.-C. and Wang, Pao K., 2017: The Hydrometeor Partitioning and Microphysical Processes over the Pacific Warm Pool in Numerical Modeling. *Atmos. Res.*, 183, 308-321.
98. Chueh, C.-C., Wang, Pao K. and Hashino, T., 2018: Numerical Study of Motion of Falling Conical Graupel. *Atmos. Res.*, 199, 82-92.
99. Nettesheim, J., and Wang, Pao K., 2018: A Numerical Study on the Aerodynamics of Freely Falling Planar Ice Crystals. *Journal of the Atmospheric Science*, 75, 2849-2865.
100. Wang, Pao K., Lin, K.-H. Elaine, Liao, Y.-C., Liao, H.-M., Lin, Y.-S., Hsu, C.-T., Hsu, S.-M., Wan, C.-W., Lee, S.-Y., Fan, I.-C., Ting, T.-T. and Tan, P.-H., 2018: Construction of the REACHES Climate Database Based on Historical Documents of China, *Nature: Scientific Data* | 8:180288 | DOI: 10.1038/sdata.2018.288
101. Seela, B. K., Janapati, J., Lin, P.-L., Wang, Pao K. and Lee, M.-T., 2018: Raindrop Size Distribution Characteristics of Summer and Winter Season Rainfall over North

Taiwan. *Journal of Geophysical Research: Atmospheres*, 123, (20), 11, 602-11, 624.  
<https://doi.org/10.1029/2018JD028307>

102. Kant, S., Panda, J., Kumar Pani, S. and Wang, Pao K., 2018: Long-term Study of Aerosol-cloud-precipitation Interaction over the Eastern Part of India Using Satellite Observations during Pre-monsoon Season. *Theoretical and Applied Climatology*, <https://doi.org/10.1007/s00704-018-2509-2>
103. Lin, K.-H. Elaine, Hsu, C.-T., Wang, Pao K., et al., 2019: Reconstructing Historical Typhoon Series and Spatiotemporal Characteristics from REACHES Documentary Records, *Journal of Geographical Sciences* 93: 81-107.
104. \*林冠慧、許景慈、王寶貫、許世旻、林濟暄、汪志偉、曾琬鈴、吳宛真、潘威 (2019) 從清朝文獻紀錄重建颱風序列與時空特徵, *地理學報*, 93:81-107.
105. Lin, K.-H. Elaine, Wang, Pao K., Pai, P.-L., Lin, Y.-S. and Wang, C.-W., 2020: Historical Droughts in the Qing Dynasty (1644-1911) of China. *Climate of the Past*, 16, 911-9.
106. Hirofumi, Ohyama; Morino, Isamu; Velasco, Voltaire A.; Klausner, Theresa; Bagtasa<sup>5</sup>, Gerry; Kiel<sup>6</sup>, Matthäus; Matthias, Frey; Hori, Akihiro; Uchino<sup>1</sup>, Osamu; Matsunaga<sup>1</sup>, Tsuneo; Deutscher<sup>2</sup>, Nicholas M.; DiGangi<sup>7</sup>, Joshua P.; Choi, Yonghoon; Diskin, Glenn S.; Pusede, Sally E.; Fiehn, Alina; Roiger, Anke; Lichtenstern, Michael; Schlager, Hans; Wang, Pao K.; Chou, Charles C.-K.; Andrés-Hernández, Maria Dolores and Burrows, John P., 2020, Validation of XCO<sub>2</sub> and XCH<sub>4</sub> Retrieved from a Portable Fourier Transform Spectrometer with Those from in-situ Profiles from Aircraft Borne Instruments, *Atmos. Meas. Tech.*, 13, 5149-5163.
107. Wang, Pao K. and Chueh, C. C., 2020: A Numerical Study on the Ventilation Coefficients of Falling Lobed Hailstones. *Atmos. Res.* 234, 104737. <https://doi.org/10.1016/j.atmosre>
108. Chou, Y. L., Wang, Pao K. and Cheng, K. Y., 2021: Sensitivity of Simulated Storm Life Span to Ventilation, *Terr. Atmos. Ocean.* 32, No. 3, 361-374.
109. Dyakov, Y. A., Adamson, S. O., Wang, Pao K., Golubkov, G. V., Olkhov, O. A., Peskov, V. D., Rodinov, I. D., Rodionova, I. P., Rodionova, A. I., Shapovalov, V. L., Shestakov, D. V. and Golubkov, M. G., 2021a: Isomerization and Decay of a Criegee Intermediate CH<sub>3</sub>CHOO in the Earth's Upper Atmosphere. *Russian J. Phys. Chem., B*, 15, 559-565.
110. Dyakov, Y. A., Adamson, S. O., Wang, Pao K., Vetchinkin, A. S., Golubkov, G.V., Morozov, I. I., Umanskii, S. Ya., Chaikina, Yu. A. and Golubkov, M. G., 2021b: Collisional Dissociation of Criegee CH<sub>3</sub>CHOO and Methane Intermediates in the Earth's Upper Atmosphere, *Russ. J. Phys. Chem. B*, 2021, Vol. 15, No. 5, pp. 782-788.
111. Borchevkina, O. P., Adamson, S. O., Dyakov, Y. A., Karpov, I. V., Golubkov, G. V., Wang, Pao K., Golubkov, M. G., 2021a: The Influence of Tropospheric Processes on Disturbances in the D and E Ionospheric Layers. *Atmosphere* 12, 1116. <https://doi.org/10.3390/atmos12091116>
112. Borchevkina, Olga P., Kurdyeva, Yuliya A., Dyakov, Yurii A., Karpov, Ivan V., Golubkov, Gennady V., Wang, Pao K. and Golubkov, Maxim G., 2021b: Thermospheric Disturbances Caused by the Propagation of Acoustic and Internal

- Gravity Waves from the Lower Atmosphere during a Meteorological Storm, *Atmosphere* 12, 1384; <https://doi.org/10.3390/atmos12111384>
113. Popová, Jana; Sokol, Zbyněk; Šlegl, Jakub; Wang, Pao K. and Chou, Yen-Liang, 2022: Research Cloud Electrification Model in the Wisconsin Dynamic/Microphysical Model 2: Charge Structure in an Idealized Thunderstorm and its Dependence on Ion Generation Rate, *Atmos. Res.*, 270, 106090. (SCI). <https://doi.org/10.1016/j.atmosres.2022.106090>
  114. Chen, Y.-W., Chen, Y.-C., Chou, C. C.-K., Hung, H.-M., Chang, S.-Y., Eirenschmalz, L., Lichtenstern, M., Ziereis, H., Schlager, H., Stratmann, G., Kaiser, K., Schneider, J., Borrmann, S., Obersteiner, F., Förster, E., Zahn, A., Chen, W.-N., Lin, P.-H., Chang, S.-C., Andrés Hernández, M. D., Wang, P.-K., and Burrows, J. P., 2021: Contribution of the gas-phase reaction between hydroxyl radical and sulfur dioxide to the sulfate aerosol over West Pacific, *Atmos. Chem. Phys. Discuss.* [preprint], <https://doi.org/10.5194/acp-2021-788>, 2021.
  115. Golubkov, G. V., Adamson, S. O., Borchevkin, O. P., Wang, P. K.; Dyakov, Y. A. Efshov, I. I., Karpov, I. V., Kurdyayeva, Y. A., Lukhovitskaya, E. E., Olkhov, O. A. Tepenitsina, N.Y., Umanskii, S. Y., Shagimuratov, I. I., Shapovalov, V. L., Yakimova, G. A. and Golubkov, M. G., 2022: Coupling of Ionospheric Disturbances with Dynamic Processes in the Troposphere. *Rus. J. Phys. Chem. B*, 16(3), 508-530.
  116. Mohammad, S., Wang, P. K. and Chou, Y. L., 2022: A Cloud Model Study of Internal Gravity Wave Breaking Atop a High Shear Supercell in Us High Plains. *Rus. J. Phys. Chem. B*, 16(3), 549-563.
  117. Dyakov, Y. A., Adamson, S. O., Wang, P. K., Vetchinkin, A. S., Golubkov, G. V., Peskov, V. D., Rodionov, A. I., Syromyatnikov, A. G., Umanskii, S. Y., Shestakov, D. V. and Golubkov, M. G. 2022: Excited State Dynamics of CH<sub>3</sub>CHOO Criegee Intermediates in the Upper Atmosphere of the Earth. *Rus. J. Phys. Chem. B*, 16(3), 543-548.
  118. Jhang, Syu-Ruei, Chen, Yi-Ying, Shiau, Yo-Jin, Lee, Chia-Wei, Chen, Wei-Nai, Chang, Chih-Chung, Chiang, Chih-Feng, Guo, Horng-Yuh, Wang, Pao-Kuan and Chou, Charles C.-K. 2022, Jul: Denitrifies and Nitrous Oxide Emissions from a Subtropical Vegetable Cropland. *ACS Earth Space Chem.*, 6, 8, 2024-2031.
  119. Wang, Pao K. 2022, Aug: Theoretical Studies on the Motions of Cloud and Precipitation Particles- A Review. *Meteorology*, 1, 288-310.
  120. Chou, Y.-L. and Wang, Pao K. 2023: An Expanded Sensitivity Study of Simulated Storm Life Span to Ventilation Parameterization in a Cloud Resolving Model. *Atmos.*, 14, 720.
  121. Popová, J., Sokol, Z., Wang, P. and Svoboda, J., 2023: Observations and modelling of the winter thunderstorm on 4 February 2022 at the Milešovka meteorological observatory. *Q. J. R. Meteorol. Soc.*, 2023; 1-21. (SCI). <https://doi.org/10.1002/qj.4572>
  122. Dyakov, Y. A., S.O. Adamson, G. V. Golubkov, I. I. Morozov, D. R. Nigmatullin, O. A. Olkhov, P. K. Wang, and M. G. Golubkov (2023, Dec). Reactions of CH<sub>2</sub>OO, CH<sub>3</sub>CHOO, and (CH<sub>3</sub>)<sub>2</sub>COO with Methane through the Formation of Intermediate Complex. *Atoms*, 11, 157.

123. Allahverdyan, A. E., S. G. Gevorkian, Y. A. Dyakov, P.-K. Wang (2023, Oct). Thermodynamic definition of mean temperature. *Physical Review E*, 108, 044112.

#### INVITED BOOK REVIEWS

1. Wang, Pao K., 1985: Review of Weather and Climate Responses to Solar Variations (B. McCormach, Ed., 1983, Colorado Associated University Press), *EOS*, 66, 497-498.
2. Wang, Pao K., 1985: Review of Carbon Dioxide - Current Views and Developments in Energy/ Climate Research (Bach, W., et al., Eds., 1983, Reidel, D.), *Dynamics of Atmosphere and Oceans*, 10, 259-260.
3. Wang, Pao K., 1986: Review of Quality Assurance for Environmental Measurements, STP-867 (Taylor J. and Stanley, T., Eds., 1985, American Society for Testing and Materials), *Bull. Amer. Meteor. Soc.*, 67, 569.
4. Wang, Pao K., 1987: Review of Atmospheric Chemical Compounds: Sources, Occurrences, and Bioassay (Graedel, T., Hawkins, D. T. and Claxton, L. D., Eds., 1986, 732pp, Academic Press), *Bull. Amer. Meteor. Soc.*, 68, 512.
5. Wang, Pao K., 1989: Review of The Climate of China and Global Climate (D. Ye, C. Fu, J. Chao, and M. Yoshino, Eds., 1987, 442pp, Springer-Verlag), *Bull. Amer. Meteor. Soc.*, 70, 301-302.
6. Wang, Pao K., 1989: Review of Synoptic Meteorology in China (*Bao Chenglan, 1987, 269pp, Springer-Verlag*), *Bull. Amer. Meteor. Soc.*, 70, 185-186.
7. Wang, Pao K., 1990: Review of Environmental Consequences of Nuclear War. Vol. I: Physical and Atmospheric Effects. 2nd Ed., (Pittock, Ackerman, Crutzen, McCracken, Sharpiro and Turco, eds., 359pp, John Wiley & Sons), *Bull. Amer. Meteor. Soc.* 71, 1471-1472.
8. Wang, Pao K., 1992: Review of Global Environmental Change (Corell R. W. and Anderson, P. A., eds., 1990, 264pp), *Bull. Amer. Meteor. Soc.*, 73, 1290-1291.
9. Wang, Pao K., 1994: Review of Atmospheric Change-An Earth System Perspective (by Graedel, T. E. and Crutzen, P. J., 1993, 446pp), *Bull. Amer. Meteor. Soc.*, 74, 2231-2232.
10. Wang, Pao K., 1997: Review of Microphysics of Clouds and Precipitation (by Pruppacher, H. R. and Klett, J. D. 1997, Kluwer Publishing), *Aerosol Sci. & Technol.* 28, 381-382.

#### JUMPING CIRRUS MOVIES

1. STEPS 2000 **Denver Storm**, 20 July, 2000 (*courtesy of Dr. Walter Lyons*)
2. 8 August, 2003 **Bavaria Storm** (*courtesy of Dr. Willi Schmid*)

#### PUBLICATIONS IN CHINESE LANGUAGE BY WANG, PAO K.

##### ● 書籍

1. 王寶貫, 1996: **雲物理學**, 國立編譯館主編, 渤海堂印行, 382pp.

2. 王寶貫, 1996: 天與地, 牛頓出版社, 349pp.
3. 王寶貫, 2001: 洞察, 天下文化出版社, 314pp.
4. 王寶貫, 2004: 微塵大千, 經典出版社, 216pp.
5. 《危機年代：臺灣環境調查報告》(王寶貫等著，經典雜誌出版)，2007。
6. 王寶貫, 2023: 航空氣象學, 成大出版社, 320pp.

● **主編之論文集**

- “台灣及太平洋友邦南島民族氣候變遷調適及因應政策研討會”論文集, 中央研究院環境變遷研究中心, (2014.4)
- “環變風雲十年間-環境變遷研究中心十周年暨劉紹臣院士榮退研討會”論文集, 中央研究院環境變遷研究中心, (2015.10)
- “2050 NET-ZERO Taiwan Can Do It! / 淨零之路—台灣的雙贏策略 Roads to Net-Zero, A Win-win Strategy for Taiwan; 王寶貫·蕭代基 主編; 中央研究院環境變遷研究中心, (2023.3)

● **以下個別文章收集於上列《天與地》書中：**

1. 時間與空間, 牛頓雜誌, 136, 12-21 (September 1994)
2. 物質宇宙, 牛頓雜誌, 137, 12-21 (October 1994)
3. 銀河星系, 牛頓雜誌, 138, 16-25 (November 1994)
4. 恆星, 牛頓雜誌, 139, 22-31 (December 1994)
5. 太陽, 牛頓雜誌, 140, 12-21 (January 1995)
6. 太陽系, 牛頓雜誌, 141, 18-27 (February 1995)
7. 天論思想的演變, 牛頓雜誌, 142, 12-21 (March 1995)
8. 大地源起, 牛頓雜誌, 143, 16-25 (April 1995)
9. 地球時空, 牛頓雜誌, 144, 14-23 (May 1995)
10. 濛濛大氣, 牛頓雜誌, 145, 14-23 (June 1995)
11. 世界之風, 牛頓雜誌, 146, 12-23 (July, 1995)
12. 光怪, 牛頓雜誌, 147, 12-21 (August, 1995)
13. 茫茫大海, 牛頓雜誌, 148, 12-23 (September 1995)
14. 南極、北極, 牛頓雜誌, 149, 14-25 (October 1995)
15. 高山大川, 牛頓雜誌, 150, 10-21 (November 1995)
16. 天地與人, 牛頓雜誌, 151, 22-29 (December 1995)

● **以下個別文章(第 10 期~第 56 期)刊載於《經典雜誌》，收集於上列《微塵大千》書中：**

1. 第 10 期 太空與人類
2. 第 15 期 莊子鬥東郭

3. 第 16 期 看見一個彩色世界
4. 第 18 期 萬紫千紅天地藏
5. 第 19 期 光速奇譚
6. 第 21 期 宇宙極速 都是相對論惹的禍
7. 第 23 期 神奇光路歷程 四十二度的玄機
8. 第 25 期 日暈月暈與海市蜃景—拆穿光線的魔法
9. 第 28 期 綺麗幻景光世界
10. 第 31 期 神奇無邊的重力 地球之吸星大法
11. 第 32 期 太空人的無重世界
12. 第 34 期 無重過生活 太空人的另類人生
13. 第 39 期 波動於無形 聲音是怎麼產生的
14. 第 40 期 耳聽南腔北調 人類世界裏的聲音
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17. 第 49 期 現代文明的螺絲釘 無所不「電」
18. 第 52 期 電與磁的循環相生傳奇
19. 第 54 期 細說雷嗔電怒
20. 第 56 期 莫懼天雷震石壁 解讀有趣的雷電現象

### ● 經典雜誌

1. 第 60 期 大塊噫氣 其名為風
2. 第 65 期 追蹤風的旅行 漫談盛行風向
3. 第 68 期 喚雨騰雲總是風
4. 第 92 期 風有多長？—漫談旋風
5. 第 93 期 坐看雲起時
6. 第 96 期 大西洋颶風
7. 第 97 期 冷與熱的交匯—霧的生成原理
8. 第 99 期 來如春夢天明去—細說露的凝結
9. 第 101 期 以沙為核，凝水成雪
10. 第 108 期 見雲知晴雨
11. 第 113 期 格陵蘭氣象站
12. 吸熱西行，鼓浪而來—大西洋颶風的誕生，《變調爵士城》，2006, 98-117  
(經典雜誌出版)

### ● 中國時報

1. 暴風雨，中國時報，人間咖啡館 (2001/1/7)
2. 鑽石與我，中國時報，浮世繪染坊 (2002/2/2)
3. 雨聲留客夜翻盆，中國時報，人間咖啡館 (2002/8/23)

4. 雪國隨想曲, 中國時報, 人間咖啡館 (2002/12/19)
5. 霜寒與雪白, 中國時報, 人間咖啡館 (2003/6/10)
6. 科學詩人侯祿布, 中國時報, 人間咖啡館 (2004/5/15)
7. 身後餘生(譯), 中國時報, 人間咖啡館 (2004/5/15)
8. 戰爭與蒼蠅(上), 中國時報, 人間咖啡館 (2004/8/7)
9. 戰爭與蒼蠅(下), 中國時報, 人間咖啡館 (2004/8/8)
10. 法國人在英格蘭幹什麼? 中國時報, 浮世繪染坊 (2004/8/24)
11. 海嘯 有話要說嗎? 中國時報, 浮世繪染坊 (2005/1/11)
12. 世界最大的祕密, 中國時報, 浮世繪染坊 (2005/9/29)

● 科學發展 (國科會出版)

1. 從歷史文獻看氣候變遷, 科學發展, 356, 52-29 (2002)
2. 怎樣從甲骨文導出商代氣候? 科學發展, 360, 70-75 (2002)
3. 野馬與塵埃—大氣懸浮粒子, 科學發展, 370, 66-69 (2003)

● 其他

1. 二次大戰氣象秘史(譯), 氣象預報與分析, 111, 39-48 (1987)
2. 一種星空, 兩般神秘, 聯合文學, 13, 90-95 (1997)
3. 雷公的髮髻, 國立交通大學丘成桐中心《數理人文》期刊 (2016年7月號)
4. 飛越深度減碳天塹, 台灣將現3契機, 台灣銀行家, No. 80, 42-43 (2016.8)
5. 星空、季節、節氣與氣候, 建構農業氣象培訓課程, 中華農業氣象學會 (2017.1)
6. 「海洋與氣候變遷」主題之科普短文—“海溫”(高中版)、“海水冷暖知多少”(國中版)、“巨浪滔天”(國小版), 國立臺灣海洋大學臺灣海洋教育中心(2017.7)
7. “迴歸線上的島國風雲”—世界休閒協會台灣分會 (2017.8)/2017年台灣夏至235研討會論文