

## STEPHEN E. SCHWARTZ

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**Professional Experience** *Brookhaven National Laboratory: Senior Scientist Emeritus*, 2018-; *Senior Scientist*, 1990-2018; *Scientist*, 1977-90; *Associate Scientist*, 1975-77. *Stony Brook University: Adjunct Professor*, (School of Marine and Atmospheric Sciences), 2019-; 1994-97; *Assistant Professor (Chemistry)*, 1969-75. *Energieonderzoek Centrum Nederland*, Visiting Scientist, 1996.

**Chief Scientist** Atmospheric Science Program, U.S. Dept. of Energy, 2004-2009.

**Principal Honors and Awards** Haagen-Smit Clean Air Award, California Air Resources Board, 2022, International Aerosol Fellow, International Aerosol Research Assembly, 2020. Research Milestone, U.S. Department of Energy (one of 40 milestones in the 40-year history of DOE), 2017. Schneider lecture, American Geophysical Union, 2018. Outstanding Leadership Award, DOE, 2010. Science and Technology Award, Brookhaven National Laboratory, 2006. Haagen-Smit Award for outstanding paper in *Atmospheric Environment*, 2003. Fellow, American Association for the Advancement of Science, 2002. Fellow, American Geophysical Union, 2005. ISI Highly Cited Researcher, Thompson Scientific, 2001. Sigma Xi, 1969 (University of California, Berkeley). Phi Beta Kappa, 1963 (Harvard). University City (MO) High School Hall of Fame, 2019.

**Principal Research** **Earth energy budget and climate change:** Relating global temperature change, forcing, and climate sensitivity, mainly through observations. Budget and lifetime of anthropogenic CO<sub>2</sub>.

**Role of tropospheric aerosols as shortwave forcing agents:** Direct and indirect radiative forcing by aerosols. *Science* paper (1992) has over 4000 citations.

**Atmospheric radiation:** Instrumental in establishment of Department of Energy Atmospheric Radiation Measurement Program. Paper describing this program in the *Bulletin of the American Meteorological Society* (1994) has over 500 citations.

**Cloud chemistry and acid deposition:** Demonstrated importance of oxidation by H<sub>2</sub>O<sub>2</sub> in converting SO<sub>2</sub> to sulfuric acid deposited in rain through laboratory studies, field measurements, and chemical transport modeling. Demonstrated rapid and highly efficient scavenging of aerosol particles into cloud water. Demonstrated lack of reaction of NO<sub>2</sub> in liquid water clouds, contrary to widespread prior understanding. *Science* paper (1989, 100 citations) was influential on 1992 Acid Deposition amendments to the Clean Air Act and recognized in 2017 as a Research Milestone by DOE.

**Physical chemistry:** Laboratory and theoretical studies of gas- and aqueous-phase kinetics. Delineated roles of mass transport processes in controlling reactions in cloudwater, stimulating much research nationally and internationally.

**Doctoral Supervision** Thesis advisor, SUNY Stony Brook (2); Co-supervisor, New York University; Co-advisor, Florida State University; Opponent, University of Stockholm; Member of committee, SUNY Stony Brook (2), Wageningen University (Netherlands), University of Leipzig.

<b>Career Publications</b>	Book (authored)	1	Journal articles and book chapters	140
	Books (edited)	2	Proceedings and abstracts	300
	National and international reviews	11	Reports and reviews	40

Most publications available at <https://wpw.bnl.gov/schwartz/publications-and-presentations>

**Professional Society Membership** American Association for the Advancement of Science; American Chemical Society (Physical and Environmental Divisions); American Geophysical Union (Atmospheric Science; Global Environmental Change); American Physical Society; American Meteorological Society; American Association for Aerosol Research; European Geosciences Union, Gesellschaft für Aerosolforschung; International Union for Pure and Applied Chemistry.

**Education** **Harvard College** (A.B., Chemistry, 1963, Magna cum Laude).

**University of California, Berkeley** (Ph.D., Chemistry, 1968, with H. S. Johnston). NSF Graduate Fellow (1963-67); Woodrow Wilson Fellow (hon., 1963-64).

*Thesis:* Kinetics of Nitrogen Dioxide Fluorescence

**University of Cambridge, England** (Postdoctoral Fellow, 1968-69 with B. A. Thrush). Fulbright Fellow. Ramsay Memorial Fellow (hon.).

## Science leadership

Chief Scientist, Atmospheric Science Program, U.S. Department of Energy (DOE), 2004-09.

Lead Scientist, Tropospheric Aerosol Program, DOE, 2000-04.

Science Board, ARM (DOE Atmospheric Radiation Measurement Program) Climate Research Facility, 2004-06.

Management Team, Atmospheric Radiation Measurement (ARM) Program, DOE, 1990-99.

Steering Committee, ACE-2 (Aerosol Characterization Experiment: Radiative Forcing due to Aerosols over the Polluted North Atlantic Region), 1993-97.

## Committees and service

Climate Change Science Program (U.S.). Co-editor and coauthor of several chapters of "Atmospheric Aerosol Properties and Impacts on Climate, "Synthesis and Assessment Product 2.3, 2009. <http://downloads.climate-science.gov/sap/sap2-3/sap2-3-final-report-all.pdf>

Intergovernmental Panel on Climate Change, Contributing author, "Couplings Between Changes in the Climate System and Biogeochemistry" in *Climate Change 2007--The Physical Science Basis*; Contributing author, "Aerosols, their Direct and Indirect Effects" and "Radiative Forcing of Climate Change" in *Climate Change 2001--The Scientific Basis*; Contributing author, "Aerosols" in *Climate Change 1994*; Contributing author, "Radiative Forcing of Climate" in *Climate Change 1992*.

American Geophysical Union, Committee on Global Environmental Change, 1994-98, and Climate Change Panel, 1998. This committee and panel drafted the 1998 AGU Position Statement "Climate Change and Greenhouse Gases" *Eos Trans. Amer. Geophys. Un.* **80**, 49 (1999); <http://onlinelibrary.wiley.com/doi/10.1029/99EO00036/abstract>.

Brookhaven Organization of Scientists, President, 1997-99.

Committee on Energy and Natural Resources, U.S. Senate, Invited witness, Science Concerning Global Climate Change, Washington, DC, 1994.

Mission to Washington--Joint Appeal by Religion and Science for the Environment, Invited participant, U.S. Senate, Washington DC, 1992.

International Union of Pure and Applied Chemistry, Commission on Atmospheric Chemistry, Associate Member, 1991-94; Titular Member, 1995-98; Co-author, "Units for use in atmospheric chemistry," Schwartz, S. E. and Warneck, P., *Pure Appl. Chem.* **67**, 1377-1406 (1995); Interdivisional Committee on Nomenclature and Symbols, 1998- 2003.

National Research Council, Committee on Atmospheric Chemistry, 1988-91; Panel on Atmospheric Effects of Stratospheric Aircraft, 1993.

U.S. National Acid Precipitation Assessment Program, Primary co-author, "Atmospheric Process Research and Development", Report 2 of *Acidic Deposition: State of Science and Technology*, 1991.

American Meteorological Society, Committee on Atmospheric Chemistry, 1985-91; principal author of AMS Statement on Acid Deposition, *Bull. Amer. Meteorol. Soc.* **70**, 1039-1040 (1989).

## Editorial

Earth and Space Science Open Archive (ESSOAr), Editorial Board, 2018- . *Tellus B*, Advisory Board, 1997-2003. *International Journal of Chemical Kinetics*, Editorial Advisory Board, 1993-95. *Urban Atmosphere*, North American Editor/Chemistry and Editorial Advisory Board, 1991-95. *Journal of Geophysical Research - Atmospheres*, Associate Editor, 1986-89. *Atmospheric Environment*, Associate Editor, 1984-95.

## Conference organization

Co-Chair, Fourth Santa Fe Conference on Global & Regional Climate Change, Santa Fe, NM, 2017.

Co-Chair, Workshop on Earth's Energy Imbalance, Brookhaven National Laboratory and Stony Brook University, 2012.

Program Committee, Third Santa Fe Conference on Global and Regional Climate Change, Santa Fe NM, 2011.

Co-Convener, Symposium on Physical and Atmospheric Chemistry in Honor of Harold Johnston, American Chemical Society, Division of Physical Chemistry, San Francisco CA, 2000.

Steering Committee, Sixth International Conference on Air-Surface Exchange of Gases and Particles, Edinburgh, UK, 2000.

Co-chair, Gordon Research Conference, Atmospheric Chemistry, Newport RI, 1995.

Co-chair, Fifth International Conference on Precipitation Scavenging and Atmosphere-Surface Exchange Processes, Richland WA, 1991, and Coordinator (with W. G. N. Slinn) of proceedings, *Precipitation Scavenging and Atmosphere-Surface Exchange*, (Hemisphere, Washington DC, 1992).

## Personal

Born, 1941, St. Louis, Mo. Married; two grown children. Home Address: 12 Mallard Drive, Center Moriches, NY 11934.