

# EDWARD S. SARACHIK

## EDUCATION:

Diploma, Bronx High School of Science, N.Y., 1956

B.S. (magna cum laude) with Honors in Physics, 1960, Queens College of the City University of New York.

M.S. and Ph.D. in Physics, 1966, Brandeis University. **Thesis title:** “Analytic properties of perturbation diagrams containing composite particles in a model field theory” (Advisor: Prof. Marc Grisaru).

## PROFESSIONAL EXPERIENCE:

1961-1962. Teaching Assistant, Physics, Brandeis University.

1962-1965. Research Assistant, Physics, Brandeis University.

1965-1967. Research Associate, Theory Group, Stanford Linear Accelerator Center, Stanford University.

1967-1970. Staff Research Physicist, NASA Electronics Research Center, Cambridge, MA.

1968-1970. Visiting Instructor, Physics, Brandeis University.

1970-1971. Staff Mathematician, DOT Transportation System Center, Cambridge, MA.

1971-1973. Research Associate, Meteorology Department, Massachusetts Institute of Technology (for Prof. Jule Charney).

1973-1979. Research Fellow, Center for Earth and Planetary Physics, Harvard University (for Prof. Richard Lindzen).

1974-1978. Lecturer in Atmospheric Physics, Center for Earth and Planetary Physics, Harvard University.

1978-1985. Member Center for Earth and Planetary Physics, Harvard University.

1979-1983. Research Associate, Center for Earth and Planetary Physics, Harvard University.

1980-1983. Project Manager in the Division of Applied Sciences for the Program on Earth and Planetary Atmospheres, Harvard University.

1983-1985. Senior Research Fellow in Dynamical Meteorology and Oceanography, Harvard University (without term).

1984-1987. Oceanographer, NOAA/Pacific Marine Environmental Laboratory, Seattle, WA.

1984-1987. Affiliate Associate Professor, Dept. of Atmospheric Sciences, University of Washington.

1984- 2003. Senior Fellow, Joint Institute for Study of Atmosphere and Ocean, University of Washington.

1984-1987. Senior Fellow, Joint Institute for Marine and Atmospheric Research, University of Hawaii.

1985-1987. Affiliate Associate Professor, School of Oceanography, University of Washington.

1988-1993. Research Professor, Department of Atmospheric Sciences, University of Washington.

1988-1993. Adjunct Research Professor, School of Oceanography, University of Washington.

1991- 1996. Director, Experimental Climate Forecast Center, JISAO, University of Washington.

1993-2007. Professor, Department of Atmospheric Sciences, University of Washington.

1993-2007. Adjunct Professor, School of Oceanography, University of Washington.

1996-2001 Director, S.P. Hayes Center of JISAO, University of Washington.

1999-2007. Adjunct Professor of Applied Mathematics, University of Washington.

2002-2009. Co-Director, JISAO Center for Science in the Earth System

2007- . Emeritus Professor of Atmospheric Sciences

## **HONORS:**

N.Y. State Regents Scholarship, 1956-1960  
Phi Beta Kappa (Junior Year), 1959  
Paul Klapper Physics Prize, Queens College, 1960  
University Fellowship, University of California, 1960  
NSF Postdoctoral Fellowship, Meteorology, 1971  
NOAA Outstanding Performance Award 1985  
Fellow, American Meteorological Society, 1990  
Editor's Award, *Journal of Physical Oceanography*, American Meteorological Society, 1996  
Fellow, American Geophysical Union, 1998  
Fellow, AAAS, 1999  
National Academies of Sciences National Associate 2003-  
.0002 Nobel Prize for Peace, awarded to IPCC

## **MEMBERSHIPS:**

American Geophysical Union (Fellow)  
American Meteorological Society (Fellow)  
American Physical Society  
European Geophysical Society  
Sigma Xi-Research Society of America  
Society for Industrial and Applied Mathematics  
The Oceanography Society  
American Association for the Advancement of Science (Fellow)

## **PUBLICATIONS:**

E.S. Sarachik, 1963: Notes for Jackson's "Weak Interactions" in Particles and Fields, W. A. Benjamin, Inc.

E.S. Sarachik, 1967: Complex propagator insertions in the square diagram, *Nuovo Cimento*, **51A**, 949-969.

E.S. Sarachik, 1969: The interactions of intense laser beams with free electrons, NASA TN D-5204, 28 pp.

E.S. Sarachik and G.T. Schappert, 1969: Classical theory of high intensity laser radiation scattered by free electrons, *Lett. Nuovo Cimento*, **2**, 7-9.

E.S. Sarachik and G.T. Schappert, 1971: Reply to a comment, *Lett. Nuovo Cimento*, **2**, 592.

E.S. Sarachik and G.T. Schappert, 1970: Classical theory of the scattering of intense laser radiation by free electrons, *Phys. Rev.*, **D1**, 2138-2153.

M. Israeli and E.S. Sarachik, 1973: Cumulus parameterization and conditional instability of the second kind, *J. Atmos. Sci.*, **30**, 582-589.

E.S. Sarachik, 1974: Two-level models of CISK in *Dynamics of the Tropical Atmosphere*, J. Young ed., NCAR, Boulder, CO., pp. 303-309.

E.S. Sarachik, 1974: The tropical mixed layer and cumulus parameterization, *J. Atmos. Sci.*, **31**, 2225-2230.

M.A. Cane and E.S. Sarachik, 1976: Forced baroclinic ocean motion, I: The equatorial unbounded case. *J. Marine Res.*, **34**, 629-665.

M.A. Cane and E.S. Sarachik, 1977: Forced baroclinic ocean motions, II: The equatorial bounded case, *J. Marine Res.*, **35**, 395-432.

E.S. Sarachik, 1978: Boundary layers on both sides of the tropical ocean surface, *Proceedings of the FINE Conference*, 86 pp., D. W. Moore, ed.

E.S. Sarachik, 1978: Tropical sea surface temperature: An interactive one-dimensional atmosphere-ocean model, *Dyn. Atmos. & Oceans.*, **2**, 455-469.

M.A. Cane and E.S. Sarachik, 1979: Forced baroclinic ocean motions, III: The equatorial basin case, *J. Marine Res.*, **37**, 355-398.

M.A. Cane and E.S. Sarachik, 1981: The periodic response of a linear, baroclinic equatorial ocean, *J. Marine Res.*, **39**, 651-693.

E.S. Sarachik, 1981: Review of cloud generation in climate models, *Proceedings of the NASA Workshop on Clouds and Climate: Modelling and Satellite Observational Studies*, NASA GISS Report, pp. 8-27.

M.A. Cane and E.S. Sarachik, 1981: Linear baroclinic response of Equatorial Oceans to periodic forcing. In *Recent Progress in Equatorial Oceanography: A report of the final SCOR working group*, McCreary, Moore and Witte, eds., NOVA Univ. Press, pp. 365-372.

E.S. Sarachik, 1982: Ocean heat fluxes, in the *Proceedings of the NATO Advanced Research Institute on Large Scale Transport of Heat and Matter in the Ocean*, published by the Laboratoire D'Océanographie Physique, Museum National D'Histoire, Naturelle de Paris, E. B. Kraus and M. Fieux, eds., pp. 39-69.

M.A. Cane and E.S. Sarachik, 1983: Seasonal heat transports in a forced equatorial baroclinic model. *J. Phys. Oceanogr.*, **13**, 1744-1746.

E.S. Sarachik, 1983: Book Review of A.E. Gill's "Atmosphere-Ocean Dynamics," *Bull. Am. Met. Soc.*, **64**, 504-505.

M.A. Cane and E.S. Sarachik, 1983: Equatorial oceanography. *Reviews of Geophysics and Space Physics*, **21**, 1137-1148.

E.S. Sarachik, 1984: Large Scale Heat Fluxes at the Ocean Surface, in *Large Scale Oceanographic Experiments and Satellites*, NATO Advanced Study Institute, C. Gautier and M. Fieux, editors, Reidel Press, 147-167.

E.S. Sarachik, 1985: Modeling Sea-Surface Temperature and its variability, *Proceedings of the First National Workshop on the Global Weather Experiment*, National Academy of Sciences Press, pp. 765-778.

E.S. Sarachik, 1985: A simple theory for the vertical structure of the tropical atmosphere, *Pure and Appl. Geophys.*, **123**, 261-271.

E.S. Sarachik, 1987: Book Review of J.C.J. Nihoul's "Coupled Ocean-Atmosphere Models," *Bull. Am. Met. Soc.*, **67**, 558-559.

E.S. Sarachik, 1987: Modelling ocean heat transports and tracers in tropical regions, in *Further Progress in equatorial Oceanography: Report of the U.S. TOGA Workshop on the Dynamics of the Equatorial Oceans*, E. Katz and J. Witte, Eds., 189-214.

E.S. Sarachik, 1987: The Role of the Ocean in Interannual Climate Variability, in *Further Progress in Equatorial Oceanography: A Report of the U.S. TOGA Workshop on the Dynamics of the Equatorial Oceans*, E. Katz and J. Witte, Eds., 397-412.

D.S. Battisti, A.C. Hirst, and E.S. Sarachik, 1989: Instability and predictability in coupled atmosphere-ocean models. *Phil. Trans. Roy. Soc. London*, **A329**, 237-247.

E.S. Sarachik and R.H. Gammon, 1990: The role of the ocean in the NOAA program 'Climate and Global Change,' NOAA Climate and Global Change Program Special Report No. 1, UCAR Productions, 33pp, 1990.

D.E. Harrison, B. Geise and E.S. Sarachik, 1990: Mechanisms of sea surface temperature change in the 1982-83 El Niño: results from ocean general circulation hindcasts. *J. Climate*, **3**, 173-188.

E.S. Sarachik, 1990: Predictability of ENSO, in *Climate-Ocean Interaction*, M.E. Schlesinger, ed., Kluwer Academic Publishers, 161-171.

A.J. Weaver and E.S. Sarachik, 1990: On the importance of vertical resolution in certain ocean general circulation models, *J. Phys. Oceanogr.*, **20**, 600-609.

Y. Wakata and E.S. Sarachik, 1991: On the role of equatorial ocean modes in the ENSO cycle. *J. Phys. Oceanogr.*, **21**, 434-443.

A.J. Weaver and E.S. Sarachik, 1991: The role of mixed boundary conditions in numerical models of the ocean's climate. *J. Phys. Oceanogr.*, **21**, 1470-1493.

A.J. Weaver, and E.S. Sarachik, 1991: Reply to Suginohara et al., *J. Phys. Oceanogr.*, **21**, 1702-1707.

Y. Wakata and E.S. Sarachik, 1991: Unstable Coupled Atmosphere Ocean Basin Modes in the Presence of a Spatially Varying Basic State. *J. Atmos. Sci.*, **48**, 2060-2077.

A.J. Weaver and E.S. Sarachik, 1991: Evidence for decadal variability in an ocean general circulation model: An advective mechanism. *Atmosphere-Ocean*, **29**, 197-231.

M.A. Cane and E.S. Sarachik, co-Chairpersons of The Provisional Working Group, 1991: Prospectus: A TOGA Program on Seasonal to Interannual Prediction. NOAA Climate and Global Change Program Special Report #4, UCAR Productions, 46pp.

E.S. Sarachik (on behalf of the Provisional Working Group), 1991: Initial Implementation Plan for the TOGA Program on Seasonal to Interannual Prediction. 13pp. (Appendix C of the JSC/CCCO TOGA Scientific Steering Group Report of the Tenth Session, WCRP-63, November, 1991, WMO/TD-No 441).

A.J. Weaver, E.S. Sarachik and J. Marotzke, 1991: Freshwater flux forcing of decadal/interdecadal oceanic variability. *Nature*, **353**, 836-838.

C. Leovy and E.S. Sarachik, 1991: Predicting Climate Change for the Pacific Northwest. *Northwest Environmental Journal*, **7**, 169-201.

Y. Wakata, and E.S. Sarachik, 1992: Effects of the meridional extent of upwelling on atmosphere-ocean instabilities. *J. Met. Soc. Japan*, **70**, 843-854.

The Task Group (A.D. Moura, L. Bengtsson, J. Buizer, A. Busalacchi, M.A. Cane, P. Lagos, A. Leetmaa, T. Matsuno, K. Mooney, P. Morel, E.S. Sarachik, J. Shukla, A. Sumi, and M. Patterson), 1992: Proposal for the Establishment of an International Research Institute for Climate Prediction. 51pp+appendices.

- E.S. Sarachik, 1992: Climate prediction and the ocean. *Oceanus*, **35**, 66-73.
- E.S. Sarachik, 1992: The US TOGA Program on Prediction (T-POP). *TOGA Notes*, **7**, 23-25.
- A.J. Weaver, J. Marotzke, P.F. Cummins, and E.S. Sarachik, 1993: Stability and variability of the thermohaline circulation. *J. Phys. Oceanogr.*, **23**, 39-60.
- F.L. Yin and E.S. Sarachik, 1993: On the dynamics and thermodynamics of the steady equatorial undercurrent. *J. Phys. Oceanogr.*, **23**, 1647-1669.
- M. Winton and E.S. Sarachik, 1993: Thermohaline oscillations of an oceanic general circulation model induced by strong steady salinity forcing. *J. Phys. Oceanogr.*, **23**, 1389-1410.
- Y. Wakata, and E.S. Sarachik, 1994: Nonlinear effects in coupled atmosphere-ocean basin modes. *J. Atmos. Sci.*, **51**, 909-920.
- F.L. Yin and E.S. Sarachik, 1994: A new convective scheme for ocean general circulation models. *J. Phys. Oceanogr.*, **24**, 1425-1430.
- F.L. Yin and E.S. Sarachik, 1995: On interdecadal thermohaline oscillations in a sector ocean general circulation model: advective and convective processes. *J. Phys. Oceanogr.*, **25**, 2465-2484.
- E.S. Sarachik, 1995: El Niño. In *1995 McGraw-Hill Yearbook of Science and Technology*, Sybil Parker, ed., pp. 125-129. Another version in the *McGraw-Hill Encyclopaedia of Science and Technology*, 8<sup>th</sup> edition. 661-663.
- Y.-Q. Chen, D.S. Battisti, and E.S. Sarachik, 1995: A new ocean model for studying the tropical oceanic aspects of ENSO. *J. Phys. Oceanogr.*, **25**, 2065-2089
- David McDermott and E.S. Sarachik, 1995: Thermohaline Circulations and Variability in a Two-Hemisphere Sector Model of the Atlantic. In National Research Council, 1995: *Natural Climate Variability on Decade-to-Century Time Scales*. D.G. Martinson, K. Bryan, M. Ghil, M.M. Hall, T.R. Karl, E.S. Sarachik, S. Sorooshian, and L.D. Talley, eds. National Academy Press, Washington, D.C., pp. 384-396
- E.S. Sarachik, 1995: Coupled Modeling. In: National Research Council, 1995: *Natural Climate Variability on Decade-to-Century Time Scales*. D.G. Martinson, K. Bryan, M. Ghil, M.M. Hall, T.R. Karl, E.S. Sarachik, S. Sorooshian, and L.D. Talley, eds. National Academy Press, Washington, D.C. , pp 414-418.

R.E. Dickenson and E.S. Sarachik, 1996: Climate modeling: atmosphere-ocean-land interactions. *McGraw-Hill Encyclopaedia of Science and Technology*, 8<sup>th</sup> edition. 3-7.

National Research Council, 1995. Natural Climate Variability on Decade-to-Century Time Scales. D.G. Martinson, K. Bryan, M. Ghil, M.M. Hall, T.R. Karl, E.S. Sarachik, S. Sorooshian, and L.D. Talley, eds. National Academy Press, Washington, D.C. , 630 pp.

D.S. Battisti and E.S. Sarachik, 1995: Understanding and Predicting ENSO. For the *US National Report to IUGG (1991-1994): Contributions in Oceanography, Revs. Geophys. (Supp.)*, **33**, 1367-1376.

R.E. Dickenson, V. Meleshko, D. Randall, E. Sarachik, P. Silva-Dias, and A. Slingo, 1996: "Climate Processes" Chapter 4 in the 1995 IPCC Assessment, pp. 384-396.

E.S. Sarachik, M. Winton, and F.L. Yin, 1996: Mechanisms for Decadal-to-Centennial Climate Variability. In NATO ASI Vol 144, *Decadal Climate Variability: Dynamics and Predictability*, D.L.T. Anderson and J. Willebrand, eds., Springer Verlag, 157-210.

E.S. Sarachik, 1995: Review of B.A. Kagan's "Ocean-Atmosphere Interaction and Climate Modelling," *Bull. Am. Met. Soc.*, **76**, 1468-1469.

Y-Q. Chen, D.S. Battisti, T.N. Palmer, J. Barsugli, and E.S. Sarachik, 1996: A study of the predictability of tropical Pacific SST in a coupled atmosphere/ocean model using singular vector analysis: the role of the annual cycle and the ENSO cycle. *Mon. Wea. Rev.* **125**, 831-845

E.S. Sarachik, and Eileen Shea: End-to-end seasonal to interannual climate prediction. *ENSO Signal*, #7, May 1997, p4-6.

A.D. Moura and E.S. Sarachik, 1997: Seasonal-to-interannual climate prediction and applications: new institutions, new possibilities. *WMO Bulletin*, **46**, 342-347.

J.M. Wallace, E.M. Rasmusson, T.P. Mitchell, V.E. Kousky, E.S. Sarachik, and H. von Storch, 1998: On the structure and evolution of ENSO-related climate variability in the tropical Pacific: lessons from TOGA. *J. Geophys. Res.*, **103**, 14,241-14,259.

Z. Wu, E.S. Sarachik, and D.S. Battisti, 1999: Thermally forced surface winds on an equatorial beta-plane. *J. Atmos. Sci.*, **56**, 2029-2037.

P.W. Mote, E.S. Sarachik, and M. Dequé, 1999: "Seasonal Forecasting" In *Numerical modeling of the global atmosphere for climate prediction*, P.W. Mote and A. O'Neill, Editors, Kluwer Academic Publishers, 387-402.



D.S. Battisti, E.S. Sarachik, and A.C. Hirst, 1999: A consistent model for the large scale steady surface atmospheric circulation in the tropics. *J. Climate*,

Z. Wu, D.S. Battisti, and E.S. Sarachik 2000: Rayleigh Friction, Newtonian Cooling, and the Linear Response to Steady Tropical Heating. *J. Atmos. Sci.*, **57**, 1937-1957.

S.D. Johnson, D.S. Battisti, and E.S. Sarachik, 1999: Empirically derived Markov models and prediction of tropical Pacific sea surface temperature anomalies. *J. Climate*, **13**, 3-17.

S.D. Johnson, D.S. Battisti, and E.S. Sarachik, 1999: Seasonality in an empirically derived Markov model of tropical Pacific sea surface temperature anomalies, *J. Climate*, **13**, 3327-3335.

Z. Wu, E.S. Sarachik, and D.S. Battisti, 1999: The vertical structure of convective heating and the three-dimensional structure of the forced circulation in the tropics. *J. Atmos. Sci.*, **57**, 2169-2187.

Z. Wu, E.S. Sarachik, and D.S. Battisti, 2001: Thermally driven tropical circulations under Rayleigh friction and Newtonian cooling: Analytic solutions. *J. Atmos. Sci.*, **58**, 724-741.

E.S. Sarachik, 1999: The Application of Climate Information, *Consequences*, **5**, 27-36.

Sarachik, E.S., and K. Alverson, 2000: Opportunities for CLIVAR/PAGES North American Oscillation Studies. *CLIVAR Exchanges/PAGES Newsletter*, **5**, 14-16.

Johnson, S.D., D.S. Battisti, and E.S. Sarachik, 1999: Optimal growth patterns of SST and subsurface heat content anomalies in the tropical Pacific. *J. Climate*, submitted.

Sarachik, E.S., 2000: Recent Advances in Climate Predictability and Forecasting, *The Climate Report Newsletter*, M. Golnaraghi editor, **1**, 2-5.

Goodman, P.J. and E.S. Sarachik, 2005: Forced variability of North Atlantic Deep Water Production in an Ocean GCM. *J. Marine Res.*, submitted.

Sarachik, E.S., 2001: A National Climate Service: 21st Century Necessity, Guest Editorial in *ENSO Signal*, May 2001, issue 17, p 5-6.

E.S. Sarachik, 2001: El Niño/Southern Oscillation. In the *Oxford Encyclopedia of Global Change*, Vol I, 340-345.

Biasutti, M., D.S. Battisti, and E.S. Sarachik, 2003: On the annual cycle over the tropical Atlantic, South America, and Africa. *J. Climate*, **16**, 2491-2508.

Sarachik, E.S. 2003: The Ocean in Climate. Chapter 10 of Volume 2 of for *Wiley Handbook of Weather, Climate, and Water*, T. Potter and B. Colman eds., 129-133.

Sarachik E.S., and D.J. Vimont, 2002: Decadal Variability in the Pacific. In *Chaos in geophysical flows*, Otto Editore, pp 125-167.

Kamenkovich, I. V., and E. S. Sarachik, 2004: On reducing errors in temperature and salinity in an ocean model forced by restoring boundary conditions. *J. Phys. Ocean.* **34**, 1856-1869.

Kamenkovich, I. V., and E. S. Sarachik, 2004: Mechanisms Controlling the Sensitivity of the Atlantic Thermohaline Circulation to the Parameterization of Eddy Transports in Ocean GCMs. *J. Phys. Oceanography*, **34**, 1628–1647.

Biasutti, M., D.S. Battisti, and E.S. Sarachik, 2003: Mechanisms controlling the annual cycle of precipitation in the tropical Atlantic sector in an atmospheric GCM. *J. Climate*, **17**, 4708-4723.

Biasutti, M., D.S. Battisti, and E.S. Sarachik, 2005: Terrestrial influence on the annual cycle of the Atlantic ITCZ in an AGCM coupled to a slab ocean. *J. Climate*, **18**, 211-228.

Miles, E. L., A. K. Snover, L. W. Binder, E. S. Sarachik, P. W. Mote, and N. Mantua, 2006: Design Criteria for a National Climate Service: Insights from a RISA Program. *PNAS*, **103**, 19616-19623.

Mitchell, T. and E.S. Sarachik, 2007: El Nino-Southern Oscillation. *McGraw Hill Encyclopedia of Science and Technology*, in press..

Mitchell, T. and E.S. Sarachik, 2007: Predicting El Niño. 2008. *McGraw-Hill Yearbook of Science and Technology*. Submitted.

Wu, Z., E. K Schneider, B. P Kirtman, E.S. Sarachik, N. E. Huang, 2008: The modulated annual cycle – An alternative reference frame for climate anomalies. *Climate Dynamics*, **31**, 823-841.

Kamenkovich, I.V., W, Cheng, E.S. Sarachik, and D.E. Harrison, 2009: Simulation of the Argo observing system in an ocean general circulation model. *J. Geophys. Res.*, **114**, C09021, doi:10.1029/2008JC005184.

**Book:**

E.S. Sarachik and M.A. Cane, 2010: *The El Niño-Southern Oscillation Phenomenon*, Cambridge University Press, 384pp.

## MAJOR INPUTS INTO NATIONAL RESEARCH COUNCIL AND INTERNATIONAL DOCUMENTS

National Research Council, 1991: *Four-Dimensional Model Assimilation of Data: A Strategy for the Earth System Sciences*. National Academy Press, 78pp.

National Research Council, 1994: *GOALS for Predicting Seasonal-to-Interannual Climate*. National Academy Press, 103pp.

World Climate Research Program, 1995: *CLIVAR-A Study of climate variability and predictability*. WCRP-89, WMO/TD No. 690, 157pp.

National Research Council, 1995a: *A Review of the US Global Change Research Program and NASA's Mission to Planet Earth/Earth Observing System*. National Academy Press, 96pp.

National Research Council, 1995b: *Natural Climate Variability on Decade-to-Century Time Scales*. D.G. Martinson, K. Bryan, M. Ghil, M.M. Hall, T.R. Karl, E.S. Sarachik, S. Sorooshian, and L.D. Talley, eds. National Academy Press, Washington, D.C. , 630 pp.

National Research Council, 1996: *Learning to Predict El Niño: Accomplishments and Legacies of the TOGA Program*. National Academy Press, 171pp (Chair of Committee).

National Research Council, 1998: *The Atmospheric Sciences entering the 21<sup>st</sup> Century*. National Academy Press, 364pp.

National Research Council, 1998: *Decade-to-Century-Scale Climate Variability and Change: A Science Strategy*. National Academy Press. 142pp

National Research Council, 1998: *Overview: Global Environmental Change, Research Pathways for the Next Decade*. National Academy Press, 59pp.

World Climate Research Program, 1998: *Initial CLIVAR Implementation Plan/* WCRP-103, WMO/TD No. 869, 290pp+Appendices.

National Research Council, 1999: *Global Environmental Change, Research Pathways for the Next Decade*. National Academy Press, 595pp.

National Research Council, 1999: *Capacity Of Us Climate Modeling To Support Climate Change Assessment Activities*. National Academy Press, 65pp.

National Research Council, 1999: *Adequacy of Observing Systems*. National Academy Press, 53pp.

National Research Council, 1999: *Making Climate Forecasts Matter*. National Academy Press. 175pp.

National Research Council, 1999: *Assessment of NASA Plans for Post-2002 Earth Observing Missions*. National Academy Press,

National Research Council, 2000: *Review of NASA's Earth Science Enterprise. Research Strategy for 2000-2010*. National Academy Press,

National Research Council, 2001: *The Science of Regional and Global Change*. National Academy Press, 19pp.

National Research Council, 2001: *Increasing the Effectiveness of US Climate Modeling*. National Academy Press, 128pp (Chair of Committee).

National Research Council, 2001: *Comments on Catalyzing U.S. World Climate Research Programme (WCRP) Activities*. National Academy Press, 21pp.

National Research Council, 2001: *Climate Change Science: An Analysis of Key Questions*. National Academy Press, pp.29.

***A Large-Scale CO<sub>2</sub> Observing Plan: Oceans and Atmosphere:*** A report of the Large-Scale CO<sub>2</sub> Observations Working Group, Michael Bender, Chair, 273pp.

## **PROFESSIONAL ACTIVITIES:**

### **Proposal Reviewer:**

NASA, NSF, NOAA, DOE, NSERC of Canada

### **Paper Reviewer for:**

Dynamics of Atmospheres and Oceans, J. Atmospheric Science, J. Physical Oceanography, J. Fluid Mechanics, Reviews of Geophys. and Space Physics, J. Marine Res., J. Geophys. Res., Mon. Wea. Rev., Bull. Am. Met. Soc., J. Climate, Int. J. of Climatology, Atmosphere-Ocean, Nature, Science, Climate Dynamics, Deep Sea Research, Climate Research, Paleoceanography etc.

**Member:**

INDEX Theoretical Panel 1973-1975

Equatorial Theoretical Panel 1975-

SEQUAL Scientific Panel 1979-1984.

JISAO Council 1984-1989.

JIMAR Council 1984-1987.

EPOCS Council 1985-1989.

National Academy of Sciences/NRC Climate Research Committee, 1985-1988.

AMS Committee on Interaction of Sea and Atmosphere, 1989- 1992,

Chairman, 1990-1992.

National Academy of Sciences/NRC Panel on Model-Assimilated Data Sets in Atmospheric and Oceanic Research, 1989-1991.

Working Group for the TOGA Program on Seasonal to Interannual Prediction (Chairman), 1991-6.

National Academy of Sciences/NRC TOGA Advisory Panel, 1991- 1996

Chairman, 1992-1996.

National Academy of Sciences/NRC Climate Research Committee, (*Ex Officio*), 1992-1996.

NOAA/Global Programs Task Group on Implementation of a International Research Institute on Climate Prediction, 1992-

NRC/Climate Research Committee Steering Committee for the GOALS Study Conference, 1992-1993.

World Climate Research Program CLIVAR Scientific Steering Group, 1993-1999.

Co-Chair, 1994-1995

UCAR Scientific Advisory Council for the Climate Systems Modeling Program 1993-1998.

National Academy of Sciences/NRC DecCen Advisory Panel. 1995-1998.

National Academy of Sciences/NRC Committee on Global Change Research 1995-

National Academy of Sciences/NRC Panel on the Human Dimensions of Seasonal-to Interannual Climate Change. 1997-1998.

AAAS Committee on Council Affairs 1996-1999

AAAS Council Representative to Section on Atmos. Sci. and Hydrology 1996-1999

National Academy of Sciences/NRC Climate Research Committee, 1997-2000 (Vice-Chair, 1999-2000).

IRI Working Group on Forecast Applications (Chair), 1998-1999.

National Academy of Sciences/NRC Panel on Climate Observing System Status 1998

UCAR Climate System Modeling Advisory Board (Chair), 1999-2004

National Academy of Sciences/NRC Committee on the Effectiveness of Climate Modeling (Chair) 2000-2001.

NAS/NRC Board on Atmospheric Science and Climate (*ex officio*) 2000.

NAS/NRC Panel on NASA Science Post-2000 Plans, 2000

IRI Science and Technology Advisory Committee, Co-Chair, 2000-2003, Chair 2003-

Revelle Prize Committee, AGU, 1999-2000.  
AMS Nominating Committee, 2001-2002  
NAS/NRC Special Committee on The Science of Climate Change, 2001  
Earth System Modeling Framework Advisory Board (NASA) 2002-2005  
UW Program on the Environment Governing Board 2002-2005  
CLIVAR Climate Prediction Applications Postdoctoral Program Steering Committee 2007-

**Invited Lecturer:**

IUGG General assemblies, IAMAP General Assemblies, AGU meetings, Joint Oceanographic Assemblies, NCAR Summer Colloquium, NASA Cloud-Climate Workshop, SCOR Meetings, Woods Hole Geophysical Fluid Dynamic Program, FGGE-INDEX-NORPAX [FINE] Workshop, Numerous Universities and Government Laboratories, Monsoon Workshop (Delhi), Interannual Variability of Monsoon Workshop (Delhi), NATO Advanced Study Institutes, NATO Advanced Research Workshops, Latin-American Winter School on Geophysical Fluid Dynamics, Fortaleza Course on Tropical Atmosphere-Ocean Interactions, International School for Theoretical Physics (Trieste), GOALS Study Conference, Final TOGA Conference, CLIVAR Implementation Meetings, NCAR Summer Colloquia, , CLIVAR midlife meeting, etc.

**Principal Lecturer:**

Course on Coupled Atmosphere-Ocean Interactions in the Tropics (with Mark Cane) , Fortaleza, Brazil, 1987,1989 .

Course on Coupled Atmosphere-Ocean Interactions in the Tropics (with Mark Cane) , International Center for Theoretical Physics, Trieste, Italy, July, 1991 and May, 1993.

Decadal Variability in Climate, NATO Advanced Study Institute, Ecole de Physique Theorique, Les Houches, France, Feb., 1995.

NCAR Summer Colloquium on Decadal Variability, July 2000.

Institute on Chaos in Geophysical Flows, L'Aquila, Italy, Sept 2001.

Workshop on El Niño-Southern Oscillation, International School for Theoretical Physics (Trieste), June 2002.

Course on Climate Variability Studies in the Ocean "Tracing and Modelling the Ocean Variability" International School for Theoretical Physics (Trieste), June 2003.

**Editorial Positions:**

J. Atmos. Sci., Associate Editor, 1983 - 1990  
J. Phys. Oceanogr., Associate Editor, 1986 - 2003  
J. Geophys. Res. Guest Editor (with D.L.T. Anderson and P.J. Webster) for final TOGA Volume, 1998.

## **ACADEMIC ACTIVITIES:**

### **Courses Taught at Harvard University:**

Introduction to Fluid Mechanics (with G. Carrier, 1976)  
Dynamical Meteorology (1977-for R.S. Lindzen while on sabbatical)  
Misc. Lectures in Geophysical Fluid Dynamics Courses

### **Courses Taught at University of Washington:**

Large Scale Tropical Meteorology (Spring 88; Autumn 90, Autumn 92, Winter 95, Winter 97, Winter 99, Winter 01; Winter 06)  
Atmosphere-Ocean Interactions (Spring 89, Spring 2003, Fall 2006)  
Equatorial Oceanography (Winter 1993)  
Introduction to Dynamics (Autumn 93)  
The Ocean in Climate (Winter 96, Winter 98, Winter 2000, Winter 2002)  
Carbon Cycle Modeling (with Paul Quay & Steve Emerson; Spring 2000)  
Climate Change 2001-The IPCC Report (Spring 2002, Spring 2007)

### **Student Committees:**

#### **As Chair:**

Ping Tian (Chair, Atmos. Sci. M.S. Committee, Awarded 1988)  
Michael Winton (Chair, Atmos. Sci. Ph.D. Committee, Awarded 1993)  
Nathan Mantua (Co-Chairman, Atmos. Sci. Ph.D. Committee, Awarded 1994)  
David McDermott (Chair, Atmos. Sci. Ph.D. Committee, Awarded 1996)  
Ying-Quei Chen (Co-Chair, Atmos. Sci., Ph.D. Committee, Awarded 1996)  
Chris Thompson (Co-Chair, Applied Math, Ph.D. Committee, Awarded 1998)  
Zhaohua Wu (Co-Chair, Atmos. Sci. Ph.D. Committee, Awarded 1998)  
Paul Goodman (Chair, Atmos. Sci., Ph.D. Committee, Awarded 2000)  
Scot Johnson (Chair, Atmos. Sci., Ph.D. Committee, Awarded 1999)  
Michaela Biasutti (Co-Chair, Atmos. Sci. MS Committee, Awarded 2000)  
Dan Vimont (Co-Chair, Atmos. Sci. Ph.D Committee, Awarded 2000)

#### **As Member:**

Fong Chau (Atmos. Sci. Ph.D. Committee, Awarded 1987)

David Battisti (Atmos. Sci. Ph.D. Committee, Awarded 1988)  
Benjamin Geise (School of Oceanography Ph.D. Committee, Awarded 1989)  
C.J. Beegle (School of Oceanography Ph.D. Committee, Awarded 1995)  
Xaoli Zhu (Atmos. Sci. Ph.D. Committee, Awarded 1990)  
Matthew Wyant (Atmos. Sci. Ph.D. Committee, Awarded 1996)  
Wendell Welch (Applied Math, Ph.D. Committee, Awarded 1996)  
Laura Landrum (School of Oceanography, Ph. D. Committee, Awarded 1996)  
Elena Yulaeva (Atmos. Sci. Ph.D. Committee, awarded 1996))  
Ming Fang (Applied Math, Ph.D. Committee, Awarded 1996)  
Randy Brown (Applied Math, Ph.D. Committee, Awarded 1994)  
Tertia Hughes (McGill University--as outside examiner, Awarded 1995)  
Sarah M. Woolley (Behavioral Neuroscience Ph.D. Committee as GSR,  
Awarded 1999)  
Yuan Zhang (Atmos. Sci., Ph.D. Committee, Awarded 1996)  
Christian Bantzer (Atmos. Sci., Ph.D. Committee)  
Sim Larkin (School of Oceanography, Ph.D. Committee, Awarded 2000)  
Weimin Wei (School of Oceanography, M.S. Committee, Awarded 1998)  
Gus Fanning (U. Victoria, Outside Ph.D. Examiner, Awarded 1997)  
Scottie Henderson (Zoolology, Ph. D. Committee as GSR, Awarded 2001)  
Matt Carr (Atmospheric Sciences, Ph.D. Committee, Awarded 2001)  
Dawn Glinsmann (Art History, Ph.D. Committee as GSR, awarded 2006)  
Jeff Yin (Atmos. Sci. Ph.D. Committee, Awarded 2002)  
Dickson Preston (Art History, Ph.D. Committee as GSR, Awarded 2008)  
Ken Takahashi (Atmospheric Sciences, Ph.D. Committee, awarded 2006)  
Ioana Dima (Atmospheric Sciences, Ph.D. Committee, Awarded 2005)  
Will Roberts (Atmospheric sciences, Ph.D. Committee, Awarded 2007)

**FUNDING**(since 1984):

NOAA/EPOCS and NOAA/TOGA (to PMEL), \$114,150, "The Tropical Modeling and Analysis Program", D.E. Harrison and E.S. Sarachik, Principal Investigators, 10/1/1984 to 9/30/1985.

NOAA/EPOCS and NOAA/TOGA (to PMEL), \$115,000, "Tropical Modeling and Data Analysis Studies", D.E. Harrison and E.S. Sarachik, Principal Investigators, 10/1/85 to 9/30/86.

NOAA/EPOCS (to PMEL), \$49,790, "ENSO Modeling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 10/1/86 to 9/30/87.

NOAA/EPOCS (to PMEL), \$53,152, "ENSO Modeling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 10/1/87 to 9/30/88.



NOAA/EPOCS (to JISAO, U. of Washington), \$26,333, "ENSO Modeling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 1/1/88 to 9/30/88.

NOAA/OCAR (to JISAO, U. of Washington), \$62,315, "Climate Variations on Interannual to Interdecadal Time Scales", E.S. Sarachik, Principal Investigator, 1/1/88 to 12/31/88.

NOAA/OCAR (to JISAO, U. of Washington), \$130,000, "A Proposal from the University of Washington Experimental Climate Forecast Center for Investigating the Physical Basis for Interannual to Interdecadal Climate Predictability," E.S. Sarachik and J.M. Wallace, Principal Investigators, 1/1/88 to 12/30/88.

NOAA/OCAR (to JISAO, U. of Washington), \$152,206, "A Proposal from the University of Washington Experimental Climate Forecast Center for Investigating the Physical Basis for Interannual to Interdecadal Climate Predictability," E.S. Sarachik and J.M. Wallace, Principal Investigators, 1/1/89 to 12/30/89.

NOAA/EPOCS (to JISAO, U. of Washington), \$76,091, "ENSO Modelling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 10/1/88 to 9/30/89.

NSF (Climate Dynamics) (to JISAO, U. of Washington), \$90,000, "Coupled Atmosphere-Ocean Modeling," E.S. Sarachik, Principal Investigator, 10/1/89-3/31/93.

NOAA/OCAR (to JISAO, U. of Washington), \$140,167, "A Proposal from the University of Washington Experimental Climate Forecast Center for Investigating the Physical Basis for Interannual to Interdecadal Climate Predictability," E.S. Sarachik and J.M. Wallace, Principal Investigators, 1/1/90 to 12/30/90.

NOAA/EPOCS (to JISAO, U. of Washington), \$62,091, "ENSO Modeling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 10/1/89 to 9/30/90.

NSF (International Programs) (to JISAO, U. of Washington), \$13,326, "U.S.-Japan Joint Seminar: The El Niño-Southern Oscillation Phenomenon", E.S. Sarachik and J.M. Wallace, Principal Investigators, 5/1/90-10/31/90.

NOAA/OCAR (to JISAO, U. of Washington), \$175,000, "A Proposal from the University of Washington Experimental Climate Forecast Center for Investigating the Physical Basis for Interannual to Interdecadal Climate Predictability," E.S. Sarachik and J.M. Wallace, Principal Investigators, 1/1/91 to 12/30/91.

NOAA/Global Programs (to JISAO, U. of Washington), \$115,000 "Carbon and Solar Imprints on Natural Climate Change and the Greenhouse Effect", M. Stuiver and E.S. Sarachik, Principal Investigators, 1/1/91-12/30/92.

NOAA/EPOCS (to JISAO, U.of Washington), \$88,807, "ENSO Modeling with a Coupled Atmosphere-Ocean Model", E.S. Sarachik, Principal Investigator, 1/1/91 to 12/30/91.

NOAA/EPOCS and TOGA Office of NOAA/Global Programs (to JISAO, U. of Washington), "ENSO Modeling with a Coupled Atmosphere-Ocean Model", D.S. Battisti and E.S. Sarachik, Principal Investigators. \$196,447 1/1/92 to 12/30/92; \$211,276 1/1/93 to 12/30/93; \$204,669, 1/1/94-12/30/94.

NOAA/Global Programs and NSF/Climate Dynamics (submitted by the Experimental Climate Forecast Center of JISAO, U. of Washington), "Thermohaline Circulation and Variability in Climate", E.S. Sarachik, Principal Investigator, \$ 116,379 1/1/1992-3/31/93; \$122,558 4/1/93-3/30/94.

NOAA/Office of Global Programs (submitted by the Experimental Climate Forecast Center of JISAO, U. of Washington) :Infrastructure Grant” , 199,390K

NSF/Oceanography (to JISAO, U. of Washington), \$65,000, "Investigation of Dynamics and Energetics of the Upper Ocean Equatorial Pacific Ocean Using the Norpax Shuttle Dataset," E.S. Sarachik and 6/1/92-5/31/94.

DOE/National Institute for Global Environmental Change (Western Regional Center), (to JISAO, U. of Washington) \$68,267, "Advective and Convective Ocean Ventilation Processes in Climate Change," 7/1/92-6/30/93.

DOE/National Institute for Global Environmental Change (Western Regional Center), (to JISAO, U. of Washington) (\$93,611, first year, 7/1/93-6/30/94; \$84,206 second year 7/1/94-6/30/95; \$82,000 third year, 7/1/95-6/30/96) "The Role of the Ocean in Climate Variability: Ocean Ventilation Processes, Thermohaline Variability, and Feedbacks of the Ocean to Ice and to the Atmosphere," 7/1/93-6/30/96.

NOAA/Office of Global Programs (to S. Hayes Center of JISAO, University of Washington) \$875,000. J.M. Wallace and E.S. Sarachik, PIs, 1/1/95-12/31/95.

NOAA/Office of Global Programs (to S. Hayes Center of JISAO, University of Washington) \$800,000. J.M. Wallace and E.S. Sarachik, PIs, 1/1/96-12/31/96.

NOAA/Office of Global Programs (to JISAO, U. Of Washington) “Decadal natural Variability in the Tropical Atmosphere-Ocean Climate System,” D.S. Battisti, E.S. Sarachik and F.L. Yin, PIs, 7/1/96-6/30/99. First Year \$90,000.

NOAA/Office of Global Programs (to S. Hayes Center of JISAO, University of Washington) \$550,000. J.M. Wallace and E.S. Sarachik, PIs, 1/1/97-12/31/97, and every year after that until 2000.

NOAA(OGP/Atlantic Program). "Decadal Variability Around the Atlantic Basin: The Role of Land/Atmosphere/Ocean Interaction in the Atlantic". Battisti/Sarachik/Kamenkovich, 36 months, \$383,551 7/1/99-6/30/2002.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik and J.M. Wallace, PIs, 7/1/2001-6/30/2002, \$610,000.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.M. Miles and E.S. Sarachik, PIs, 4/1/2002-3/30/2002, \$1.66M/yr.

National Science Foundation "Role of the Southern Ocean in the global ocean circulation." (to Center for Science in the Earth System of JISAO, UW), I.V. Kamenkovich, and E. S. Sarachik, PIs, 5/ 1/2002 4/30/2004, \$242,552.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.M. Miles and E.S. Sarachik, PIs, 4/1/2003-3/31/2004, \$1.60M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.M. Miles and E.S. Sarachik, PIs, 4/1/2004-3/31/2005, \$1.495M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.M. Miles and E.S. Sarachik, PIs, 4/1/2005-3/31/2006, \$1.42M.

NOAA/Office of Global Programs Office of Climate Observations (to Center for Science in the Earth System of JISAO, UW) E.S. Sarachik, PI, 7/1/04-6/30/05, \$60K.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2005-3/31/2006, \$1.4M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2006-3/31/2007, \$1.4M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2007-3/31/2008, \$1.4M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2008-3/31/2009, \$1.4M.

NOAA/Office of Global Programs Office of Climate Observations (to Center for Science in the Earth System of JISAO, UW) I. Kamenkovich and E.S. Sarachik, PI, 7/1/04-6/30/05, \$60K.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2006-3/31/2007, \$1.4M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2007-3/31/2008, \$1.4M.

NOAA/Office of Global Programs (to Center for Science in the Earth System of JISAO, UW), E.S. Sarachik, PI, 4/1/2008-3/31/2009, \$1.46M.

NOAA/Office of Global Programs Office of Climate Observations (to Center for Science in the Earth System of JISAO, UW) I. Kamenkovich and E.S. Sarachik, PI, 7/1/04-6/30/09, \$60K each year.