

CURRICULUM VITAE

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EDUCATION

B.S. Electrical Engineering, Oklahoma State University, 1971
M.S. Electrical Engineering, Oklahoma State University, 1973
Ph.D. Electrical Engineering, Oklahoma State University, 1975

RESEARCH AND PROFESSIONAL EXPERIENCE

Dr. Emanuel conducts research on factors that influence atmospheric CO₂ and CH₄ increases, the global carbon cycle, and terrestrial processes and characteristics, including land cover and land use.

Senior Scientist, Joint Global Change Research Institute, Pacific Northwest National Laboratory, April 2009–September 2014.

Program Scientist, Terrestrial Ecology Program, NASA Headquarters, 2003–March 2009.

Staff Member, U.S. National Climate Assessment, U.S. Global Change Research Program, Washington, D.C., 2012–2013.

Program Scientist, Orbiting Carbon Observatory, NASA Headquarters 2006–2008.

Member, U.S. Carbon Cycle Interagency Working Group, 2003–March 2009.

Member, U.S. Government Delegations to the 27th Session of the Intergovernmental Panel on Climate Change, Valencia, Spain, November 12–17, 2007 and to the 8th Session of Working Group II of the Intergovernmental Panel on Climate Change, Brussels, Belgium, April 2–6, 2007.

Interim Coordinator, U.S. North American Carbon Program, U.S. Climate Change Science Program, 2005–2006.

Research Associate Professor, Department of Environmental Sciences, University of Virginia, 1994–March 2009.

Interim Director, Oak Ridge Center for Advanced Studies, Oak Ridge, Tennessee, 2000–2002.

Member, Global Analysis, Interpretation, and Modeling Task Force, International Geosphere-Biosphere Programme, 1992–1998.

Senior Research Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory, 1990–1994 (with ORNL 1975–1994).

Research Associate Professor, Department of Environmental Sciences, University of Virginia, 1994–April 2009.

Assistant to the Vice President for Research and Graduate Studies for National Laboratory Relations, University of Virginia, 2000–2003.

Interim Director, Oak Ridge Center for Advanced Studies, Oak Ridge, Tennessee, 2000–2002.

Senior Research Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory, 1990–1994 (with ORNL 1975–1994).

Research Scholar, Biosphere Project, International Institute for Applied Systems Analysis, Laxenburg, Austria, 1988.

Associate Faculty Member, Graduate Program in Ecology, University of Tennessee, 1978–1994.

NATIONAL AND INTERNATIONAL COMMITTEES

Member, U.S. Carbon Cycle Interagency Working Group, 2003–2009.

Member, U.S. Government Delegation to the 27th Session of the Intergovernmental Panel on Climate Change, Valencia, Spain, November 12–17, 2007.

Member, U.S. Government Delegation to the 8th Session of Working Group II of the Intergovernmental Panel on Climate Change, Brussels, Belgium, April 2–6, 2007.

Member, Global Analysis, Interpretation, and Modeling Task Force, International Geosphere-Biosphere Programme, 1992–1998.

Chair, User Working Group, NASA-Distributed Active Archive Center for Biogeochemical Dynamics, Oak Ridge National Laboratory, 1997–1998 (Member, 1992–1998).

Member, National Technical Advisory Committee, National Institute for Global Environmental Change, U.S. Department of Energy, 1994–1997.

Participant, Long-Term Ecosystem Modeling Activity, Global Change and Terrestrial Ecosystems, International Geosphere-Biosphere Program, 1993–1997.

Member, Management Organization Working Group, NASA Earth Observing System Data and Information System, 1992–1994.

Member, Sub-Committee on Earth System Integration, Earth System Science Committee, National Research Council, 1987–1989.

Member, Global Land Habitability Working Group, NASA, 1985–1986.

PROFESSIONAL AND HONORARY AFFILIATIONS

American Geophysical Union

Sigma Xi

Phi Kappa Phi

AWARDS

2004 Performance Award, Office of Earth Science, National Aeronautics and Space Administration.

2002 Award for Excellence in a Team Activity, Oak Ridge National Laboratory.

1991 Award for Excellence in Publication, Oak Ridge National Laboratory.

1991 Technical Communication Award, Society for Technical Communication.

1985 Award for Excellence in Publication, Oak Ridge National Laboratory.

MILITARY SERVICE

Honorable Discharge, Captain, U.S. Army Reserve

PUBLICATIONS

- Emanuel, W. R., and R. J. Mulholland. 1974. Energy based dynamic model for Lago Pond, Georgia. pp. 354–362. In *Proceedings of the 1974 Joint Automatic Control Conference*. Austin, Texas.
- Emanuel, W. R., and R. J. Mulholland. 1975. Energy based dynamic model for Lago Pond, Georgia. *IEEE Transactions on Automatic Control* 20:98–101.
- Emanuel, W. R. 1975. *Linear Periodic Control with Application to Environmental Systems*. Report No. 74-8. Center for Systems Science, Oklahoma State University, Stillwater, Oklahoma.
- Gowdy, C. M., R. J. Mulholland, and W. R. Emanuel. 1975. Modeling the global carbon cycle. *International Journal of Systems Science* 6:965–976.
- Mulholland, R. J., and W. R. Emanuel. 1975. Periodic optimal control of ecological systems. pp. 148–152. In *Proceedings of the 1975 IEEE Conference on Decision and Control*. IEEE Press, New York.
- Emanuel, W. R., and R. J. Mulholland. 1976. Linear periodic control with applications to environmental systems. *International Journal of Control* 24:807-820.
- Emanuel, W. R., B. D. Murphy, D. D. Huff, C. L. Begovich, and J. R. Hurt. 1977. *An Optimization Model for Air Quality Analysis in Energy Facility Siting*. ORNL/TM-6007. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Emanuel, W. R., D. C. West, and H. H. Shugart. 1978. Spectral analysis of forest model time series. *Ecological Modelling* 4:313–326.
- Emanuel, W. R., H. H. Shugart, and D. C. West. 1978. Spectral analysis and forest dynamics: The effects of perturbations on long-term dynamics. pp. 193–207. In H. H. Shugart (ed.) *Proceedings of the SIMS Conference on Time-Series and Ecological Processes*. SIAM, Philadelphia.
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- Van Voris, P., R. V. O'Neill, H. H. Shugart, and W. R. Emanuel. 1978. *Functional Complexity and Ecosystem Stability: An Experimental Approach*. ORNL/TM-6199. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Chan, Y.-H., J. S. Olson, and W. R. Emanuel. 1979. *Simulation of Land-Use Patterns Affecting the Global Carbon Cycle*. ORNL/TM-6651. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

- O'Neill, R. V., W. R. Emanuel, J. D. Newbold, and J. W. Elwood. 1979. Simulation in the service of environmental research: Experience with a stream ecosystem project. pp. 401–405. In *Proceedings of the 1979 Summer Simulation Conference*. Society for Computer Simulation, LaJolla, California.
- Emanuel, W. R., J. S. Olson, and G. G. Killough. 1980. The expanded use of fossil fuels by the U.S. and the global carbon dioxide problem. *Journal of Environmental Management* 10:37–49.
- Gardner, R. H., J. B. Mankin, and W. R. Emanuel. 1980. A comparison of three world carbon models. *Ecological Modelling* 8:313–332.
- Shugart, H. H., W. R. Emanuel, D. C. West, and D. L. DeAngelis. 1980. Environmental gradients in a beech-yellow poplar stand simulation model. *Mathematical Biosciences* 50:163–170.
- Van Voris, P., R. V. O'Neill, W. R. Emanuel, and H. H. Shugart. 1980. Functional complexity and ecosystem stability. *Ecology* 61:1352–1360.
- Parzyck, D. C., R. W. Brocksen, and W. R. Emanuel. 1980. Regional analysis and environmental impact assessment. In *Proceedings of the Workshop on Environmental Assessment*. Council on Environmental Quality, Washington, D.C.
- Emanuel, W. R., G. G. Killough, and H. H. Shugart. 1980. Calibration and testing of models of the global carbon cycle. pp. 642–649. In *Proceedings, International Conference on Systems and Cybernetics*. IEEE Press, New York.
- Emanuel, W. R., W. M. Post, and H. H. Shugart. 1980. Modeling the role of terrestrial ecosystems in the global carbon cycle. pp. 803–810. In *Proceedings of the 1980 Pittsburgh Conference on Modeling and Simulation*. Instrument Society of America, Pittsburgh.
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- Emanuel, W. R., G. G. Killough, and J. S. Olson. 1981. Modeling the circulation of carbon in the world's terrestrial ecosystems. pp. 335–354. In B. Bolin (ed.) *Modeling the Global Carbon Cycle*. SCOPE 16. John Wiley, New York.
- Shugart, H. H., D. C. West, and W. R. Emanuel. 1981. Patterns in the long-term dynamics of forests: An application of simulation models. pp. 74–94. In D. C. West, H. H. Shugart, and D. B. Botkin (eds.) *Forest Succession: Concepts and Applications*. Springer-Verlag, New York.

- Shugart, H. H., J. M. Klopatek, and W. R. Emanuel. 1981. Ecosystem analysis and land-use planning. pp. 665–699. In E. J. Kormondy and J. F. McCormick (eds.) *Handbook of Contemporary Developments in World Ecology*. Greenwood Press, Westport, Connecticut.
- Killough, G. G., and W. R. Emanuel. 1981. Distributions of transit time and age for several models of carbon turnover in the ocean. pp. 45–50. In W. J. Mitsch, R. W. Bosserman, and J. M. Klopatek (eds.) *Energy and Ecological Modeling*. Elsevier, New York.
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- Zinke, P. J., A. G. Stangenberger, W. M. Post, W. R. Emanuel, and J. S. Olson. 1984. *Worldwide Organic Soil Carbon and Nitrogen Data*. ORNL/TM-8857. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Shugart, H. H., W. R. Emanuel, and A. M. Solomon. 1984. Modeling long-term changes in forested landscapes and their relation to the earth's energy balance. pp. 229–252. In B. Moore and M. Dastoor (eds.) *The Interaction of Global Biochemical Cycles*. JPL Publication 84-21. NASA-Jet Propulsion Laboratory, Pasadena, California.
- Emanuel, W. R., B. Moore, and H. H. Shugart. 1984. Some aspects of understanding changes in the global carbon cycle. pp. 55–83. In B. Moore and M. Dastoor (eds.) *The Interaction of Global Biochemical Cycles*. JPL Publication 84-21. NASA-Jet Propulsion Laboratory, Pasadena, California.
- Emanuel, W. R., G. G. Killough, W. M. Post, and H. H. Shugart. 1984. Modeling terrestrial ecosystems in the global carbon cycle with shifts in carbon storage capacity by land-use change. *Ecology* 65:970–983.

- Emanuel, W. R., G. G. Killough, W. M. Post, H. H. Shugart, and M. P. Stevenson. 1984. *Computer Implementation of a Globally Averaged Model of the World Carbon Cycle*. TR010. Carbon Dioxide Research Division, U.S. Department of Energy, Washington, D.C.
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- Shugart, H. H., and W. R. Emanuel. 1985. Carbon dioxide increase: The implications at the ecosystem level. *Plant, Cell, and Environment* 8:381–386.
- Emanuel, W. R., Y.-S. Fung, G. G. Killough, B. Moore, and T.-H. Peng. 1985. Modeling the global carbon cycle and changes in the atmospheric carbon dioxide levels. pp. 141–173. In J. R. Trabalka (ed.) *Atmospheric Carbon Dioxide and the Global Carbon Cycle*. DOE/ER-0239. Carbon Dioxide Research Division, U.S. Department of Energy, Washington, D.C.
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- Emanuel W. R., I. C. Prentice, T. M. Smith, H. H. Shugart, Jr., and A. M. Solomon. 1989. Models for analysis of vegetation responses to global environmental change. pp. 251–259. In R. D. Noble, J. L. Martin, and K. F. Jensen (eds.) *Air pollution Effects on Vegetation*. U.S. Forest Service, Washington, D.C.
- King, A. W., W. R. Emanuel, and R. V. O’Neill. 1990. Linking mechanistic models of tree physiology with models of forest dynamics: Problems of temporal scale. pp. 241–248. In R. K. Dixon, R. S. Meldahl, G. A. Ruark, and W. G. Warren (eds.) *Process Modeling of Forest Growth Responses to Environmental Stress*. Timber Press, Portland, Oregon.

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- Emanuel, W. R., with the DOE Multi-Laboratory Climate Change Committee. 1990. *Energy and Climate Change*. Lewis, Chelsea, Michigan.
- King, A. W., W. R. Emanuel, and W. M. Post. 1990. The response of atmospheric CO₂ to changes in land use. pp. 326–328. In J. S. Levine (ed.) *Global Biomass Burning*. MIT Press, Cambridge, MA.
- Moore, B., J. Aber, G. Brasseur, R. Dickinson, W. Emanuel, and J. Melillo. 1990. Integrated modeling of the earth system. pp. 16–66. In *Research Strategies for the U.S. Global Change Research Program*. National Academy Press, Washington, D.C.
- Emanuel, W. R., and D. S. Schimel. 1990. Terrestrial ecosystems and climatic change. pp. 101–115. In B. Manowitz (ed.) *Global Climate Feedbacks: Proceedings of the Brookhaven National Laboratory Workshop*. CONF-9006134. U.S. Department of Energy, Washington, D.C.
- King, A. W., W. R. Emanuel, and W. M. Post. 1992. Projecting future concentrations of atmospheric CO₂ with global carbon cycle models: The importance of simulating historical changes. *Environmental Management* 16:91–108.
- Post, W. M., W. R. Emanuel, and A. W. King. 1992. Soil organic matter dynamics and the global carbon cycle. pp. 107–119. In N. H. Batjes, and E. M. Bridges (eds.) *World Inventory of Soil Emission Potentials*. International Soil Reference and Information Centre, Wageningen, The Netherlands.
- Post, W. M., J. Pastor, A. W. King, and W. R. Emanuel. 1992. Aspects of the interaction between vegetation and soil under global change. *Water, Air, and Soil Pollution* 64:345–363.
- Prentice, I. C., R. A. Monserud, T. M. Smith, and W. R. Emanuel. 1993. Modeling large-scale vegetation dynamics. pp. 235–250. In A. M. Solomon and H. H. Shugart (eds.) *Vegetation Dynamics and Global Change*. Chapman and Hall, New York.
- Emanuel, W. R., A. W. King, and W. M. Post. 1994. A dynamic model of terrestrial carbon cycling. pp. 239–260. In M. Heimann (ed.) *The Global Carbon Cycle*. Springer-Verlag, Berlin.
- King, A. W., W. R. Emanuel, and W. M. Post. 1994. A dynamic model of terrestrial carbon cycling response to land-use change. pp. 132–149. In M. Kanninen (ed.) *Carbon Balance of World's Forested Ecosystems: Towards a Global Assessment*. Painatuskeskus, Helsinki.
- Emanuel, W. R., A. W. King, and W. M. Post. 1994. Changes in atmospheric CO₂ concentration and the global carbon cycle. pp. 37–54. In N. E. Tolbert, and J. Preiss (eds.) *Regulation of Atmospheric CO₂ and O₂ by Photosynthetic Carbon Metabolism*. Oxford University Press, New York.

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- Woodward, F. I., T. M. Smith, and W. R. Emanuel. 1995. A global primary productivity and phytogeography model. *Global Biogeochemical Cycles* 9:471–490.
- King, A. W., W. R. Emanuel, S. D. Wullschleger, and W. M. Post. 1995. In search of the missing carbon sink: A model of terrestrial biospheric response to land-use change and atmospheric CO₂. *Tellus* 47B:501–519.
- Emanuel, W. R. 1996. Modeling carbon cycling on disturbed landscapes. *Ecological Modelling* 89:1–12.
- Shugart, H. H., W. R. Emanuel, and G. Shao. 1996. Models of forest structure for conditions of climatic change. *Commonwealth Forestry Review* 75:51–64.
- Shugart, H. H., G. Shao, W. R. Emanuel, and T. M. Smith. 1997. Modeling the structural response of vegetation to climate change. pp. 265–272. In B. Huntley, W. Cramer, A. V. Morgan, H. C. Prentice, and J. R. M. Allen (eds.) *Past and Future Rapid Environmental Changes: The Spatial and Evolutionary Responses of Terrestrial Biota*. Springer, New York.
- Schimel, D. S., W. R. Emanuel, B. Rizzo, T. M. Smith, F. I. Woodward, H. Fisher, T. G. F. Kittel, T. Painter, N. Rosenbloom, R. McKeown, D. S. Ojima, W. J. Parton, D. W. Kicklighter, A. D. McGuire, J. M. Melillo, Y. Pan, A. Haxeltine, C. Prentice, S. Sitch, K. Hibbard, R. R. Nemani, L. L. Pierce, S. W. Running, J. G. Borchers, J. Chaney, R. P. Nielson, and B. H. Braswell. 1997. Spatial variability in ecosystem processes at the continental scale: Models, data and the role of disturbance. *Ecological Monographs* 67:251–271.
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