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### Education

B. A. in Biology, Hamilton College, 1965  
Ph.D. in Ecology, S.U.N.Y., Stony Brook, 1979

### Professional Experience

2009, 2011, 2012, 2014 Acting Director, Woods Hole Research Center  
2005-2008, 2010 Deputy Director, Woods Hole Research Center  
1989-present Senior Scientist, Woods Hole Research Center, Woods Hole, Massachusetts  
1993-1994 Visiting Senior Scientist, Office of Mission to Planet Earth, NASA, Washington, D.C.  
1987-1989 Associate Scientist, Woods Hole Research Center, Woods Hole, MA  
1984-1987 Assistant Scientist, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA  
1975-1984 Research Associate, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA  
1967-1974 Research Associate, Biology Department, Brookhaven National Laboratory, Upton, NY

### Other Professional Activities

#### *Awards and Honors*

2012 Fellow of the American Geophysical Union  
2012 Complimentary member of the European Geophysical Union  
2007 Citation from the Intergovernmental Panel on Climate Change (IPCC)  
for contributions to the Award of the Nobel Peace Prize for 2007 to the IPCC  
2001-2004 Marquis Who's Who in America  
1999-2000 Marquis Who's Who in the East  
1995 Honorary Doctorate from the Faculty of Forest Science, University of Munich

#### *Editorships*

2017- *Global Change Biology*  
2009-2015 U.S. Senior Editor, *Carbon Management*  
2007-present *Faculty of 1000*

#### *Professional Societies*

Member, American Geophysical Union  
Member, Sigma Xi

### Publications

Woodwell, G.M., R.A. Houghton and N.R. Tempel. 1973. Atmospheric CO<sub>2</sub> at Brookhaven, Long Island, New York: Patterns of variation up to 125 meters. *Journal of Geophysical Research* **78**:932-940.

Woodwell, G.M., R.H. Whittaker and R.A. Houghton. 1975. Nutrient concentrations in plants in the Brookhaven oak-pine forest. *Ecology* **56**:318-332.

Woodwell, G.M., and R.A. Houghton. 1977. Biotic influences on the world carbon budget, pp. 61-72. In: W. Stumm (ed.), *Global Chemical Cycles and Their Alterations by Man*. Report of the Dahlem Workshop, Berlin, 15-19 November 1976, Abakon Verlagsgesellschaft, Berlin.

Woodwell, G.M., D.E. Whitney, C.A.S. Hall and R.A. Houghton. 1977. The Flax Pond ecosystem study: Exchanges of carbon in water between a salt marsh and Long Island Sound. *Limnology and Oceanography* **22**:833-838.

Houghton, R.A. 1979. The role of vascular plants in the carbon exchanges of a salt marsh. Dissertation. State University of New York, Stony Brook.

Woodwell, G.M., C.A.S. Hall, D.E. Whitney and R.A. Houghton. 1979. The Flax Pond ecosystem study: Exchanges of inorganic nitrogen between an estuarine marsh and Long Island Sound. *Ecology* **60**:695-702.

Woodwell, G.M., R.A. Houghton, C.A.S. Hall, D.E. Whitney, R.A. Moll and D.W. Juers. 1979. The Flax Pond ecosystem study: The annual metabolism and nutrient budgets of a salt marsh. Pages 491-511 *in*: R.L. Jefferies and A.J. Davy (eds.), *Ecological Processes in Coastal Environments*. Blackwell Scientific Publications, Oxford, England.

Houghton, R.A., and G.M. Woodwell. 1980. The Flax Pond ecosystem study: CO<sub>2</sub> exchanges between a salt marsh and the atmosphere. *Ecology* **61**:1434-1445.

Houghton, R.A., and G.M. Woodwell. 1981. Biotic contributions to the global carbon cycle: The role of remote sensing. Pages 593-600 *in*: P.G. Burroff and D.B. Morrison (eds.), *Machine Processing of Remotely Sensed Data*. Proceedings of the Seventh International Symposium. Purdue University, West Lafayette, Indiana.

Moore, B., R.D. Boone, J.E. Hobbie, R.A. Houghton, J.M. Melillo, B.J. Peterson, G.R. Shaver, C.J. Vorosmarty and G.M. Woodwell. 1981. A simple model for analysis of the role of terrestrial ecosystems in the global carbon budget. Pages 365-385 *in*: B. Bolin (ed.), *Carbon Cycle Modelling*, SCOPE 16. John Wiley and Sons, New York.

Woodwell, G.M., and R.A. Houghton. 1981. Measurement of climatic changes caused by the increase in atmospheric CO<sub>2</sub>: The role of the biota. A summary. Pages 533-540 *in*: N.B. Beatty (ed.), *Carbon Dioxide Effects Research and Assessment Program*. Proceedings of the Workshop on First Detection of Carbon Dioxide Effects. Harpers Ferry, West Virginia, June 8-10, 1981. DOE/CONF-8106214.

Houghton, R.A., J.E. Hobbie, J.M. Melillo, B. Moore, B.J. Peterson, G.R. Shaver and G.M. Woodwell. 1983. Changes in the carbon content of terrestrial biota and soils between 1860 and 1980: A net release of CO<sub>2</sub> to the atmosphere. *Ecological Monographs* **53**:235-262.

Houghton, R.A., and G.M. Woodwell. 1983. Effect of increased C, N, P and S on the global storage of C. Pages 327-343 *in*: B. Bolin and R.B. Cook (eds.), *The Major Biogeochemical Cycles and Their Interactions*, SCOPE 21. John Wiley and Sons, New York.

- Park, A.B., R.A. Houghton, G.M. Hicks and C.J. Peterson. 1983. Multi-temporal change detection techniques for the identification and monitoring of forest disturbances. Seventeenth International Symposium on Remote Sensing of the Environment, May 9-13, 1983, Environmental Research Institute of Michigan, Ann Arbor, Michigan.
- Woodwell, G.M., J.E. Hobbie, R.A. Houghton, J.M. Melillo, B. Moore, A.B. Park, B.J. Peterson, G.R. Shaver and T.A. Stone. 1983. Deforestation measured by Landsat: Steps toward a method. TR005. United States Department of Energy, Washington, D.C. 63 pp.
- Woodwell, G.M., J.E. Hobbie, R.A. Houghton, J.M. Melillo, B. Moore, B.J. Peterson and G.R. Shaver. 1983. Global deforestation: Contribution to atmospheric carbon dioxide. *Science* **222**:1081-1086.
- Hobbie, J.E., J.J. Cole, J.L. Dungan, R.A. Houghton and B.J. Peterson. 1984. The controversy on the role of the biota in the global CO<sub>2</sub> balance. *BioScience* **34**:492-498.
- Morris, J.T., R.A. Houghton and D.B. Botkin. 1984. Theoretical limits of belowground production by Spartina alterniflora: An analysis through modelling. *Ecological Modelling* **26**:155-175.
- Woodwell, G.M., J.E. Hobbie, R.A. Houghton, J.M. Melillo, B. Moore, A. Park, B.J. Peterson and G.R. Shaver. 1984. Measurement of changes in the vegetation of the earth by satellite imagery. Pages 221-240 in: G.M. Woodwell (ed.), *The Role of Terrestrial Vegetation in the Global Carbon Cycle: Measurement by Remote Sensing*, SCOPE 23. John Wiley and Sons, Chichester.
- Houghton, R.A. 1985. The effects of mortality on estimates of net above-ground production by Spartina alterniflora. *Aquatic Botany* **22**:121-132.
- Houghton, R.A., R.D. Boone, J.M. Melillo, C.A. Palm, G.M. Woodwell, N. Myers, B. Moore and D.L. Skole. 1985. Net flux of carbon dioxide from tropical forests in 1980. *Nature* **316**:617-620.
- Houghton, R.A., W.H. Schlesinger, S. Brown and J.F. Richards. 1985. Carbon dioxide exchange between the atmosphere and terrestrial ecosystems. Pages 113-140 in: J.R. Trabalka, (ed.), *Atmospheric Carbon Dioxide and the Global Carbon Cycle*. DOE/ER-0239, U.S. Department of Energy, Washington, D.C.
- Melillo, J.M., C.A. Palm, R.A. Houghton, G.M. Woodwell and N. Myers. 1985. A comparison of two recent estimates of disturbance in tropical forests. *Environmental Conservation* **12**:37-40.
- Houghton, R.A. 1986. Estimating changes in the carbon content of terrestrial ecosystems from historical data. Pages 175-193 in: J. R. Trabalka and D.E. Reichle (eds.), *The Changing Carbon Cycle. A Global Analysis*. Springer-Verlag, New York.
- Palm, C.A., R.A. Houghton, J.M. Melillo and D.L. Skole. 1986. Atmospheric carbon dioxide from deforestation in Southeast Asia. *Biotropica* **18**:177-188.
- Palm, C.A., R.A. Houghton, J.M. Melillo, D.L. Skole and G.M. Woodwell. 1986. The effect of tropical deforestation on atmospheric CO<sub>2</sub>. Pages 181-194 in: R. Lal, P.A. Sanchez, and R.W. Cummings (eds.), *Land Clearing and Development in the Tropics*. A.A. Balkema, Rotterdam.

Woodwell, G.M., R.A. Houghton and T.A. Stone. 1986. Deforestation in the Brazilian Amazon Basin measured by satellite imagery. Pages 23-32 *in*: G. Prance (ed.). *Tropical Rain Forests and the World Atmosphere*. AAAS Symposium 101, Westview Press, Boulder, Colorado.

Woodwell, G.M., R.A. Houghton, T.A. Stone and A.B. Park. 1986. Changes in the area of forests in Rondonia, Amazon Basin, measured by satellite imagery. Pages 242-257 *in*: J.R. Trabalka and D.E. Reichle (eds.). *The Changing Carbon Cycle. A Global Analysis*. Springer-Verlag, New York.

Houghton, R.A. 1987. Biotic changes consistent with the increased seasonal amplitude of atmospheric CO<sub>2</sub> concentrations. *Journal of Geophysical Research* **92**:4223-4230.

Houghton, R.A. 1987. Terrestrial metabolism and atmospheric CO<sub>2</sub> concentrations. *BioScience* **37**:672-676.

Houghton, R.A., R.D. Boone, J.R. Fruci, J.E. Hobbie, J.M. Melillo, C.A. Palm, B.J. Peterson, G.R. Shaver, G.M. Woodwell, B. Moore, D.L. Skole, and N. Myers. 1987. The flux of carbon from terrestrial ecosystems to the atmosphere in 1980 due to changes in land use: geographic distribution of the global flux. *Tellus* **39B**:122-139.

Woodwell, G.M., R.A. Houghton, T.A. Stone, R.F. Nelson, and W. Kovalick. 1987. Deforestation in the tropics: New measurements in the Amazon Basin using Landsat and NOAA Advanced Very High Resolution Radiometer Imagery. *Journal Geophysical Research* **92**:2157-2163.

Houghton, R.A. 1988. Reply [to Comment by Idso on amplitude of seasonal CO<sub>2</sub> concentrations]. *Journal of Geophysical Research* **93**:1747-1748.

Houghton, R.A. 1988. The global carbon cycle (letter). *Science* **241**:1736.

Melillo, J.M., J.R. Fruci, R.A. Houghton, B. Moore and D.L. Skole. 1988. Land use change in the Soviet Union between 1850 and 1980: causes of a net release of CO<sub>2</sub> to the atmosphere. *Tellus* **40B**:116-128.

Houghton, R.A. 1989. The contribution of deforestation and reforestation to atmospheric carbon dioxide. Pages 145-155 *in*: S. Gupta and R.K. Pachauri, editors. *Global Warming and Climate Change: Perspectives from Developing Countries*. Tata Energy Research Institute, New Delhi, India.

Houghton, R.A. 1989. Emissions of greenhouse gases. Pages 53-62 *in*: N. Myers. *Deforestation Rates in Tropical Forests and their Climatic Implications*. Friends of the Earth, London, U.K.

Houghton, R.A. 1989. Global circulation of carbon. Pages 56-61 *in*: O. Kitani and C.W. Hall (eds.). *Biomass Handbook*. Gordon and Breach Science Publishers, London.

Houghton, R.A. 1989. Greenhouse gases released to the atmosphere from deforestation for farmland. Pages 219-223 *in*: J.C. Topping (ed.). *Coping with Climate Change*. Second North American Conference on Preparing for Climate Change. Climate Institute, Washington, D.C.

Houghton, R.A., and G.M. Woodwell. 1989. Global climatic change. *Scientific American* **260**(4):36-44.

Stone, T.A., G.M. Woodwell, and R.A. Houghton. 1989. Tropical deforestation in Para Brazil: analysis with Landsat and Shuttle Imaging Radar A. *Proceedings of the International Geoscience and Remote Sensing Symposium 1*:192-195, IEEE Press, New York.

Burke, M.K., R.A. Houghton, and G.M. Woodwell. 1990. Progress toward predicting the potential for increased emissions of CH<sub>4</sub> from wetlands as a consequence of global warming. Pages 451-455 in: A.F. Bouwman (editor). *Soils and the Greenhouse Effect*. John Wiley & Sons, Chichester, UK.

Houghton, R.A. 1990. The future role of tropical forests in affecting the carbon dioxide concentration of the atmosphere. *Ambio* **19**:204-209.

Houghton, R.A. 1990. The global effects of tropical deforestation. *Environmental Science & Technology* **24**:414-422.

Houghton, R.A. 1990. Pacific Northwest forests and the global carbon cycle. Pages 138-141 in: E.A. Norse. *Ancient Forests of the Pacific Northwest*. Island Press, Washington, D.C.

Houghton, R.A. 1990. The relationship of standing and residual biomass to global warming. Pages 197-227 in: D.L. Klass, editor. *Energy from Biomass and Wastes XIII*. Institute of Gas Technology, Chicago, Illinois.

Houghton, R.A., and D.L. Skole. 1990. Carbon. Pages 393-408 in: B.L. Turner, W.C. Clark, R.W. Kates, J.F. Richards, J.T. Mathews, and W.B. Meyer (editors). *The Earth As Transformed by Human Action*. Cambridge University Press, Cambridge, U.K.

Woodwell, G.M., and R.A. Houghton. 1990. The experimental impoverishment of natural communities: Effects of ionizing radiation on plant communities, 1961-1976. Pages 9-24 in: G.M. Woodwell (editor). *The Earth in Transition: Patterns and Processes of Biotic Impoverishment*, Cambridge University Press, New York.

Dale, V.H., R.A. Houghton, and C.A.S. Hall. 1991. Estimating the effects of land use change on global atmospheric CO<sub>2</sub> concentrations. *Canadian Journal of Forest Research* **21**:87-90.

Houghton, R.A. 1991. Biomass burning from the perspective of the global carbon cycle. Pages 321-325 in J.S. Levine (editor). *Global Biomass Burning*, MIT Press, Cambridge, Massachusetts.

Houghton, R.A. 1991. Global warming: The scientific consensus. Pages 32.1-32.4 in: *Proceedings: Hydrogen Applications for a Sustainable Future - 2nd Annual Meeting of the National Hydrogen Association*. National Hydrogen Association, Washington, D.C.

Houghton, R.A. 1991. Releases of carbon to the atmosphere from degradation of forests in tropical Asia. *Canadian Journal of Forest Research* **21**:132-142.

Houghton, R.A. 1991. The role of forests in affecting the greenhouse gas composition of the atmosphere. Pages 43-55 in: R.L. Wyman (editor). *Global Climate Change and Life on Earth*, Chapman and Hall, New York.

Houghton, R.A. 1991. Tropical deforestation and atmospheric carbon dioxide. *Climatic Change* **19**:99-118.

Houghton, R.A., D.S. Lefkowitz, and D.L. Skole. 1991. Changes in the landscape of Latin America between 1850 and

1980. I. A progressive loss of forests. *Forest Ecology and Management* **38**:143-172.

Houghton, R.A., D.L. Skole, and D.S. Lefkowitz. 1991. Changes in the landscape of Latin America between 1850 and 1980. II. A net release of CO<sub>2</sub> to the atmosphere. *Forest Ecology and Management* **38**:173-199.

Rastetter, E.B., and R.A. Houghton. 1992. Carbon budget estimates. (Letter to the editor). *Science* **258**:382.

Dale, V.H., R.A. Houghton, A. Grainger, A.E. Lugo, and S. Brown. 1993. Emissions of greenhouse gases from tropical deforestation and subsequent uses of the land. Pages 215-260 in *Sustainable Agriculture and the Environment in the Humid Tropics*, National Research Council, National Academy Press, Washington, D.C.

Houghton, R.A. 1993. The carbon cycle (review of a meeting). *Bulletin of the Ecological Society of America* **74**:355-356.

Houghton, R.A. 1993. Changes in terrestrial carbon over the last 135 years. Pages 139-157 in: M. Heimann (editor). *The Global Carbon Cycle*. Springer-Verlag, Berlin.

Houghton, R.A. 1993. The flux of carbon from changes in land use. Appendix B in: I.G. Enting and K.R. Lassey (editors). *Projections of Future CO<sub>2</sub>*. Technical Paper 27, Division of Atmospheric Research, CSIRO, Australia.

Houghton, R.A. 1993. Is carbon accumulating in the northern temperate zone? *Global Biogeochemical Cycles* **7**:611-617.

Houghton, R.A. 1993. The role of the world's forests in global warming. Pages 21-58 in: K. Ramakrishna and G.M. Woodwell (editors). *World Forests for the Future. Their Use and Conservation*. Yale University Press, New Haven, Connecticut.

Houghton, R.A., J.D. Unruh, and P.A. Lefebvre. 1993. Current land use in the tropics and its potential for sequestering carbon. *Global Biogeochemical Cycles* **7**:305-320.

Unruh, J.D., R.A. Houghton, and P.A. Lefebvre. 1993. Carbon storage in agroforestry: an estimate for sub-Saharan Africa. *Climate Research* **3**:39-52.

Woodwell, G.M., and R.A. Houghton. 1993. Warming the north: What happens? Pages 1-8 in: T.S. Vinson and T.P. Kolchugina (eds.). *Carbon Cycling in Boreal Forest and Sub-Arctic Ecosystems: Biospheric Responses and Feedbacks to Global to Global Climate Change*. EPA/600R-93/084, U.S. Environmental Protection Agency, Washington, D.C.

Dale, V.H., S. Brown, E.P. Flint, C.A.S. Hall, R.A. Houghton, L.R. Iverson, J.F. Richards, and J. Uhlig. 1994. Estimating CO<sub>2</sub> flux from tropical forests. Pages 365-378 in: V.H. Dale (editor). *Effects of Land Use Change on Atmospheric CO<sub>2</sub> Concentrations. South and Southeast Asia as a Case Study*. Springer-Verlag, New York.

Dixon, R.K., S. Brown, R.A. Houghton, A.M. Solomon, M.C. Trexler, and J. Wisniewski. 1994. Carbon pools and flux of global forest ecosystems. *Science* **263**:185-190.

Houghton, R.A. 1994. Forests and the global carbon cycle: Current storage and emissions (in Portuguese). Pages 39-76

in: *Emissao X Sequestro de CO<sub>2</sub>: Uma Nova Oportunidade de Negocios para o Brasil*. Companhia Vale do Rio Doce, Rio de Janeiro, Brazil.

Houghton, R.A. 1994. The worldwide extent of land-use change. *BioScience* **44**:305-313.

Houghton, R.A., and J.L. Hackler. 1994. The net flux of carbon from deforestation and degradation in South and Southeast Asia. Pages 301-327 in: V.H. Dale (editor). *Effects of Land Use Change on Atmospheric CO<sub>2</sub> Concentrations. South and Southeast Asia as a Case Study*. Springer-Verlag, New York.

Houghton, R.A., and G.M. Woodwell. 1994. Forests as carbon sinks. Pages 35-40 in K. Ramakrishna (editor). *Criteria for Joint Implementation Under the Framework Convention on Climatic Change*, The Woods Hole Research Center, Woods Hole, Massachusetts.

Rayner, S., F. Bretherton, S. Buol, M. Fosberg, W. Grossman, R. Houghton, R. Lal, J. Lee, S. Lonergan, J. Olson, R. Rockwell, C. Sage, E. van Imhoff. 1994. A wiring diagram for the study of land-use/cover change: Report of working group A. Pages 13-53 in: W.B. Meyer and B.L. Turner (eds.). *Changes in Land Use and Land Cover: A Global Perspective*. Cambridge University Press, Cambridge, U.K.

Stone, T.A., P. Schlesinger, R.A. Houghton, and G.M. Woodwell. 1994. A map of the vegetation of South America based on satellite imagery. *Photogrammetric Engineering & Remote Sensing* **60**:541-551.

Houghton, R.A. 1995. Balancing the global carbon cycle with terrestrial ecosystems. Pages 133-152 in: R.G. Zepp and Ch. Sonntag (editors). *The Role of Non-Living Organic Matter in the Earth's Carbon Cycle*. John Wiley & Sons Ltd., Chichester, U.K.

Houghton, R.A. 1995. Carbon cycle. Pages 491-504 in *Encyclopedia of Energy Technology and the Environment*, John Wiley & Sons, Inc., New York.

Houghton, R.A. 1995. Changes in the storage of terrestrial carbon since 1850. Pages 45-65 in: R. Lal, J. Kimble, E. Levine, and B.A. Stewart (editors). *Soils and Global Change. Advances in Soil Science*, Lewis Publishers, CRC Press, Inc., Boca Raton, Florida.

Houghton, R.A. 1995. Deforestation. Pages 449-461 in: *Encyclopedia of Environmental Biology*, Academic Press, Orlando, Florida.

Houghton, R.A. 1995. Determining emissions of carbon from land: A global strategy. Pages 59-76 in: S. Murai (editor). *Toward Global Planning of Sustainable Use of the Earth. Development of Global Eco-Engineering*. Elsevier Science B.V., Amsterdam, The Netherlands.

Houghton, R.A. 1995. Effects of land-use change, surface temperature, and CO<sub>2</sub> concentration on terrestrial stores of carbon. Pages 333-350 in: G.M. Woodwell and F.T. Mackenzie (editors). *Biotic Feedbacks in the Global Climatic System: Will the Warming Feed the Warming?* Oxford University Press, New York.

Houghton, R.A. 1995. Global effects of deforestation. Pages 492-508 in: D.J. Hoffman, B.A. Rattner, G.A. Burton, and J. Cairns (editors). *Handbook of Ecotoxicology*. Lewis Publishers, Boca Raton, Florida.

Houghton, R.A. 1995. Human transformation of North America [Book Review]. *Conservation Biology* **9**:1661-1663.

Houghton, R.A. 1995. Land-use change and the carbon cycle. 1995. *Global Change Biology* **1**:275-287.

Houghton, R.A. 1995. Tropical forests and climate. Pages 263-289 in R.B. Primack and T.E. Lovejoy, editors. *Ecology, Conservation, and Management of the Southeast Asian Rainforests*. Yale University Press, New Haven, Connecticut.

Houghton, R.A., and J.L. Hackler. 1995. Continental Scale Estimates of the Biotic Carbon Flux from Land Cover Change: 1850-1980. ORNL/CDIAC-79, NDP-050, Oak Ridge National Laboratory, Oak Ridge, Tennessee. 144 pp.

Post, W.M., D.W. Anderson, A. Dahmke, R.A. Houghton, A.-Y. Huc, R. Lassiter, R.G. Najjar, H.-U. Neue, T.F. Pedersen, S.E. Trumbore, and R. Vaikmae. 1995. What is the role of nonliving organic matter cycling on the global scale? Pages 155-174 in: R.G. Zepp and Ch. Sonntag (editors). *The Role of Non-Living Organic Matter in the Earth's Carbon Cycle*. John Wiley & Sons Ltd., Chichester, U.K.

Woodwell, G.M., F.T. Mackenzie, R.A. Houghton, M.J. Apps, E. Gorham, and E.A. Davidson. 1995. Will the Warming Speed the Warming? Pages 393-411 in: G.M. Woodwell and F.T. Mackenzie (editors). *Biotic Feedbacks in the Global Climatic System: Will the Warming Feed the Warming?* Oxford University Press, New York.

Houghton, R.A. 1996. Climate and meteorology. Pages 112-114 in: G.T. Kurian and G.T.T. Molitor (editors). *Encyclopedia of the Future*. Simon & Schuster Macmillan, New York.

Houghton, R.A. 1996. Converting terrestrial ecosystems from sources to sinks of carbon. *Ambio* **25**:267-272.

Houghton, R.A. 1996. Land-use change and terrestrial carbon: the temporal record. Pages 117-134 in M.J. Apps and D.T. Price (editors). *Forest Ecosystems, Forest Management and the Global Carbon Cycle*. Springer-Verlag, Berlin.

Houghton, R.A. 1996. Terrestrial sources and sinks of carbon inferred from terrestrial data. *Tellus* **48B**:420-432.

Melillo, J.M., R.A. Houghton, D.W. Kicklighter, and A.D. McGuire. 1996. Tropical deforestation and the global carbon budget. *Annual Review of Energy and the Environment* **21**:293-310.

Houghton, R.A. 1997. Terrestrial carbon storage: Global lessons for Amazonian research. *Ciencia e Cultura Sao Paulo* **49**:58-72.

Houghton, R.A. 1998. Data requirements for estimating emissions of carbon from terrestrial ecosystems. Pages 21-30 in: Proceedings Pecora 13 Symposium. Human Interactions with the Environment: Perspectives from Space. American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland.

Houghton, R.A. 1998. Historic role of forests in the global carbon cycle. Pages 1-24 in: G.H. Kohlmaier, M. Weber, and R.A. Houghton (editors). *Carbon Dioxide Mitigation in Forestry and Wood Industry*. Springer-Verlag, Berlin.

Houghton, R.A., E.A. Davidson, and G.M. Woodwell. 1998. Missing sinks, feedbacks, and understanding the role of terrestrial ecosystems in the global carbon balance. *Global Biogeochemical Cycles* **12**:25-34.

IGBP Terrestrial Carbon Working Group. 1998. The terrestrial carbon cycle: Implications for the Kyoto Protocol. *Science* **280**:1393-1394.



- Kohlmaier, G.H., M. Weber, and R.A. Houghton (editors). 1998. *Carbon Dioxide Mitigation in Forestry and Wood Industry*. Springer-Verlag, Berlin.
- Woodwell, G.M., F.T. Mackenzie, R.A. Houghton, M.J. Apps, E. Gorham, and E.A. Davidson. 1998. Biotic feedbacks in the warming of the earth. *Climatic Change* **40**:495-518.
- Houghton, R.A. 1999. The annual net flux of carbon to the atmosphere from changes in land use 1850-1990. *Tellus* **51B**:298-313.
- Houghton, R.A. 1999. Ecosystem metabolism. Pages 172-175 in: D.E. Alexander and R.W. Fairbridge (editors). *Encyclopedia of Environmental Science*, Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Houghton, R.A. 1999. Greenhouse effect. Pages 303-306 in: D.E. Alexander and R.W. Fairbridge (editors). *Encyclopedia of Environmental Science*, Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Houghton, R.A., and J.L. Hackler. 1999. Emissions of carbon from forestry and land-use change in tropical Asia. *Global Change Biology* **5**:481-492.
- Houghton, R.A., and K. Ramakrishna. 1999. A review of national emissions inventories from select non-Annex I countries: Implications for counting sources and sinks of carbon. *Annual Review of Energy and the Environment* **24**:571-605.
- Houghton, R.A., J.L. Hackler, and K.T. Lawrence. 1999. The U.S. carbon budget: contributions from land-use change. *Science* **285**:574-578.
- Houghton, R.A. 2000. A new estimate of global sources and sinks of carbon from land-use change. *EOS* **81**(19) Supplement, p. S281.
- Houghton, R.A. 2000. Emissions of carbon from land-use change. Pages 63-76 in: *The Carbon Cycle* (T.M.L. Wigley and D.S. Schimel, editors), Cambridge University Press, New York, NY.
- Houghton, R.A. 2000. Interannual variability in the global carbon cycle. *Journal of Geophysical Research* **105**:20,121-20,130.
- Houghton, R.A., and J.L. Hackler. 2000. Changes in terrestrial carbon storage in the United States. 1. The roles of agriculture and forestry. *Global Ecology and Biogeography* **9**:125-144.
- Houghton, R.A., J.L. Hackler, and K.T. Lawrence. 2000. Changes in terrestrial carbon storage in the United States. 2. The role of fire and fire management. *Global Ecology and Biogeography* **9**:145-170.
- Houghton, R.A., D.L. Skole, C.A. Nobre, J.L. Hackler, K.T. Lawrence, and W.H. Chomentowski. 2000. Annual fluxes of carbon from deforestation and regrowth in the Brazilian Amazon. *Nature* **403**:301-304.
- Noble, I., M. Apps, R. Houghton, D. Lashof, W. Makundi, D. Murdiyarsa, B. Murray, W. Sombroek, and R. Valentini. 2000. Implications of different definitions and generic issues. Pages 53-126 in: R.T. Watson, I.R. Noble, B. Bolin, N.H. Ravindranath, D.J. Verardo, and D.J. Dokken (editors). *Land Use, Land-Use Change, and Forestry. A Special Report of the IPCC*. Cambridge University Press, New York.

- Houghton, R.A. 2001. Counting terrestrial sources and sinks of carbon. *Climatic Change* **48**:525-534.
- Houghton, R.A. 2001. Forests and agriculture. Pages 36-50 in: G.M. Woodwell (editor). *Forests in a Full World*. Yale University Press, New Haven.
- Houghton, R.A. 2001. Forests and the warming of the earth. Pages 9-34 in: G.M. Woodwell (editor). *Forests in a Full World*. Yale University Press, New Haven.
- Houghton, R.A. 2001. Global terrestrial productivity and carbon balance. Pages 499-520 in: J. Roy, B. Saugier, and H.A. Mooney, editors. *Terrestrial Global Productivity*, Academic Press, San Diego, California.
- Houghton, R.A., and J.L. Hackler. 2001. Carbon Flux to the Atmosphere from Land-Use Changes: 1850 to 1990. ORNL/CDIAC-131, NDP-050/R1. Carbon Dioxide Information Analysis Center, U.S. Department of Energy, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.
- Houghton, R.A., K.T. Lawrence, J.L. Hackler, and S. Brown. 2001. The spatial distribution of forest biomass in the Brazilian Amazon: A comparison of estimates. *Global Change Biology* **7**:731-746.
- Pacala, S.W., G.C. Hurtt, D. Baker, P. Peylin, R.A. Houghton, R.A. Birdsey, L. Heath, E.T. Sundquist, R.F. Stallard, P. Ciais, P. Moorcroft, J.P. Caspersen, E. Shevliakova, B. Moore, G. Kohlmaier, E. Holland, M. Gloor, M.E. Harmon, S.-M. Fan, J.L. Sarmiento, C.L. Goodale, D. Schimel, C.B. Field. 2001. Consistent land- and atmosphere-based U.S. carbon sink estimates. *Science* **292**:2316-2320.
- Schimel, D.S., J.I. House, K.A. Hibbard, P. Bousquet, P. Ciais, P. Peylin, B.H. Braswell, M.J. Apps, D. Baker, A. Bondeau, J. Canadell, G. Churkina, W. Cramer, A.S. Denning, C.B. Field, P. Friedlingstein, C. Goodale, M. Heimann, R.A. Houghton, J.M. Melillo, B. Moore III, D. Murdiyarso, I. Noble, S.W. Pacala, I.C. Prentice, M.R. Raupach, P.J. Rayner, R.J. Scholes, W.L. Steffen, and C. Wirth. 2001. Recent patterns and mechanisms of carbon exchange by terrestrial ecosystems. *Nature* **414**:169-172.
- DeFries, R.S., R.A. Houghton, M.C. Hansen, C.B. Field, D. Skole, J. Townshend. 2002. Carbon emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 90s. *Proceedings of the National Academy of Sciences* **99**:14256-14261.
- Goodale, C.L., M.J. Apps, R.A. Birdsey, C.B. Field, L.S. Heath, R.A. Houghton, J.C. Jenkins, G. H. Kohlmaier, W. Kurz, S. Liu, G.-J. Nabuurs, S. Nilsson, and A.Z. Shvidenko. 2002. Forest carbon sinks in the northern hemisphere. *Ecological Applications* **12**:891-899.
- Houghton, R.A. 2002. Forests for carbon storage. *Global Change* **7**(4):12-13.
- Houghton, R.A. 2002. Global effects of deforestation. Pages 645-666 in: D.J. Hoffman, B.A. Rattner, G.A. Burton, and J. Cairns, editors. *Handbook of Ecotoxicology*, Second Edition, Lewis Publishers, Boca Raton, Florida.
- Houghton, R.A. 2002. Magnitude, distribution and causes of terrestrial carbon sinks and some implications for policy. *Climate Policy* **2**:71-88.
- Houghton, R.A. 2002. Temporal patterns of land-use change and carbon storage in China and tropical Asia. *Science in*

*China* (Series C) **45** (Supp.):10-17.

Houghton, R.A. 2002. Terrestrial carbon sinks --- uncertain explanations. *Biologist* **49**:155-160.

Houghton, R.A., and J.L. Hackler. 2002. Carbon flux to the atmosphere from land-use changes. In *Trends: A Compendium of Data on Global Change*, Carbon Dioxide Information and Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee.

Hurt, G.C., S.W. Pacala, P.R. Moorcroft, J. Caspersen, E. Shevliakova, R.A. Houghton, and B. Moore III. 2002. Projecting the future of the U.S. carbon sink. *Proceedings of the National Academy of Sciences* **99**:1389-1394.

Bergen, K.M., S.G. Conard, R.A. Houghton, E.S. Kasischke, V.I. Kharuk, O.N. Krankina, K.J. Ranson, H.H. Shugart, A.I. Sukhinen, and R.F. Treyfeld. 2003. NASA and Russian scientists observe land-cover and land-use change and carbon in Russian forests. *Journal of Forestry* **101**:34-41.

Houghton, R.A. 2003. Revised estimates of the annual net flux of carbon to the atmosphere from changes in land use and land management 1850-2000. *Tellus* **55B**:378-390.

Houghton, R.A. 2003. Why are estimates of the terrestrial carbon balance so different? *Global Change Biology* **9**:500-509.

Houghton, R.A., and J.L. Hackler. 2003. Sources and sinks of carbon from land-use change in China. *Global Biogeochemical Cycles*, 17(2), 1034, doi:10.1029/2002GB001970.

Houghton, R.A. 2003. The contemporary carbon cycle, pp. 473-513. In *Biogeochemistry* (ed. W.H. Schlesinger) Vol. 8 *Treatise on Geochemistry* (eds. H.D. Holland and K.K. Turekian), Elsevier-Pergamon, Oxford, U.K.

House, J.I., I.C. Prentice, N. Ramankutty, R.A. Houghton and M. Heimann. 2003. Reconciling apparent inconsistencies in estimates of terrestrial CO<sub>2</sub> sources and sinks. *Tellus* **55B**: 345-363.

Asner, G.P., R.S. DeFries, and R.A. Houghton. 2004. Typological responses of ecosystems to land use change. Pages 337-344 in: R.S. DeFries, G.P. Asner, R.A. Houghton (editors), *Ecosystems and Land Use Change*. American Geophysical Union, Washington, D.C.

DeFries, R.S., G.P. Asner, and R.A. Houghton (editors). 2004. *Ecosystems and Land Use Change*. American Geophysical Union, Washington, D.C.

DeFries, R.S., G.P. Asner, and R.A. Houghton. 2004. Trade-offs in land-use decisions: Towards a framework for assessing multiple ecosystem responses to land-use change. Pages 1-9 in: R.S. DeFries, G.P. Asner, R.A. Houghton (editors), *Ecosystems and Land Use Change*. American Geophysical Union, Washington, D.C.

Hirsch, A.I., W.S. Little, R.A. Houghton, N.A. Scott, and J.D. White. 2004. The net carbon flux due to deforestation and forest re-growth in the Brazilian Amazon: Analysis using a process-based model. *Global Change Biology* **10**:908-924.

Houghton, R.A., and C.L. Goodale. 2004. Effects of land-use change on the carbon balance of terrestrial ecosystems. Pages 85-98 in: R.S. DeFries, G.P. Asner, R.A. Houghton (editors), *Ecosystems and Land Use Change*. American Geophysical Union, Washington, D.C.

Houghton, R.A., F. Joos, and G.P. Asner. 2004. The effects of land use and management on the global carbon cycle. Pages 237-256 in: G. Gutman, A.C. Janetos, C.O. Justice, E.F. Moran, J.F. Mustard, R.R. Rindfuss, D. Skole, B.L. Turner II, and M.A. Cochrane (editors), *Land Change Science: Observing, Monitoring, and Understanding Trajectories of Change on the Earth's Surface*. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Goetz, S.J., A.G. Bunn, G.J. Fiske, and R.A. Houghton. 2005. Satellite-observed photosynthetic trends across boreal North America associated with climate and fire disturbance. *Proceedings of the National Academy of Sciences* **102**:13521-13525.

Houghton, R.A. 2005. Aboveground forest biomass and the global carbon balance. *Global Change Biology* **11**:945-958.

Houghton, R.A. 2005. Tropical deforestation as a source of greenhouse gas emissions. Pages 13-21 in: P. Moutinho and S. Schwartzman, editors. *Tropical Deforestation and Climate Change*. Amazon Institute for Environmental Research, Belém, Pará, Brazil.

Krankina, O.N., R.A. Houghton, M.E. Harmon, E.H. Hogg, D. Butman, M. Yatskov, M. Huso, R. F. Treyfeld, V.N. Razuvaev, and G. Spycher. 2005. Effects of climate, disturbance, and species on forest biomass across Russia. *Canadian Journal of Forest Research* **35**:2281-2293.

Bradley, B.A., R.A. Houghton, J.F. Mustard, and S.P. Hamburg. 2006. Invasive grass reduces aboveground carbon stocks in shrublands of the Western US. *Global Change Biology* **12**:1815-1822.

Chapin, F.S., G.M. Woodwell, J.T. Randerson, E.B. Rastetter, G.M. Lovett, D.D. Baldocchi, D.A. Clark, M.E. Harmon, D.S. Schimel, R. Valentini, C. Wirth, J.D. Aber, J.J. Cole, M.L. Goulden, J.W. Harden, M. Heimann, R.W. Howarth, P.A. Matson, A.D. McGuire, J.M. Melillo, H.A. Mooney, J.C. Neff, R.A. Houghton, M.L. Pace, M.G. Ryan, S.W. Running, O.E. Sala, W.H. Schlesinger, and E.-D. Schulze. 2006. Reconciling carbon-cycle concepts, terminology, and methods. *Ecosystems* **9**:1041-1050.

Chhabra, A., H. Geist, R.A. Houghton, H. Haberl, A.K. Braimoh, P.L.G. Vlek, J. Patz, J. Xu, N. Ramankutty, O. Coomes, and E.F. Lambin. 2006. Multiple impacts of land-use/cover change. Pages 71-116 in: E.F. Lambin and H. Geist (editors), *Land-Use and Land-Cover Change*. Springer-Verlag, Heidelberg.

Houghton, R.A., and J.L. Hackler. 2006. Emissions of carbon from land use change in sub-Saharan Africa. *Journal of Geophysical Research* **111**, G02003, doi:10.1029/2005JG000076.

Hurtt G.C., S. Frohking, M.G. Fearon, B. Moore, E. Shevliakova, S. Malyshev, S.W. Pacala, and R.A. Houghton. 2006. The underpinnings of land-use history: three centuries of global gridded land-use transitions, wood harvest activity, and resulting secondary lands. *Global Change Biology* **12**:1-22.

Ramankutty, N., L. Graumlich, F. Achard, D. Alves, A. Chhabra, R.S. DeFries, J.A. Foley, H. Geist, R.A. Houghton, K. Klein Goldewijk, E.F. Lambin, A. Millington, K. Rasmussen, R.S. Reid, and B.L. Turner. 2006. Global land-cover change: recent progress, remaining challenges. Pages 9-39 in: E.F. Lambin and H. Geist (editors), *Land-Use and Land-*

*Cover Change*. Springer-Verlag, Heidelberg.

Canadell, J.G., C. Le Quéré, M.R. Raupach, C.B. Field, E.T. Buitenhuis, P. Ciais, T.J. Conway, N.P. Gillett, R.A. Houghton, and G. Marland. 2007. Contributions to accelerating atmospheric CO<sub>2</sub> growth from economic activity, carbon intensity, and efficiency of natural sinks. *Proceedings of the National Academy of Sciences* **104**:18866-18870.

Canadell, J.G., D.E. Pataki, R. Gifford, R.A. Houghton, Y. Luo, M.R. Raupach, P. Smith, and W. Steffen. 2007. Saturation of the terrestrial carbon sink. Pages 59-78 in: J.G. Canadell, D. Pataki, and L. Pitelka (editors), *Terrestrial Ecosystems in a Changing World*. Springer-Verlag, Berlin.

**CCSP, 2007.** *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, 242 pp.

Goetz, S.J., M.C. Mack, K.R. Gurney, J.T. Randerson and R.A. Houghton. 2007. Ecosystem responses to recent climate change and fire disturbance at northern high latitudes: observations and model results contrasting northern Eurasia and North America. *Environmental Research Letters* **2** 045031 (9pp) doi:10.1088/1748-9326/2/4/045031.

Houghton, R.A. 2007. Balancing the global carbon budget. *Annual Review of Earth and Planetary Sciences* **35**:313-347.

Houghton, R.A., 2007: The carbon cycle in land and water systems. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. 103-106.

Houghton, R.A., D. Butman, A.G. Bunn, O.N. Krankina, P. Schlesinger, T.A. Stone. 2007. Mapping Russian forest biomass with data from satellites and forest inventories. *Environmental Research Letters* **2**, 045032 (doi:10.1088/1748-9326/2/4/045032).

King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks, 2007: Preface. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. XIII-XVIII.

King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks, 2007: Executive Summary. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. 1-14.

King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J.

Wilbanks, 2007: What is the carbon cycle and why care? In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. 15-20.

Pacala, S., R.A. Birdsey, S.D. Bridgman, R.T. Conant, K. Davis, B. Hales, R.A. Houghton, J.C. Jenkins, M. Johnston, G. Marland, and K. Paustian, 2007: The North American carbon budget past and present. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. 29-36.

Ramankutty, N., H.K. Gibbs, F. Achard, R. DeFries, J.A. Foley, and R.A. Houghton. 2007. Challenges to estimating carbon emissions from tropical deforestation. *Global Change Biology* **13**:51-66.

Saatchi, S.S., R.A. Houghton, R.C. dos Santos Alvala, J.V. Soares, and Y. Yu. 2007. Distribution of aboveground live biomass in the Amazon basin. *Global Change Biology* **13**:816-837.

DeFries, R.S., D.C. Morton, G.R. van der Werf, L. Giglio, G.J. Collatz, J.T. Randerson, R.A. Houghton, P.K. Kasibhatla, and Y. Shimabukuro. 2008. Fire-related carbon emissions from land use transitions in southern Amazonia. *Geophysical Research Letters* **35**, L22705, doi:10.1029/2008GL035689.

Goward, S.N., J.G. Masek, W. Cohen, G. Moisen, G.J. Collatz, S. Healey, R.A. Houghton, C. Huang, R. Kennedy, B. Law, S. Powell, D. Turner, and M.A. Wulder. 2008. Forest disturbance and North American carbon flux. *Eos* **89**:105-106.

Houghton, R.A. 2008. Biomass. Pages 448-453 in: S.E. Jorgensen & B.D. Fath (editors). *Encyclopedia of Ecology, 1<sup>st</sup> Edition*. Elsevier, Oxford.

Houghton, R.A. 2008. Carbon Flux to the Atmosphere from Land-Use Changes. In *TRENDS: A Compendium of Data on Global Change*. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A.

Houghton, R.A. 2008. Sinks, sinks, and more sinks. [Book review of D.S. Reay, C.N. Hewitt, K.A. Smith, and J. Grace (editors). *Greenhouse Gas Sinks*, CABI, Cambridge, MA.] *Ecology* **89**:292-293.

Houghton, R.A., and S.J. Goetz. 2008. New satellites help quantify carbon sources and sinks. *Eos* **89**(43):417-418.

Ito, A., J.E. Penner, M.J. Prather, C.P. de Campos, R.A. Houghton, T. Kato, A.K. Jain, X. Yang, G.C. Hurtt, S. Frolking, M.G. Fearon, L.P. Chini, A. Wang, and D.T. Price. 2008. Can we reconcile differences in estimates of carbon fluxes from land-use change and forestry for the 1990s? *Atmospheric Chemistry & Physics* **8**:3291-3310.

Jeon, S.B., C.E. Woodcock, F. Zhao, X. Yang, R.A. Houghton and J.L. Hackler. 2008. The effects of land use change on the terrestrial carbon budgets of New England. Geoscience and Remote Sensing Symposium, 2008. IGARSS 2008. IEEE International **5** (7-11 July 2008), pp:V - 204 - V - 207. doi: 10.1109/IGARSS.2008.4780063.

Searchinger, T.D., and R.A. Houghton. 2008. Biofuels: Clarifying assumptions. *Science* **322**:371-374.

Searchinger, T., R. Heimlich, R.A. Houghton, F. Dong, A. Elobeid, J. Fabiosa, S. Tokgoz, D. Hayes, and T.-H. Yu. 2008. Use of U.S. croplands for biofuels increases greenhouse gasses through emissions from land use change. *Science* **319**:1238-1240.

Canadell, J.G., M.R. Raupach, and R.A. Houghton. 2009. Anthropogenic CO<sub>2</sub> emissions in Africa. *Biogeosciences* **6**:463-468.

Goetz, S.J., A. Baccini, N.T. Laporte, T. Johns, W. Walker, J. Kellndorfer, R.A. Houghton and M. Sun. 2009. Mapping and monitoring carbon stocks with satellite observations: a comparison of methods. *Carbon Balance and Management* **4**:2 doi:10.1186/1750-0680-4-2.

Houghton, R.A. 2009. Emissions of carbon from land management. Background note for the World Development Report 2010. The World Bank, Washington, DC.

Houghton, R.A. 2009. Terrestrial carbon and biogeochemical cycles. Pages 340-346 in: S.A. Levine (editor), *The Princeton Guide to Ecology*. Princeton University Press, Princeton.

Houghton, R.A., M. Gloor, J. Lloyd, C. Potter. 2009. The regional carbon budget. Pages 409-428 in: M. Keller, M. Bustamante, J. Gash, and P. Silva Dias, editors. *Amazonia and Global Change*, Geophysical Monograph Series 186, American Geophysical Union, Washington, DC.

Houghton, R.A., F. Hall, and S.J. Goetz. 2009. Importance of biomass in the global carbon cycle. *Journal of Geophysical Research* **114**, G00E03, doi:10.1029/2009JG000935.

Le Quéré, C., M.R. Raupach, J.G. Canadell, G. Marland, L. Bopp, P. Ciais, T.J. Conway, S.C. Doney, R.A. Feely, P. Foster, P. Friedlingstein, K. Gurney, R.A. Houghton, J.J. House, C. Huntingford, P.E. Levy, M.R. Lomas, J. Majkut, N. Metzl, J.P. Ometto, G.P. Peters, I.C. Prentice, J.T. Randerson, S.W. Running, J.L. Sarmiento, U. Schuster, S. Sitch, T. Takahashi, N. Viovy, G.R. van der Werf, and F.I. Woodward. 2009. Trends in the sources and sinks of carbon dioxide. *Nature GeoScience* **2**:831-836.

Friedlingstein, P., R.A. Houghton, G. Marland, J. Hackler, T.A. Boden, T.J. Conway, J.G. Canadell, M.R. Raupach, P. Ciais, and C. Le Quéré. 2010. Update on CO<sub>2</sub> emissions. *Nature Geoscience* **3**:811-812.

Greenglass, N., J. Funk, M. Chaum, and R.A. Houghton. 2010. Fixing a flawed approach to forest accounting in the next round of the Kyoto Protocol. *Carbon Management* **1**(2): 179–182.

Houghton, R.A. 2010. How well do we know the flux of CO<sub>2</sub> from land-use change? *Tellus B*, **62**(5):337-351. doi: 10.1111/j.1600-0889.2010.00473.x

Houghton, R.A., and S. Dhakal. 2010. Welcome to *Carbon Management*. *Carbon Management* **1**:1-3.

Houghton, R.A., N. Greenglass, A. Baccini, A. Cattaneo, S. Goetz, J. Kellndorfer, N. Laporte, and W. Walker. 2010. The role of science in Reducing Emissions from Deforestation and forest Degradation (REDD). *Carbon Management* **1**(2), 253–259.

Olofsson, P., P. Torchinava, C. E. Woodcock, A. Baccini, R. A. Houghton, M. Ozdogan, F. Zhao and X. Yang.

2010. Implications of land use change on the national terrestrial carbon budget of Georgia. *Carbon Balance and Management* **5**:4 doi:10.1186/1750-0680-5-4

Ryan, M.G., M.E. Harmon, R.A. Birdsey, C.P. Giardina, L.S. Heath, R.A. Houghton, R.B. Jackson, D.C. McKinley, J.F. Morrison, B.C. Murray, D.E. Pataki, and K.E. Skog. 2010. A synthesis of the science on forests and carbon for U.S. forests. *Issues in Ecology*, Report Number 13, 15 pp.

Greenglass, N., and R.A. Houghton. 2011. Towards results-based REDD+ mechanisms. *Carbon Management* **2**:513-515.

Hall, F.G., K. Bergen, J.B. Blair, R. Dubayah, R. Houghton, G. Hurtt, J. Kellndorfer, M. Lefsky, J. Ranson, S. Saatchi, H.H. Shugart, and D. Wickland. 2011. Characterizing 3-D vegetation structure from space: Mission requirements. *Remote Sensing of Environment* **115**:2753-2775.

Hurtt, G.C., L.P. Chini, S. Frothingham, R.A. Betts, J. Feddema, G. Fischer, J.P. Fisk, K. Hibbard, R.A. Houghton, A. Janetos, C.D. Jones, G. Kindermann, T. Kinoshita, Kees Klein Goldewijk, K. Riahi, E. Shevliakova, S. Smith, E. Stehfest, A. Thomson, P. Thornton, D.P. van Vuuren, and Y.P. Wang. 2011. Harmonization of land-use scenarios for the period 1500–2100: 600 years of global gridded annual land-use transitions, wood harvest, and resulting secondary lands. *Climatic Change* **109**:117–161; doi: 10.1007/s10584-011-0153-2.

Kuemmerle, T. P., Olofsson, O. Chaskovskyy, M. Baumann, K. Ostapowicz, C.E. Woodcock, R.A. Houghton, P. Hostert, W.S. Keeton, and V.C. Radeloff. 2011. Post-Soviet farmland abandonment, forest recovery, and carbon sequestration in western Ukraine. *Global Change Biology* **17**:1335-1349.

Masek, J.G., W.B. Cohen, D. Leckie, M.A. Wulder, R. Vargas, B. de Jong, S. Healey, B. Law, R. Birdsey, R.A. Houghton, D. Mildrexler, S. Goward, and W. B. Smith. 2011. Recent rates of forest harvest and conversion in North America. *Journal of Geophysical Research* **116**, G00K03, doi:10.1029/2010JG001471.

McKinley, D.C., M.G. Ryan, R.A. Birdsey, C.P. Giardina, M.E. Harmon, L.S. Heath, R.A. Houghton, R.B. Jackson, J.F. Morrison, B.C. Murray, D.E. Pataki, and K.E. Skog. 2011. A synthesis of current knowledge on forests and carbon storage in the United States. *Ecological Applications* **21**:1902-1924.

Olofsson, P., T. Kuemmerle, P. Griffiths, J. Knorn, A. Baccini, V. Gancz, V. Blujdea, R.A. Houghton, I.V. Abrudan and C.E. Woodcock. 2011. Carbon implications of forest restitution in post-socialist Romania. *Environmental Research Letters* **6** 045202.

Pan, Y., R.A. Birdsey, J. Fang, R. Houghton, P.E. Kauppi, W.A. Kurz, O.L. Phillips, A. Shvidenko, S.L. Lewis, J.G. Canadell, P. Ciais, R.B. Jackson, S.W. Pacala, A.D. McGuire, S. Piao, A. Rautiainen, S. Sitch, and D. Hayes. 2011. A large and persistent carbon sink in the world's forests. *Science* **333**:988-993.

Richter, D. deB., and R.A. Houghton. 2011. Gross CO<sub>2</sub> fluxes from land-use change: Implications for reducing global emissions and increasing sinks. *Carbon Management* **2**:41-47.

Woodwell, G.M., R.A. Houghton, E.A. Davidson and D.C. Nepstad. 2011. The first principles for climatic stabilization. *Carbon Management* **2**:605-606.

Baccini, A., S.J. Goetz, W.S. Walker, N.T. Laporte, M. Sun, D. Sulla-Menashe, J. Hackler, P.S.A. Beck, R.



- Dubayah, M.A. Friedl, S. Samanta, and R.A. Houghton. 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change* **2**:182-185; doi:10.1038/nclimate1354.
- Gloor, M., L. Gatti, R. Brienen, T.R. Feldpausch, O.L. Phillips, J. Miller, J.P. Ometto, H. Rocha, T. Baker, B. de Jong, R.A. Houghton, Y. Malhi, L.E.O. C. Aragão, J.-L. Guyot, K. Zhao, R. Jackson, P. Peylin, S. Sitch, B. Poulter, M. Lomas, S. Zaehle, C. Huntingford, P. Levy, and J. Lloyd. 2012. The carbon balance of South America: a review of the status, decadal trends and main determinants. *Biogeosciences* **9**:5407-5430.
- Goetz, S.J., B. Bond-Lamberty, B.E. Law, J.A. Hicke, C. Huang, R.A. Houghton, S. McNulty, T. O'Halloran, M. Harmon, A.J.H. Meddens, E.M. Pfeifer, D. Mildrexler, E.S. Kasischke. 2012. Observations and assessment of forest carbon dynamics following disturbance in North America. *J. Geophys. Res.*, **117**, No. G2, G02022  
<http://dx.doi.org/10.1029/2011JG001733>
- Houghton, R.A. 2012. Carbon emissions and the drivers of deforestation and forest degradation in the tropics. *Current Opinion in Environmental Sustainability* **4**:597-603.
- Houghton, R.A. 2012. Historic changes in terrestrial carbon storage. Pages 59-82 in: R. Lal, K. Lorenz, R. F. Hüttl, B.U. Schneider, and J. von Braun (editors). *Recarbonization of the Biosphere: Ecosystems and the Global Carbon Cycle*. Springer, Dordrecht. DOI 10.1007/978-94-007-4159-1\_4.
- Houghton, R.A. 2012. Land management options for mitigation and adaptation to climate change. In: Freedman, B. (Ed.) *Global Environmental Change*: SpringerReference ([www.springerreference.com](http://www.springerreference.com)). Springer-Verlag Berlin Heidelberg, 0. DOI: 10.1007/SpringerReference\_300074 2012-02-01 13:50:14 UTC
- Houghton, R.A., J.I. House, J. Pongratz, G.R. van der Werf, R.S. DeFries, M.C. Hansen, C. Le Quéré, and N. Ramankutty. 2012. Carbon emissions from land use and land-cover change. *Biogeosciences* **9**:5125-5142.  
doi:10.5194/bg-9-5125-2012.
- Le Quéré, C., R.J. Andres, T. Boden, T. Conway, R.A. Houghton, J.I. House, G. Marland, G.P. Peters, G. van der Werf, A. Ahlström, R.M. Andrew, L. Bopp, J.G. Canadell, P. Ciais, S.C. Doney, C. Enright, P. Friedlingstein, C. Huntingford, A.K. Jain, C. Jourdain, E. Kato, R.F. Keeling, K. Klein Goldewijk, S. Levis, P. Levy, M. Lomas, B. Poulter, M.R. Raupach, J. Schwinger, S. Sitch, B.D. Stocker, N. Viogy, S. Zaehle, and N. Zeng. 2012. The global carbon budget 1959-2011. *Earth System Science Data Discussions* **5**:1107-1157.
- Birdsey, R, Y. Pan, R. Houghton. 2013. Sustainable landscapes in a world of change: tropical forests, land use and implementation of REDD+: Part I. *Carbon Management* **4**(5):465-468.
- Birdsey, R, Y. Pan, R. Houghton. 2013. Sustainable landscapes in a world of change: tropical forests, land use and implementation of REDD+: Part II. *Carbon Management* **4**(6):567-569.
- Erb, K.-H., T. Kastner, S. Luysaert, R.A. Houghton, T. Kuemmerle, P. Olofsson, and H. Haberl. 2013. Bias in the attribution of forest carbon sinks. *Nature Climate Change* **3**:854-856.
- Houghton, R.A. 2013. The contribution of land use and land-use change to the carbon cycle. Pages 52-76 in: D.G. Brown, D.T. Robinson, N.H.F. French, and B.C. Reed (editors). *Land Use and the Carbon Cycle*. Cambridge University Press, New York.
- Houghton, R.A. 2013. The emissions of carbon from deforestation and degradation in the tropics: Past trends and future potential. *Carbon Management* **4**(5):539-546.

Houghton, R.A. 2013. Keeping management effects separate from environmental effects in terrestrial carbon accounting. *Global Change Biology* **19**:2609-2612.

Houghton, R.A. 2013. Role of forests and impact of deforestation in the global carbon cycle. Pages 15-38 *in*: F. Achard & M.C. Hansen (editors). *Global Forest Monitoring from Earth Observation*. CRC Press, Boca Raton.

Hurttt, G.C., S.W. Pacala, P.R. Moorcroft, J. Caspersen, E. Shevliakova, R.A. Houghton, B. Moore III, and J. Fisk. 2013. Ecosystem Demography Model: U.S. Ecosystem Carbon Stocks and Fluxes, 1700-1990. Model product. Available on-line <http://daac.ornl.gov> from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. <http://dx.doi.org/10.3334/ORNLDAAC/1160>

Le Quéré, C., R.J. Andres, T. Boden, T. Conway, R.A. Houghton, J.I. House, G. Marland, G.P. Peters, G. van der Werf, A. Ahlström, R.M. Andrew, L. Bopp, J.G. Canadell, P. Ciais, S.C. Doney, C. Enright, P. Friedlingstein, C. Huntingford, A.K. Jain, C. Jourdain, E. Kato, R.F. Keeling, K. Klein Goldewijk, S. Levis, P. Levy, M. Lomas, B. Poulter, M.R. Raupach, J. Schwinger, S. Sitch, B.D. Stocker, N. Viogy, S. Zaehle, and N. Zeng. 2013. The global carbon budget 1959-2011. *Earth System Science Data* **5**:165-185.

Patra, P. K., Canadell, J. G., Houghton, R. A., Piao, S. L., Oh, N.-H., Ciais, P., Manjunath, K. R., Chhabra, A., Wang, T., Bhattacharya, T., Bousquet, P., Hartman, J., Ito, A., Mayorga, E., Niwa, Y., Raymond, P. A., Sarma, V. V. S. S., and Lasco, R. 2013. The carbon budget of South Asia, *Biogeosciences*, **10**, 513-527, doi:10.5194/bg-10-513-2013.

Smith, K.R., M.A. Desai, J.V. Rogers, and R.A. Houghton. 2013. Joint CO<sub>2</sub> and CH<sub>4</sub> accountability for global warming. *Proceedings of the National Academy of Sciences (US)*, **110**(31):E2865–E2874; doi/10.1073/pnas.1308004110 PNAS.

Tyukavina, A., S. Stehman, P. Potapov, S.A. Turubanova, A. Baccini, S.J. Goetz, N.T. Laporte, R.A. Houghton, and M.C. Hansen. 2013. National-scale estimation of gross forest aboveground carbon loss: a case study of the Democratic Republic of the Congo. *Environmental Research Letters* **8**:044039 (14pp); doi:10.1088/1748-9326/8/4/044039

Fang, J., T. Kato, Z. Guo, Y. Yang, H. Hu, H. Shen, X. Zhao, A.W. Kishimodo-Mo, Y. Tang, and R.A. Houghton. 2014. Evidence for environmentally enhanced forest growth. *P. Natl. Acad. Sci. USA* **111**:9527-9532. doi:10.1073/pnas.1402331111.

Houghton, R.A. 2014. Carbon dioxide and climate: game changers. Pages 23-33 *in*: R.A. Houghton & A.B. White (editors). *Ecology and the Common Good*, Woods Hole Research Center, Falmouth, MA.

Houghton, R.A. 2014. The contemporary carbon cycle. Pages 399-435 *in*: D.M. Karl and W.H. Schlesinger (editors). Volume 10, *Treatise on Biogeochemistry (Second Edition)* (eds. H.D. Holland and K.K. Turekian). Elsevier.

Houghton, R.A., and A.B. White (editors). 2014. *Ecology and the Common Good. The Great Issues of Environment in the Twenty-First Century*, Woods Hole Research Center, Falmouth, MA.

Le Quéré, C., G.P. Peters, R.J. Andres, R.M. Andrew, T.A. Boden, P. Ciais, P. Friedlingstein, R.A. Houghton, G. Marland, R. Moriarty, S. Sitch, P. Tans, A. Arneeth, A. Arvanitis, D.C.E. Bakker, L. Bopp, J.G. Canadell, L.P. Chini, S.C. Doney, A. Harper, I. Harris, J.I. House, A.K. Jain, S.D. Jones, E. Kato, R.F. Keeling, K. Klein Goldewijk, A. Körtzinger, C. Koven, N. Lefèvre, F. Maignan, A. Omar, T. Ono, G.-H. Park, B. Pfeil, B. Poulter, M.R. Raupach, P.

- Regnier, C. Rödenbeck, S. Saito, J. Schwinger, J. Segschneider, B.D. Stocker, T. Takahashi, B. Tilbrook, S. van Heuven, N. Viovy, R. Wanninkhof, A. Wiltshire, and S. Zaehle. 2014. Global carbon budget 2013. *Earth Systems Science Data* 6:235-263, doi:10.5194/essd-6-235-2014.
- Luyssaert, S., M. Jammot, P.C. Stoy, S. Estel, J. Pongratz, E. Ceschia, G. Churkina, A. Don, K.-H. Erb, M. Ferlicoq, B. Gielen, T. Grünwald, R.A. Houghton, K. Klumpp, A. Knohl, T. Kolb, T. Kuemmerle, T. Laurila, A. Lohila, D. Loustau, M.J. McGrath, P. Meyfroidt, E.J. Moors, K. Naudts, K. Novick, J. Otto, K. Pilegaard, C.A. Pio, S. Rambal, C. Rebmann, J. Ryder, A.E. Suyker, A. Varlagin, M. Wattenbach, A.J. Dolman. 2014. Land management and land-cover change have impacts of similar magnitude on surface temperature. *Nature Climate Change* 4: 389-393; doi:10.1038/nclimate2196
- Pongratz, J., C.H. Reick, R.A. Houghton, and J.I. House. 2014. Terminology as a key uncertainty in net land use and land cover change carbon flux estimates. *Earth System Dynamics* 5:177-195.
- Raupach, M.R., M. Gloor, J.L. Sarmiento, J.G. Canadell, T.L. Frölicher, T. Gasser, R.A. Houghton, C. Le Quéré, and C.M. Trudinger. 2014. The declining uptake rate of atmospheric CO<sub>2</sub> by land and ocean sinks. *Biogeosciences* 11:3453-3475, doi:10.5194/bg-11-3453-2014.
- Valentini, R., A. Arneth, A. Bombelli, S. Castaldi, R. Cazzolla Gatti, F. Chevallier, P. Ciais, E. Grieco, J. Hartmann, M. Henry, R. A. Houghton, M. Jung, W. L. Kutsch, Y. Malhi, E. Mayorga, L. Merbold, G. Murray-Tortarolo, D. Papale, P. Peylin, B. Poulter, P. A. Raymond, M. Santini, S. Sitch, G. Vaglio Laurin, G. R. van der Werf, C. A. Williams, and R. J. Scholes. 2014. The full greenhouse gases budget of Africa: synthesis, uncertainties and vulnerabilities. *Biogeosciences* 11:381-407.
- Anderegg, W.R.L., A.P. Ballantyne, W.K. Smith, J. Majkut, S. Rabin, C. Beaulieu, R. Birdsey, J.P. Dunne, R.A. Houghton, R.B. Myneni, Y. Pan, J.L. Sarmiento, N. Serota, E. Shevliakova, P. Tans, and S.W. Pacala. 2015. Tropical nighttime warming as a dominant driver of variability in the terrestrial carbon sink. *Proc. Nat. Acad. Sci.* 112 (51): 15591-15596; doi: 10.1073/pnas.1521479112
- Ballantyne, A.P., R. Andres, R. Houghton, B.D. Stocker, R. Wanninkhof, W. Anderegg, L.A. Cooper, M. DeGrandpre, P.P. Tans, J.B. Miller, C. Alden, and J.W.C. White. 2015. Audit of the global carbon budget: estimate errors and their impact on uptake uncertainty. *Biogeosciences* 12:2565-2584.
- Goetz, S.J., M. Hansen, R.A. Houghton, W. Walker, N. Laporte, and J. Busch. (2015). Measurement and monitoring needs, capabilities and potential for addressing reduced emissions from deforestation and forest degradation under REDD+. *Environmental Research Reviews*, 10(12), 123001. doi:10.1088/1748-9326/10/12/123001
- Houghton, R.A. 2015. Deforestation. Pages 313-315 in: J.F. Shroder, R. Sivanpillai (eds.). *Biological and Environmental Hazards, Risks, and Disasters*. Elsevier.
- Houghton, R.A., B. Byers and A.A. Nassikas. 2015. A role for tropical forests in stabilizing atmospheric CO<sub>2</sub>. *Nature Climate Change* 5:1022-1023.
- Le Quéré, C., R. Moriarty, R. M. Andrew, G. P. Peters, P. Ciais, P. Friedlingstein, S. D. Jones, S. Sitch, P. Tans, A. Arneth, T. A. Boden, L. Bopp, Y. Bozec, J. G. Canadell, L. P. Chini, F. Chevallier, C. E. Cosca, I. Harris, M. Hoppema, R. A. Houghton, J. I. House, A. K. Jain, T. Johannessen, E. Kato, R. F. Keeling, V. Kitidis, K. Klein Goldewijk, C. Koven, C. S. Landa, P. Landschützer, A. Lenton, I. D. Lima, G. Marland, J. T. Mathis, N. Metzl, Y. Nojiri, A. Olsen, T. Ono, S. Peng, W. Peters, B. Pfeil, B. Poulter, M. R. Raupach, P. Regnier, C. Rödenbeck, S.

Saito, J. E. Salisbury, U. Schuster, J. Schwinger, R. Séférian, J. Segsneider, T. Steinhoff, B. D. Stocker, A. J. Sutton, T. Takahashi, B. Tilbrook, G. R. van der Werf, N. Viovy, Y.-P. Wang, R. Wanninkhof, A. Wiltshire, and N. Zeng. 2015. Global carbon budget 2014. *Earth Syst. Sci. Data* 7:1–39. doi:10.5194/essd-7-1-2015

Le Quéré, C., R. Moriarty, R. M. Andrew, J. G. Canadell, S. Sitch, J. I. Korsbakken, P. Friedlingstein, G. P. Peters, R. J. Andres, T. A. Boden, R. A. Houghton, J. I. House, R. F. Keeling, P. Tans, A. Arneth, D. C. E. Bakker, L. Barberp. L. Bopp, J. Chang, F. Chevallier, L. P. Chini, P. Ciais, M. Fader, R. A. Feely, T. Gkritzalis, I. Harris, J. Hauck, T. Ilyina, A. K. Jain, E. Kato, V. Kitidis, K. Klein Goldewijk, C. Koven, P. Landschützer, S. K. Lauvset, N. Lefèvre, A. Lenton, I. D. Lima, N. Metzl, F. Millero, D. R. Munro, A. Murata, J. E. M. S. Nabel, S. Nakaoka, Y. Nojiri, K. O. O'Brien, A. Olsen, T. Ono, F. F. Pérez, B. Pfeil, D. Pierrot, B. Poulter, G. Rehder, C. Rödenbeck, S. Saito, U. Schuster, J. Schwinger, R. Séférian, T. Steinhoff, B. D. Stocker, A. J. Sutton, T. Takahashi, B. Tilbrook, I. T. van der Laan-Luijkx, G. R. van der Werf, S. van Heuven, D. Vandemark, N. Viovy, A. Wiltshire, S. Zaehle, and N. Zeng. 2015. Global carbon budget 2015. *Earth Syst. Sci. Data* 7:349-396. doi:10.5194/essd-7-349-2015

Li, Y., Y.-G. Wang, R.A. Houghton, and L.-S. Tang. 2015. Hidden carbon sink beneath desert. *Geophysical Research Letters* 42; doi:10.1002/2015GL064222

Tyukavina, A., A. Baccini, M.C. Hansen, P.V. Potapov, S.V. Stehman, R. A. Houghton, A.M. Krylov, S. Turubanova, and S. J. Goetz. 2015. Aboveground carbon loss in natural and managed tropical forests from 2000 to 2012. *Environmental Research Letters* 10 074002; doi:10.1088/1748-9326/10/7/074002

Cervarich, M., S. Shu, A.K. Jain, A. Arneth, J. Canadell, P. Friedlingstein, R.A. Houghton, E. Kato, C. Koven, P. Patra, B. Poulter, S. Sitch, B. Stocker, N. Viovy, A. Wiltshire and N. Zeng. 2016. The terrestrial carbon budget of South and Southeast Asia. *Environ. Res. Lett.* 11 (2016) 105006; doi:10.1088/1748-9326/11/10/105006

Houghton, R.A. 2016. Global carbon budgets and the role of remote sensing. Pages 639-657 in: P.S. Thenkabail, editor. *Remote Sensing Handbook, Volume II, Land Resources Monitoring, Modeling, and Mapping with Remote Sensing*. CRC Press, Boca Raton, FL.

Houghton, R.A. 2016. Deforestation. Pages 313-315 in: R. Sivanpillai, editor. *Biological and Environmental Hazards, Risks, and Disasters*. Elsevier, Waltham, Massachusetts.

Le Quéré, C., R.M. Andrew, J.G. Canadell, S. Sitch, J.I. Korsbakken, G.P. Peters, A.C. Manning, T.A. Boden, P.P. Tans, R.A. Houghton, R.F. Keeling, S. Alin, O.D. Andrews, P. Anthoni, L. Barbero, L. Bopp, F. Chevallier, L.P. Chini, P. Ciais, K. Currie, C. Delire, S.C. Doney, P. Friedlingstein, T. Gkritzalis, I. Harris, J. Hauck, V. Haverd, M. Hoppema, K. Klein Goldewijk, A.K. Jain, E. Kato, A. Körtzinger, P. Landschützer, N. Lefèvre, A. Lenton, S. Lienert, D. Lombardozi, J.R. Melton, N. Metzl, F. Millero, P.M.S. Monteiro, D.R. Munro, J.E.M.S. Nabel, S.-I. Nakaoka, K. O'Brien, A. Olsen, A.M. Omar, T. Ono, D. Pierrot, B. Poulter, C. Rödenbeck, J. Salisbury, U. Schuster, J. Schwinger, R. Séférian, I. Skjelvan, B.D. Stocker, A.J. Sutton, T. Takahashi, H. Tian, B. Tilbrook, I.T. van der Laan-Luijkx, G.R. van der Werf, N. Viovy, A.P. Walker, A.J. Wiltshire, S. Zaehle. 2016. Global carbon budget 2016. *Earth System Science Data*, DOI:10.5194/essd-8-605-2016.

Roman-Cuesta, R. M., M. Herold, M.C. Rufino, T.S. Rosenstock, R.A. Houghton, S. Rossi, K. Butterbach-Bahl, S. Ogle, B. Poulter, L. Verchot, C. Martius, and S. de Bruin. 2016. Multi-gas and multi-source comparisons of six land use emission datasets and AFOLU estimates in the Fifth Assessment Report, for the tropics for 2000–2005. *Biogeosciences* 13:5799-5819, doi:10.5194/bg-13-5799-2016

Baccini, A., W. Walker, L. Carvalho, M. Farina, D. Sulla-Menashe, and R. A. Houghton. 2017. "Tropical forests are a net carbon source based on aboveground measurements of gain and loss." *Science* 358(6360):230-234.

Ballantyne, A., W. Smith, W. Anderegg, P. Kauppi, J. Sarmiento, P. Tans, E. Shevliakova, Y. Pan, B. Poulter, A. Anav, P. Friedlingstein, R. Houghton, and S. Running. 2017. Accelerating net terrestrial carbon uptake during the warming hiatus due to reduced respiration. *Nature Climate Change* 7:148-152, doi:10.1038/nclimate3204

Giffen, R.A., C. Schwalm, R. Perschel, P. Duffy, R.A. Houghton, W. Price, and F. Lowenstein. 2017. Seeing forests for more than carbon in the trees: Incentivizing actions beyond carbon storage to mitigate climate change. *Journal of Forestry* 115:329-331.

Griscom, B.W., J. Adams, P.W. Ellis, R.A. Houghton, G. Lomax, D.A. Miteva, W.H. Schlesinger, D. Shoch, J.V. Siikamäki, P. Smith, P. Woodbury, C. Zganjar, A. Blackman, J. Campari, R.T. Conant, C. Delgado, P. Elias, T. Gopalakrishna, M.R. Hamsik, M. Herrero, J. Kiesecker, E. Landis, L. Laestadius, S.M. Leavitt, S. Minnemeyer, S. Polasky, P. Potapov, F.E. Putz, J. Sanderman, M. Silvius, E. Wollenberg, and J. Fargione. 2017. Natural climate solutions. *Proc. National Acad. Sci.* 114: 11645-11650; doi:10.1073/pnas.1710465114

Houghton, R.A., and A.A. Nassikas. 2017. Global and regional fluxes of carbon from land use and land cover change 1850–2015. *Global Biogeochemical Cycles* 31:456-472, doi:10.1002/2016GB005546.

van Marle, M.J.E., R.D. Field, G.R. van der Werf, I.A. Estrada de Wagt, R.A. Houghton, L.V. Rizzo, P. Artaxo, and K. Tsigaridis. 2017. Fire and deforestation dynamics in Amazonia (1973-2014) . *Global Biogeochemical Cycles* 31:24-38, doi:10.1002/2016GB005445.

Birdsey, R., P. Duffy, C. Smyth, W.A. Kurz, A.J. Dugan, and R.A. Houghton. 2018. Climate, economic, and environmental impacts of producing wood for bioenergy. *Environmental Research Letters* 13, 050201; <https://doi.org/10.1088/1748-9326/aab9d5>

Fargione, J.E., S. Bassett, T. Boucher, S.D. Bridgham, R.T. Conant, S.C. Cook-Patton, P. W. Ellis, A. Falcucci, J.W. Fourqurean, T. Gopalakrishna, H. Gu, B. Henderson, M.D. Hurteau, K.D. Kroeger, T. Kroeger, T.J. Lark, S.M. Leavitt, G. Lomax, R.I. McDonald, J.P. Megonigal, D.A. Miteva, C.J. Richardson, J. Sanderman, D. Shoch, S.A. Spawn, J.W. Veldman, C.A. Williams, P.B. Woodbury, C. Zganjar, M. Baranski, P. Elias, R.A. Houghton, E. Landis, E. McGlynn, W.H. Schlesinger, J.V. Siikamaki, A.E. Sutton-Grier and B.W. Griscom. 2018. Natural climate solutions for the United States. *Science Advances* 4 (11): eaat1869; DOI: 10.1126/sciadv.aat1869

Grassi, G., J. House, W.A. Kurz, A. Cescatti, R.A. Houghton, G.P. Peters, M.J. Sanz6, R.A. Viñas, R. Alkama, A. Arneth, A. Bondeau, F. Dentener, M. Fader, S. Federici, P. Friedlingstein, A.K. Jain, E. Kato, C.D. Koven, D. Lee, J.E.M.S. Nabel, A.A. Nassikas, L. Perugini, S. Rossi, S. Sitch, N. Viovy, A. Wiltshire and S. Zaehle. 2018. Reconciling global-model estimates and country reporting of anthropogenic forest CO<sub>2</sub> sinks. *Nature Climate Change* 8(10):914-920.

Houghton, R.A. 2018. Interactions between land-use change and climate-carbon cycle feedbacks. *Current Climate Change Reports*, 4(2):115-127.

Houghton, R.A., and A.A. Nassikas. 2018. Negative emissions from stopping deforestation and forest degradation, globally. *Global Change Biology* 24:350-359.

Houghton, R.A., A. Baccini, and W.S. Walker. 2018. Where is the residual terrestrial carbon sink? *Global Change Biology* 24:3277-3279.

Le Quéré, C., Andrew, R. M., Friedlingstein, P., Sitch, S., Pongratz, J., Manning, A. C., Korsbakken, J. I., Peters, G. P., Canadell, J. G., Jackson, R. B., Boden, T. A., Tans, P. P., Andrews, O. D., Arora, V. K., Bakker, D. C. E., Barbero, L., Becker, M., Betts, R. A., Bopp, L., Chevallier, F., Chini, L. P., Ciais, P., Cosca, C. E., Cross, J., Currie, K., Gasser, T., Harris, I., Hauck, J., Haverd, V., Houghton, R. A., Hunt, C. W., Hurtt, G., Ilyina, T., Jain, A. K., Kato, E., Kautz, M., Keeling, R. F., Klein Goldewijk, K., Körtzinger, A., Landschützer, P., Lefèvre, N., Lenton, A., Lienert, S., Lima, I., Lombardozzi, D., Metzl, N., Millero, F., Monteiro, P. M. S., Munro, D. R., Nabel, J. E. M. S., Nakaoka, S.-I., Nojiri, Y., Padin, X. A., Peregon, A., Pfeil, B., Pierrot, D., Poulter, B., Rehder, G., Reimer, J., Rödenbeck, C., Schwinger, J., Séférian, R., Skjelvan, I., Stocker, B. D., Tian, H., Tilbrook, B., Tubiello, F. N., van der Laan-Luijkx, I. T., van der Werf, G. R., van Heuven, S., Viovy, N., Vuichard, N., Walker, A. P., Watson, A. J., Wiltshire, A. J., Zaehle, S., and Zhu, D.: Global Carbon Budget 2017, *Earth Syst. Sci. Data* 10:405-448; <https://doi.org/10.5194/essd-10-405-2018>, 2018.

Le Quéré, C., Andrew, R. M., Friedlingstein, P., Sitch, S., Hauck, J., Pongratz, J., Pickers, P. A., Korsbakken, J. I., Peters, G. P., Canadell, J. G., Arneeth, A., Arora, V. K., Barbero, L., Bastos, A., Bopp, L., Chevallier, F., Chini, L. P., Ciais, P., Doney, S. C., Gkritzalis, T., Goll, D. S., Harris, I., Haverd, V., Hoffman, F. M., Hoppema, M., Houghton, R. A., Hurtt, G., Ilyina, T., Jain, A. K., Johannessen, T., Jones, C. D., Kato, E., Keeling, R. F., Goldewijk, K. K., Landschützer, P., Lefèvre, N., Lienert, S., Liu, Z., Lombardozzi, D., Metzl, N., Munro, D. R., Nabel, J. E. M. S., Nakaoka, S.-I., Neill, C., Olsen, A., Ono, T., Patra, P., Peregon, A., Peters, W., Peylin, P., Pfeil, B., Pierrot, D., Poulter, B., Rehder, G., Resplandy, L., Robertson, E., Rocher, M., Rödenbeck, C., Schuster, U., Schwinger, J., Séférian, R., Skjelvan, I., Steinhoff, T., Sutton, A., Tans, P. P., Tian, H., Tilbrook, B., Tubiello, F. N., van der Laan-Luijkx, I. T., van der Werf, G. R., Viovy, N., Walker, A. P., Wiltshire, A. J., Wright, R., Zaehle, S., and Zheng, B.: Global Carbon Budget 2018. *Earth Syst. Sci. Data*, 10: 2141-2194; <https://doi.org/10.5194/essd-10-2141-2018>, 2018.

Li, W., N. MacBean, P. Ciais, P. Defourny, C. Lamarche, S. Bontemps, R.A. Houghton, and S. Peng. 2018. Gross and net land cover changes in the main plant functional types derived from the annual ESA CCI land cover maps (1992–2015). *Earth Syst. Sci. Data* 10:219-234; <https://doi.org/10.5194/essd-10-219-2018>

Piao, S., Huang, M., Liu, Z., Wang, X., Ciais, P., Canadell, J.G., Wang, K., Bastos, A., Friedlingstein, P., Houghton, R.A. and Le Quéré, C., 2018. Lower land-use emissions responsible for increased net land carbon sink during the slow warming period. *Nature Geoscience*, 11(10):739.

Watson, J.E.M., T. Evans, O. Venter, B. Williams, A. Tulloch, C. Stewart, I. Thompson, J.C. Ray, K. Murray, A. Salazar, C. McAlpine, P. Potapov, J. Walston, J.G. Robinson, M. Painter, D. Wilkie, C. Filardi, W.F. Laurance, R.A. Houghton, S. Maxwell, H. Grantham, C. Samper, S. Wang, L. Laestadius, R.K. Runting, G.A. Silva-Chavez, J. Ervin and D. Lindenmayer. 2018. The exceptional value of intact forest ecosystems. *Nature Ecology and Evolution*.

## In press

Chao, Y., P. Ciais, R.A. Houghton, A.A. Nassikas.

S.C. Cook-Patton et al.

Jeon, S.-B., P. Olofsson, R.A. Houghton, F. Zhao, X. Yang, and C.E. Woodcock. The effect of historical land use and recent deforestation on the terrestrial carbon budget of New England. *Forest Ecology and Management*.

Sample et al. Forest carbon conservation and management: integration with multiple resource values and ecosystem services. *Journal of Forestry*

Schimel et al. Bulletin of the American Meteorology Society

Schwalm et al.