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## **CURRICULUM VITAE**

Born, 1949 in Bern, Switzerland

- 1978 Diploma Degree in Physics, University of Bern, Switzerland
- 1982 Ph.D. in Physics, University of Bern, Switzerland
- 1982 Research Assistant, Scripps Institution of Oceanography, UCSD, La Jolla, U.S.A.
- 1985 Senior Research Scientist and Workgroup Leader, Max-Planck-Institute for Meteorology, Hamburg, Germany
- 1998 Research Group Leader (C3) at Max-Planck-Institute for Biogeochemistry, Jena, Germany
- 2003 Director, Department of Biogeochemical Systems, Max-Planck-Institute for Biogeochemistry, Jena, Germany
- 2004/6 Managing Director, Max-Planck-Institute for Biogeochemistry, Jena, Germany
- 2008/10 Managing Director, Max-Planck-Institute for Biogeochemistry, Jena, Germany
- 2013/14 Managing Director, Max-Planck-Institute for Biogeochemistry, Jena, Germany
- 2013/18 Visiting guest professor, University of Helsinki, Finland

## **ACADEMICS**

- 1998 Member of the Academia Europaea
- 2003 Scientific Member of the Max-Planck-Society for the Advancement of the Sciences
- 2004 Call for Full Professorship (C4) at University of Kiel, Germany (declined)
- 2005 Honorary Professorship at the Friedrich-Schiller-University of Jena
- 2013 Guest Professorship, University of Helsinki, Finland

## **AWARDS**

- 2006 Heinrich-Greinacher-Preis, Heinrich-Greinacher-Stiftung, University of Bern, Switzerland
- 2007 Contribution to the Nobel Peace Prize for IPCC

## **EDITORIAL WORK**

- Review Editor of "Science" (2000-)
- Editor of "Atmospheric Chemistry and Physics (ACP)" of the European Geosciences Union.
- Associate editor "Global Biogeochemical Cycles" (2003-2006)
- Editor of "Carbon Balance and Management" (2005-)
- Editor of "Earth System Dynamics (ESD)" of the European Geosciences Union.

## **SELECTED RESEARCH COMMITTEES, OTHER SCIENTIFIC ACTIVITIES**

- Member of the Task Force on Global Analysis, Integration and Modelling (GAIM) of the International Geosphere-Biosphere Programme, 1992-2000.
- Director NATO Advanced Study Institute "The Global Carbon Cycle" in Il Ciocco, Italy, September 8-20, 1992.
- Coordinator of European Study of Carbon in the Ocean, Biosphere and Atmosphere (ESCOBA), funded by the Environmental Program of the European Communities (1993-1999).
- Member of scientific advisory board of the national French climate research programme (PNEDC).
- Member of the scientific advisory board of the "Centre des faibles Radioactivités (CFR) - Laboratoire de la Modélisation du Climat et de l'Environnement" in Gif-sur-Yvette, France.
- Member of panel of coordinators on modelling biogeochemical cycles of the climate research program of the German ministry for education and science (BMBF), (1996-1998).
- Elected member of the Chemical-Physical-Technological Section (CPT) of the Max-Planck-Society (1992-1995).
- Intergovernmental Panel on Climate Change (IPCC): Lead author in the reports of 1994, 1995, 2000, 2007, and 2013.
- Coordinator of the Carbon Cycle Model Linkage Project (CCMLP) funded by the U.S. Electric Power Research Institute (1993-2002).
- Coordinator of "Eurosiberian Carbonflux", funded by the Environmental Program of the European Communities (1998-2000).
- Co-director IGBP-GAIM-IGAC "Spring School and Workshop on Inverse Modeling of Global Biogeochemical Cycles", Heraklion, Crete, March 16-20, 1998.
- Member of the steering committee of the "CarboEurope" project cluster of the European commission (1999-2003).
- Member of the Scientific Advisory Group for Greenhouse Gas Measurements of the Global Atmosphere Watch Program of the World Meteorological Organization (1999-2008).
- Member of Scientific Advisory Board of the Institut für Meereskunde, Kiel (2000-2002).
- Member of Scientific Advisory Board of the Alfred Wegener Institute, Bremerhaven (2001-2009).
- Coordinator of "Terrestrial Carbon Observing System – Siberia", funded by the 5<sup>th</sup> Framework Programme of the European Commission (2002-2005).
- Member of the design team for Terrestrial Carbon Observations (TCO) of the Integrated Global Observing Strategy partnership (IGOS).
- Member of the German National Council for the Scientific Committee on Problems of the Environment (SCOPE).
- Member of the "Wissenschaftlicher Lenkungsausschuss" (Scientific Steering Committee) of the German Climate Computing Center (DKRZ) (2003-), Chair: 2007-2008.
- Member of the scientific steering committee of the German COSMOS project (development of a comprehensive coupled earth system model) (2003-2011).
- Member of the scientific executive committee of the CarboEurope integrated project funded by the 6<sup>th</sup> Framework Programme of European Commission (2004-2008).
- Member of the scientific advisory panel of the Centro Euro-Mediterraneo per i Cambiamenti Climatici, Lecce, Italy (2007-2011).
- Member of the scientific advisory panel of the Center for Studies of Carbon Cycle and Climate Interactions at the Lund University, Lund, Sweden (2009-).
- Conference Chair, 8<sup>th</sup> International Carbon Dioxide Conference, September 14-18, 2009.
- National Focal Point Germany Integrated Carbon Observation System (ICOS, 2010-2012).
- Co-Chair of working group "Biogeochemical Data Assimilation" of the International Space Science Institute (Bern, Switzerland), 2013-2015, and of the Autumn School on Biogeochemical Data Assimilation, Trieste, Italy, 2014.
- Jury member of the BBVA Foundation for the Frontiers of Knowledge Awards (2015-).
- Member of the Scientific Advisory Board of the Otto-Schmidt Laboratory, Saint-Petersburg, Russia (2016-).

## PUBLICATIONS

1. Heimann, M., 1978. **Beiträge zur Technik des Low Level Counting**. Diploma Thesis Part 1, University of Bern, Switzerland.
2. Heimann, M., 1978. **Über ein geophysikalisches Modell des globalen Kohlenstoffkreislaufs**. Diploma Thesis Part 2, University of Bern, Switzerland.
3. Siegenthaler, U., Heimann, M., and Oeschger, H., 1978. Model responses of the atmospheric CO<sub>2</sub> level and <sup>13</sup>C/<sup>12</sup>C ratio to biogenic CO<sub>2</sub> input. In: Williams, J. (Ed.), **Carbon dioxide, climate and society**. Pergamon Press, Oxford.
4. Loosli, H. H., Heimann, M., and Oeschger, H., 1980. Low-Level Gas Proportional Counting in an Underground Laboratory. **Radiocarbon** 22, 461-469.
5. Oeschger, H., Siegenthaler, U., and Heimann, M., 1980. The carbon cycle and its perturbation by man. In: Bach, W., Pankrath, J., and Williams, J. Eds.), **Interactions of Energy and Climate**. Reidel, Dordrecht.
6. Siegenthaler, U., Heimann, M., and Oeschger, H., 1980. 14C Variations Caused by Changes in the Global Carbon-Cycle. **Radiocarbon** 22, 177-191.
7. Heimann, M., Kamber, D., Oeschger, H., and Siegenthaler, U., 1981. Das globale Kohlenstoffsystem: Reservoirs und Flüsse. **Auswirkungen von CO<sub>2</sub>-Emissionen auf das Klima**, Band 1. Batelle-Institut, Frankfurt am Main.
8. Oeschger, H. and Heimann, M., 1981. Modelle des globalen Kohlenstoffsystems. **Auswirkungen von CO<sub>2</sub>-Emissionen auf das Klima**, Band 1. Batelle-Institut, Frankfurt am Main.
9. Heimann, M. 1982. **Modellstudien zum Verhalten des CO<sub>2</sub> und 14C in der Atmosphäre**. PhD Thesis, University of Bern, Switzerland.
10. Oeschger, H. and Heimann, M., 1983. Uncertainties of Predictions of Future Atmospheric CO<sub>2</sub> Concentrations. **Journal of Geophysical Research-Oceans and Atmospheres** 88, 1258-1262.
11. Heimann, M. and Keeling, C. D., 1986. Meridional Eddy Diffusion-Model of the Transport of Atmospheric Carbon-Dioxide 1. Seasonal Carbon-Cycle over the Tropical Pacific-Ocean. **Journal of Geophysical Research-Atmospheres** 91, 7765-7781.
12. Heimann, M., Keeling, C. D., and Fung, I. Y., 1986. Simulating the Atmospheric Carbon Dioxide Distribution with a Three-Dimensional Tracer Model. In: Trabalka, J. R. and Reichle, D. E. Eds.), **The Changing Carbon Cycle: A Global Analysis**. Springer Verlag, New York.
13. Keeling, C. D. and Heimann, M., 1986. Meridional Eddy Diffusion-Model of the Transport of Atmospheric Carbon-Dioxide 2. Mean Annual Carbon-Cycle. **Journal of Geophysical Research-Atmospheres** 91, 7782-7796.
14. Heimann, M., 1989. L'effet de serre., Réactions des êtres vivants aux changements de l'environnement, **Actes des Journées de l'Environnement** du C.N.R.S., 30 Novembre - 1er Décembre 1989, Programme Interdisciplinaire de Recherche sur l'Environnement, Paris.
15. Heimann, M. and Keeling, C. D., 1989. A three dimensional model of atmospheric CO<sub>2</sub> transport based on observed winds: 2. Model description and simulated tracer experiments. In: Peterson, D. H. (Ed.), **Aspects of Climate Variability in the Pacific and the Western Americas. Geophysical Monograph** 55, AGU, Washington.
16. Heimann, M., Keeling, C. D., and Tucker, C. J., 1989. A three dimensional model of atmospheric CO<sub>2</sub> transport based on observed winds: 3. Seasonal cycle and synoptic time scale variations. In: Peterson, D. H. (Ed.), **Aspects of Climate Variability in the Pacific and the Western Americas. Geophysical Monograph** 55, AGU, Washington.
17. Heimann, M. and Monfray, P., 1989. Spatial and temporal variation of the gas exchange coefficient for CO<sub>2</sub>: 1. Data analysis and global validation. **Max-Planck-Institute for Meteorology Report** No. 31, Hamburg.
18. Keeling, C. D., Bacastow, R. B., Carter, A. F., Piper, S. C., Whorf, T. P., Heimann, M., Mook, W. G., and Roeloffzen, H., 1989. A three dimensional model of atmospheric CO<sub>2</sub> transport based on observed winds: 1. Analysis of observational data. In: Peterson, D. H. (Ed.), **Aspects of Climate Variability in the Pacific and the Western Americas. Geophysical Monograph** 55, AGU, Washington.
19. Keeling, C. D., Piper, S. C., and Heimann, M., 1989. A three dimensional model of atmospheric CO<sub>2</sub> transport based on observed winds: 4. Mean annual gradients and interannual variations. In: Peterson, D. H. (Ed.), **Aspects of Climate Variability in the Pacific and the Western Americas. Geophysical Monograph** 55, AGU, Washington.

20. Heimann, M. and Feichter, J., 1990. A comparison of three-dimensional atmospheric transport models by means of simulations of Radon-222. **Glomac Report No. 2**. Meteorologisches Institut, Universität Hamburg, Hamburg.
21. Heimann, M., Monfray, P., and Polian, G., 1990. Modeling the long-range transport of Rn-222 to subantarctic and antarctic areas. **Tellus** 42B, 83-99.
22. Brost, R. A., Feichter, J., and Heimann, M., 1991. 3-Dimensional Simulation of Be-7 in a Global Climate Model. **Journal of Geophysical Research-Atmospheres** 96, 22423-22445.
23. Brost, R. A. and Heimann, M., 1991. The Effect of the Global Background on a Synoptic-Scale Simulation of Tracer Concentration. **Journal of Geophysical Research-Atmospheres** 96, 15415-15425.
24. Brost, R. A. and Heimann, M., 1991. Parametrization of cloud transport of trace species in global 3-D models. In: van Dop, H. (Ed.), **Proceedings of 18th international technical meeting on air pollution modelling and its application**. Plenum, New York.
25. Feichter, J., Brost, R. A., and Heimann, M., 1991. 3-Dimensional Modeling of the Concentration and Deposition of Pb-210 Aerosols. **Journal of Geophysical Research-Atmospheres** 96, 22447-22460.
26. Heimann, M., 1993. The global carbon cycle in the climate system. In: Willebrand, J. and Anderson, D. A. Eds.), **Modelling oceanic climate interactions**. Springer Verlag, Heidelberg.
27. Hoffmann, G. and Heimann, M., 1993. Water tracers in the ECHAM general circulation model., Proceedings of the International Symposium in **Studying Past and Current Environmental Changes in the Hydrosphere and the Atmosphere**, IAEA, April 19-23, Vienna, Austria, IAEA-SM-329/7.
28. Enting, I. G., Wigley, T. M., and Heimann, M., 1994. Future emissions and concentrations of carbon dioxide: Key ocean / atmosphere / land analyses. **Division of Atmospheric Research Technical Paper No. 31**. CSIRO, Australia.
29. Heimann, M., 1994. Modelling the global carbon cycle. In: Speranza, A., Tibaldi, S., and Fantechi, R. Eds.), **Global Change**, proceedings of the first Demetra meeting held at Chianciano Terme, Italy, from 28 to 31 October 1991, European Commission, EUR 15158 EN.
30. Hein, R. and Heimann, M., 1994. Determination of global scale emissions of atmospheric methane using an inverse modelling method. In: van Ham, J., et al (Ed.), **Non-CO2 Greenhouse Gases**. Kluwer, The Netherlands.
31. Heshshaimer, V., Heimann, M., and Levin, I., 1994. Radiocarbon Evidence for a Smaller Oceanic Carbon-Dioxide Sink Than Previously Believed. **Nature** 370, 201-203.
32. Kaduk, J. and Heimann, M., 1994. The Climate Sensitivity of the Osnabruck-Biosphere-Model on the Enso Time-Scale. **Ecological Modelling** 75, 239-256.
33. Winguth, A. M. E., Heimann, M., Kurz, K. D., Maier-Reimer, E., Mikolajewicz, U., and Segschneider, J., 1994. El-Nino-Southern Oscillation Related Fluctuations of the Marine Carbon-Cycle. **Global Biogeochemical Cycles** 8, 39-63.
34. Heimann, M., 1995. Dynamics of the global carbon cycle. **Nature**, News and Views, 629-630.
35. Heimann, M., 1995. The TM2 tracer model, model description and user manual. **Technical Report No. 10**, ISSN 0940-9327. Deutsches Klimarechenzentrum, Hamburg.
36. Knorr, W. and Heimann, M., 1995. Impact of Drought Stress and Other Factors on Seasonal Land Biosphere CO<sub>2</sub> Exchange Studied through an Atmospheric Tracer Transport Model. **Tellus Series B-Chemical and Physical Meteorology** 47, 471-489.
37. Rehfeld, S. and Heimann, M., 1995. Three dimensional atmospheric transport simulation of the radioactive tracers Pb-210, Be-7, Be-10, and Sr-90. **Journal of Geophysical Research-Atmospheres** 100, 26141-26161.
38. Schimel, D. S., Enting, I. G., Heimann, M., Wigley, T., Raynaud, D., Alves, D., and Siegenthaler, U., 1995. The global carbon cycle. In: Houghton, J. (Ed.), **The global carbon cycle. Radiative forcing of climate change**, Report to IPCC from the Scientific Assessment Working Group (WGI). Cambridge University Press, Cambridge.
39. Heimann, M., 1996. Die Bedeutung von Verkehrsemissionen für das Klima. In: Barz, W., Brinkmann, B., and Ewers, H.-J. Eds.), **Umwelt und Verkehr**, Zentrum für Umweltforschung der Westfälischen Wilhelms-Universität, Heft 6 (ISBN 3-609-69390-8). Ecomed, Landsberg.
40. Heimann, M., 1996. Closing the atmospheric CO<sub>2</sub> budget: Inferences from new measurements of <sup>13</sup>C/<sup>12</sup>C and O<sub>2</sub>/N<sub>2</sub> ratios. **Global Change Newsletter**, IGBP, Stockholm 28, 9-11.
41. Heimann, M. and Maier-Reimer, E., 1996. On the relations between the oceanic uptake of carbon dioxide and its carbon isotopes. **Global Biogeochemical Cycles** 10, 89-110.

42. Kaduk, J. and Heimann, M., 1996. A prognostic phenology scheme for global terrestrial carbon cycle models. **Climate Research** 6, 1-19.
43. Kaminski, T., Giering, R., and Heimann, M., 1996. Sensitivity of the seasonal cycle of CO<sub>2</sub> at remote monitoring stations with respect to seasonal surface exchange fluxes determined with the adjoint of an atmospheric transport model. **Physics and Chemistry of the Earth** 21, 457-462.
44. Keeling, R. F., Piper, S. C., and Heimann, M., 1996. Global and hemispheric CO<sub>2</sub> sinks deduced from changes in atmospheric O<sub>2</sub> concentration. **Nature** 381, 218-221.
45. Kleidon, A. and Heimann, M., 1996. Simulating root carbon storage with a coupled carbon-water cycle root model. **Physics and Chemistry of the Earth** 21, 499-502.
46. Law, R. M., Rayner, P. J., Denning, A. S., Erickson, D., Fung, I. Y., Heimann, M., Piper, S. C., Ramonet, M., Taguchi, S., Taylor, J. A., Trudinger, C. M., and Wattersson, I. G., 1996. Variations in modeled atmospheric transport of carbon dioxide and the consequences for CO<sub>2</sub> inversions. **Global Biogeochemical Cycles** 10, 783-796.
47. Schimel, D. S., Alves, D., Enting, I. G., Heimann, M., Joos, F., Raynaud, D., Wigley, T., Prather, M., Derwent, R., Ehhalt, D., Fraser, P., Sanhueza, E., Zhou, X., Jonas, P., Charlson, R., Rodhe, H., Sadasivan, S., Shine, K. P., Fouquart, Y., Ramaswamy, V., Solomon, S., Srinivasan, J., Albritton, D., Derwent, R., Isaksen, I., Lal, M., and Wuebbles, D., 1996. Radiative forcing of climate change. In: Houghton, J. (Ed.), **Climate Change 1995: The Science of Climate Change**. Cambridge University Press, Cambridge.
48. Walter, B. P., Heimann, M., Shannon, R. D., and White, J. R., 1996. A process-based model to derive methane emissions from natural wetlands. **Geophysical Research Letters** 23, 3731-3734.
49. Ciais, P., Denning, A. S., Tans, P. P., Berry, J. A., Randall, D. A., Collatz, G. J., Sellers, P. J., White, J. W. C., Trolier, M., Meijer, H. A. J., Francey, R. J., Monfray, P., and Heimann, M., 1997. A three-dimensional synthesis study of delta O-18 in atmospheric CO<sub>2</sub> .1. Surface fluxes. **Journal of Geophysical Research-Atmospheres** 102, 5857-5872.
50. Ciais, P., Tans, P. P., Denning, A. S., Francey, R. J., Trolier, M., Meijer, H. A. J., White, J. W. C., Berry, J. A., Randall, D. A., Collatz, G. J., Sellers, P. J., Monfray, P., and Heimann, M., 1997. A three-dimensional synthesis study of delta O-18 in atmospheric CO<sub>2</sub> .2. Simulations with the TM2 transport model. **Journal of Geophysical Research-Atmospheres** 102, 5873-5883.
51. Heimann, M., 1997. A review of the contemporary global carbon cycle and as seen a century ago by Arrhenius and Høgbom. **Ambio** 26, 17-24.
52. Heimann, M., 1997. Modellierung des Kohlenstoffkreislaufs im Industriezeitalter. In: Gehr, P., et al. (Ed.), **CO<sub>2</sub> - eine Herausforderung für die Menschheit**. Springer, Berlin.
53. Hein, R., Crutzen, P. J., and Heimann, M., 1997. An inverse modeling approach to investigate the global atmospheric methane cycle. **Global Biogeochemical Cycles** 11, 43-76.
54. Hoffmann, G. and Heimann, M., 1997. Water isotope modeling in the Asian monsoon region. **Quaternary International** 37, 115-128.
55. Kaduk, J. and Heimann, M., 1997. Assessing the climate sensitivity of the global terrestrial carbon cycle model SILVAN. **Physics and Chemistry of the Earth** 21, 529-535.
56. Heimann, M., Esser, G., Haxeltine, A., Kaduk, J., Kicklighter, D. W., Knorr, W., Kohlmaier, G. H., McGuire, A. D., Melillo, J., Moore, B., Otto, R. D., Prentice, I. C., Sauf, W., Schloss, A., Sitch, S., Wittenberg, U., and Wurth, G., 1998. Evaluation of terrestrial Carbon Cycle models through simulations of the seasonal cycle of atmospheric CO<sub>2</sub>: First results of a model intercomparison study. **Global Biogeochemical Cycles** 12, 1-24.
57. Hoffmann, G., Werner, M., and Heimann, M., 1998. Water isotope module of the ECHAM atmospheric general circulation model: A study on timescales from days to several years. **Journal of Geophysical Research-Atmospheres** 103, 16871-16896.
58. Keeling, R. F., Stephens, B. B., Najjar, R. G., Doney, S. C., Archer, D., and Heimann, M., 1998. Seasonal variations in the atmospheric O<sub>2</sub>/N<sub>2</sub> ratio in relation to the kinetics of air-sea gas exchange. **Global Biogeochemical Cycles** 12, 141-163.
59. Kleidon, A. and Heimann, M., 1998. A method of determining rooting depth from a terrestrial biosphere model and its impacts on the global water and carbon cycle. **Global Change Biology** 4, 275-286.
60. Kleidon, A. and Heimann, M., 1998. Optimised rooting depth and its impacts on the simulated climate of an Atmospheric General Circulation Model. **Geophysical Research Letters** 25, 345-348.
61. Schulze, E. D. and Heimann, M., 1998. Carbon and water exchange of terrestrial systems. In: Galloway, J. N. and Melillo, J. Eds.), **Asian change in the context of global climate change**. Cambridge University Press, Cambridge.

62. Steffen, W., Noble, I., Canadell, J., Apps, M., Schulze, E. D., Jarvis, P. G., Baldocchi, D., Ciais, P., Cramer, W., Ehleringer, J., Farquhar, G., Field, C. B., Ghazi, A., Gifford, R., Heimann, M., Houghton, R., Kabat, P., Korner, C., Lambin, E., Linder, S., Mooney, H. A., Murdiyarso, D., Post, W. M., Prentice, I. C., Raupach, M. R., Schimel, D. S., Shvidenko, A., Valentini, R., and Terrestrial Carbon Working, G., 1998. The terrestrial carbon cycle: Implications for the Kyoto Protocol. **Science** 280, 1393-1394.
63. Stephens, B. B., Keeling, R. F., Heimann, M., Six, K. D., Murnane, R., and Caldeira, K., 1998. Testing global ocean carbon cycle models using measurements of atmospheric O<sub>2</sub> and CO<sub>2</sub> concentration. **Global Biogeochemical Cycles** 12, 213-230.
64. Wittenberg, U., Heimann, M., Esser, G., McGuire, A. D., and Sauf, W., 1998. On the influence of biomass burning on the seasonal CO<sub>2</sub> signal as observed at monitoring stations. **Global Biogeochemical Cycles** 12, 531-544.
65. Balkanski, Y., Monfray, P., Battle, M., and Heimann, M., 1999. Ocean primary production derived from satellite data: An evaluation with atmospheric oxygen measurements. **Global Biogeochemical Cycles** 13, 257-271.
66. Denning, A. S., Holzer, M., Gurney, K. R., Heimann, M., Law, R. M., Rayner, P. J., Fung, I. Y., Fan, S. M., Taguchi, S., Friedlingstein, P., Balkanski, Y., Taylor, J., Maiss, M., and Levin, I., 1999. Three-dimensional transport and concentration of SF<sub>6</sub> - A model intercomparison study (TransCom 2). **Tellus Series B-Chemical and Physical Meteorology** 51, 266-297.
67. Heimann, M., Ciais, P., and Dedieu, G., 1999. **ESCOBA - A European multidisciplinary study of the global carbon cycle in ocean, atmosphere and biosphere - Synthesis report** (ISBN 92-828-5070-6). European Commission, Luxembourg.
68. Heimann, M. and Kaminski, T., 1999. Inverse modelling approaches to infer surface trace gas fluxes from observed atmospheric mixing ratios. In: Bowman, A. F. (Ed.), **Approaches to scaling of trace gas fluxes in ecosystems**. Elsevier, Amsterdam.
69. Heimann, M., Weber, C., Duinker, J. C., Körtzinger, A., Mintrop, L., Buchmann, N., Schulze, E. D., Hein, M., Bondeau, A., Cramer, W., Lindner, M., and Esser, G., 1999. **Natürliche Senken und Quellen des atmosphärischen Kohlendioxides: Stand des Wissens und Optionen des Handelns**. Report des Max-Planck-Institut für Meteorologie, No. 287 (ISSN 09371060). Max-Planck-Institut für Meteorologie, Hamburg.
70. Houweling, S., Kaminski, T., Dentener, F., Lelieveld, J., and Heimann, M., 1999. Inverse modeling of methane sources and sinks using the adjoint of a global transport model. **Journal of Geophysical Research-Atmospheres** 104, 26137-26160.
71. Kaminski, T., Heimann, M., and Giering, R., 1999. A coarse grid three-dimensional global inverse model of the atmospheric transport - 1. Adjoint model and Jacobian matrix. **Journal of Geophysical Research-Atmospheres** 104, 18535-18553.
72. Kaminski, T., Heimann, M., and Giering, R., 1999. A coarse grid three-dimensional global inverse model of the atmospheric transport - 2. Inversion of the transport of CO<sub>2</sub> in the 1980s. **Journal of Geophysical Research-Atmospheres** 104, 18555-18581.
73. Kicklighter, D. W., Bruno, M., Donges, S., Esser, G., Heimann, M., Helfrich, J., Ift, F., Joos, F., Kaduk, J., Kohlmaier, G. H., McGuire, A. D., Melillo, J. M., Meyer, R., Nadler, A., Prentice, I. C., Sauf, W., Schloss, A. L., Sitch, S., Wittenberg, U., and Wurth, G., 1999. A first-order analysis of the potential role of CO<sub>2</sub> fertilization to affect the global carbon budget: a comparison of four terrestrial biosphere models. **Tellus Series B-Chemical and Physical Meteorology** 51, 343-366.
74. Kleidon, A. and Heimann, M., 1999. Deep-rooted vegetation, Amazonian deforestation, and climate: results from a modelling study. **Global Ecology and Biogeography** 8, 397-405.
75. Meyer, R., Joos, F., Esser, G., Heimann, M., Hooss, G., Kohlmaier, G., Sauf, W., Voss, R., and Wittenberg, U., 1999. The substitution of high-resolution terrestrial biosphere models and carbon sequestration in response to changing CO<sub>2</sub> and climate. **Global Biogeochemical Cycles** 13, 785-802.
76. Nemry, B., Francois, L., Gerard, J. C., Bondeau, A., Heimann, M., and Participants Potsdam, N. P. P. M. I., 1999. Comparing global models of terrestrial net primary productivity (NPP): analysis of the seasonal atmospheric CO<sub>2</sub> signal. **Global Change Biology** 5, 65-76.
77. von Storch, H., Güss, S., and Heimann, M., 1999. **Modellierung des Klimasystems; Eine Einführung in Funktionsweise, Anwendungen und Grenzen von konzeptionellen und realitätsnahen Modellen**. Springer Verlag, Berlin, Heidelberg.
78. Bergamaschi, P., Hein, R., Heimann, M., and Crutzen, P. J., 2000. Inverse modeling of the global CO cycle 1. Inversion of CO mixing ratios. **Journal of Geophysical Research-Atmospheres** 105, 1909-1927.

79. Heimann, M., 2000. Biogeochemische Spurenstoffkreisläufe im Klimasystem. In: Guderian (Ed.), **Handbuch der Umweltveränderungen und Ökotoxikologie, Band I: Atmosphäre**. Springer Verlag.
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81. Kasibhatla, P., Heimann, M., Hartley, D., Rayner, P. J., Mahowald, N., and Prinn, R., 2000. Inverse Methods in Global Biogeochemical Cycles. **Geophysical Monograph** 114. American Geophysical Union, Washington D.C.
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