Christian Werner

CURRICULUM VITÆ

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Personal details

born 9th of May 1976 in Würzburg, marital status: single
German citizenship

University

2007 **PhD**, *University of Freiburg*, grade: summa cum laude.
Thesis: Computation of a global N_2O emission inventory for tropical rainforest soils using a detailed biogeochemical model, [download]

2003 **Dipl. Geogr.**, *University of Würzburg*, grade: 1.0, minors: geology & botany.
Thesis: Erstellung eines N-Spurengas-Emissionskatasters für land- und forstwirtschaftlich genutzte Böden der Bundesrepublik Deutschland

2000 **B.A. Geogr.**, *University of Queensland*, Brisbane, Australia.

Scientific career

2011 – today **Research Associate**, *Senckenberg Biodiversity and Climate Research Centre (BiK-F)*, Frankfurt.
Development of advanced biogeochemical models and dynamic vegetation models; uncertainty analysis and calibration of complex models using Bayesian methods; modeling of C and N cycles and associated greenhouse gas emissions (GHG); analysis of GHG mitigation options in agricultural systems; spatial data analysis, geographic information systems and remote sensing; scientific modeling

2007 – 2010 **Post-Doc**, *IMK-IFU, Karlsruhe Institute of Technology*, Garmisch-Partenkirchen.
Process-based modeling of the soil-atmosphere trace-gas exchange at the local, regional and global scale; development of emission inventories; field and lab measurement of trace gas emissions; model development; data mining

Awards

2007 **PhD thesis**, *Elsa & Walter Hermann Award: best thesis*, Karlsruhe Institute of Technology.

2003 **Diploma thesis**, *Best thesis*, IMK-IFU, Karlsruhe Institute of Technology.

2003 **Diploma**, *Karl Sapper Award*, University of Würzburg.

Teaching

2018 **Ecology of global change**, *Seminar*, Goethe University Frankfurt.

2018 **Remote sensing for global ecology**, *Excercises*, Goethe University Frankfurt.

2017 **Introduction to Dynamic Vegetation Modeling**, *Workshop*, GFZ Potsdam.

2017 **Remote sensing for global ecology**, *Excercises*, Goethe University Frankfurt.

2016 **Remote sensing for global ecology**, *Excercises*, Goethe University Frankfurt.

2015 **Remote sensing for global ecology**, *Excercises*, Goethe University Frankfurt.

2015 **Capacity building: Data handling and analysis for GHG inventories**, *Workshop*, Karlsruhe Institute of Technology.

2014 **Remote sensing for global ecology**, *Excercises*, Goethe University Frankfurt.

2014 **Ecology of global change (indiv. appointments)**, *Seminar*, Goethe University Frankfurt.

2013 **Ecology of global change (indiv. appointments)**, *Seminar*, Goethe University Frankfurt.

2000 **Data analysis using IDRISI GIS**, *Excercises*, University of Queensland, Brisbane, Australia.

Current and previous projects

2016 - today **BioScapes I: Coupled modeling of Climate, Dynamic Vegetation, and Surface Processes from the Last Glacial Maximum to Present - EarthShape: Earth Surface Shaping by Biota**, *German Science Foundation (DFG) SPP 1803*, R.A.

2015 **Assessment of GHG emissions and identification of mitigation options for agricultural soils of Vietnam funded by the CRP Climate Change Agriculture and Food security**, *ILRI, Kenya*, Co-PI.

2013 – 2015 **FACE model data inter-comparison project**, *ORNL, USA*, R.A.

2013 **COST Large-scale modeling of forest disturbance and age dynamics**, R.A.

2013 **Integration of Global Physical Environmental Data for Determination of Greenhouse Gas Hotspots**, *ILRI, Kenya*, PI.

2009 – 2012 **N trace gas emissions from tropical savanna ecosystems and responses to global changes**, *German Science Foundation (DFG)*, PI.

2007 – 2011 **NitroEurope IP - The nitrogen cycle and its influence on the European greenhouse gas balance**, *European Union*, R.A.

2010 **Simulation of N trace gas emissions from tropical savanna ecosystems - Feasibility Studies of Young Scientists 2009**, *Karlsruhe Institute of Technology*, PI.

2007 – 2009 **Anthropogene N_2O-Emissionen aus landwirtschaftlich genutzten Böden im Bundesland Sachsen (LfULG-Verbundvorhaben Berücksichtigung von Umweltaspekten beim Biomasseanbau")**, *Saxon State Ministry of the Environment and Agriculture*, member.

2003 **Anthropogene N_2O-Emissionen aus land- und forstwirtschaftlich genutzten Böden (FE 20012257)**, *Federal Environmental Agency (UBA)*, member.

Publications

Submitted peer-review articles

[1] Walker, A. P., De Kauwe, M., Medlyn, B., Zaehle, S., Iversen, C., Asao, S., Guenet, B., Harper, A., Hickler, T., Hungate, B., Jain, A., Luo, Y., Lu, X., Lu, M., Luus, K., Megonigal, J., Oren, R., Shu, S., Talhelm, A., Wang, Y.-P., Warren, J., **Werner, C**., Xia, J., Yang, B., Zak, D., and Norby, R. The decadal biomass carbon sink in aggrading temperate forests is stimulated by experimental CO_2 enrichment. *Nature Communications*, in review.

[2] Xia, J., Walker, A. P., Norby, R. J., De Kauwe, M., Medlyn, B., Zaehle, S., Wang, Y.-P., Fenstermaker, L. F., Guenet, B., Iversen, C. M., Harper, A. B., Hickler, T., Lu, X., Luus, K., **Werner, C**., Hungate, B., Liang, J., Jiang, L., Lu, M., Megonigal, P., Nowak, R. S., Oren, R., Pendall, E., Shi, Z., Talhelm, A., Warren, J. M., Weng, E., Yan, L., Zak, D. R., and Luo, Y. Carbon influx and residence time: equal contributors to large uncertainty in CO_2 effect on terrestrial carbon storage. *Proceedings of the National Academy of Sciences*, submitted.

[3] Bagnara, M., Gonzales, R. S., Reifenberg, S., Steinkamp, J., Hickler, T., **Werner, C**., Hartig, F., and

Dormann, C. RLPJ: an R package facilitating sensitivity analysis, calibration and forward simulations with the LPJ-GUESS dynamic vegetation model. *Environmental Modelling & Software*, submitted.

Peer-reviewed articles

[1] Díaz-Pinés, E., **Werner, C**., and Butterbach-Bahl, K. Effects of climate change on CH_4 and N_2O fluxes from temperate and boreal forest soils. In Perera, A. H., Peterson, U., Martinez Pastur, G. J., and Iverson, L., Editors, *Sustaining Ecosystem Services in Northern Temperate Landscapes*. in press.

[2] **Werner, C**., Schmid, M., Ehlers, T. A., Fuentes-Espoz, J. P., Steinkamp, J., Forrest, M., Liakka, J., Maldonado, A., and Hickler, T. Effect of changing vegetation on denudation (part 1): Predicted vegetation composition and cover over the last 21 thousand years along the Coastal Cordillera of Chile. *Earth Surface Dynamics Discussions*, pages 1–34, 2018.

[3] Schmid, M., Ehlers, T. A., **Werner, C**., Hickler, T., and Fuentes-Espoz, J.-P. Effect of changing vegetation on denudation (part 2): Landscape response to transient climate and vegetation cover. *Earth Surface Dynamics Discussions*, pages 1–36, 2018.

[4] Ryan, E. M., Ogle, K., Peltier, D., Walker, A. P., De Kauwe, M. G., Medlyn, B. E., Williams, D. G., Parton, W. J., Asao, S., Guenet, B., Harper, A. B., Lu, X., Luus, K. A., Zaehle, S., Shu, S., **Werner, C**., Xia, J., and Pendall, E. Gross primary production responses to warming, elevated CO_2, and irrigation: quantifying the drivers of ecosystem physiology in a semiarid grassland. *Global Change Biology*, 40:1293–n/a, 2017.

[5] Panait, A., Diaconu, A., Galka, M., Grindean, R., Hutchinson, S. M., Hickler, T., Lamentowicz, M., Mulch, A., Tanţău, I., **Werner, C**., and Feurdean, A. Hydrological conditions and carbon accumulation rates reconstructed from a mountain raised bog in the Carpathians: A multi-proxy approach. *Catena*, 152 IS -:57–68, 2017.

[6] Norby, R. J., De Kauwe, M. G., Walker, A. P., **Werner, C**., Zaehle, S., and Zak, D. R. Comment on "Mycorrhizal association as a primary control of the CO_2 fertilization effect". *Science*, 355(6323):358.2–358, 2017.

[7] De Kauwe, M. G., Medlyn, B. E., Walker, A. P., Zaehle, S., Asao, S., Guenet, B., Harper, A. B., Hickler, T., Jain, A. K., Luo, Y., Lu, X., Luus, K., Parton, W. J., Shu, S., Wang, Y.-P., **Werner, C**., Xia, J., Pendall, E., Morgan, J. A., Ryan, E. M., Carrillo, Y., Dijkstra, F. A., Zelikova, T. J., and Norby, R. J. Challenging terrestrial biosphere models with data from the long-term multifactor Prairie Heating and CO_2 enrichment experiment. *Global Change Biology*, 348:895–n/a, 2017.

[8] Kraus, D., Weller, S., Klatt, S., Santabárbara, I., Haas, E., Wassmann, R., **Werner, C**., Kiese, R., and Butterbach-Bahl, K. How well can we assess impacts of agricultural land management changes on the total greenhouse gas balance (CO_2, CH_4 and N_2O) of tropical rice-cropping systems with a biogeochemical model? *Agriculture Ecosystems & Environment*, 224:104–115, 2016.

[9] Klatt, S., Kraus, D., Rahn, K.-H., **Werner, C**., Kiese, R., Butterbach-Bahl, K., and Haas, E. Parameter-Induced Uncertainty Quantification of Regional NO Emissions and NO Leaching using the Biogeochemical Model LandscapeDNDC. In Del Grosso, S. J. and Ahuja, L., Editors, *Advances in Agricultural Systems Modeling*. American Society of Agronomy, Inc., Crop Science Society of America, Inc., and Soil Science Society of America, Inc., Madison, WI, 2015.

[10] Hickler, T., Rammig, A., and **Werner, C**. Modelling CO_2 Impacts on Forest Productivity. *Current Forestry Reports*, 1(2):1–12, 2015.

[11] **Werner, C**., Reiser, K., Dannenmann, M., Hutley, L. B., Jacobeit, J., and Butterbach-Bahl, K. N_2O, NO, N_2 and CO_2 emissions from tropical savanna and grassland of northern Australia: an incubation experiment with intact soil cores. *Biogeosciences*, 11(21):6047–6065, 2014.

[12] Gharahi Ghehi, N., **Werner, C**., Hufkens, K., Kiese, R., Van Ranst, E., Nsabimana, D., Wallin, G., Klemedtsson, L., Butterbach-Bahl, K., and Boeckx, P. N_2O and NO emission from the Nyungwe tropical highland rainforest in Rwanda. *Geoderma Regional*, 2–3(0):41–49, 2014.

[13] Haas, E., Klatt, S., Fröhlich, A., Kraft, P., **Werner, C**., Kiese, R., Grote, R., Breuer, L., and Butterbach-Bahl, K. LandscapeDNDC: a process model for simulation of biosphere–atmosphere–hydrosphere exchange processes at site and regional scale. *Landscape Ecology*, 28:615–636, 2013.

[14] Cameron, D. R., van Oijen, M., **Werner, C**., Butterbach-Bahl, K., Grote, R., Haas, E., Heuvelink, G. B. M., Kiese, R., Kros, J., Kuhnert, M., Leip, A., Reinds, G. J., Reuter, H. I., Schelhaas, M. J., de Vries,

W., and Yeluripati, J. B. Environmental change impacts on the C- and N-cycle of European forests: a model comparison study. *Biogeosciences*, 10(3):1751–1773, 2013.

[15] **Werner, C**., Haas, E., Grote, R., Gauder, M., Graeff-Hönninger, S., Claupein, W., and Butterbach-Bahl, K. Biomass production potential from *Populus* short rotation systems in Romania. *Global Change Biology Bioenergy*, 4(6):642–653, 2012.

[16] Rahn, K.-H., **Werner, C**., Kiese, R., Haas, E., and Butterbach-Bahl, K. Parameter-induced uncertainty quantification of soil N_2O, NO and CO_2 emission from Höglwald spruce forest (Germany) using the LandscapeDNDC model. *Biogeosciences*, 9(10):3983–3998, 2012.

[17] Gharahi Ghehi, N., **Werner, C**., Cizungu Ntaboba, L., Mbonigaba Muhinda, J. J., Van Ranst, E., Butterbach-Bahl, K., Kiese, R., and Boeckx, P. Spatial variations of nitrogen trace gas emissions from tropical mountain forests in Nyungwe, Rwanda. *Biogeosciences*, 9(4):1451–1463, 2012.

[18] van Oijen, M., Cameron, D. R., Butterbach-Bahl, K., Farahbakhshazad, N., Jansson, P.-E., Kiese, R., Rahn, K.-H., **Werner, C**., and Yeluripati, J. B. A Bayesian framework for model calibration, comparison and analysis: Application to four models for the biogeochemistry of a Norway spruce forest. *Agricultural and Forest Meteorology*, 151:1609–1621, 2011.

[19] Rahn, K.-H., Butterbach-Bahl, K., and **Werner, C**. Selection of likelihood parameters for complex models determines the effectiveness of Bayesian calibration. *Ecological Informatics*, 6(6):333–340, 2011.

[20] Blagodatsky, S. A., Grote, R., Kiese, R., **Werner, C**., and Butterbach-Bahl, K. Modelling of microbial carbon and nitrogen turnover in soil with special emphasis on N-trace gases emission. *Plant and Soil*, 346(1-2):297–330, 2011.

[21] Butterbach-Bahl, K., Kahl, M., Mykhayliv, L., **Werner, C**., Kiese, R., and Li, C. A European-wide inventory of soil NO emissions using the biogeochemical models DNDC/Forest-DNDC. *Atmospheric Environment*, 43(7):1392–1402, 2009.

[22] **Werner, C**., Kiese, R., and Butterbach-Bahl, K. Soil-atmosphere exchange of N_2O, CH_4, and CO_2 and controlling environmental factors for tropical rain forest sites in western Kenya. *Journal of Geophysical Research*, 112(D3):D03308, 2007.

[23] **Werner, C**., Butterbach-Bahl, K., Haas, E., Hickler, T., and Kiese, R. A global inventory of N_2O emissions from tropical rainforest soils using a detailed biogeochemical model. *Global Biogeochemical Cycles*, 21(3):GB3010, 2007.

[24] **Werner, C**., Zheng, X., Tang, J., Xie, B., Liu, C., Kiese, R., and Butterbach-Bahl, K. N_2O, CH_4 and CO_2 emissions from seasonal tropical rainforests and a rubber plantation in Southwest China. *Plant and Soil*, 289(1-2):335–353, 2006.

Reports and non-peer-reviewed articles

[1] Butterbach-Bahl, K., Grote, R., Haas, E., Kiese, R., Klatt, S., David Kraus, S. M.-H., **Werner, C**., Wiß, F., and Wolf, B. LandscapeDNDC v1.3.3 - A process model for simulating biosphere-atmosphere-hydrosphere exchange processes. Technical report, Garmisch-Partenkirchen, Germany, 2016.

[2] **Werner, C**. Bridging the gap between site observations and global scale inventories: a global N_2O emission inventory for tropical rainforest soils. *iLeaps Newsletter*, (6):26–27, 2009.

[3] Brüggemann, N., Butterbach-Bahl, K., Forkel, R., Knoche, R., Papen, H., Seiler, W., and **Werner, C**. Auswirkungen der Klimaänderung auf den biosphärischen N-Spurengasaustausch . *Nachrichten Forschungszentrum Karlsruhe*, 38(1-2):65–67, 2006.

[4] Butterbach-Bahl, K. and **Werner**, C. Upscaling of national N_2O emissions from soils with biogeochemical models – Germany. In *N_2O emissions from agriculture*, pages 138–144. EU Commission DG Environment, Ispra, IT, 2005.

[5] **Werner**, C., Kesik, M., Papen, H., Li, C., and Butterbach-Bahl, K. Soils as sources of N-trace gases in Germany - Results from calculations with biogeochemical models. In *Controlling nitrogen flows and losses*, pages 372–374. Wageningen Academic Publishers, Wageningen, NL, 2004.

[6] Butterbach-Bahl, K. and **Werner**, C. Anthropogene N_2O-Emissionen aus land- und forstwirtschaftlich genutzten Böden. Abschlussbericht zum Umweltbundesamtforschungsvorghaben FE 200 12 257. Technical report, 2003.

Talks and poster presentations

Various talks and poster presentations at national and international conferences and workshops.

Reviewer

Ad-hoc reviewer for international journals (*Biogeosciences*, *Ecosystems*, *Experimental Agriculture*, *Global Biogeochemical Cycles*, *Global Ecology & Biogeography*, *Plant & Soil* and others).

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