Dr. Matti Barthel | Biogeochemist

RESEARCH EXPERIENCE

Research Technician – *ETH Zurich*, Department of Environmental Systems Sciences, SAE lab, Zurich, Switzerland – 05/2014 - today
Visiting Scientist– *Jardin Botanique d'Eala*, Mbandaka, DR Congo – 11/2019
Visiting Scientist– *Université Catholique de Bukavu*, Faculté de Sciences Agronomiques, Bukavu, DR Congo – 09/2016
Postdoc – *Landcare Research | Manaaki Whenua*, Ecosystems & Global Change Team, Lincoln, New Zealand – 06/2012 - 05/2014
Visiting Scientist, *Universitat de les Illes Balears*, Laboratori de Fisiologia Vegetal, Palma de Mallorca, Spain – 05/2010

EDUCATION

Dr. sc., *ETH Zurich*, Terrestrial Ecosystem Physiology Group, Marie Curie Excellence Team, Zurich, Switzerland – 11/2007 - 02/2012
M.Sc. thesis, *Max-Planck-Institute for Biogeochemistry*, Department of Biogeochemical Processes, Jena, Germany – 10/2006 - 09/2007
Studies of Biology, Specialization: Biochemistry, Neurobiology, Ecology, ***Friedrich-Schiller-University***, Jena, Germany – 10/2001 - 09/2006

Further education
UAV course, mobile GIS for spatiotemporal monitoring, zhaw, Zurich, Switzerland – 04/2017
Lab course, quantum cascade laser spectrometry, Aerodyne Research, Boston, USA – 09/2014
Field course, conservation management, Beinn Eighe National Nature Reserve, UK – 07/2009
Summer School, stable isotope ecology, University of Utah, Salt Lake City, USA – 07/2008
Field course, Mediterranean ecosystems, Island of Samos, Greece – 04/2008

MISCELLANEOUS

Languages	German (native), English (fluent)
IT-Skills	LaTeX, R statistical language, DOS shell, Linux (basics)
Driving license	International + Swiss: A1, B; completed safety + off-road 4WD training course
Boating license	European
Leisure	sports, literature, photography
Peer Reviewer	FWF Austria, Estonian Research Council, Isotopes in Environment and Health Studies, Science of the Total Environment, Biogeosciences, Oikos, Ecosystems, Journal of Geophysical Research, Tree Physiology

PUBLICATIONS | peer-reviewed

[32] Gallarotti N, **Barthel M**, Verhoeven E, Pereira EIP, Bauters M, Baumgartner S, Drake TW, Boeckx P, Mohn J, Longepierre M, Mugula JK, Makelele IA, Ntaboba CL, Six J (2021): In-depth analysis of N_2O fluxes in tropical forest soils of the Congo Basin combining isotope and functional gene analysis. *ISME J,* https://doi.org/10.1038/s41396-021-01004-x

[31] Bagalwa RM, Chartin C, Baumgartner S, Mercier S, Syauswa M, Samba VC, Zabona MT, Karume K, Cizungu NL, **Barthel M**, Doetterl S, Six J, Boeckx P, Van Oost K (2021): Spatial and seasonal patterns of rainfall erosivity in the Lake Kivu region: Insights from a meteorological observatory network, *Progress in Physical Geography: Earth and Environment*, https://doi.org/10.1177/03091333211001793

[30] Ho L, Jerves-Cobo R, Morales O, Larriva J, Arevalo-Durazno M, **Barthel M**, Six J, Bodé S, Boeckx P, Goethals P (2021): Spatial and temporal variations of greenhouse gas emissions from a waste stabilization pond: Effects of sludge distribution and accumulation, *Water Research*, 193, https://doi.org/10.1016/j.watres.2021.116858

[29] Ho L, Jerves-Cobo R, **Barthel M**, Six J, Bodé S, Boeckx P, Goethals P (2020): Effects of land use and water quality on greenhouse gas emissions from an urban river system, *Biogeosciences Discussions*, https://doi.org/10.5194/bg-2020-311| **featured in *BBC Future Planet*** article 'The rivers that 'breathe' greenhouse gases' by Matthew Keegan 24th March 2021: https://www.bbc.com/future/article/20210323-climate-change-the-rivers-that-breathe-greenhouse-gases

[28] Tamale J, Hüppi R, Griepentrog M, Turyagyenda LF, **Barthel M.**, Doetterl S, Fiener P, van Straaten O (2021): Nutrient limitations regulate soil greenhouse gas fluxes from tropical forests: evidence from an ecosystem-scale nutrient manipulation experiment in Uganda. *SOIL Discussions*, https://doi.org/10.5194/soil-2020-94.

[27] Summerauer LS, Baumann P, Ramirez-Lopez L, **Barthel M**, Bauters M, Bukombe B, Reichenbach M, Boeckx P, Kearsley E, Van Oost K, Vanlauwe B, Chiragaga D, Bisimwa Heri-Kazi A, Moonen P, Sila A, Shepherd K, Bazirake Mujinya B, Van Ranst E, Baert G, Doetterl S, Six J (2020): Filling a key gap: a soil infrared library for central Africa. *SOIL Discussions,* https://doi.org/10.5194/soil-2020-99

[26] Baumgartner S, Bauters M, **Barthel M**, Drake TW, Ntaboba LC, Bazirake BM, Six J, Boeckx P, Van Oost K (2021): Stable isotope signatures of soil nitrogen on an environmental-geomorphic gradient within the Congo Basin. *SOIL* 7, 83-94*,* https://doi.org/10.5194/soil-7-83-2021

[25] Pineda Lamprea PA, Bauters M, Verbeeck H, Baez S, **Barthel M**, Bodé S, Boeckx P (2021): Ideas and perspectives: patterns of soil CO_2, CH_4, and N_2O fluxes along an altitudinal gradient – a pilot study from an Ecuadorian neotropical montane forest. *Biogeosciences*, 18, 413-421, https://doi.org/10.5194/bg-18-413-2021

[24] Butterbach-Bahl K, Gettel G, Kiese R, Fuchs K, Werner C, Rahimi J, **Barthel M**, Merbold L (2020): Livestock enclosures in drylands of Sub-Saharan Africa are overlooked hotspots of N_2O emissions. *Nature Communications* **11,** 4644, https://doi.org/10.1038/s41467-020-18359-y

[23] Baumgartner S, **Barthel M**, Drake TW, Bauters M, Makelele IA, Mugula JK, Summerauer L, Gallarotti N, Ntaboba LC, Van Oost K, Boeckx P, Doetterl S, Werner RA, Six J (2020): Seasonality, drivers, and isotopic composition of soil CO_2 fluxes from tropical forests of the Congo Basin. *Biogeosciences,* 17, 6207–6218, https://doi.org/10.5194/bg-17-6207-2020.

[22] Yu L, Harris E, Lewicka-Szczebak D, **Barthel M**, Blomberg MRA, Harris SJ, Johnson MS, Lehman MF, Liisberg J, Müller C, Ostrom NE, Six J, Toyoda S, Yoshida N, Mohn J (2020): What can we learn from N_2O isotope data? – Analytics, processes and modelling. *Rapid Communications in Mass Spectrometry* 34:e8858. https://doi.org/10.1002/rcm.8858

[21] Bauters M, Meeus S, **Barthel M**, Stoffelen P, De Deurwaerder H, Meunier F, Drake TW, Ponette Q, Ebuy J, Vermeir P, Beeckman H, Wyffels F, Bodé S, Verbeeck H, Vandelook F, Boeckx P (2020): Century-long apparent decrease in intrinsic water-use efficiency with no evidence of progressive nutrient limitation in African tropical forest. *Global Change Biology*

[20] Ibraim E, Denk T, Wolf B, **Barthel M**, Gasche R, Wanek W, Zhang S, Kiese R, Butterbach-Bahl K, Eggleston S, Emmenegger L, Six J, Mohn J (2020): Denitrification is the main nitrous oxide source process in grassland soils according to quasi-continuous isotopocules analysis and biogeochemical modeling. *Global Biochemical Cycles*, 33, e2019GB006505. https://doi.org/ 10.1029/2019GB006505.

[19] Harris SJ, Liisberg J, Xia L, Wei J, Zeyer K, Yu L, **Barthel M**, Wolf B, Kelly BFJ, Cendón DI, Blunier T, Six J, Mohn J (2020): N_2O isotopocule measurements using laser spectroscopy: analyzer characterization and intercomparison. *Atmospheric Measurement Techniques* 13, 2797-2831, https://doi.org/10.5194/amt-13-2797-2020

[18] Li X, He H, Zhang X, Yan X, Six J, Cai Z, **Barthel M**, Zhang J, Necpalova M, Ma Q, Li Z (2019): Distinct responses of soil fungal and bacterial nitrate immobilization to land conversion from forest to agriculture. *Soil Biology and Biochemistry* 134, 81-89

[17] Drake TW, Van Oost K, **Barthel M**, Bauters M, Hoyt AM, Podgorski DC, Six J, Boeckx P, Trumbore SE, Ntaboba LC, Spencer RGM (2019): Mobilization of aged and biolabile soil carbon by tropical deforestation. *Nature Geosciences* 16, 383-408, doi: https://doi.org/10.1038/s41561-019-0384-9

[16] Bauters M, Verbeek H, Rütting T, **Barthel M**, Mujinya BB, Bamba F, Bodé S, Boyemba F, Bulonza E, Carlsson E, Eriksson L, Makelele I, Six J, Ntaboba LC, Boeckx P (2019): Contrasting nitrogen fluxes in African tropical forests of the Congo Basin. *Ecological Monographs*, 89(1)

[15] Verhoeven E, **Barthel M**, Yu L, Celi L, Said-Pullicino D, Sleutel S, Lewicka-Szczebak D, Six J, Decock C (2019): Early season N_2O emissions under variable water management in rice systems: source partitioning emissions using isotope ratios along a depth profile. *Biogeosciences* 16, 383-408

[14] Verhoeven E, Decock C, **Barthel M**, Bertora C, Sacco D, Romani M, Sleutel S, Six J (2018): Nitrification and coupled nitrification-denitrification at shallow depths are responsible for early season N_2O emissions under alternate wetting and drying management in an Italian rice paddy system. *Soil Biology and Biochemistry* 120, 58-69

[13] Hörtnagl L, **Barthel M**, Buchmann N, Eugster W, Butterbach-Bahl K, Díaz-Pinés, Zeeman M, Klumpp K, Kiese R, Bahn M, Hammerle A, Lu H, Ladreiter-Knauss T, Burri S, Merbold L (2018): Greenhouse gas fluxes over managed grasslands in Central Europe. *Global Change Biology* 1:30, doi: 10.1111/gcb.14079 | **most cited article in Global Change Biology 2018**

[12] Blessing CH, **Barthel M**, Gentsch L, Buchmann N (2016): Strong coupling of shoot assimilation and soil respiration during drought and recovery periods in beech as indicated by natural abundance $\delta^{13}C$ measurements. *Frontiers in Plant Sciences* 7:1710, doi: 10.3389/fpls.2016.01710

[11] Hunt JE, Laubach J, **Barthel M**, Fraser A, Phillips RL (2016): Carbon budgets for an irrigated intensively-grazed dairy pasture and an unirrigated winter-grazed pasture. *Biogeosciences* **13**: 2927-2944, doi:10.5194/bg-13-2927-2016

[10] Lehmann MM, Wegener F, **Barthel M**, Werner C, Buchmann N, Siegwolf RW, Werner RA (2016): Metabolic fate of the carboxyl groups of malate and pyruvate and their influence on $\delta^{13}C$ of leaf respired CO_2 during light enhanced dark respiration. *Frontiers in Plant Sciences* **7**: 739. doi:10.3389/fpls.2016.00739

[9] Laubach J, **Barthel M**, Fraser A, Hunt JE, Griffith DWT (2016): Combining two complementary micrometeorological methods to measure CH_4 and N_2O fluxes over pasture. *Biogeosciences* **13**: 1309-1327, doi:10.5194/bg-13-1309-2016

[8] Blessing C, **Barthel M**, Buchmann N (2015): Bias in estimated online leaf carbon isotope discrimination due to woody tissues. *Isotopes in Environmental and Health Studies* **51**(1): 109-123, doi:10.1080/10256016.2015.1007050

[7] **Barthel M**, Sturm P, Hammerle A, Gentsch L, Siegwolf R, Buchmann N, Knohl A (2014): Soil $H_2{}^{18}O$ labeling reveals the effect of drought on $C^{18}OO$ fluxes to the atmosphere. *Journal of Experimental Botany* **65**(20): 5783-5793, doi: 10.1093/jxb/eru312

[6] **Barthel M**, Cieraad E, Zakharova A, Hunt JE (2014): Sudden cold temperature delays plant carbon transport and shifts allocation from growth to respiratory demand. *Biogeosciences* **11**: 1425-1433, doi:10.5194/bg-11-1425-2014

[5] Gentsch L, Sturm P, Hammerle A, Siegwolf R, Wingate L, Ogee J, Baur T, Pluess P, **Barthel M**, Buchmann N, Knohl A (2014): Carbon isotope discrimination during branch photosynthesis of *Fagus sylvatica*: Field measurements using laser spectroscopy. *Journal of Experimental Botany* **65**(6): 1481-1496, doi: 10.1093/jxb/eru024

[4] Burri S, Sturm P, Baur T, **Barthel M**, Knohl A, Buchmann N (2014): The effect of physical back-diffusion of $^{13}CO_2$ tracer on the coupling between photosynthesis and soil CO_2 efflux in grassland. *Isotopes in Environment and Health Studies* **50**(4): 497-513, doi:10.1080/10256016.2014.893237

[3] **Barthel M,** Hammerle A, Sturm P, Gentsch L, Baur T, Knohl A (2011): The diel imprint of leaf metabolism on the $\delta^{13}C$ signal of soil respiration under control and drought conditions. *New Phytologist* **192**(4): 925-938, doi:10.1111/j.1469-8137.2011.03848.x

[2] Brüggemann N, Gessler A, Kayler Z, Keel SG, Badeck F, **Barthel M**, Boeckx P, Buchmann N, Brugnoli E, Esperschütz J, Gavrichkova O, Ghashghaie J, Gomez-Casanovas N, Keitel C, Knohl A, Kuptz D, Palacio S, Salmon Y, Uchida Y, Bahn M (2011): Carbon allocation and carbon isotope fluxes in the plant–soil–atmosphere continuum: a review. *Biogeosciences* **8**: 3457-3489, doi:10.5194/bg-8-3457-2011

[1] **Barthel M**, Sturm P, Knohl A (2011) Soil matrix tracer contamination and canopy re-cycling did not impair $^{13}CO_2$ plant-soil pulse labeling experiments. *Isotopes in Environmental and Health Studies* **47**(3): 359-371, doi:10.1080/10256016.2011.587610

miscellaneous

[6] Dötterl S, Drake T, Bauters M, Van Oost K, **Barthel M**, Hoyt A (2020) Environmental research in the heart of Africa: The Congo Biogeochemistry Observatory: The role of the changing Tropics for future global carbon dynamics. *Open Access Government*, vol. Jan20: no. 25, pp. 328-329, Crewe: Adjacent Digital Politics Ltd., 2020.

[5] Six J (2016) Biogeochemistry in the Congo. Pan European Networks, *Science and Technology* 21.

[4] Hunt J, Laubach J, **Barthel M**, Fraser A, Phillips RL (2014) Role of grazers in the carbon budget for irrigated dairy farm. *Proceedings of the 5th Australasian Dairy Science Symposium* 2014: 185-187.

[3] **Barthel M** (2012) The effect of drought on the carbon and water cycling within the atmosphere-plant-soil system using carbon and oxygen stable isotopes. *Dissertation ETH. No 20103, ETH Zurich* 147p.

[2] **Barthel M**, Sturm P, Gentsch L, Knohl A (2010) Technical Note: A combined soil/canopy chamber system for tracing $\delta^{13}C$ in soil respiration after a $^{13}CO_2$ canopy pulse labelling. *Biogeosciences Discussions* 7: 1603-1631, doi:10.5194/bgd-7-1603-2010.

[1] **Barthel M** (2007) Seasonal variations in N turnover in an intensively managed cropland - key factors affecting N_2O emissions. *Master Thesis, University of Jena* 59p.

CONFERENCE CONTRIBUTIONS | *talk, °poster, ~meeting, #convener, ^virtual

^Baumgartner S, Drake T, **Barthel M** (2021): Cuvette Centrale Expedition – Challenges associated with fieldwork in the DR Congo. TECLIM seminar, *UC Louvain, Belgium*

#°**Barthel, M**, Bauters M, Ntaboba LC, Baumgartner S, Gallarotti N, Dériaz N, Summerauer L, Boeckx P, Rukeza M, Vanlauwe B, Van Oost K, Makelele I, Six J (2019): Low N_2O emissions from tropical forests of the Congo Basin as a result of complete denitrification. Isotope Workshop: What can we learn from N_2O isotope data?, 23.-24. October 2019 in *Zurich*, *Switzerland*

***Barthel, M**, Bauters M, Ntaboba LC, Baumgartner S, Gallarotti N, Dériaz N, Summerauer L, Boeckx P, Rukeza M, Vanlauwe B, Van Oost K, Makelele I, Six J (2019): Tropical forests of the Congo Basin are a weak source of N_2O and a strong sink for CH_4. NCGG8 8th International Symposium on Non-CO_2 Greenhouse Gases, 12.-14. June 2019 in *Amsterdam*, *The Netherlands*

°Barthel, M, Bauters M, Ntaboba LC, Baumgartner S, Gallarotti N, Dériaz N, Summerauer L, Boeckx P, Rukeza M, Vanlauwe B, Van Oost K, Makelele I, Six J (2018): Magnitude and isotopic signature of soil-derived N_2O and CO_2 measured across several tropical forest sites in the DR Congo. TropSOC kick-off meeting, 5.-9. March 2018 in *Bukavu*, *DR Congo*

***Barthel, M**, Bauters M, Ntaboba L, Baumgartner S, Gallarotti N, Dériaz N, Summerauer L, Boeckx P, Rukeza M, Vanlauwe B, Van Oost K, Makelele I, Six J (2017): Magnitude and isotopic signature of soil-derived N_2O measured across several tropical forest sites in the DR Congo. IsoCycles 2017, 15.-20. Oct 2017 in *Ascona*, *Monte Verità, Switzerland*

~Barthel, M (2017): Agriculture's Global Warming Potential: multilateral approaches for predictions, CNRS Ecotron facility 9. March 2017 in *Montpellier, France*

***Barthel M**, Baumgartner S, Deriaz N, Summerauer L, Bauters M, Ntaboba L, Six J (2017): Fluxes and isotopic composition of soil-derived N_2O across several forest sites in the DR Congo. Seminar: Congo Basin Biogeochemistry, 6th Jan 2017 in *Ghent, Belgium*

***Barthel M,** Decock C, Wilde B, Mikita C, Verhoeven E, Mohn J, Six J (2015): On-line assessment of $\delta^{15}N^{\alpha}$, $\delta^{15}N^{\beta}$, $\delta^{18}O$ of soil-derived N_2O using quantum cascade laser spectroscopy. NORA-ICOS-SITES workshop on "Gas flux measurements in terrestrial ecosystems - state of the art and emerging technologies", 10.-13. May 2015 in *Gothenburg, Sweden*

Hunt JE, ***Barthel M,** Cieraad E, Hammerle A, Sturm P, Gentsch L, Zakharova A, Knohl A (2013): Drought and temperature effects on carbon transport and allocation: results from $^{13}CO_2$ pulse labeling experiments. 5th joint conference of New Zealand Ecological Society and Ecological Society of Australia, 24.-29.Nov 2013 in *Auckland, New Zealand*

***Barthel M,** Hunt E, Fraser A, Whitehead D, Laubach J (2013): CO_2, N_2O and CH_4 exchange of a high intensity dairy pasture system in NZ. Grassland Seminar, ETH Zurich 30.09.2013 in *Zürich, Switzerland*

Hunt JE, *Barthel M, Fraser A, Whitehead D, Laubach J (2013): CO_2, N_2O and CH_4 exchange of a high intensity dairy pasture system in NZ. Ozflux Meeting 8.-11.Jul 2013 in *Palm Cove, Australia*

°Barthel M, Sturm P, Hammerle A, Siegwolf R, Gentsch L, Buchmann N, Knohl A (2013): The influence of a sudden change in soil $H_2{}^{18}O$ on $C^{18}OO$ fluxes to the atmosphere: a label approach. European Geosciences Union General Assembly 7.-12.Apr 2013 in *Vienna, Austria*

***Barthel M,** Hammerle A, Sturm P, Gentsch L, Knohl A (2011): The carbon flow through the atmosphere-plant-soil system under drought. Annual Meeting of the German Association for Stable Isotope Research 10.-12.Oct 2011 in *Villigen-PSI, Switzerland*

***Barthel M,** Hammerle A, Sturm P, Gentsch L, Knohl A (2011): The carbon flow through the atmosphere-plant-soil system under drought. 96th Annual Meeting of the Ecological Society of America 7.-12.Aug 2011 in *Austin, TX, USA*

°Barthel M, Sturm P, Knohl A (2010): Tracing $\delta^{13}C$ in soil respiration after a $^{13}CO_2$ canopy pulse labelling. Stable Isotopes and Biogeochemical cycles in Terrestrial Ecosystems, Monte Verità 21.-26.Mar 2010 in *Ascona, Switzerland*

***Barthel M,** Hammerle A, Sturm P, Knohl A (2010): The carbon flow through the atmosphere-plant-soil system under drought. IPAS Colloqium, ETH Zürich 6.Dec 2010 in *Zürich, Switzerland*

***Barthel M**, Sturm P, Knohl A (2009): Using high frequency laser spectroscopy to measure ecophysiological parameters in drought stressed beech saplings. *2nd* minisymposium on the use of stable isotopes in tree physiology and forest ecology, Nancy-Université 3.Jul 2009 in *Nancy, France*

***Barthel M**, Sturm P, Knohl A (2009): Drought effects on plant ecophysiology of *Fagus sylvatica.* QUERCO – Oak model-ecosystems under climate change, WSL 30.Apr 2009 in *Birmensdorf, Switzerland*

Gentsch L, **°Barthel M** (2008): Tracing the Carbon and Water Cycling through Terrestrial Ecosystems Using Stable Isotope Laser Spectroscopy. JESIUM – Joint European Stable Isotope User Meeting, Presqu'île de Giens 31.Aug-5.Sep 2008 in *Hyères, France*

***Barthel M**, Sturm P, Knohl A (2008): Using stable isotope laser spectroscopy to investigate the influence of drought on the mesophyll conductance to CO_2. ESF Exploratory Workshop on mesophyll conductance to CO_2: mechanisms, modeling and ecological Implications 27.Sep-1.Oct 2008 in *Sa Coma, Spain*