

ROSER MATAMALA

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Education

- University of Barcelona, Barcelona, Spain. Biological Sciences Ph.D. 1997,
- University of Barcelona, Barcelona, Spain. Plant Biology M.S. 1993,
- University of Barcelona, Barcelona, Spain. Biology B.S. 1991

Professional Positions

- **University of Chicago Consortium for Advanced Science & Engineering (CASE)**, IL
2018-present, *Institute Fellow*
- **Northwestern Argonne Institute of Science & Engineering (NAISE)**, IL
2015-present, *Institute Fellow*
- **Argonne National Laboratory**, Environmental Science Division, IL
2006-present, *Scientist*
2002-2005, *Assistant Scientist*
2000-2001, *Research Associate*
- **Duke University**, Botany Department, NC
1998-2000, *Research Associate*
- **Smithsonian Environmental Research Center (SERC)**, MD
1993-1997, *Plant Biologist*
- **Institut de Recerca i Tecnologia Agroalimentaries (IRTA)**, Barcelona, Spain
1991-1993, *Research Assistant*

Honors and Awards

- Norbert Gerbier-Mumm International Award, 2012
- Fellowship, Spanish Government Ministerio de Educacion, Cultura y Deporte, 1997

Referred Journal Articles

Matamala, R., Jastrow, J.D., Calderón, F.J., Liang, C., Fan, Z., Michaelson, G.J. and Ping, C.L. Predicting the decomposability of arctic tundra soil organic matter with mid infrared spectroscopy. Accepted in *Soil Biology and Biochemistry*, 2018.

Matamala, R., Calderón, F.J., Jastrow, J.D., Fan, Z., Hofmann, S.M., Michaelson, G.J., Mishra, U., and Ping, C.L. 2017. Influence of site and soil properties on the DRIFT spectra of northern cold-region soils. *Geoderma* 305:80-91. doi:10.1016/j.geoderma.2017.05.014.

- Mishra, U., B. Drewniak, J.D. Jastrow, R. Matamala, and U.W.A. Vitharana. 2017. Spatial representation of high latitude organic carbon and active-layer thickness in CMIP5 earth system models. *Geoderma* 300:55-63. doi:10.1016/j.geoderma.2016.04.017.
- Vitharana, U.W.A., U. Mishra, J.D. Jastrow, R. Matamala, and Z. Fan. 2017. Observational needs for estimating Alaskan soil carbon stocks under current and future climate. *Journal of Geophysical Research: Biogeosciences* 122:415-429. doi:10.1002/2016JG003421.
- Lokupitiya, E. , A.S. Denning, K. Schaefer, D. Ricciuto, R. Anderson, M.A. Arain, I. Baker, A.G. Barr, G. Chen, J.M. Chen, P. Ciais, D.R. Cook, M. Dietze, M. El Maayar, M. Fischer, R. Grant, D. Hollinger, C. Izaurralde, A. Jain, C. Kucharik, Z. Li, S. Liu, L. Li, R. Matamala, P. Peylin, D. Price, S.W. Running, A. Sahoo, M. Sprintsin, A.E. Suyker, H. Tian, C. Tonitto, M. Torn, Hans Verbeeck, S.B. Verma, Y. Xue. 2016. Carbon and energy fluxes in cropland ecosystems: a model- data comparison. *Biogeochemistry* doi:10.1007/s10533-016-0219-3.
- Yan, Hao Wang, Shao-qiang, Billesbach, Dave Oechel, Walter Bohrer, Gil Meyers, Tilden Martin, Timothy A. Matamala, Roser Phillips, Richard P. Rahman, Faiz Yu, Qin Shugart, Herman H. Y. 2015. Improved global simulations of gross primary product based on a new definition of water stress factor and a separate treatment of C₃ and C₄ plants. *Ecological Modelling* 297:42-59.
- Wagle, P., X. Xiao, R.L. Scott, T.E. Kolb, D.R. Cook, N. Brunzell, D.D. Baldocchi, J. Basara, R. Matamala, Y. Zhou, and R. Bajgain. 2015. Biophysical controls on carbon and water vapor fluxes across agrassland climatic gradient in the United States. *Agricultural and Forest Meteorology* 214–215:293–305. doi:10.1016/j.agrformet.2015.08.265.
- Wagle, P., X. Xiao, M.S. Torn, D.R. Cook, R. Matamala, M.L. Fischer, C. Jin, J. Dong, and C. Biradar. 2014. Sensitivity of vegetation indices and gross primary production of tallgrass prairie to severe drought. *Remote Sensing of Environment* 152:1-14.
- Fan, Z, JD Jastrow, C Liang, R Matamala, and RM Miller. 2013. Priming effects in boreal black spruce forest soils: quantitative evaluation and sensitivity analysis. *PLoS One* 8: e77880.
- Mishra U, JD Jastrow, R Matamala, G Hugelius, CD Koven, JW Harden, CL Ping, GJ Michaelson, Z Fan, RM Miller, AD McGuire, C Tarnocai, P Kuhry, WJ Riley, K Schaefer, EAG Schuur, MT Jorgenson, and LD Hinzman. 2013. Empirical estimates to reduce modeling uncertainties of soil organic carbon in permafrost regions: a review of recent progress and remaining challenges. *Environmental Research Letters* 8:035020.
- Lynch, D.J., Matamala, R., Norby, R.J., Iversen, C., Gonzalez-Meler, M.A., 2013. Quantifying fine-root carbon sources and turnover using ¹³C tracer at the conclusion of a long-term FACE experiment. *New Phytologist* 199:420-430.
- Gilmanov, T., Baron, V., Hanan, N.P., Matamala, R., Prueger, J., Hatfield, J. 2013. CO₂ uptake and ecophysiological parameters of the grain crops in midcontinent North America: Estimates from flux tower measurements. *Agriculture, Ecosystems and Environment* 164:162-175.
- Gomez-Casanovas, N., Matamala, R., Cook, D.R., Gonzalez-Meler, M.A. 2012. Net ecosystem exchange affects the autotrophic and heterotrophic components of soil respiration at different time scales in prairie grasslands. *Global Change Biology* 18: 2532-45.

- Schaefer, K., Schwalm, C.R., Williams, C., et al. 2012. A model-data comparison of gross primary productivity: Results from the North American Carbon Program site synthesis. *Journal of Geophysical Research-Biogeosciences* 117. G03010 DOI: 10.1029/2012JG001960
- Garten, C.T., Brice, D.J., Castro, H.F. et al 2011. Response of "Alamo" switchgrass tissue chemistry and biomass to nitrogen fertilization in West Tennessee, USA. *Agriculture Ecosystems & Environment* 140: 289-297.,
- Xiao, J., Zhuang, Q., Law, B.E., et al., 2011. Assessing net ecosystem carbon exchange of U.S. terrestrial ecosystems by integrating eddy covariance flux measurements and satellite observations. *Agricultural and Forest Meteorology* 151:60-69.
- Yi, C.X., Ricciuto, D. Li, R. et al., 2010. Climate controls of terrestrial carbon exchange across biomes and continents. *Environmental Research Letters*, 5: article number 034007.
- Schwalm, C.R., Williams, C.A., Schaefer, K. et al., 2010. A model-data intercomparison of CO₂ exchange across North America: Results from the North American Carbon Program site synthesis. *Journal of Geophysical Research-Biogeosciences* 115: Article number G00H05.
- Garten CT, Smith JL, Tyler DD et al., 2010. Intra-annual changes in biomass, carbon, and nitrogen dynamics at 4-year old switchgrass field trials in west Tennessee, USA. *Agriculture Ecosystems & Environment* 136:177-84.
- Xiao J, Zhuang Q, Law BD, et al. 2010. A Continuous measure of gross primary production for the conterminous United States derived from MODIS and AmeriFlux data. *Remote Sensing & Environment* 576-91.
- Xiao J, Zhuang Q, Baldocchi DD et al. 2008. Estimation of net ecosystem carbon exchange for the conterminous United States by combining MODIS and AmeriFlux data. *Agricultural and Forest Meteorology* 148:1827-47.
- Matamala R, Jastrow DJ, Miller RM, Garten CT. 2008. Temporal changes in the distribution of C and N stocks in a restored tallgrass prairie in the U.S. Midwest. *Ecological Applications* 18: 1470-88.
- Pritchard SG, Strand AE, McCormack ML, Davis MA, Finzi AC, Jackson RB, Matamala R, Rogers HH, Oren R. 2008. Fine root dynamics in a loblolly pine forest are influenced by Free-Air-CO₂-Enrichment (FACE): a six year minirhizotron study. *Global Change Biology* 14: 588-602.
- Allison VJ, Z Yermakov, RM Miller, JD Jastrow, R Matamala. 2007. Assessing soil microbial community composition across landscapes: Do surface soils reveal patterns? *Soil Science Society of America Journal* 71:730-734.
- Allison VJ, Z Yermakov, RM Miller, JD Jastrow, and RMatamala. 2007. Using landscape and depth gradients to decouple the impact of correlated environmental variables on soil microbial community composition. *Soil Biology and Biochemistry* 39:505-516.
- Finzi AC, Moore D, DeLucia EH, Lichter J, Kim HS, Matamala R, Jackson RB, McCarthy H, Oren R, Pippen JS, Schlesinger WH. 2006. Progressive Nitrogen Limitation of Ecosystem Processes under Elevated CO₂ in a Warm-Temperate Forest. *Ecology* 87: 15-25.
- Allison VJ, RM Miller, JD Jastrow, R Matamala, DR Zak. 2005. Changes in soil microbial community structure in a tallgrass prairie chronosequence. *Soil Science Society of America Journal* 69:1412-21.
- Jastrow JD, RM Miller, R Matamala, RJ Norby, TW Boutton, CW Rice, CE Owensby. 2005. Elevated atmospheric CO₂ increases soil carbon. *Global Change Biology* 11:2057-64.

- Matamala R, MA Gonzalez-Meler, JD Jastrow, R Norby, WH Schlesinger. 2003. Impacts of fine root turnover on forest NPP and soil C sequestration potential. *Science* 302: 1385-87.
- Pataki DE, DS Ellsworth, RD Evans, et al., 2003. Tracing changes in ecosystem function under elevated carbon dioxide conditions. *BioScience* 53: 805-18.
- Allen AS, Andrews JA, Finzi AC, Matamala R, Richter DR, Schlesinger WH. 2000. Effects of Free-Air CO₂ Enrichment (FACE) on belowground processes in a loblolly pine forest. *Ecological Applications* 10: 437-48.
- Andrews JA, Matamala R, Westover KM, Schlesinger WH. 2000. Temperature effect on the diversity of soil heterotrophs and the $\delta^{13}\text{C}$ of soil-respired CO₂. *Soil Biology and Biochemistry* 32: 699-706.
- Luo Y L, JA Andrews, L White, R Matamala, KVR Schafer, W H Schlesinger. 2000. Elevated CO₂ differentiates ecosystem carbon processes: A deconvolution analysis of Duke Forest FACE data. *Ecological Monographs* 71:357-76.
- Matamala R, Schlesinger WH. 2000. Effects of atmospheric CO₂ enrichment on fine root production and activity in an intact temperate forest ecosystem. *Global Change Biology* 6: 967-80.
- DeLucia, EH, Hamilton JG, Shawna LN, et al., 1999. Net primary production of a forest ecosystem with experimental CO₂ enrichment. *Science* 284: 1177-79.
- Andrews J A, Matamala R, Harrison K, Schlesinger WH. 1999. Separation of root from total soil respiration using ¹³C labeling during free-air CO₂ enrichment (FACE). *Soil Science Society of America Journal* 63: 1429-35.
- Matamala R, Drake BG. 1998. The influence of atmospheric CO₂ enrichment on plant-soil nitrogen interactions in a wetland plant community on the Chesapeake Bay. *Plant and Soil* 210: 93-101.
- Drake BG, Muehe M, Peresta G, González-Meler MA, Matamala R. 1996 Acclimation of photosynthesis, respiration and ecosystem carbon flux of a wetland on Chesapeake Bay, Maryland to elevated atmospheric CO₂ concentration. *Plant and Soil* 187: 111-8.
- Peñuelas J, R Matamala. 1993. Variations in the mineral-composition of herbarium plant-species collected during the last 3 centuries. *Journal of Experimental Botany*, 44: 1523-25.
- Peñuelas J, R Matamala. 1990. Changes in N and S leaf content, stomatal density and specific leaf area of 14 plant species during the last three centuries of CO₂ increase. *Journal of Experimental Botany* 41: 1119-24.

Book chapters

- Schlesinger WH, E S Bernhardt, EH DeLucia, et al., 2006. The Duke Forest FACE experiment: CO₂ enrichment of a loblolly pine forest. In ES 187, J Nosberger, SP Long, RJ Norby, M Stitt, GR Hendrey, and H Blum (eds.) *Managed Ecosystems and CO₂: Case Studies, Processes and Perspectives*, Springer-Verlag, New York. Pp. 197-212.
- Drake BG, Peresta G, Beugeling E, Matamala R. 1996. Long-term elevated CO₂ exposure in a Chesapeake Bay wetland: Ecosystem gas exchange, Primary production and tissue nitrogen. *Carbon Dioxide and Terrestrial Ecosystems*. Ed. Koch G W and Mooney H A pp. 197-214.

Reports

- Matamala, R., and D.B. Stover. 2013. Introduction to a Virtual Special Issue: modeling the hidden half – the root of our problem. *New Phytologist* 200:939-942.

Hamada, Y., Graham, R., Matamala, R., 2013. Emerging Technological Needs for Terrestrial Biogeochemistry Measurements. *Eos, Transactions American Geophysical Union*, 94: 473.

Matamala R, MA Gonzalez-Meler, JD Jastrow, R Norby, WH Schlesinger. 2004 Response to Comment on: Impacts of Fine Root Turnover on Forest NPP and Soil C Sequestration Potential. *Science* 304:1745.

Presentations (only invited are shown)

- Invited short talk at DOE-BER TES/SBR Joint Investigators Meeting, Potomac, MD, 2018.
- Invited seminar to Ecological seminar series Duke University, NC, 2018.
- Invited seminar to Biological Sciences Department seminar series, University of Illinois at Chicago, 2017.
- Keynote speaker for the Fundacao de Amparo a Pesquisa do Estado de Sao Paulo (FAPESP), Research Program on Global Climate Change (RPGCC), Sao Paulo, Brazil, 2014.
- Invited seminar at University Wisconsin-Madison seminar series, WI, 2014.
- Invited seminar to MBL, Woods Hole, MA, 2013.
- Invited speaker at the 16th International Congress of Photosynthesis Research, St. Louis, MO, 2013.
- Invited speaker at the AmeriFlux Annual Investigators Meeting, Washington D.C., 2009.
- Invited speaker at ESA Meeting Linking Roots and Soil session, Albuquerque, NM, 2009.
- Invited speaker at Colombia University, Colombia, 2007.
- Keynote speaker for the European COST E-38 conference Tartu, Estonia, 2005.
- Invited speaker, TCP DOE review in Boulder, Colorado, 2003.
- Invited speaker, Morton Arboretum seminar series, IL, 2002.
- Invited speaker for the Global Change Education Program, ANL, IL, 2002.
- Invited seminar at University of Toledo, Toledo, OH, 2001.
- Invited seminar at University of Illinois Urbana-Champaign, Urbana, IL, 2000.

Workshop organizer:

Organization committee member of the “Sensor Needs for Terrestrial Biochemistry Measurements Workshop”, ANL, 2013.

Organizer of the “Scaling Root Processes: Global Impacts” Workshop for DOE-BER, Washington, D.C., 2012.

Local organization ANL Arctic Soils Workshop, Argonne, IL, 2011.

Local organization committee member for the Soil Ecology Society Meeting, Argonne, IL, 2005.

Funding

- Underground Radio Frequency Wireless Network for Measuring Soil Moisture over Large Spatial Scales. PI, \$300K total, 2019-2020, NSF EAGER Signals in the Soil (Sits).

- Rays for Roots – Integrating Backscatter X-ray Phenotyping, Modeling, and Genetics to Increase Carbon Sequestration and Switchgrass Resource Use Efficiency. PI at Argonne and Co-PI project, \$395K total, 2018-2020, ARPA.E Rhizosphere Observations Optimizing Terrestrial Sequestration.
- Climate Adaptation and Sustainability in Switchgrass: Exploring Plant-Microbe-Soil Interactions across Continental Scale Environmental Gradients. Co-PI, \$2,000K total, 2016-2020, USA, DOE-BER-BSSD Genomic Science Program.
- Scientific Focus Area: Soil Carbon Response to Environmental Change. Co-PI. \$1,050K/y, 2014-20, USA DOE-BER-CESD Terrestrial Ecosystem Science Program.
- Identifying Patterns and Association among Hyperspectral Data and Meteorological and Biological Measurements for Investigating Near-Surface Atmosphere-Biosphere Interactions”, Co-PI, \$150K/y, 2014-16, ANL, Laboratory Directed Research and Development.
- Measurements of Carbon Fluxes and Stocks in Midwest Agricultural Land and Restored Grasslands: a Bottom up Contribution to NACP. PI. \$300,000/y, 2006-2014, USA DOE-BER CESD Terrestrial Ecosystem Science Program.
- Carbon flux from thawing permafrost: Development of a predictive model linking microbial activity and biogeochemistry with carbon metabolism”, Co-PI. \$425K/y, 2012-14, ANL, Laboratory Directed Research and Development.
- Development of Unique Environmental Basic Research Capabilities for Sustainable Bioenergy Research. Co-PI, \$100K/y, 2007-2009, ANL, Laboratory Directed Research and Development.
- Characterizing Organic Carbon Flux from Litter Sources to Mineral-Soil Sinks: (I). Enriched Background Isotope Study (EBIS) closure, and (II) Establishment of a Distributed Enriched Isotope Study for AmeriFlux Hardwood Forests. Co-PI, \$110K/y, 2006-2013, USA, DOE-BER-CESD Terrestrial Ecosystem Science Program.
- Soil Carbon Responses to Elevated CO₂. Co-PI, \$350K/y, 2006-2013, USA, DOE-BER-CESD Terrestrial Ecosystem Science Program.
- The DOE Consortium for Research on Enhancing Carbon Sequestration in Terrestrial Ecosystems. Co-PI, \$300K/y, 2006-2009, USA, DOE-BER-CESD Carbon Sequestration Program.
- Measurement and Partitioning of Carbon Dioxide Exchange in Midwest Grasslands Accruing Soil Carbon. PI. \$300K/y, 2004-2006, USA DOE-BER-CESD Terrestrial Ecosystem Science Program.

Other Activities:

Outreach: Mentoring of 15 undergraduate students through participation in many educational programs (Science Undergraduate Laboratory Internship programs). Committee member of 5 graduate students. Participation in activities and lectures organized to inspire young women to pursue careers in science at the Middle and High School level. Participating in Science Careers in Search of Women at ANL.

Networking: Participation in Databases and Network activities to foster interactions and collaborations across science disciplines and methodologies such as the North American Carbon Program, the AmeriFlux Network, Fluxnet, and the International Soil Carbon Network.

Professional memberships: Ecological Society of America, and American Geophysical Union.