Christian Andrew Davies

Email: Christian.Davies@rice.edu
Nationality: British
Residency: USA Permanent Resident

Education

Ph.D. Microbial Ecology, Institute of Ecology and Resource Management, The University of Edinburgh & Centre for Ecology and Hydrology Edinburgh, UK (awarded 2005).
Dissertation Title: "Nitric and nitrous oxide emission from an upland agricultural grassland soil".
Dissertation Advisors: Dr. Ute Skiba and Dr. Bob Rees.

B.Sc. (Hons. 2.i.) Biological Sciences with Professional Experience, Department of Biological Sciences, The University of Salford, UK (awarded 1999).

Citizenship: British

Professional Experience

2013 – Present Project Leader, Environmental Biotechnologist, Biodomain Technology Group, Shell Projects and Technology, USA: Responsible for assessing the sustainability of renewable bioenergy, including carbon intensity (CI), GHG emissions, ecosystem function/services valuation, and technology/management strategies for improving the overall CI for biofuels.

2015 – Present Adjunct Associate Professor, Department of Earth Sciences, School of Natural Sciences, Rice University.

2014 – Present Faculty Affiliate, Department of Soil and Crop Sciences, Colorado State University.

2010 – 2013 Project Leader, Environmental Biotechnologist, Biodomain Technology Group, Shell Projects and Technology, UK: Responsible for assessing the sustainability of renewable bioenergy, including carbon intensity (CI), GHG emissions, ecosystem function/services valuation, and technology/management strategies for improving the overall CI for biofuels.

2008 – 2010 Environmental Biotechnologist, Shell Global Solutions, Innovation Biodomain, UK: Assessment of soil carbon and nitrogen cycling under a range of biomass production scenarios to identify sustainable methods of biofuel production. Involved in the development of ecosystem approaches to enhanced oil recovery and bioremediation of oil sands mining operations using biochar.

2005 – 2008 Postdoctoral Research Associate, Odum School of Ecology, The University of Georgia: Microbial biogeochemistry and assessing the long term effects of global climate change in the form of soil warming on greenhouse gas emissions and soil carbon (advisor: Dr. Mark A. Bradford).

2003 – 2005 Postdoctoral Research Associate, Department of Biology, Queen Mary, University of London, UK: Marine biogeochemistry and the identification of

novel nitrogen cycle pathways in Indian Ocean using stable isotope biogeochemistry on GHG emissions (advisor: Dr. Mark Trimmer).

Postdoctoral Associates

Past

Dr. Pietro Panzacchi (PDRA) Assessing biochar, soil carbon interactions, and the potential for carbon sequestration using biochar as an alternative to existing technology options (University of Bologna. Italy).

Research Students

Current

Dagmar Henner (PhD) Modeling ecosystem service impacts of bioenergy production in Europe (University of Aberdeen & CEH Lancaster. UK).

Trung Nguyen (PhD) Assessing the effects of land use and change on ecosystem services using DAYCENT and network optimization tools (Colorado State University, USA).

Past

Thalita Abruzzini (PhD) Quantifying soil and carbon benefits of biochar under sugarcane production in Brazil (University of Sao Pualo, Brazil). Graduated 2015.

Andy Robertson (PhD) Assessing the soil carbon sequestration value of energy crops (University of Aberdeen & CEH Lancaster. UK). Graduated 2015.

Adriana Silva (PhD) Assessing the effects of land use and change into Sugarcane in Brazil on soil carbon and above/below ground biomass carbon (University of Sao Paulo, Brazil). Graduated 2014.

Tom Salisbury (Summer placement student) Quantifying the biochar and soil carbon contribution to CO_2 flux in a mesocosm experiment using stable isotope probing (University of Bristol). Graduated 2013.

Eleanor Michie (Year in Industry Student – 71%) Quantifying the biochar and soil carbon contribution to CO_2 flux in a mesocosm experiment using stable isotope probing (University of York. UK). Graduated 2013.

Serena Manara (BSc.) Microbial consortia involved in the transformation of tar and biochar derived from wood pyrolysis processes. (University of Bolzano, Italy). Graduated 2012.

Maurits Dekker (MSc.) The remediation of oil sands tailing pond water using biochar (University of Amsterdam, Netherlands). Graduated 2011.

Research Publications

Cherubin M. R., Franco A. L. C., Cerri C. E. P., Karlen, D. L., Pavinato P. S., **Davies C. A.**, and Cerri C. C. (2016) Phospjorous pools responses to land-use change for sugarcane expansion in weathered Brazilian soils. *Geoderma*, 265, 27-38.

Silva-Olaya A. M., Cerri, C. E. P., Williams S., Cerri C. C., **Davies C. A.**, and Paustian K. (2016) Modelling SOC response to land use change and management practices in sugarcane cultivation in South-Central Brazil. *Plant and Soil*, 1-16.

Silva-Olaya A. M., Paustian K., **Davies C. A.**, Cherubin M. R., Franco A. L. C., Cerri, C. C., and Cerri, C. E. P. (2016) Soil carbon changes in areas undergoing expansion of sugarcane into pastures in south-central Brazil. *Agriculture Ecosystems and Environment*, 228, 38-48.

Robertson A. D., Whitaker J., Morrison R., **Davies C. A.**, Smith P., and McNamara N. (2016) A *Miscanthus* plantation can be carbon neutral without increasing soil carbon. *Global Change Biology Bioenergy*, doi:10.1111/gcbb.12397.

Robertson A. D., **Davies C. A.**, Smith P., Stott, A. W., Clark E. L., and McNamara N. (2016) Carbon inputs from *Miscanthus* displace older soil organic carbon without induced priming. *BioEnergy Research*, doi:10.1007/s12155-016-9772-9.

Cherubin M. R., Karlen, D. L., Franco A. L. C., Tormena C. A., Cerri C. E. P., **Davies C. A.**, and Cerri C. C. (2016) Soil quality indexing strategies for evaluating sugarcane expansion in Brazil. *PloS one*, 11 (3), 1-26.

Cherubin M. R., Karlen, D. L., Franco A. L. C., Tormena C. A., Cerri C. E. P., **Davies C. A.**, and Cerri C. C. (2016) Soil physical quality response to sugarcane expansion in Brazil. *Geoderma* (267), 156-168.

Teague, W.R., Apfelbaum, S., Lal, R., Kreuter, U.P., Rowntree, J., **Davies, C.A.**, Conser R., Rasmussen, M., Hatfield, J., Wang, T., Wang F., and Byck, P. (2016) The role of ruminants in reducing agriculture's carbon footprint in North America. *Journal of Soil and Water Conservation*, 71 (2), 156-164.

Cherubin M. R., Franco A. L. C., Cerri C. E. P., da Silva Oliviera M., **Davies C. A.**, and Cerri C. C. (2015) Sugarcane expansion in Brazilian tropical soils – Effects of land use change on soil chemical attributes. *Agriculture, Ecosystems & Environment* (211), 173-184.

Franco A. L. C., Cherubin M. R., Pavinato P. S., Cerri C. E. P., Six J., **Davies C. A.**, and Cerri C. C. (2015) Soil carbon, nitrogen and phosphorous changes under sugarcane expansion in Brazil. *Science of The Total Environment* (515), 30-38.

Robertson A. D., **Davies C. A.**, Smith P., Dondini M., and McNamara N. (2015) Modelling the carbon cycle of *Miscanthus* plantations: existing models, current validation efforts and future development. *Global Change Biology Bioenergy* (7), 405-421.

Mello F. F., Cerri C. E. P., **Davies C. A.,** Galdos M. V., Holbrook M., Paustian K., Maia S. M. F., Bernoux M., and Cerri C. C. (2014) Soil carbon and sugarcane ethanol payback time. *Nature*

Climate Change (4), 605-609.

Brewer C. E., Chuang V. J., Masiello C. A., Gonnermann H., Gao X., Dugan B., Driver L. E., Panzacchi P., Zygourakis K., and **Davies C. A.** (2014) Production controls on the density and porosity of biochar. *Biomass and Bioenergy* (66), 176-185.

Goldemberg J., Mello F. F., Cerri C. E. P., **Davies C. A.**, and Cerri C. C. (2014) Meeting the global demand for biofuels in 2021 through sustainable land use change policy. *Energy Policy.* (69), 14-18.

Mimmo T., Baratieri M., **Davies C. A.**, Panzacchi P., and Tonon G. (2014) Assessment of biochar quality produced at different pyrolysis temperatures by thermal analysis. *Biomass and Bioenergy* (62), 149 – 157.

Bradford M. A., Keiser A. D., **Davies C. A.**, Mersmann C. A. and Strickland M. S. (2012) Empirical evidence that soil carbon formation from plant inputs is positively related to microbial growth. *Biogeochemistry* (113), 1-11.

Smith P., **Davies C. A**., Ogle S. *et. al.*(2012) Towards an integrated global framework to assess the impacts of land use and management change on soil carbon: current capability and future vision. *Global Change Biology* (18), 2089-2101.

Bradford M. A., Watts, B. W., and **Davies C. A.** (2010) Thermal adaptation of heterotrophic soil respiration in laboratory microcosms. *Global Change Biology* (16), 1576-1588.

Strickland M. S., Callaham, M. A., **Davies C. A.**, Lauber, C. L., Ramirez, K., Richter, D. D. Jr., Fierer, N., and Bradford M. A. (2010) Rates of *in situ* carbon mineralisation in relation to land-use, microbial community and edaphic characteristics. *Soil Biology & Biochemistry* (42), 260-269.

Bradford M. A., Wallenstein, M. D., Allison, S. D., Treseder, K. K., Frey, S. D., Watts, B. W., **Davies, C. A.**, Maddox, T. R., Melillo, J. M., Mohan, J. E., and Reynolds, J. F. (2009) Decreased mass specific respiration under experimental warming is robust to the microbial biomass method employed. *Ecology Letters* (12), E15-E18.

Bradford M. A., **Davies C. A.**, Frey S. D., Maddox T. R., Melillo J. M., Mohan J. E., Reynolds J. F., Treseder K. K., and Wallenstein M. D. (2008) Acclimation of soil microbial respiration to elevated temperature. *Ecology Letters* (11), 1316-1327.

Nicholls J. C., **Davies C. A.**, and Trimmer M. (2007) High-resolution profiles and nitrogen isotope tracing reveal a dominant source of nitrous oxide and multiple pathways of nitrogen gas formation in the central Arabian Sea. *Limnology and Oceanography* (52), 156-168.

Trimmer M., Nicholls J. C., Morley N., **Davies C. A.** and Aldridge J. (2005) Bi-phasic regulation of anammox in estuarine sediments. *Applied and Environmental Microbiology* (71), 1923-1930.

Monographs and Technical Reports

Ineson P, Parekh N. R., Hall G. H., Thomson I. P., Poskitt J. M., Pickup R. W., and **Davies C. A.** (1999) Microbial basis of CH_4 oxidation in soils. Final report to the Centre for Ecology and Hydrology.

Conferences/Workshops/Presentations

Davies C. A. (2014) United Nations Economics of land degradation workshop. U.N. Bonn, Germany.

Davies C. A. (2011) ETI/BBSRC funded International soil carbon monitoring standards and methodologies workshop (as a member of chairing committee by invitation). Rothamsted. UK.

Davies C. A. (2011) The role of biochar in low carbon bionergy context to the ETI Bio SAG. ETI. UK.

Davies C. A. (2010) Soil carbon presentation to the ETI board to gain sign off for the ELUM project funding. ETI. UK.

Davies C. A. (2010) The importance of soil carbon in delivering sustainable bio energy to the ETI Bio SAG. ETI. UK.

Davies C. A., Frey S., Mohan, J. E., Melillo J. M., and Bradford M. A. (2007) Microbial acclimation: Community-level functional responses to seasonality and 17 years of soil warming. Ecological Society of America meeting San Jose, CA. Oral presentation.

Davies C. A., Trimmer M. and Nicholls J. C. (2005) Novel pathways for the formation of N_2O and N_2 in the Arabian Sea. ASLO Annual Meeting. Oral presentation.

Davies C. A., Trimmer M. and Nicholls J. C. (2005) Novel pathways for the formation of N_2O and N_2 in the Arabian Sea. British Ecological Society Lancaster. Oral presentation.

Davies C. A., Skiba U. M., and Rees R. M. (2001) NO and N_2O emissions from an upland grassland soil. British Ecological Society Birmingham. Poster presentation.

Grants

2010 – 2013 EU FP7 People Programme, Marie Curie Grant: Low Carbon Future Fuels (LOWCAFF) Assessing the potential for biochar to reduce biofuel carbon intensity. €796, 000.

2006 Anaerobic ammonium oxidation: does it exist as a pathway in the terrestrial nitrogen cycle? UGA Research Foundation New Faculty Research Grant. $7,000.

Professional Service & Recognition

2015 – Present Fellow of the British Society of Soil Science.
2015 – Present Arizona State University Adaptive grazing science advisory board.
2014 – Present United Nations Economics of Land Degradation Private Sector Toolkit

development team.
2011 – Present Steering Committee Member of NERC funded Carbo BioCrop Project. UK.
2011 – 2016 Shell Steering Advisory Group representative of the Energy Technologies Institute. UK.
2010 – 2017 Technical Advisor and ELUM Bio project reviewer for the Energy Technologies Institute. UK.
2010 – Present Reviewer for Global Change Biology Bioenergy, Greenhouse Gas Measurement & Management and Global Change Biology.
2010 – 2019 Centre for Ecology and Hydrology Fellow. CEH Lancaster. UK.
2005 – 2008 Science fair judge, Colham Ferry Elementary School, Oconee County, GA, USA.
2005 – 2008 Lab Health and Safety Manager, Bradford Lab, Odum School of Ecology, UGA. USA.

Society Memberships
British Society of Soil Science member since 1999
Society of Applied Microbiology member since 1997
British Ecological Society member since 1999
American Society for Microbiology member since 2004

Collaborators
Steven Apfelbaum, Applied Ecological Services
Marco Baratieri, Bolzano University
Maria Briones, University of Vigo
Peter Byck, Arizona State University
Carlos C. Cerri, University of Sao Paulo
Carlos E. Cerri, University of Sao Paulo
Francesca Cotrufo, CSU
Brandon Dugan, Rice University
Miles Dyck, University of Alberta
Mark Easter, CSU
Jose Goldemberg, University of Sao Paulo
Ian Head, Newcastle University
Phil Ineson, University of York
Rattan Lal, Ohio State University
Caroline Masiello, Rice University
Niall McNamarra, CEH Lancaster
Tanja Mimmo, Bolzano University
Nick Ostle, Lancaster University
Pietro Panzacchi, University of Bologna
Keith Paustian, CSU
Silvia Toet, University of York
Giustino Tonon, Bolzano University
Pete Smith, University of Aberdeen
Saran Sohi, University of Edinburgh
Jens-Arne Subke, University of Stirling
Maurizio Ventura, Bolzano University
Jeanette Whittaker, CEH Lancaster
Jeremy Woods, Imperial College London