SENIOR RESEARCH SCIENTIST

Summary

Aquatic and terrestrial geochemist, Peatland and Permafrost Biogeochemistry, Multi-omic, Global Change, Mass Spectrometry, Gas Fluxes and Isotopes, Plant-Soil-Microbiome interactions Integration of multidisciplinary science to implement field- and laboratory-based investigations to advance understanding of how soil carbon responds to global change and the underlying microbial mechanisms and interactions that determine its response.

Highlights

- Excellent communication skills
- Excellent written and verbal skills
- Problem-solving and analysis skills
- Project management
- Advanced chemical research
- Research and Analysis
- Time Management
- Effective Multitasking

Accomplishments

Received the Outstanding Performance AwardÂ Award for providing scientific research within Pacific Northwest National Laboratory (2015).

Received the Director Award for Outstanding Performance,Â Award for providing scientific research within Pacific Northwest National Laboratory (2014).

Nominated for theÂ The Dorothy and Russel Johnsen Dissertation Award at Florida State University (2011)

Nominated for theÂ Outstanding Teaching Assistant Award (OTAA) at Florida State University (2011)

Received the best Teaching Assistant award for upper classes laboratory at Florida State University Â (2008 & 2009)

Experience

04/2016 to Current

Senior Research Scientist Emd Millipore ï¼ Urbana , IL

01/2014 to Current

Scientific and technical expertise and leadership Colorado State University ï¼ Fort Collins , CO in support of Environmental Molecular Sciences Laboratory (EMSL) user program

01/2014 to 03/2016

Terrestrial and Subsurface Ecosystems Postdoctoral Fellowship Brown University ï¼ Providence , RI

Department of Energy's Office of Biological and Environmental Research TES program

Project achievements:Â

- Â Developed different extraction protocols for extracting organic matter from soils Â and other natural environments
- Optimized organic matter sample analysis capability and pipeline established at PNNL to generate high throughput, high resolution, and highly reproducible data
- Â Characterized the composition of a variety of environmental and microbial samples funded through the National Science foundation (NSF) and the Department of Energy (DOE)
- Analyzed data and generated reports for over 100 projects over the range of two years, funded externally through NSF and DOE and internally through EMSL user projects or Laboratory Directed Research and Development, ranging from understanding organic matter composition across the aquatic-terrestrial interface and salt marshes, to detection of contaminants across the Columbia river and Hanford site to linking organic matter composition with microbial community composition. The outcome of these projects is co-authored publications
- A central member of Microbiomes in Transition (MinT) Initiative which aims at integrating multidisciplinary research to develop multiscale models that enable a mechanistic understanding of microbiome function and response to perturbation, at PNNL
- A member of Pan-Omics Project, which aims at developing and applying new omics technologies, sponsored by DOE-BER.
- Â Published two personal first author publications in addition to co-authored publications with EMSL users.
- Â Presented project results at several conferences.
- Mentored two interns and one masters student

01/2012 to 12/2014

Postdoctoral Researcher Florida State University ï¼ City , STATE

Project achievements:

- Published research as first author of two scientific journals, co-authored 7 scientific journals in high impact journals, and co-authored an additional journal which is currently in review. Â Â Â Â Â
- Developed and implemented projects from idea inception through to data analysis for to investigate the lability of soil and dissolved organic matter and the composition of decomposer microbial communities in response to the climatic forcing of environmental processes that determine carbon storage and sequestration in peatlands. Â Â Â Â Â
- A central member of the DOE-funded experiment entitled, â€œSpruce and Peatland Responses Under Climatic and Environmental Changeâ€ (SPRUCE) being conducted atÂ the Marcell Experimental Forest (MEF) near Grand Rapids Minnesota, USA, where the US Department of Energy's Oak Ridge National Laboratory and the US Forest Service. Â
- Published the first paper for the SPRUCE experiment regarding the characteristics, composition and dynamics of both dissolved and soil organic matter at MEF, which helped in establishing a benchmark for the detection of changes following manipulation of environmental variables. Â
- Presented project results at several conferences Â·Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Mentored a graduate student and three undergraduates over the span of 2 years.
- Participated in 4 field trips from sample collection.

08/2007 to 12/2011

Research Assistant Florida State University ï¼ City , STATE
Project achievements:

- Â Published research as first author of 4 scientific journals and co-authored three papers
- Developed, implement, and managed projects from idea inception through to data analysis for studying dissolved organic matter characterization using different analytical approaches
- Â My work provided significant advancements regarding the difference in DOM quality, reactivity and composition between bogs and fens and their probable response to climate change
- Â Presented project results at several conferences

Education
2011
Ph.D. : Analytical Chemistry Florida State University ï¼ City , State
2006
Bachelor of Science : Chemistry General Chemistry Lebanese University ï¼ City Lebanon
Affiliations
American Geophysical Union (2008-present)
Graduate Women in Science (2007-2011)
Publications

- Â R.M. Wilson and A.M. Hopple, M.M. Tfaily , S.D. Sebestyen , C.W. Schadt , L. Pfeifer-Meister , C. Medvedeff , K.J. McFarlane , J.E. Kostka , M. Kolton , R. Kolka , L.A. Kluber , J.K. Keller , T.P. Guilderson , N.A. Griffiths , J.P. Chanton, S.D. Bridgham, and P.J. Hanson, Stability of peatland carbon to rising temperatures, In press: Â Nature Communications.
- James C. Stegen, Allen H. Hurlbert, Benjamin Bond-Lamberty, Xingyuan Chen, Carolyn G. Anderson, Rosalie K. Chu, Francisco Dini-Andreote, Sarah J. Fansler, Nancy J. Hess, and Malak Tfaily, Aligning the Measurement of Microbial Diversity with Macroecological Theory, In press: Frontiers Microbiology
- Bailey VL, AP Smith,Â MM Tfaily, SJ Fansler, and B Bond-Lamberty.Â 2016.Â Â "Differences in the Complexity of Soluble Organic Carbon in Pore Waters Sampled from Different Pore Size Domains."Â Accepted: Soil Biology and Biochemistry.
- Â Walker, Lawrence R.; Tfaily, Malak M.; Shaw, Jared B.; Hess, Nancy J; PaÅ¡a-ToliÄ‡, Ljiljana; Koppenaal, David W., Unambiguous Detection of Bacterial Siderophores by Direct Injection 21 Tesla Fourier Transform Ion Cyclotron Resonance Mass spectrometry, Accepted::Metallomics
- James C. Stegen, James K. Fredrickson, Michael J. Wilkins, Allan E. Konopka, William C. Nelson, Evan V. Arntzen, William B. Chrisler, Rosalie K. Chu, Robert E. Danczak, Sarah J. Fansler, David W. Kennedy, Charles T. Resch, and Malak Tfaily. Groundwater-Surface Water Mixing Shifts Ecological Assembly Processes and Stimulates Organic Carbon Turnover, Nature communications, doi:10.1038/ncomms11237
- Hodgkins, S. B., M. M. Tfaily, D. C. Podgorski, C. K. McCalley, S. R. Saleska, P. M. Crill, V. I. Rich, J. P. Chanton and W. T. Cooper (2016). "Elemental composition and optical properties reveal changes in dissolved organic matter along a permafrost thaw chronosequence in a subarctic peatland." Geochimica et Cosmochimica Acta 187: 123-140. 7.Â Â Â Â Â Tfaily, M. M., Rosalie K. Chu, Nikola ToliÄ‡, Kristyn M. Roscioli, Brian Anderson, Christopher R. Anderton, Ljiljana PaÅ¡a-ToliÄ‡, Errol Robinson, Nancy J. Hess, Advanced solvent based methods for molecular characterization of soil organic matter by high resolution mass spectrometry. Anal. Chem. 2015. DOI: 10.1021/acs.analchem.5b00116 8.Â Â Â Â Â Tfaily, M. M., Corbett, J. E., Wilson. R, Chanton, J. P., Glaser, P. H., Cawley, K. M., Jaffe, R., Cooper,W. T., Utilization of PARAFAC-Modeled Excitation-Emission Matrix (EEM) Fluorescence Spectroscopy to Identify Biogeochemical Processing of Dissolved Organic Matter in a Northern Peatland. Photochem Photobiol. 2015 Mar 12. DOI: 10.1111/php.12448. J. Elizabeth Corbett, Malak M. Tfaily, David J. Burdige, Paul H. Glase , and Jeffrey P. Chanton.biojeosciences. The relative importance of methanogenesis in the decomposition of organic matter in northern peatlands; J. Geophys. Res. Biogeosci., 120, 280â€“293. doi: 10.1002/2014JG002797. 10.Â Â Holmes, M. E. , Chanton, J., Tfaily, M. M., Ogram, A., CO2 and CH4 isotope compositions and production pathways in a tropical peatland, Global Biogeochem.Cycles, Accepted, October 2014. 11.Â Â Tfaily, M. M., Cooper, W. T., Kostka, J., Chanton, J. P., Schadt, C., Hanson, P., Iverson, C., Chanton, J. P., Organic Matter Transformation in the Peat Column at Marcell Experimental Forest: Humification and Vertical Stratification, Biogeosiecnes, 2014, 119,DOI:10.1002/2013JG002492 12.Â Â Hodgkins, S. B., Tfaily, M. M., McCalley, C., Logan, T. A., Crill, P., Saleska., S. R., Rich, V. I., Chanton, J. P., Changes in soil chemistry due to permafrost thaw increase greenhouse gas production in arctic peat, PNAS, April 7, 2014 DOI: 10.1073/pnas.1314641111 Lin, X., Tfaily, M. M., Steinweg J. M., Chanton, P. R., Esson, K., Chanton, J. P., Cooper, W. T., Schadt, C., Kostka, J., Microbial spatial niche stratification and temporal dynamics in response to organic matter transformation in a northern forested peatland, Appl. Environ. Microbiol. June 2014 vol. 80 no. 11 3531-3540 Lin, X., Tfaily, M. M., Green, S., Steinweg J. M., Chanton, P. R., Esson, K., Chanton, J. P., Cooper, W. T., Schadt, C., Kostka, J., Integrated metagenomic and NMR spectroscopic analysis of carbon metabolism and nutrient acquisition (N, P) in an ombrotrophic peatland Appl. Environ. Microbiol. June 2014 vol. 80 no. 11 3531-3540 Tfaily, M. M., Hamdan, R., Corbett, J. E., Chanton, J. P., Glaser, P. H., Cooper, W. T. (2013) Investigating dissolved organic matter decomposition in northern peatlands using complimentary analytical techniques.Â Geochim. Cosmochim. Acta112, 116-129. 16.Â Â Corbett, J. E., Tfaily, M. M., Burdige, D. J. ,Cooper, W. T., Glaser, P. H.,Â Chanton, J. P. (2013), Partitioning pathways of CO2 production in peatlands with stable carbon isotopes. Biogeochemistry 114, 327-340 17.Â Â Corbett, J. E., Burdige, D. J. , Tfaily, M. M., Dial, A. R., Cooper, W. T., Glaser, P. H., Chanton, J. P. (2013) Surface Production Fuels Deep Heterotrophic Respiration in Northern Peatlands, accepted for publication in Global Biogeochem. Cycles 18.Â Â Cooper, W. T., Tfaily, M. M., Corbett, J. E., Chanton, J. P. (2013) Correlating bulk optical spectroscopy and ultrahigh-resolution mass spectrometry to determine the molecular composition of dissolved organic matter in Northern peatlands, in: Functions of natural organic matter in changing environment, edited by: Jiaming XU, Jianjun Wu, and Yan He Springer (2013) 19.Â Â Lin X, Green S, Tfaily, M. M., Prakash, O., Konstantinidis,Â K.T., Corbett, J. E., Chanton, J. P., Cooper, W. T., Kostka, J. E. (2012)Â Microbial community structure and activity linked to contrasting

biogeochemical gradients in bog and fen environments of the Glacial Lake Agassiz Peatland. Appl Environ Microbiol 78(19):7023-31 20.Â Â Tfaily, M. M., Hodgkins, S., Podgorski, D.,Â Chanton, J. P., Cooper, W. T. (2012) Comparison of Dialysis and Solid-phase Extraction for Isolation and Concentration of Dissolved Organic Matter Prior to Fourier Transform Ion Cyclotron Resonance Mass Spectrometry, Anal Bioanal Chem 404:447â€“457 21.Â Â Tfaily, M. M., Podgorski, D., Corbett, J. E., Chanton, J. P., Cooper, W. T. (2011) Influence of acidification on the optical properties and molecular composition of dissolved organic matter, Analytica Chimica Acta 706, 261-267 22.Â Â Tfaily, M. M., D'Andrilli, J., Corbett, E., Chanton, J. P., Cooper, W. T. (2010) Molecular characterization of dissolved organic matter (DOM) in Northern peatlands: Identifying the chemical signatures of climate change, Geochim. Cosmochim. Acta, 74 (11), A1038-A103Â Â Â Â Â Â Â Â Â Â Â Â Â 23.Â Â Corbett, J. E., Chanton, J. P.,Â Burdige, D., Glaser, P. H., Cooper, W.T., Siegel, D. I., Dasgupta, S. S., Tfaily, M. M. (2010)Â Partitioning peatland gas prodution: Determining the fraction of CO_2 produced from methanogenesis, Geochim. Cosmochim. Acta, 74 (11), A190-A190 24.Â Â Tfaily, M. M., Corbett, J., Chanton, J., Cooper, W. T. (2010) DOM in Northern Peatlands: Correlating Bulk Spectroscopic Properties with Molecular Composition, Geophysical Research abstracts Vol. 13

Skills

Proficient in a number of DOM and SOM characterization techniques: Electro spray ionization Fourier transform Ion Cyclotron Resonance mass spectrometry (ESI- FT ICR MS) Electro spray ionization Time of Flight mass spectrometry (ESI-TOF MS) GC combustion-interfaced Finnegan MAT Delta V isotope ratio mass spectrometer (GC IRMS) 3D-Steady state fluorescence spectroscopy (Excitation emission matrix fluorescence spectroscopy EEMS) Multivariate Parallel factor (PARAFAC) analysis of fluorescence EEM data UV/Vis absorption spectroscopy Fourier transform Infrared spectroscopy (FT IR) Solid state 13C NMR GC and HPLC Proficient in a number of DOM and Soil organic matter extraction/concentrating/desalting techniques: Solid phase extraction (SPE) Dialysis Freeze drying Extraction of porewater using Rhizons Proficient in sample collection techniques: Pizeometers for porewater collection Rhizons for porewater collection Drill/hole saw: Collection of frozen uncompressed cores in poorly decomposed woody peat Russian Peat Borer: Collection of uncompressed cores in poorly decomposed woody peat. Proficient in soil incubation studies Proficient in Statistical Analyses in multiple platforms R Statistical Program (R Development Core Team) Matlab Origin ver. 8.6. (Statistical Analyses and Curve-fitting routines)

Additional Information

- GRANTS Current Organization Providing Support U.S. Department of Energy, Office of Science, Biological and Environmental Research Title of Award Illuminating the pathways to carbon liberation: a systems and modeling approach to resolving the 'consequential unknowns' of carbon transformation and loss from thawing permafrost peatlands Award Period 10/01/2016 - 09/30/2019 Total Amount for Entire Award Period $2,069,000 Number of Person-months per Year 1.2 M. Tfaily serves as Task Lead for all PNNL activities on the project including organic matter characterization and meta-omics approaches integration. Current Organization Providing Support Pacific Northwest National Laboratory, Lab directed research and development Title of Award Tracking the Fate of new C in Northern Peatlands by a Compound-Specific Stable Isotope-Labeling Approach coupled with FISH-NanoSIMS Award Period 10/1/2016-9/30/2018 Total Amount for Entire Award Period $ 250,000 Number of Person-months per Year 1.8 M. Tfaily serves as PI Current Organization Providing Support Pacific Northwest National Laboratory, Lab directed research and development Title of Award Deciphering Microbial Communication Through Metabolites Award Period 10/1/2016-9/30/2019 Total Amount for Entire Award Period $ 960,000 Number of Person-months per Year 1.2 M. Tfaily serves as task lead for secondary metabolite characterization by LC MS/MS. Current Organization Providing Support Pacific Northwest National Laboratory, Lab directed research and development Title of Award Advancing ecosystem understanding of carbon turnover and storage through molecular characterization Award Period 10/1/2015-9/30/2017 Total Amount for Entire Award Period $ 450,000 Number of Person-months per Year 1.2 M. Tfaily serves as task lead for organic matter characterization (primary and secondary metabolites) and integration with multiple omics approaches. Current Organization Providing Support Pacific Northwest National Laboratory, Lab directed research and development Title of Award Development of an in situ multimodal mass spectrometry imaging approach for studying the rhizosphere: from revealing activation of metabolic pathways to elucidating nanoscale exchanges Award Period 10/1/2015-9/30/2017 Total Amount for Entire Award Period $ 275,000 Number of Person-months per Year 1.2 M. Tfaily serves as task lead for root exudates metabolite and metabolite pathways characterization AWARDS 2015 Outstanding Performance Award, Pacific Northwest National Laboratory 2014 Director Award for Outstanding Performance, Pacific Northwest National Laboratory 2012 The Dorothy and Russel Johnsen Dissertation Award Nominee 2011 Outstanding Teaching Assistant Award (OTAA) Nominee-Spring 2010 Best Teaching Assistant award for upper classes laboratory 2008 Outstanding Teaching Assistant Award (OTAA) Nominee