Dr. James Longstaffe

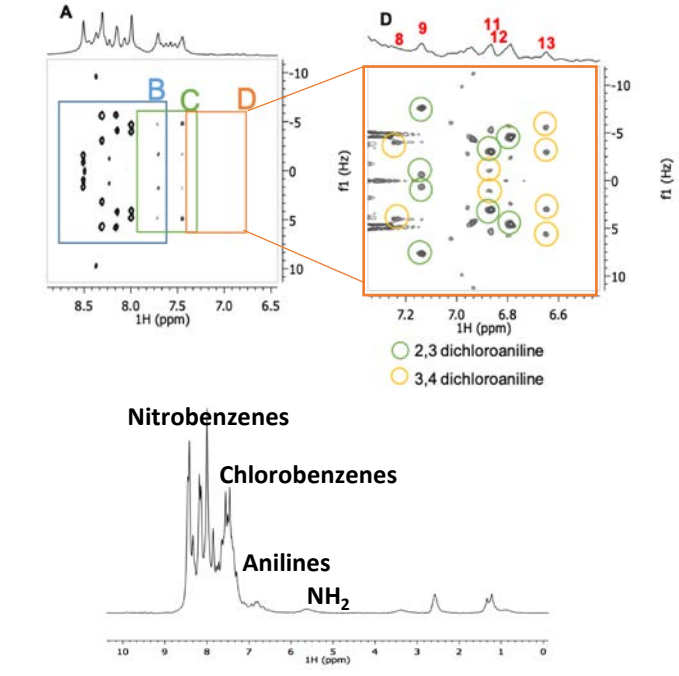
Assistant Professor
Environmental Chemistry
School of Environmental Sciences
University of Guelph

Dr. James Longstaffe received his PhD in Environmental Chemistry from the University of Toronto in 2013. He also has a Masters degree in Materials Chemistry from Dalhousie.

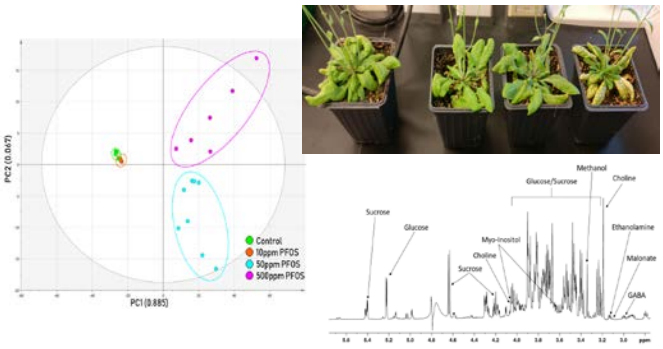
Dr. Longstaffe's research focuses on the behaviour of chemical contaminants in the environment. Contamination of the environment with anthropogenic chemical agents is recognized as one of the leading factors contributing to global environmental change. The complex relationships between the chemical, physical, and biological processes that occur in the heterogeneous mixture of air, water, soil and biology in the near-surface environment plays an important role in governing the behaviour of contamination in the global environment, including their persistence, degradation, transport and ecotoxicity.

A key part of Dr. Longstaffe's research involves developing applying novel analytical methods to provide new insight into the natural processes that remove or reduce the impact of environmental contamination.

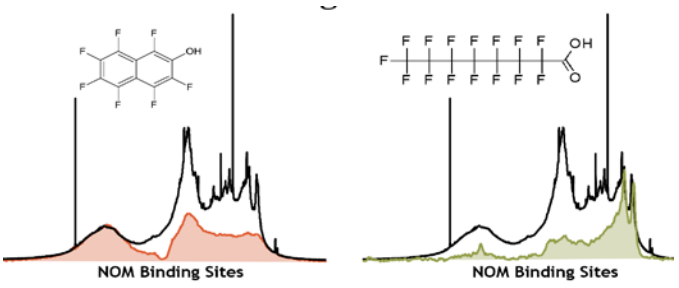
Dr. Longstaffe's two primary research areas are: (i) developing a molecular-level understanding of the role that environmental matrices (soils, sediments, colloids, mineral surfaces, natural organic matter) play in governing the availability of contaminants for natural attenuation processes (sequestration, degradation, transport), and (ii) developing novel analytical tools and methods for the characterization of contaminated environments.



Characterization of Non-Aqueous Phase Liquids



Environmental Metabolomics



Contaminant Binding

Selected Papers and Theses

Selected Publications

Fallaise D., Tweedie H.B., Konzuk J., Cheyne C., Mack E.E., Longstaffe J.G. Practical application of 1H benchtop NMR spectroscopy for the characterization of a nonaqueous phase liquid from a contaminated environment. Magnetic Resonance in Chemistry, 2019, 57, 93-100.

Fallaise D., Konzuk J., Cheyne C., Mack E.E., Longstaffe J.G. Nontargeted analysis of a non-aqueous phase liquid from a chemical manufacturing site using nuclear magnetic resonance spectroscopy. Environmental Toxicology and Chemistry, 2019, 38, 947-955.

Longstaffe J.G., Fallaise D. Characterization of Heavily Contaminated Environments Using NMR Spectroscopy. eMagRes, 2017, 6, 407-418.

Longstaffe J.G. Courtier-Murias D., Simpson A.J. A Nuclear Magnetic Resonance Study of the Dynamics of Organofluorine Interactions with Dissolved Humic Acid. Chemosphere, 2016, 145, 307-313.

Longstaffe J.G., Konzuk J. NMR in the Environmental Industry. Mag. Res. Chem. 2015, 53, 691-693.

Longstaffe J.G., Courtier-Murias D. Simpson A.J. The pH-Dependence of Organofluorine Binding Domain Preference in Dissolved Humic Acid. Chemosphere. 2013, 90, 270-275.

Longstaffe J.G., et al. In-Situ Molecular-Level Elucidation of Organofluroine Binding Sites in a Whole Peat Soil. Environ. Sci. Technol. 2012, 46, 10508-10513.

Longstaffe J.G., Simpson A.J. Understanding Solution-State Noncovalent Interactions Between Xenobiotics and Natural Organic Matter using 19F/1H Heteronuclear Saturation Transfer Difference Nuclear Magnetic Resonance Spectroscopy. Environ. Toxicol. Chem. 2011, 30, 1745.

Longstaffe J.G., Simpson M.J., Maas W., Simpson A.J. Identifying Components in Dissolved Humic Acid that bind Organofluorine Contaminants using 1H{19F} Reverse Heteronuclear Saturation Transfer Difference NMR Spectroscopy. Environ, Sci. Technol. 2010, 44, 5476-5482.

Theses

Darcy Fallaise, MSc (2016-2018). Development of NMR methods for the characterization of complex non-aqueous phase liquids.

Darla Bennett, PhD (2016-present). Characterization of NAPL behavior using NMR.

Ryan Freemantle, MSc (2017-present). Improved understanding of anaerobic bioreactor fouling using NMR Spectroscopy.

Liam O'Hare, MSc (2018-present). Non-targeted NMR-based metabolomics methods to characterize Arabidopsis Thaliana exposure to contaminated soils and groundwater.

Lucus Sunderland, MSc (2018-present). Development of NMR fingerprinting methods to understand variation and attenuation of groundwater contaminants.

Johnathan Abraham, MSc (2018-present). Agrochemical interactions with natural organic matter in a riparian stream.