The UNIVERSITY CONSORTIUM

Dr. Beth Parker

- Director, The G^{360} Institute
- NSERC Senior Industrial Research chair in Fractured Bedrock Contamination
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Dr. Parker is a Professor in the School of Engineering at the University of Guelph and holds a Senior Industrial Research Chair in Fractured Rock Contaminant Hydrology from the Canadian Natural Sciences and Engineering Research Council (NSERC) since 2007.

Dr. Parker's main research thrusts are:

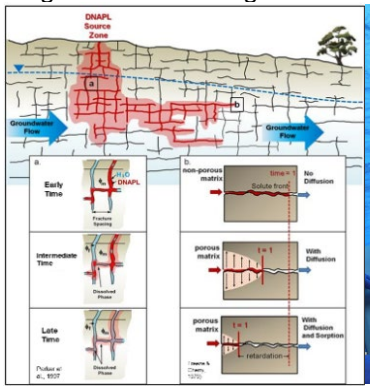
- Developing and validating process-informed site conceptual models
- Improving characterization, remediation, monitoring technologies and data analysis for aged industrial contaminated sites in complex hydrogeologic settings
- Collection and analysis of high resolution special and temporal data used for groundwater resource protection
- Evaluating water quantity and quality impacts to groundwater and surface water and groundwater from natural resource extraction (i.e. mining, upstream oil and gas, permits to take water)
- Improve groundwater flow system understanding for flow path analysis, flux distributions and travel times

Dr. Parker began her professional career as an environmental engineer in New York State working on characterizing, monitoring and remediation of industrial-derived contaminants in groundwater, primarily in glacial and bedrock sediments. After seven years working to characterize and remediate chlorinated solvent and metal contaminants in complex industrial environments under RCRA and Superfund legislation, she continued her education at the University of Waterloo (Ontario, Canada) where she completed her PhD in Earth Sciences in 1996 and then was a Research Professor from 1996 – 2007. In 2007 she moved her research program to the University of Guelph as a Full Professor.

In addition to the NSERC IRC awarded in 2007 as recognition of her scientific leadership with chlorinated solvent behaviour in groundwater, she received the John Hem Award (2009) the M. King Hubbert Award (2018), and was made a Fellow of the American Geophysical Union (2020). She also received the Guelph YMCA Women of Distinction Award in 2019.

As founding director of the G^{360} Institute for Groundwater Research, she directs a large group of interdisciplinary scientists and engineers that focus on developing and implementing high resolution field methods. The aim of this group is quantifying advective and diffusive transport and associated reactive processes attenuating industrial contaminants in complex hydrogeological settings via the development of robust, process-based site conceptual models. These models are used to assess risks to receptors and develop appropriate monitoring and remediation designs for cost effective site management and aquifer protection.

Dr. Parker's long-term focus has been on quantifying the role of diffusion on various contaminant source zone types and plume evolution, often creating limits to cost effective remediation. This is synergistic with her long term interest in characterization of aquitards to better understand groundwater flow systems, linking recharge areas to discharge areas.



Selected Papers and Theses

Selected Publications

Filippini*, M., Parker, B.L., Dinelli, E., Wanner*, P., Chapman*, S.W., Gargini A. 2020. Assessing aquitard integrity in a complex aquifer-aquitard system contaminated by chlorinated hydrocarbons. Water Res. 171.

Puigserver, D., Herrero, J., Parker, B. L., Carmona, J. M. 2020. Natural attenuation of pools and plumes of carbon tetrachloride and chloroform in the transition zone to bottom aquitards and the microorganisms involved in their degradation. Sci. 712

Ben-Israel*, M., Wanner, P., Fernandes, J. Burken, J.G., Aravena, R., Parker, B.L., Haack, E.A., Tsao, D.T., Dunfield, K.E. 2020. Quantification of toluene phytoextraction rates and microbial biodegradation functional profiles at a fractured bedrock phytoremediation site. Sci. 707.

Quinn*, P., Cherry, J. A., Parker, B. L. 2020. Relationship between the critical Reynolds number and aperture for flow through single fractures evidence from laboratory studies. J. Hydrol. 581.

Forde*, O.N., Cahill, A.G., Mayer, K.U., Mayer, B., Simister, R. L., Finke, N., Crowe, S. A., Cherry, J. A., Parker B. L. 2019. Hydro-biogeochemical Impacts of Fugitive Methane on a Shallow Unconfined Aquifer. Sci. 690.

Klazinga*, D., Steelman*, C. M., Cahill*, A. G., Endres, A. L., Parker, B.L. 2019. Methane migration in an unconfined aquifer: Numerical simulations of a controlled release experiment at CFB Borden. J. Contam. Hydrol. 225.

Manna*, F., Walton*, K., Cherry, J.A., Parker, B.L. 2019. Five-century record of climate and groundwater recharge variability in southern California. Sci. Rep. 9.

Marshall*, R; Levison, J; McBean, E; Parker, B.L. 2019. Wastewater impacts to groundwater at a fractured sedimentary bedrock site in Ontario, Canada: implications for First Nations' source water protection. Hydrogeol. J. 27.

Klazinga*, D., Steelman*, C. M., Endres, A. L., Parker, B.L. 2019. Geophysical response to methane migration in groundwater during a controlled injection into a sandy aquifer. J. Appl. Geophys. 168.

Harvey*, T.M., Arnaud, E., Meyer*, J.R., Steelman*, C.M, Parker, B.L. 2019. Characterizing scales of hydrogeological heterogeneity in ice-marginal sediments, Wisconsin, USA. Hydrogeol. J. 27.

Manna*, F., Murray, S., Abbey, D., Martin, P., Cherry, J.A., Parker, B.L. 2019. Spatial and temporal variability of groundwater recharge in a sandstone aquifer in a semiarid region. Hydrol. Earth Syst. Sci. 23.

Maldaner*, C., Munn*, J., Coleman*, T., Molson, J., Parker, B.L. 2019. Groundwater flow quantification in fractured rock boreholes using active distributed temperature sensing under natural gradient conditions. Water Resour. Res. 55(4).

Capes*, D.C., Steelman*, C.M., Parker, B.L. 2018. Hydrologic interpretation of seasonally dynamic ambient temperature profiles in sealed bedrock boreholes. J. Hydrol. 567.

Persaud*, E., Levison, J., Pehme*, P., Novakowski, K., Parker, B.L. 2018. Cross-hole fracture connectivity assessed using hydraulic responses during liner installations in crystalline bedrock boreholes. J. Hydrol. 556.

Wanner*, P., Parker, B.L., Hunkeler, D. 2018. Assessing the effect of chlorinated hydrocarbon degradation in aquitards on plume persistence due to back-diffusion. Sci. 633.

Cahill*, A.G., Parker, B.L., Mayer, B., Mayer, K.U., Cherry, J.A. 2017. High resolution spatial and temporal evolution of dissolved gases in groundwater during a controlled natural gas release experiment. Sci. 622-623.

Haslauer, C., Meyer*, J.R., Bárdossy, A., Parker, B.L. 2017. Estimating a representative value and proportion of true zeros for censored analytical data with applications to contaminated site assessment. Environ. Sci. Technol. 51(13).

Wanner, P., Chapman*, S., Parker, B.L., Aravena, R., Hunkeler, D. 2016. Quantification of Degradation of Chlorinated Hydrocarbons in Saturated Low Permeability Sediments Using Compound-Specific Isotope Analysis (CSIA). Environ. Sci. Technol. 50(11).

Coleman*, T.I., Parker, B.L., Maldaner*, C.H., Mondanos, M.J. 2015. Groundwater flow characterization in a fractured bedrock aquifer using active DTS tests in sealed boreholes. J. Hydrol. 528.

Steelman*, C.M., Kennedy*, C.S., Parker, B.L. 2015. Geophysical conceptualization of a fractured sedimentary bedrock riverbed using ground-penetrating radar and induced electrical conductivity. J. Hydrol., 521.

Meyer*, J. R., Parker, B. L., Cherry, J. A. 2014. Characteristics of high resolution hydraulic head profiles and vertical gradients in fractured sedimentary rocks. J. Hydrol., 517.

Pehme*, P., Parker, B.L., Cherry, J.A., Blohm, D. 2014. Detailed measurement of the magnitude and orientation of thermal gradients in lined boreholes for characterizing groundwater flow in fractured rock. . J. Hydrol., 513.

Pehme*, P.E., Parker, B.L., Cherry, J.A., Molson, J.W., Greenhouse, J.P. 2013. Enhanced detection of hydraulically active fractures by temperature profiling in lined heated bedrock boreholes. J. Hydrol., 484.

Chapman* S.W., Parker, B.L., Sale, T.C., Doner, L.A. 2012. Testing high resolution numerical models for analysis of contaminant storage and release from low permeability zones. J. Contam. Hydrol. 136-137.

Meyer*, J.R., Parker, B.L., Cherry, J.A. 2008. Detailed hydraulic head profiles as essential data for defining hydrogeologic units in layered fractured sedimentary rock. Environ. Geol. 56(1).

Parker, B.L., McWhorter, D.B., Cherry, J.A. 1997. Diffusive loss of non-aqueous phase organic solvents from idealized fracture networks in geologic media. Groundwater, 35(6).

Parker, B.L., Gillham, R.W., Cherry, J.A. 1994. Diffusive disappearance of immiscible-phase organic liquids in fractured geologic media. Ground Water, 32(5).

Recent Theses (2019-2020)

Oliver Conway-White, April 2020, MSc thesis: Lithostratigraphic Characterization of a Buried Bedrock Valley Using Airborne and Surface Geophysics.

Jonathan Kennel, February 2020, PhD thesis: High Frequency Water Level Responses to Natural Signals.

Terri Cheung, November 2019, MSc thesis (University of Calgary): Establishing High-resolution Hydrogeological, Geochemical and Isotopic Baseline Conditions of the Fresh Water Zone at a Field Research Site near Brooks, Alberta, Canada.

Chrystyn Skinner, September 2019, MSc thesis: High-resolution Hydrogeological Characterization of a Fractured Dolostone Municipal Supply Aquifer to Create a Refined 3-D Conceptual Site Model with Hydrogeologic Units.

Christopher Morgan, August 2019, MSc thesis: Fracture Network Characterization of an Aquitard Surface within the Wonewoc Sandstone using Digital Outcrop Photogrammetry and Discrete Fracture Network (DFN) Modelling.

R Chow, May 2019, PhD thesis (University of Tubingen): Modelling Surface Water - Groundwater Exchanges: Evaluating Model Uncertainty from the Catchment to Bedform-Scale