



Dr. Beth Parker

- Director, The G³⁶⁰ Institute
- NSERC Senior Industrial Research chair in Fractured Bedrock Contamination
- Professor, School of Engineering, University of Guelph
- Associate Director, The University Consortium

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 spatial 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



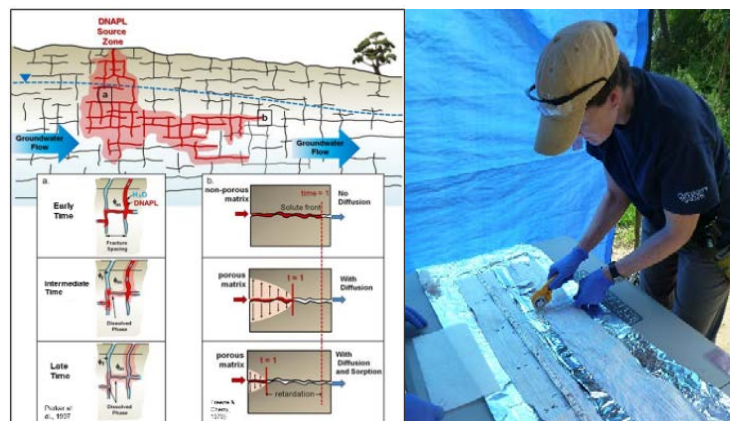
Dr. Parker began her professional career more than 35 years ago as an environmental engineer in New York State working on characterizing, monitoring and remediation of industrial-derived contaminants in groundwater, primarily in glacial and bedrock sediments. After seven years working to characterize 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 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) and the M. King Hubbert Award (2018). She also received the Guelph YMCA Women of Distinction Award in 2019.

As founding director of the G³⁶⁰ 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

- 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. *Hydrology and Earth System Science*, DOI: 10.5194/hess-2018-531.
- Walton*, K.M., Unger, A.J.A., Ioannidis, M.A., Parker, B.L. 2019. Benchmarking NAPL redirection and matrix entry and fracture intersections below the water table. *Water Resources Research*, 55, DOI: 10.1029/2018WR023435.
- Capes*, D.C., Steelman*, C.M., Parker, B.L. 2018. Hydrologic interpretation of seasonally dynamic ambient temperature profiles in sealed bedrock boreholes. *Journal of Hydrology*, 567, 133-148.
- Quinn*, P., Klammer, H., Cherry, J.A., Parker, B.L. 2018. Insights from unsteady flow analysis of underdamped slug tests in fractured rock. *Water Resources Research*, 54(8), 5825-5840.
- Chapman*, S.W., Cherry, J.A., Parker, B.L. 2018. Multiple-scale hydraulic characterization of a surficial clayey aquitard overlying a regional aquifer in Louisiana. *Journal of Hydrology*, 558, 546-563.
- 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. *Science of Total Environment*, 622-623: 1178-1192.
- Manna*, F., Walton*, K., Cherry, J.A., Parker, B.L. 2017. Mechanisms of recharge in a fractured porous rock aquifer in a semi-arid region. *Journal of Hydrology*, 555, 869-880.
- Steelman*, C.M., Klazinga*, D., Cahill*, A.G., Endres, A., Parker, B.L. 2017. Monitoring the evolution and migration of a methane gas plume in an unconfined sandy aquifer using time-lapse GPR and ERT. *Journal of Contaminant Hydrology*, 205, 12-24.
- 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. *Environmental Science & Technology*, 51(13), 7502-7510.
- Allen*, A., Borchardt, M., Kieke, B., Dunfield, K., Parker, B.L. 2017. Virus occurrence in private and public wells in a fractured dolostone aquifer in Canada. *Hydrogeology Journal*, 25:1117-1136.
- Cahill*, A.G., Steelman*, C., Forde, O., Kuloyo, O., Ruff, S.E., Mayer, B., Mayer, K.U., Strous, M., Ryan, M.C., Cherry, J.A., Parker, B.L. 2017. Mobility and persistence of methane in groundwater in a controlled-release field experiment. *Nature Geoscience*, 10, 289-294.
- Munn*, J. D., Coleman*, T. I., Parker, B. L., Mondanos, M. J., & Chalari, A. 2017. Novel cable coupling technique for improved shallow distributed acoustic sensor VSPs. *Journal of Applied Geophysics*, 138, 72-79.
- Quinn*, P.M., Cherry, J.A., Parker, B.L. 2016. Depth-discrete specific storage in fractured sedimentary rock using steady-state and transient single-hole hydraulic tests. *Journal of Hydrology*, 542, 756-771.
- Manna*, F., Cherry, J.A., McWhorter, D.B., Parker, B.L. 2016. Groundwater recharge assessment in an upland sandstone aquifer of southern California. *Journal of Hydrology*, 541(B), 787-799.
- 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). *Environmental Science and Technology*, 50 (11), 5622-5630.
- Meyer*, J.R., Parker, B.L., Arnaud, E., Runkel, A.C. 2016. Combining High Resolution Vertical Gradients and Sequence Stratigraphy to Delineate Hydrogeologic Units for a Contaminated Sedimentary Rock Aquifer System. *Journal of Hydrology*, 534, 505-523.
- 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. *Journal of Hydrology*, 528, 449-462.
- 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. *Journal of Hydrology*, 521, 433-446.
- Meyer*, J. R., Parker, B. L., Cherry, J. A. 2014. Characteristics of high resolution hydraulic head profiles and vertical gradients in fractured sedimentary rocks. *Journal of Hydrology*, 517, 493-507.
- 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. *Journal of Hydrology*, 513, 101-114.
- Quinn*, P.M., Parker, B.L., Cherry, J.A. 2013. Validation of non-Darcian flow effects in slug tests conducted in fractured rock boreholes. *Journal of Hydrology*, 486, 505-518.
- 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. *Journal of Hydrology*, 484, 1-15.
- 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. *Journal of Contaminant Hydrogeology*, 136-137, 106-116.
- 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. *Environmental Geology*, 56(1), 27-44.
- Parker, B.L., Cherry, J.A., Chapman*, S.W. 2004. Field study of TCE diffusion profiles below DNAPL to assess aquitard integrity. *Journal of Contaminant Hydrology*, 74(1-4), 197-230.
- Parker, B.L., Cherry, J.A., Chapman*, S.W., Guilbeault*, M.A. 2003. Review and analysis of chlorinated solvent DNAPL distributions in five sandy aquifers. *Vadose Zone Journal*, 2(2), 116-137.
- 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), 1077-1088.
- 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), 805-820.

Recent Theses (2018-2019)

- Jonathan Munn, June 2018, Ph.D. thesis: Using sonic and acoustic sensing methods to characterize vertical distribution in fractured sedimentary rock aquifers and aquitards.
- Shoaib Saleem, September 2018 Ph.D. thesis: Modelling nitrate transport in various geological setting under different climate scenarios.
- Rachel Marshall, December 2018, Ph.D. thesis: Source water protection for First Nations communities.
- Hari Bhatti, August 2018, M.Sc. thesis: Field validation of low cost multilevel monitoring systems (MLS) with water-filled rubber packers in a shallow dolomite aquifer.
- Tim Speirs, May 2018, M.Sc. thesis: Transport and fate of fluorinated DNAPL in a surficial clay aquitard.