Philip Charles Bennett
Professor, Dept. of Geological Sciences, Jackson School of Geosciences
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FIELDS OF SPECIALIZATION:

Geomicrobiology, aqueous geochemistry, hydrogeology.

EDUCATION:

Ph.D. (1989) Syracuse University, Syracuse NY; Geology/Aqueous Geochemistry Focus
M.S. (1985) State University of New York, Syracuse NY; Environmental Studies/Environmental Chemistry Focus
B.S. (1981) The Evergreen State College, Olympia WA; (Environmental Chemistry Focus)

PROFESSIONAL EXPERIENCE:

Program Officer: National Science Foundation. 9/2018 to 2/2021. Geobiology and Low Temperature Geochemistry program.
Associate Dean for Academic Affairs: Jackson School of Geosciences. (5/2009 to 9/2013)
Graduate Advisor, Graduate program in geological sciences, 2003-2006
Professor, University of Texas at Austin, Dept. of Geological Sciences (9/2000 to present). Full-time (with tenure) appointment, holding the Flawn Fellowship.
Associate Professor: 9/94-9/2000, Jackson Centennial Teaching Fellowship;
Assistant Professor: 1/89 – 9/94
Research Collaborator, University of California, Los Alamos National Laboratory (1990-1996). Research on mineral surface chemistry with CST division.
Organic Analytical Chemist, Calocerinos Spina Engineers: 12/83 – 9/85.
Firefighter/Medic: (1978-2001). Highest rank: District Chief, Travis Co ESD#4.

AWARDS AND HONORS:

Knebel Teaching Award for graduate instruction. 2012
National Ground Water Association *Henry Darcy Distinguished Lecturer*, 1997
Houston Oil and Minerals Faculty Excellence Award 1994
Syracuse University Graduate School Marshall, 1989

PROFESSIONAL AFFILIATIONS:

State of Texas Licensed Professional Geologist #2789
Geological Society of America, Fellow; American Geophysical Union, Member;
International Association of Hydrogeologists. Council Member: 2000-2004
Intl. Soc. Env. Biogeochemistry. Board Member: 2000-present, Council member, 2007-

PROFESSIONAL SERVICE

NSF Site Selection Panel: DUSEL-S3: Deep Underground Sci. & Eng. Lab 2007.
NRC Ad Hoc Committee "Geology and Public Health" Member, 2004-2007
NASA Astrobiology Institute Review Panel 2006
NSF Review Panel: Nanotechnology in Research and Technology. 2005
NSF Review Panel EAR-GE program, 1999-2003 (7 panels)
NIEHS Review Panel, 2003; NSF Review Panel: LExEn program, 1999;

Editorial Board, Geomicrobiology J. 2013-present, Associate Editor: GSA Bulletin. 1995-2004; Editorial Board: Ground Water: 1995-2003; Associate Editor: J. Hydrology: 1997-2005; Editorial Board: Geology. 1994-1997

PEER REVIEWED PUBLICATIONS: (*STUDENT AUTHORS IN ITALICS*)

In Preparation:

Christensen, H., **Bennett, P.C.** Cardenas, M.B. and Nielsen, Bethany. Carbon cycling in a shallow vadose zone influenced by river hydropeaking. In Preparation for Global Biogeochemical Cycles

Bennett, P.C., Cardenas, M.B., Grutsch, C., Zamora, P. Carbonate chemistry of a karst aquifer inundated by a massive storm surge during super typhoon Haiyan. In prep for *Applied Geochemistry.*

Bennett, P.C., *Sydow, L.*, Nordstrom, D.K., *Jones, A.A.*, and McClesky, R.B. Sulfur Chemistry of Cinder Pool, Yellowstone National Park: A modern setting for the origin of life. In Preparation for *PNAS.*

Myers, D.D., Omelon, C.R., and **Bennett, P.C.** The role of arsenic during inorganic carbon uptake and primary production by cyanobacteria in the extremely low-DIC geothermal waters at the El Tatio Geyser Field, Chile. *Geobiology*.

Bennett, P.C. Wolfe, W.W., Gilbert, K.L., Christensen, H.V., Gypsum Solubility in Aqueous Systems at high PCO_2. In Preparation for *Geochimica et Cosmochimica Acta*.

In Print/Press:

1. *Tune*, A.K., Druhan, J.L., Wang, J., Schmidt, L.M, **Bennett**, P.C., Rempe, D.M. Carbon Dioxide Production in Bedrock beneath Soils Substantially Contributes to Forest Carbon Cycling. In Press: JGR-Biogeosciences. DOI: 10.1029/2020JG00579.
2. *Guiltinan*, E.J., Cardenas, M.B., **Bennett, P.C.**, Zhang, T., Espinoza, D.N. (2017) The effect of organic matter and thermal maturity on the wettability of supercritical CO2 on organic shales. *Intl. Journal of Greenhouse Gas Control* v.65, 15-22
3. *Shuai*, P., Cardenas, M.B., Knappett, S.K., **Bennett, P.C**., Nielson, B.T. (2017) Denitrification in the banks of fluctuating rivers: the effects of river stage amplitude, sediment hydraulic conductivity and dispersivity, and ambient groundwater flow. *Water Resources Research*. DOI 10.1002/2017WR020610
4. *Jones, A.A.* and **Bennett, P.C.** (2017) Revealing hidden diversity: investigating the impact of minerals on biofilm community structure and diversity. *Frontiers in Microbiology*. https://doi.org/10.3389/fmicb.2017.00491.
5. Plenge, M., Omelon, C., Engel, A.S., and **Bennett, P.C**. (2017**)** Thermophilic archaeal diversity and methanogenesis from El Tatio Geyser Field, Chile *Geomicrobiology J*. 34, 3, 220-230. http://dx.doi.org/10.1080/01490451.2016.1168496
6. Sydow, L., **Bennett, P.C.**, and Nordstrom, D.K. (2016) Sulfur chemistry of Cinder Pool, YNP: Implications for a chemical origin of life. *Procedia Earth and Planetary Science* v. 17, 504-507.
7. *Warden*, J.G., Casaburi, G., Omelon, C.R., **Bennett**, P.C., Breecker, D.O., and Foster, J.S. (2016). Characterization of microbial mat microbiomes in the modern thrombolite ecosystem of

Lake Clifton, Western Australia. *Frontiers in Microbiology* http://dx.doi.org/10.3389/fmicb.2016.01064.

8. *Gilbert, K.* **Bennett, P.C.**, Wolfe, W., Zhang, T and Katherine D. Romanak, K.D. (2016) CO_2 solubility in aqueous solutions containing Na^+, Ca^{2+}, Cl^-, SO_4^{2-} and HCO_3^-: the effects of electrostricted water and ion hydration thermodynamics. *Applied Geochemistry* 67, 59-67. http://dx.doi.org/10.1016/j.apgeochem.2016.02.002.
9. Kirk, M.F., Altman, S., Santillan, E.F.U., **Bennett**, P.C. (2016) Interplay between Microorganisms and Geochemistry in Geological Carbon Storage International Journal of Greenhouse Gas Control. *Journal of Greenhouse Gas Control* 11, 133-140.
10. *Briody*, A.C. Cardenas, M.B., Shuai, P., Knappett, P.S.K., **Bennett, P.C.** (2016) Groundwater flow, nutrient, and stable isotope dynamics in the parafluvial-hyporheic zone of the regulated Lower Colorado River (Texas) over the course of a small flood. *Hydrogeology J.* 24, 923-935.
11. *Santillan, E.F.*, Shanahan, T. Omelon, C., Major, J., and **Bennett, P.C.** (2015) Isolation and characterization of a CO2-tolerant Lactobacillus strain from Crystal Geyser, Utah, U.S.A., Frontiers in Earth Science: Biogeosciences 3, article 41. http://dx.doi.org/10.3389/feart.2015.00041.
12. *Chaudhary*, K., *Guiltinan*, E.J., Cardenas, M.B., Maisano, J.A., Ketcham, R.A., and **Bennett, P.C.** (2015) Wettability measurement under high P-T conditions using X-ray imaging with application to the brine-supercritical CO2 system. Geochem. Geophys. Geosys. 16, 9, 2858. http://dx.doi.org/10.1002/2015GC005936.
13. Cardenas, M.B., **P.C. Bennett**, Zamora, P.B., Befus, K.M., Rodolfo, R.S., Cabria, H.B. and Lapus, M.R. (2015) Devastation of aquifers from tsunami-like storm surge by Supertyphoon Haiyan. *Geophysical Research Letters* 42, 8, 2844–2851.
14. M.C.Y. Lau, B.T. Stackhouse, A.C. Layton, A. Chauhan T.A., Vishnivetskaya, K. Chourey, N.C.S. Mykytczuk, **P.C. Bennett**, G. Lamarche-Gagnon, N. Burton, J. Ronholm, W.H. Pollard, C.R. Omelon, D.M. Medvigy, R.L. Hettich, S.M. Pfiffner, L.G. Whyte. and T.C. Onstott. (2015) An active atmospheric methane sink in high Arctic mineral cryosols. ISME Journal 9, 1880-1891.
15. *Jones, A.A.* and **Bennett, P.C**. (2014) Mineral microniches control the diversity of subsurface microbial populations. *Geomicrobiology Journal* 31 (3), 246-261
16. Crystal Ng, G.H., Bekins, B.A., Cozzarelli, I.M., Baedecker, M.J., **Bennett, P.C**., Amos, R.T. (2014) A mass balance approach to investigating geochemical controls on secondary water quality impacts at a crude oil spill site near Bemidji, MN. *J. Contaminant Hydrology*, 164, 1-15
17. **Bennett**, P.C., El-Shishtawy, A., Sharp, J.M. and Atwia, M. (2014) Sources and pathways of manganese in the central Nile Delta, Egypt. *Journal of African Earth Sciences*, 96, 8-20
18. Deng, W., Cardenas, M.B., and **Bennett, P.C.** (2014) Extended roof snap-off for a continuous nonwetting fluid and an example case for supercritical CO2. *Advances in Water Resources*, 64, 34–46

19. *Chaudhary, K.*, Cardenas, M.B., Deng, W., **Bennett**, P.C. (2013) Pore geometry effects on intrapore viscous to inertial flows and on effective hydraulic parameters. *Water Resources Research.* 49(2) 1149-1162.

20. Deng, W, Cardenas, M.B., Kirk, M.F., Altman, S.J. and **Bennett, P.C.** (2013) Effect of Permeable Biofilm on Micro- And Macro-Scale Flow and Transport in Bioclogged Pores, *Environmental Science & Technology* 2013 47 (19), 11092-11098

21. *Chaudhary, K.*, Cardenas, M.B., Wolfe, W.W. Maisano, J.A., Ketcham, R.A., and **Bennett, P.C.** (2013) Pore-scale trapping of supercritical CO2 and the role of grain wettability and shape. *Geophysical Research Letters*. 40, (15) 3878-3882 doi:10.1002/grl.50658

22. *Santillan, E.U.* Altmann, S., Kirk, M. and **Bennett, P.C**. (2013) Mineral influence on Microbial Survival During Carbon Sequestration. *Geomicrobiology Journal*. 30, 7, 578-592.

23. K. D. Romanak, **P. C. Bennett**, C. Yang, S.D. Hovorka (2012) Process-Based Approach to Soil Gas Monitoring at Geologic Carbon Storage Sites. *Geophysical Research Letters*. 39. 15, DOI: 10.1029/2012GL052426

24. *Chaudhary, K.*, Cardenas, M.B., Deng, W., and **Bennett, P.C.** (2012) The role of eddies inside pores in the transition from Darcy to Forchheimer flows. *Geophysical Research Letters*. 38, doi:10.1029/2011GL050214

25. *Wang, L.*, Cardenas, M.B., Deng, W., and **Bennett, P.C**. (2012) Theory for dynamic longitudinal dispersion in fractures and rivers with Poiseuille flow. *Geophysical Res. Letters* 39, LO5401.

26. Andrews, M.J., Cardenas, M.B., and **Bennett, P.C.** (2011) Quantification of turbulent non-isothermal mixing between a jet and cooler ambient water using thermal imagery. G^3 12, doi:10.1029/2011GC003530

27. **Bennett, P.C.** and Omelon, C. (2010) Microbial Geochemistry, at the intersection of disciplines: in (Parker, A. and Russell, H. Eds) Contribution of Geochemistry to the Study of the Planet. Wiley-Blackwell.

28. *Linhoff, B.* **Bennett, P.C.** Puntsag, T., and Gerel, O. (2011) Geochemical Evolution of Uraniferous Soda Lakes in Eastern Mongolia. *Environmental Earth Science.* 62, 171-183. DOI: 10.1007/s12665-010-0512-8.

29. *Steinhauer, E.S.*, Omelon, C. and **Bennett, P.C.** (2010) Kinetics of microbial corrosion of limestone by sulfuric acid speleogenesis. *Geomicrobiology J.* 27, 723-738.

30. *A. E. Dunckel*, M. B. Cardenas, A. H. Sawyer, and **P. C. Bennett** (2009) High-resolution in-situ thermal imaging of microbial mats at El Tatio Geyser, Chile shows coupling between community color and temperature. *Geophysical Research Letters*. 36, 23, doi:10.1029/2009GL041366.

31. *Landrum, J.T.*, **Bennett, P.C.**, Engel, A.S., Pasten, P. Alseno, M. and Milliken, K. (2009) Partitioning geochemistry of Arsenic and Antimony, El Tatio Geyser Field, Chile. *Applied Geochemistry* 24, 664-676. DOI: 10.1016/j.apgeochem.2008.12.024.

32. Yoon, D.W., Gross, D.E., Lynch, V.M., Lee, C.H., **Bennett, P.C.** and Sessler, J.L. (2009) Real-time determination of chloride anion concentration in aqueous-DMSO using a pyrrole-strapped calixpyrrole anion receptor. *Chemical Communications*, 1109-1111. DOI: 10.1039/b818077f.

33. Omelon, C.R., Pollard, W., Ferris, F.G., **Bennett, P.C.** (2008) Cyanobacteria within Cryptoendolithic Habitats: the Role of High pH in Biogenic Rock Weathering under Elevated Temperatures in the Canadian high Arctic. *9th International Conference on Permafrost*, p. 1-6.

34. **Bennett**, P.C. and Engel, A.S. (2007) Microbial Sulfur Cycling in a Sulfidic Cave. (2007) *Proceedings of the Twelfth International Symposium on Water-Rock Interaction WRI-12*. (T. Bullen and Y. Wang, Eds) Taylor and Francis Group. p. 853-857.

35. *Landrum, J.T*, **Bennett**, P.C., *Alsina, M.A.* & Pastén, P.A. (2007) Biogeochemical controls on arsenic: El Tatio Geyser Field, Chile. *Proc. of the 12th International Symposium on Water-Rock Interaction WRI-12*. (T. Bullen and Y. Wang, Eds) Taylor and Francis Group. p. 875-879.

36. Meisinger, D.B., Zimmermann, J., Ludwig, W. Schleifer, K.H., Wanner, G. Schmid, M., **Bennett, P.C**. Engel, A.S., Lee, N.M. (2007) In situ detection of novel Acidobacteria in microbial mats from a chemolithoautotrophically-based cave ecosystem (Lower Kane Cave, WY, USA). *Environmental Microbiology*. 9, 1523-1534.

37. **Bennett,** P.C., Engel, A.S., Roberts, J.A. (2007) Counting and imaging bacteria on mineral surfaces. *Clay Mineral Society Workshop Proceedings*.

38. Committee on Research Priorities for Earth Science and Public Health (Skinner, C.H. Chair; **Bennett, P.C**., and others) (2007) Earth Materials and Health, Research Priorities for Earth Science and Public Health. Board on Earth Sciences and Resources, National Research Council.

39. Phoenix, V.R., **Bennett**, P.C., Engel, A.S., Tyler, S.W., Ferris, F.G. (2006) Chilean high-altitude hot spring sinters: a model system for UV screening mechanisms by early Precambrian cyanobacteria. *Geobiology*. 4, p. 15-28

40. **Bennett,** P.C. and Engel, A.S. (2005) Role of Microorganisms in Karstification. In Microorganisms and Earth Systems: Advances in Geomicrobiology (GM Gadd, KT Semple, and HM Lappin-Scott, eds). p. 345-364, Society for General Microbiology.

41. *Engel, A.S.*, Porter, M.L., Stern, L.A. Quinlan, S. and **Bennett**, P.C. (2004) Bacterial diversity and ecosystem functionality of filamentous microbial mats dominated by "Epsilonproteobacteria" associated with aphotic (cave) sulfidic springs. *FEMS Microbiology Ecology.* 51, 31-53.

42. *Engel, A.S.*, Stern, L.A. and **Bennett**, P.C. (2004) Microbial contributions to cave formation: New insights into sulfuric acid speleogenesis. *Geology* 32, 369-372.

43. Roberts, J.A. **Bennett**, P.C., Gonzalez, L.A., Macpherson, G.L., Milliken, K.L. (2004) Microbial precipitation of dolomite in methanogenic groundwater *Geology*, 32, 277-280.

44. *Rogers, J.R.* and **Bennett**, P.C. (2004) Mineral stimulation of subsurface microorganisms: Release of limiting nutrients from silicates. *Chemical Geology* 203, 91-108

45. *Engel, A.S.*, Lee, N., Porter, M.L., Stern, L, **Bennett**, P.C., Wagner, M. (2003) Filamentous "Epsilonproteobacteria" dominate microbial mats from sulfidic cave springs. *Applied and Environmental Microbiology* 69, 5503-5511.

46. Dutton, A.R., Hovorka, S.D., **Bennett**, P.C. (2002) Effect of Pleistocene depositional heterogeneity on movement of a subsurface crude-oil spill, San Patricio County, south Texas. *Gulf Coast Association of Geological Societies Transactions*, 52, 207-215.

47. Stern. L.A., Engel, A.S. **Bennett**, P.C., Porter, M. (2002) Subaqueous and subaerial speleogenesis in a sulfidic cave. *Karst Waters Institute Special Publication* 7, 89-91.

48. *Zimmerman, M D.*, **Bennett**, P.C., Sharp, J.M. Jr. and Choi, W.C. (2002) Experimental Determination of Sorption in Fractured Flow Systems. *J. Contaminant Hydrol.*, 58, 51-77.

49. *Rogers, J.R.*, **Bennett**, P.C. and Choi, W.J. (2001) Enhanced weathering of silicates by subsurface microorganisms: a strategy to release limiting inorganic nutrients? *Proc of the 10th international symposium on water-rock interaction WRI-10*, 1461-1464.

50. **Bennett**, P.C., *Rogers, J.A.*, Hiebert, F.K., and *Choi, W.J.* (2001) Silicates, silicate weathering, and microbial ecology. *Geomicrobiology Journal*, 18, 3-19

51. **Bennett**, P.C., Hiebert, F.K., *Rogers, J.A.* (2000) Microbial control of mineral-groundwater equilibria: Macroscale to microscale. *Hydrogeology Journal*. 8, 47-62.

52. Fryar, A.E., Macko, S.A., Mullican, W.F., Romanak, K.D., **Bennett**, P.C. (2000) Nitrate reduction during ground-water recharge, Southern High Plains, Texas. *J. Contaminant Hydrology* 40, 335-363

53. **Bennett**, P.C. and *Rogers, J.R.* (1999) The mineralogy of microbial ecology. In *Groundwater: Past Achievements and Future Challenges* (O. Sililo, ed). International Association of Hydrogeologists.

54. **Bennett**, P.C., *Rogers, J.R.*, Hiebert, J.K. and *Choi, W.J.* (1999) Mineralogy and mineral weathering: Fundamental components of subsurface microbial ecology. *USGS Water Resources Investigation 99-4018C*. 169-176.

55. *Rogers, J. R.*, P. C. **Bennett**, and F. K. Hiebert. 1999. Patterns of microbial colonization on silicates. *USGS Water Resources Investigation 99-4018C*. 237-242.

56. *Mahler, B.J.*, Lynch, F.L. and **Bennett**, P.C. (1999) Mobile Sediment in an Urbanizing Karst Aquifer: Implications for Contaminant Transport. *Environmental Geology* 39, 25-38.

57. *Rogers, J.R.*, **Bennett**, P.C., and *Choi, W.J.* (1998) Feldspars as a source of nutrients for microorganisms. *American Mineralogist*, 83, 1532-1540.

58. *Nicot, J.P.*, **Bennett**, P.C., *Romanak, K.D.* (1998) Gas Phase Dynamics of Playa-Wetlands. *J. Environmental Engineering*. 124, 1038-1046.

59. *Mahler, B.J.*, Winkler, M., **Bennett**, P.C., Hillis, D.M. (1998) DNA-Labeled Clay: A Sensitive New Method for Tracing Particle Transport. *Geology* 26, 831-834.

60. *Mahler, B.J.*, **Bennett**, P.C., and *Zimmerman, M.* (1998) Lanthanide clays for use in characterizing sediment transport. *Groundwater* 36, 835-843.

61. *Lee, R.* and **Bennett**, P.C. (1998) Reductive dissolution and solute transport in a sewage contaminated glacial outwash aquifer. *Groundwater* 36, 583-595.

62. Glaser, P., **Bennett**, P.C., and Siegel, D.I. and E.A. Romanowicz (1996) Paleo-reversals in ground water flow and peatland development at Lost River, MN, *Holocene* 6, 413-421.

63. **Bennett**, P.C. *Hiebert, F.K.* and *Choi, W.J.* (1996) Rates of Microbial Weathering of Silicates in Ground Water. *Chemical Geology*, 132, 45-53.

64. **Bennett** P.C. and Casey, W.H. (1993) Organic acids and the dissolution of silicates, in *The role of organic acids in geological processes.* (Pittman, E.D. and Lewan, M. eds.) Springer.

65. **Bennett**, P.C. and *Council, T.* (1993) The geochemistry of ikaite formation at Mono Lake, California: Implications for the origin of tufa mounds. *Geology*, 21, p. 971-974.

66. **Bennett** P.C., Siegel D.I., Baedecker M.J., Cozzarelli I. and Hult M. (1993) The fate of crude oil in a sand and gravel aquifer I. Inorganic geochemistry. *Applied Geochemistry*., 8, 529-549.

67. Baedecker M.J., Cozzarelli I., **Bennett** P.C. and Siegel D.I. (1993) The fate of crude oil in a sand and gravel aquifer III. Geochemical processes. *Applied Geochemistry*, 8, 569-586.

68. *Hiebert, F.* and **Bennett** P.C. (1992) Microbial control of silicate weathering in organic-rich ground water. *Science*, 258, 278-281.

69. **Bennett**, P.C. and Hiebert, F.K. (1992) Microbial mediation of silicate diagenesis in organic-rich waters. In *Proceedings of the 7th Internat. Symp. on Water Rock Interaction, Park City, Utah* (Y. Kharaka, ed.), A.A. Balkema, p. 267-271.

70. Tait, C.D., Janecky, D.R., Clark, D.L. and **Bennett**, P.C. (1992) Oxalate complexation with aluminum(III) and iron (III) at moderately elevated temperatures. *In Proc. of the 7th Int. Symp. on Water Rock Interaction,* (Y. Kharaka, ed.) A.A. Balkema, p. 349-353.

71. **Bennett** P.C. (1991) The chemistry of silica-organic complexation in a petroleum-contaminated aquifer. *USGS Water-Resources Investigation Report 91-4720*, p. 638-640.

72. **Bennett** P.C. (1991) Quartz dissolution in organic-rich aqueous systems. *Geochimica et Cosmochimica Acta*, 55, 1781-1797.

73. **Bennett** P.C., Siegel D.I., Hill B. and Glaser, P. (1991) The fate of silicate minerals in a peat bog. *Geology* 19, 328-331.

74. Siegel, D.I., Stoner, D.W., Byrnes, T.R. and **Bennett**, P.C. (1990) A geochemical process approach to identify inorganic and organic ground water contamination. *GW Management*, 2, 1291-1306.

75. Baedecker M.J., Siegel D.I., **Bennett** P.C. and Cozzarelli I.M. (1988) The fate and effects of crude oil in a shallow aquifer I. The distribution of chemical species and geochemical facies. U.S. Geological Survey, *Water-Resources Investigations Report 88-4220*, p. 13-20.

76. De Lorenzo, R.A., Gray, B.C., **Bennett**, P.C. and Lamparella, V.J. (1989) Effect of crowd size on patient volume at a large, multipurpose, indoor stadium. *J. Emerg. Medicine*, 7, 379-384.

77. Marley, N.A., **Bennett**, P., Janecky, D.R. and Gaffney, J.S. (1989) Spectroscopic evidence for organic diacid complexation with dissolved silica in aqueous systems. I. Oxalic Acid. *Organic Geochemistry*, 14, 525-528.

78. **Bennett**, P.C., Siegel, D.I. (1989) Silica-organic complexes and enhanced quartz dissolution in water by organic acids. in *Proceedings of the 6th Inter. Symp. on Water Rock Interaction, Malvern, UK* (D.L. Miles, ed.), 69-72.

79. **Bennett**, P.C. 1989. Silica mobility in a petroleum-contaminated aquifer. U.S. Geological Survey, *Water-Resources Investigations Report 88-4220*, p. 5-12.

80. **Bennett**, P., Melcer, M., Siegel, D.I. and Hassett, J. (1988) The dissolution and solubility of quartz in dilute aqueous solutions of organic acids at 25°C. *Geochim. et Cosmochim. Acta*, 52, 1521-1530.

81. **Bennett**, P. and Siegel, D.I. (1987). Increased solubility of quartz in water due to complexation by dissolved organic compounds. *Nature*, 326, 684-687.

PATENTS AND INTELLECTUAL PROPERTY

1. Romanak, K.D. and Bennett, P.C.: (2017) Process-Based Approach for the Detection of Deep Gas Invading the Surface. U.S. Patent No. 9,645,129
2. Romanak, K.D. and Bennett, P.C.: (**PENDING**) Process-Based Approach for the Detection of CO2 Injectate Leakage. European Patent Application Filing Date: June 27, 2013

CONFERENCE PROCEEDINGS AND FIELD GUIDES

Engel, A.S. and **Bennett,** P.C. (2008) Lower Kane Cave, Wyoming: Where biology and geology meet. 2008 NSS Rocky Mountain Regional Meeting Field Guide.

Fryar, A.E., Macko, S.A., Romanak, D.D., **Bennett**, P.C., and Mullican, W.F. (1995) Evidence of limited denitrificaiton beneath playas recharging the Ogallala Aquifer. in *Proceedings, Water for Texas, Research leads the way conference*, Jan. 1995.

Ging, P.B. and **Bennett**, P.C. (1994) Evaluation of water quality conditions in the upper Bull Creek watershed. in *Factors Affecting Water Resources, Proceedings of the Fall meeting of the American Water Resources Association*, Austin, TX, Dec. 9, 1994.

Hiebert, F.K., **Bennett**, P.C and *Pope, S.R.* (1995) Enhanced mineral diagenesis secondary to intrinsic bioremediation of NAPLs. in *Toxic Substances and the Hydrologic Sciences* Proc. of the Annual meeting of the American Institute of Hydrology. p. 650-665

Mahler, B.J. and **Bennett**, P.C. (1991) The interaction of flow mechanics and aqueous chemistry in a Texas Hill Country grotto. In *Proc. of the 3rd conference on hydrogeology, ecology, monitoring, and management of ground water in karst terranes*, Dec. 4-6, 1991, Nashville, TN. p. 405-415.

INVITED LECTURES, SYMPOSIA, AND SHORT COURSES

- *University of Rouen* (Invited lecture), March 2013
- *Intl. Society of Environmental Biogeochemistry* (Short Course) Nov. 2012
- *European Geological Union* (Invited Keynote Paper), April 2012
- *U. Pennsylvania* (Invited Lecture), March 2011
- *International Geological Congress* 33, (Invited Keynote Paper) August 2008
- *American Society of Microbiology* (Invited paper) June 2008
- *University of Texas El Paso* (Invited Lecture) Feb. 2007
- *Cairo University, Egypt* (Invited Lecture) Nov. 2006
- *Miami University of Ohio* (Invited Lecture) Oct. 2006
- *University of Vermont* (Invited Lecture), Oct. 2006
- *McMaster University* (Invited Lecture), Feb. 2006
- *University of Toronto* (Invited Lecture), Feb. 2006
- *University of Sheffield* (Invited Lecture), January 2006
- *University of Illinois, Dept of Microbiology.* (Invited Lecture) Oct. 2005.
- *Society for General Microbiology*: Main Symposium Invited Speaker. Sept. 2005.
- *Clay Mineral Society Workshop (2004).* Invited Speaker.
- *William Smith Conference,* The Geological Society, October 2002
- *IAH Water-2000*: Cape Town, South Africa, Invited keynote speaker
- *Intl. Symp. GW Contamination*. (Invited speaker) June, 2000, Tokyo, Japan
- *Virginia Tech etc*. (Invited Lecture) February, 2000
- *Swiss Federal Institute for Env. Science and Technology;* (Invited Lecture). Dec. 1999
- *XIVth Intl. Symposium on Environmental Biogeochemistry (1999)* Plenary Speaker
- *University of Wisconsin (1999)* Invited Weeks Lecturer
- *Gordon Research Conference* "Modeling Flow in Permeable Materials" (1998): Invited
- *Goldschmidt, France (1998)* Session Organizer "Bacterially mediated silicate diagenesis"
- *University of New Mexico* (1998): Invited lecture
- *Duke University* (1996) Invited Lecture
- *GSA Annual Meeting (1995)* GSA Short Course "Contaminant Organic Geochemistry"
- *GSA Annual Meeting (1994)* "Geologic significance of microbial processes
- *University of Michigan* (1992): Invited Turner Lecturer
- *Southern Methodist University* (1992) Invited Lecture
- *Texas A&M University* (1991) Invited Lecture

1997 HENRY DARCY DISTINGUISHED LECTURESHIP

The Henry Darcy Distinguished Lecturer is selected annually by the Association of Ground Water Scientists and Engineers of the National Ground Water Association. During 1997, I was invited by 70+ academic and research institutions to present the lecture *Water, Microbes, and Rocks: The Geochemical Ecology of Contaminated Ground Water*. I visited 52 of these locations in the U.S., Canada, Australia, Germany, England and Ireland.

ABSTRACTS AND PAPERS PRESENTED (SELECTED, LAST 15 YEARS**)**

Tune, A.K. et al. (2020) EP009-01Respiration in a shale rhizosphere dominated by deep root respiration, not oxidation of petrogenic organic carbon. Abstract to be presented at the 2020 Fall Meeting of the AGU, Virtual.

Tune, A.K. et al. (2019) Considering Weathered Bedrock in Global Carbon Cycling: CO-2 Production and DOC Dynamics in a Bedrock Weathering Profile Underlying a Forested Hillslope. Abstract presented at the Annual Meeting of the ASA-CSSA-SSSA San Antonio

Turetcaia, A. et al. (2019) The Effects of Stream Organic Matter on Respiration in the Hyporheic Zones: An Experimental Study. Abstract H12I-15 Presented at the 2019 Fall AGU meeting.

Turetcaia, A. et al. (2018) B51L-2119: Mapping Redox Potentials in River Bed Sediment using Open Circuit Microbial Fuel Cells: An Evaluation. Abstract presented at the 2018 Fall AGU Meeting, Washington DC.

Christensen, H. et al. (2017) H33D-1927: Soil Gas Dynamics and Microbial Activity in the Unsaturated Zone of a Regulated River. Abstract presented at the 2017 Fall AGU Meeting, New Orleans.

Bennett, P.C. (2017) 126-7 Peat Bogs and Oil Spills: Silicate Weathering Research in the Siegel Lab. Abstract presented at the 2017 Annual Meeting of the Geological Society of America, Seattle.

Connolly, C. (2016) B43G-06: Characterizing Groundwater Sources of Organic Matter to Arctic Coastal Waters. Abstract presented at the 2016 Fall AGU Meeting

Jones, A.A. and **Bennett**, P.C. (2015) B11J-0569: Solid and Aqueous Geochemical Controls on Phylogenetic Diversity and Abundance of Microbial Biofilms. Abstract presented at the Fall AGU Meeting, San Francisco.

Warden, J.G. et al. (2015) B21C-0440 Hydrologic Controls on Modern Microbialite Formation. Abstract presented at the Fall AGU Meeting, San Francisco.

Watson, J., Neilson, B., Cardenas, M.B. and Bennett, P.C. (2015) H33C-1624 Investigation of Hyporheic Thermal Flux and Downstream Attenuation Driven by Hydropeaking in the Colorado River, Austin, Texas. Abstract presented at the Fall AGU Meeting, San Francisco.

Santillan, Eugenio F.U., Choi, Wanjoo, Bennett, Philip C. and Leyris, Juliette (2015) 109-9 The Effects of Biocide Use on Subsurface Microbial Populations During Hydraulic Fracturing in the Eagle Ford Formation, Texas, USA. Abstract Presented at the Annual Meeting of the Geological Society of America, Baltimore.

Warden, J.G., Breecker, D.O. and **Bennett**, P.C. (2014). Quantification and Description of Springs Emerging Through the Thrombolites of Lake Clifton, Western Australia. Abstract Presented at the Annual Meeting of the Geological Society of America, Vancouver.

Jones, A.A. and Bennett, P.C. (2014) The Microbe-Mineral Association: A Fundamental Control On Biomass, Community Membership, Metabolism, And Geochemistry In Karst Systems. Abstract Presented at the Annual Meeting of the Geological Society of America, Vancouver.

Santillan, E.U., Major, J.R., and **Bennett**, P.C. (2014) Microbial Communities in Terrestrial CO2 Springs: Insights into the Long-Term Effects of Carbon Sequestration on Subsurface Microorganisms. Abstract B13A-0174 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec

Jones, A.A. and **Bennett**, P.C. (2014) Minerals as Ecosystems in the Nutrient-Limited Subsurface. Abstract B23A-0193 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.

Bennett, P.C., Cardenas, M B, Zamora, P B, Befus, K M, Rodolfo, R S, Geos, Cabria, H B, Lapus, M R, Geos, Muan, M, Geos, (2014) Rapid salinization of a karst aquifer after a typhoon-generated storm surge: Hydraulics, geochemistry, and community impact. Abstract H41K-07 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.

Sydow, L.A. and Bennett, P.C. (2013) Sulfur Chemistry of Cinder Pool, YNP: A Search For The Chemical Origin Of Life. Abstract presented at the Annual Meeting of the Geological Society of America, Denver.

Myers, K., Omelon, C.R. **Bennett**, P.C. (2013) Physical and Geochemical Controls on the Structure and Function of Microbial Mat Communities at El Tatio Geyser Field, Chile. Abstract B13B-0467 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Sydow, L.A. and **Bennett**, P.C. (2013) The Origin of Life in a Terrestrial Hydrothermal Pool? The Importance of a Catalytic Surface. Title, Abstract B22F-05 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Stackhouse et al., (2013) CO2, CH4, and DOC Flux During Long Term Thaw of High Arctic Tundra. Abstract B31H-08 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Onstott, T.C. et al., (2013) An Atmospheric CH4 Sink in the High Arctic and its Implication for Global Warming. Abstract B33K-0616 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec

Jones, A.A. and **Bennett**, P.C. (2013) Decoupling the Impacts of Heterotrophy and Autotrophy on Sulfuric Acid Speleogenesis. Abstract B21F-03 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Deng, W., Cardenas, M, Kirk, M F, Altman, S J, **Bennett**, P, (2013) The effect of permeable biofilm on micro- and macro-scale flow and transport in bioclogged pores. Abstract H43F-1513 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Warden, J.G., Breecker, D., and **Bennett**, P.C. (2013) Geochemical reactivity in the mixing zone of a coastal salt lake and its effect on microbialite formation, Lake Clifton, Western Australia. Abstract H43A-1416 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Chaudhary, K., Cardenas, M, Wolfe, W W, Maisano, J A, Ketcham, R A, **Bennett**, P. (2013) Pore-scale imaging of capillary trapped supercritical CO2 as controlled by water-wet vs. CO2-wet media and grain shapes. Abstract H41P-02 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.

Bennett, P.C. et al. (2012) Methane and Carbon Dioxide Gas Dynamics in High-Arctic Permafrost Polygons. AGU Fall Meeting

Myers, K., Engel, A.S., Omelon, C.R. **Bennett**, P.C. (2012) Physicochemical and Biological Zonation of High Temperature Silica and Arsenic-Rich Streams at El Tatio Geyser Field, Chile. AGU Fall Meeting

Santillan, E.U., Shanahan, T.M., Wolfe, W.W., **Bennett**, P.C. (2012) Mineral Influence on Microbial Survival During Carbon Sequestration. AFU Fall Meeting

Jones, A.A. and **Bennett**, P.C. (2012) Mineralogical controls on surface colonization by sulfur-metabolizing microbial communities. AGU Fall Meeting

Sydow, L., **Bennett**, P.C., and Nordstrom, D.K. (2012) Cinder Pool's Sulfur Chemistry: Implications for the Origin of Life in Hydrothermal Environments. AGU Fall Meeting

Deng, W., Cardenas, M.V., **Bennett**, P.C. (2011) Snap-off of supercritical CO2 within circular and noncircular pores. AGU Fall Meeting

Wolfe, W.W. and **Bennett**, P.C. (2011) Solubility and dissolution kinetics of gypsum as a function of CO2 partial pressure: Implications for geological carbon sequestration. AGU

Santillan, E.U., Franks, M.A., Omelon, C.R., **Bennett**, P.C. (2011) Microbes under pressure: A comparison of CO2 stress responses on three model organisms and their implications for geologic carbon sequestration. AGU Fall Meeting

Jones, A.A. and **Bennett**, P.C. (2011) Mineralogical Controls on Microbial Diversity in a Sulfuric Acid Karst System. AGU Fall Meeting

Bennett, P.C. and Omelon, C.R. (2008) Microbial Geochemistry: The influence of microbes on geochemistry; the influence of geology on microbial ecology. IGC 33, Oslo Norway.

Omelon, C.R., Pollard, W.H., Ferris, F.G., and **Bennett, P.C.** (2008) Carbonate precipitation potential by cyanobacterial activity in high Arctic cryptoendolithic habitats. Goldschmidt Meeting, Vancouver, Canada

Steinhauer, E.S. and **Bennett, P.C.** (2008) Microbial acceleration of sulfuric acid speleogenesis in Kane Cave, WY. Goldschmidt Meeting, Vancouver Canada.

Franks, M.A., **Bennett, P.C.,** Omelon, C. and Engel, A.S. (2007) Environmental controls on methanogen viability in the hydrothermal waters of the El Tatio geyser field, Chile. AGU.

Linhoff, B.S., **Bennett, P.C.,** Puntsag, T. (2007) Uranium Geochemistry in Hypersaline Soda Lakes in Eastern Mongolia. AGU Fall Meeting, H11C-0685.

Landrum, J.T., Engel, A.S., Milliken, K., and **Bennett, P.C.** (2006) Biogeochemistry of antimony and arsenic in hydrothermal fluids and opaline deposits from El Tatio Geyser Field, Chile. Geological Society of America *Abs with Programs*, Vol. 38, No. 7, p. 546.

Landrum, J.T., Milliken, K., Engel, A.S., Lansdown, J. and **Bennett, P.C.** (2005) Biogeochemical controls on As and Sb partitioning into hydrothermal silica at El Tatio, Chile. ISEB

Meisinger, D., Lee, N., Engel, A.S., **Bennett, P.C.** (2005) Geomicrobiology: Caves as portals to novel, chemoautotrophic ecosystems in the subsurface/. Munich Environmental Microbiology meeting, Germany.

FUNDED RESEARCH:

Omelon, C.M., Breeker, D. and Bennett, P.C. Activity, preservation and fossilization of cryptoendolithic microorganisms in Antarctica. National Science Foundation $150,000 9/1/16-9/1/18

Cardenas, M.B. and Bennett, P.C., RAPID: The effects of typhoon Haiyan's storm surge on coastal aquifers, National Science Foundation. $49,581 4/1/14 – 3/31/15.

Center for Frontiers of Subsurface Energy Security, US DOE EFRC Center of Excellence. Total Budget $12M, Budget for Theme 2 (Bennett, PI) $1.2M (9/20014-9/2016).

Cardenas, M.B. and Bennett, P.C. Collaborative Research: River regulation's effects on lateral and longitudinal mass and energy transfers in coupled terrestrial-aquatic systems. National Science Foundation. $154,873. 1/2014-1/2017.

Omelon, C.M. and Breeker, D., McKay, D. and Bennett, P.C. Cryptoendolithic Microorganisms of the Antarctic Dry Valleys: Identification of and Processes Controlling Biosignature Preservation and Fossilization of Microorganisms. NASA ROSES-2010. $150,000. 11/11 – 11/12

Shanahan, T. and Bennett, P.C. Acquisition of Instrumentation for Organic Molecular Geochemistry. National Science Foundation. $100,000. 9/10 – 9/11

T. Arbogast, P. Bennett, S. Bryant, M. Delshad, G. Pope, S. Srinivasan, M. Wheeler. Center for Frontiers of Subsurface Energy Security, US DOE EFRC Center of Excellence. Total Budget $15.1M, Budget for Task 1 (Bennett, PI) $1.6M (9/2009-9/2014).

Bennett, P.C. and Omelon, C. The Geochemical Ecology of Cryptoendolithic Microorganisms: Relationships Between Cyanobacteria and sandstone weathering in the Canadian High Arctic. National Science Foundation Polar Programs. ARC-0909482; $330,000; 9/2009-9/2012.

Bennett, P.C. The Kinetics of Microbial Speleogenesis. National Science Foundation, geochemistry and geobiology , EAR-0617160. $65,000 8/15/2006-8/14/2010

Bennett, P.C., (with A.S. Engel, LSU). Hydrobiogeochemistry of As and Sb at El Tatio Geyser Field. NSF-geochemistry and geobiology. $120,000 (UT Portion). EAR-0545336 8/15/2006-8/14/2009

Bennett, P.C. The geochemical significance of Dark Life. UT Jackson School of Geosciences Research Initiative. $130,000. 8/15/2006 – 8/31/2008.

Bennett, P.C. and Sharp, J.M. Sediment Transport in an Urbanizing Karst Watershed. 3/1/2001-2/28/2003. NSF Hydrological Sciences EAR 0001197. $90,000

Bennett, P.C. and Stern, L.A. Sulfuric Acid Speleogenesis by Chemolithotrophic Bacteria: Community Structure and Habitat Modification by Acid Extremophiles. NSF Life in Extreme Environments (LExEn) Program. EAR 0085576 12/1/2000 – 11/30/2004 $356,000

Carlson, W.D., Bennett, P.C., and Milliken, K.L. Electron-Beam Microscopy and Microanalysis of Natural Materials. Acquisition of a Electron Probe and Environmental Scanning Electron Microscope. W.M. Keck Foundation. $750,000 + $400,000 match.

Sharp, J.M. and Bennett, P.C. Study of factors affecting chemical composition of groundwater in the Nile delta (Egypt) U.S. State Dept./U.S. Egypt Science and Technology Joint Fund Program. $30,000, 9/1/99-8/31/99

Banner, J.L., Bennett, P.C., Connelly, J. and Housh, T. Acquisition of a high-resolution ICP-MS. National Science Foundation, Major Research Instrumentation. $229,000. 8/1/98-8/1/01 (matched by the University of Texas for a total of $658,000)

Bennett, P.C. Microbial Weathering of Feldspars: Aggressive Release of Limiting Nutrients. National Science Foundation. $144,000, 6/1/99-12/1/01

Bennett, P.C. Mineral chemistry controls of microbial ecology during intrinsic biodegradation of petroleum. American Chemical Society, Petroleum Research Fund. 6/98 – 9/00. $60,000

Bennett, P.C. Investigations of methane seeps in the Pine River Valley, Colorado. Colorado Oil and Gas Conservation Commission, 9/95-9/96. $9,000

Famiglietti, J.S., Bennett, P.C., Sharp, J.M., and Banner, J. Graduate Research Traineeships in Hydrology: Role of the Hydrologic Cycle in the Coupled Earth System. 9/94-9/00; $537,500.

Bennett, P.C. and Hillis, D. Polymer-labeled clays for tracing groundwater flow and transport in fractures. Texas Higher Education Coordinating Board, Advanced Technology Program. 1/94-1/96, $136,000

Bennett, P.C. and Sharp, J.M. Mass transport properties of fracture skins. National Science Foundation, 1/94-6/98, $254,000

Bennett, P.C. Silicate dissolution in organic-rich aqueous systems: reaction mechanisms and rate control. National Science Foundation. 9/91-9/93, $129,000

Bennett, P.C. Characterization of the contaminant organic geochemistry of the PANTEX facility and surrounding site. U.S. Department of Energy. 1990-1995, $526,000

Bennett, P.C. The aqueous organic chemistry of silica in geologic systems. American Chemical Society, Petroleum Research Foundation. 7/90-6/92, $18,000

Outreach:

The Kane Cave research project was featured in the WGBH-NOVA program, "The Mysterious Life of Caves" (originally aired 2002, repeated several times since), with a parallel article in the *Smithsonian Magazine* (Oct. 2002 issue) http://www.pbs.org/wgbh/nova/caves/. This program shown in modified form in 2003 in the UK by BBC as "The Secret Life of Caves", and then translated for broadcast in at least Sweden and France. The work was also featured in a radio spot on *MicrobeWorld*, sponsored by the American Society for Microbiology. Based on the May, 2004 *Geology* publication, highlight articles have appeared in *Science*, *Nature*, *Spiegel*, and *Nederlandse Geologische Vereniging*, and additional articles have appeared in six languages based on Internet searches.

As a member of the Travis County Search and Rescue team I use my knowledge of geology and hydrology to train new members in land navigation, river searches, and field safety. I was featured in the UT Acalde magazine and on the Alcalde show for this outreach work.

STUDENT MENTORING

Supervised 14 PhD students to completion (as of 9/2020)
Supervised 31 MS students to completion (9/2020)
Mentored >15 undergraduate students doing research in geochemistry and geomicrobiology
Currently co-supervising one PhD Candidate.

GRADUATE COURSES (*ANNUALLY)

Proposal Preparation and Evaluation (New for 2021)
Geomicrobiology*
Aqueous Geochemistry*
Biogeochemical Kinetics
Geochemical Kinetics
Analytical Methods in Geochemistry
Environmental Organic Geochemistry
Case Studies in Hydrogeology
Physical Hydrogeology

UNDERGRADUATE COURSES:

Field Methods in Hydrogeology
Aqueous Geochemistry
Physical Geology
Introduction to Hydrogeology
Origin and Early Evolution of Life (UT Signature Seminar)
Rocks and Water of the Middle East (UT Signature Seminar)

UNIVERSITY SERVICE:

Ethics and Leadership Flag committee (AY 2014 to 2017)
University Gender Equity Council (AY 2014 to 2017)
University Research Safety Advisory Committee (AY1998 to 2008).
College of Natural Sciences Safety Committee (AY1995 2003, Chair AY1996 to 2003).
University Research Policy committee (AY1995-1997). Chair for AY 1997.
University Committee on Objectivity in Research (AY1997). Committee member.

Departmental/School Service

Chair, Appointments Committee (AY 2015 to 2017)
Associate Dean for Academic Affairs (2009-2013)
Graduate Advisor (AY2003 to 2006)
Chair, Graduate Studies Comm. (AY2003-2006),
Chair Admissions and Support Committee (AY 1995-1997; 2003-2006)
Safety Officer/Safety Committee Chair (AY1993 to 2008, 2009 - 2012).