

## Curriculum Vitae

### GREGORY J. WALSH

**Project Chief and Research Geologist specializing in complexly deformed rocks.  
Expertise in geologic mapping, structural geology, tectonics, digital cartography, and GIS.**

**Address:** U.S. Geological Survey  
P.O. Box 628  
Montpelier, Vermont 05601 USA  
E-mail: gwalsh@usgs.gov

**Personal:** Citizenship: United States  
Languages: English; working knowledge of French

**Education:** **University of Massachusetts**, Amherst, Massachusetts USA, B.S. in Geology (1986)  
**University of Vermont**, Burlington, Vermont USA, M.S. in Geology (1989)

**Positions:** **1992-Present U.S. Geological Survey - Reston, Virginia and Montpelier, Vermont:** As a Project Chief and Research Geologist, I manage and conduct bedrock geologic mapping projects in the northeastern United States. I managed two international mapping projects in Morocco and the completion of the new bedrock geologic map of Vermont, and conducted mapping Madagascar. I specialize in the structure and tectonics of complexly deformed rocks, the integration of geologic data with hydrogeologic studies, and the use of GIS as a mapping and analysis tool. I have trained geologists in geologic mapping, GIS, GPS, digital mapping, and U-Pb geochronology by SHRIMP.

**1990-1992 Heindel and Noyes, Inc., Burlington, Vermont:** As a consultant, I managed geologic and hydrogeologic site characterizations for water supply and wastewater disposal projects.

**1988-1990 Vermont Agency of Natural Resources, Waterbury, Vermont:** As an independent contractor, I conducted bedrock geologic mapping as part of the statewide project to produce a new bedrock geologic map of Vermont.

**1986-1988 University of Vermont, Department of Geology, Burlington, Vermont:** As a teaching assistant, I instructed "Physical Geology" and "Methods of Field Geology" laboratories.

**1986 U.S. Geological Survey: Menlo Park, California:** As a geologist, I assisted with geophysical and geological studies of the San Andreas Fault and the Sierra Nevada Batholith, California.

**Research:**

- Geologic mapping and structural analysis of complexly deformed rocks.
- Geologic mapping and tectonic evolution of the northern Appalachians, USA.
- Geologic mapping and tectonic evolution of Madagascar.
- Geologic mapping and tectonic evolution of the Anti-Atlas Mountains of Morocco.
- Integration of structural geology, geologic mapping, tectonics and hydrogeology to solve research problems in fractured rock hydrology.

**Awards:**

- Undergraduate Dean's List five semesters (1982-1986)
- Amoco Geophysics Award (1985)
- NAGT – USGS Student Internship (1985)
- L.R. Wilson Award, UMASS Amherst (1986)
- Charles G. Doll Award, Vermont Geological Society (1988)
- Twelve USGS performance awards (1997-2012)
- Elected GSA Fellow (2013)

**Memberships:**

- Geological Society of America (Member 1988-2013, Fellow 2013-present)
- Geological Society of America, Northeastern Section Management Board (Elected Vice-Chair, 2013-2014; Chair, 2014-2015; Past-Chair, 2015-2016)
- Vermont Geological Society (Member 1992-present)
- New Hampshire Geological Society (Member 1998-present)

**Publications (excluding abstracts):**

1. Stanley, R., Armstrong, T., Kraus, J., Walsh, G., Prewitt, J., Kimball, C., and Cua, A., 1987, The pre-Silurian hinterland along the valleys of the White and Mad Rivers, *in* Westerman, D.S., editor, New England Intercollegiate Geological Conference: Guidebook for Field Trips in Vermont, v. 2, 79<sup>th</sup> Annual Meeting, Montpelier, Vermont, p. 314-338.
2. Stanley, R.S., DelloRusso, V., O'Loughlin, S.B., Lapp, E.T., Armstrong, T.R., Prewitt, J.P., Kraus, J.F., and Walsh, G.J., 1987, A transect through the pre-Silurian rocks of central Vermont, *in* Westerman, D.S., editor, New England Intercollegiate Geological Conference: Guidebook for Field Trips in Vermont, v. 2, 79<sup>th</sup> Annual Meeting, Montpelier, Vermont, p. 272-295.
3. Walsh, G.J., and Kimball, C.V., 1989, Geochemistry of the metabasic rocks from the pre-Silurian rift-clastic sequence of central Vermont, *in* Colpron, M., and Doolan, B., editors, Proceedings of the Quebec-Vermont Appalachian Workshop, University of Vermont, Burlington, Vermont, p. 74-76.
4. Walsh, G.J., 1992, Bedrock geology of the Fayston – Buels Gore area central Vermont: Vermont Geological Survey Special Bulletin No. 13, 74 p., scale 1:24,000, <http://www.anr.state.vt.us/dec/geo/specbulls.htm>.
5. Ross, D.S., Bartlett, R.J., Magdoff, F.R., and Walsh, G.J., 1994, Flow path studies in forested watersheds of headwater tributaries of Brush Brook, Vermont: Water Resources Research, v. 30, no. 9, p. 2611-2618, [doi:10.1029/94WR01490](https://doi.org/10.1029/94WR01490).
6. Walsh, G.J., and Ratcliffe, N.M., 1994, Preliminary bedrock geologic map of the Plymouth quadrangle and eastern portion of the Killington Peak quadrangle, Windsor and Rutland Counties, Vermont: U.S. Geological Survey Open-File Report 94-225, 36 p., scale 1:24,000, <http://pubs.er.usgs.gov/publication/ofr94225A>.
7. Walsh, G.J., Ratcliffe, N.M., Dudley, J.B., and Merrifield, T., 1994, Digital bedrock geologic map of the Mount Holly and Ludlow quadrangles, Vermont and explanation of the bedrock geology database in the Vermont Geographic Information System: U.S. Geological Survey Open-File Report 94-229, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_12480.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_12480.htm).
8. Walsh, G.J., and Ratcliffe, N.M., 1994, Digital bedrock geologic map of the Plymouth quadrangle, Vermont: U.S. Geological Survey Open-File Report 94-654, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_18567.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_18567.htm).

9. Walsh, G.J., and Falta, C.K., 1996, Preliminary bedrock geologic map of the Rochester quadrangle, Rutland, Windsor, and Addison Counties, Vermont: U.S. Geological Survey Open-File Report 96-25, scale 1:24,000, <http://pubs.er.usgs.gov/publication/ofr9625>.
10. Walsh, G.J., and Falta, C.K., 1996, Digital bedrock geologic map of the Rochester quadrangle, Vermont: U.S. Geological Survey Open-File Report 96-33, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_43379.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_43379.htm).
11. Walsh, G.J., Armstrong, T.R., and Ratcliffe, N.M., 1996, Preliminary bedrock geologic map of the Vermont part of the 7.5 x 15 minute Mount Ascutney and Springfield quadrangles, Windsor County, Vermont: U.S. Geological Survey Open-File Report 96-719, 38 p., scale 1:24,000, <http://pubs.usgs.gov/of/1996/719/>.
12. Walsh, G.J., Armstrong, T.R., and Ratcliffe, N.M., 1996, Digital bedrock geologic map of the Vermont part of the 7.5 x 15 minute Mount Ascutney and Springfield quadrangles, Vermont: U.S. Geological Survey Open-File Report 96-733, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_18694.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_18694.htm).
13. Armstrong, T.R., Walsh, G.J., and Spear, F.S., 1997, A transect across the Connecticut valley sequence in east-central Vermont: *in* Grover, T.W., Mango, H.N., and Hasenohr, E.J., editors, New England Intercollegiate Geological Conference: Guidebook to Field Trips in Vermont and adjacent New Hampshire and New York, 89th Annual Meeting, Castleton, Vermont, p. A6: 1-56.
14. Ratcliffe, N.M., Walsh, G.J., and Aleinikoff, J., 1997, Basement, metasedimentary and tectonic cover of the Green Mountain massif and western flank of the Chester dome, *in* Grover, T.W., Mango, H.N., and Hasenohr, E.J., editors, New England Intercollegiate Geological Conference: Guidebook to Field Trips in Vermont and adjacent New Hampshire and New York, 89th Annual Meeting, Castleton, Vermont, p. C6: 1-54.
15. Walsh, G.J., 1998, Digital bedrock geologic map of the Vermont part of the Hartland quadrangle, Windsor County, Vermont: U.S. Geological Survey Open-File Report 98-123, 17 p., scale 1:24,000, <http://pubs.usgs.gov/of/1998/0123a/report.pdf> , [http://ngmdb.usgs.gov/Prodesc/proddesc\\_17764.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_17764.htm)
16. Ratcliffe, N.M., and Walsh, G. J., 1998, Digital and preliminary bedrock geologic map of the Mount Carmel quadrangle, Vermont: U.S. Geological Survey Open-File Report 98-330, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_17795.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_17795.htm).
17. Walsh, G. J., and Ratcliffe, N.M., 1998, Digital and preliminary bedrock geologic map of the Pico Peak quadrangle, Vermont: U.S. Geological Survey Open-File Report 98-226, scale 1:24,000, [http://ngmdb.usgs.gov/Prodesc/proddesc\\_17784.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_17784.htm).
18. Walsh, G.J., and Clark, S.F., Jr., 1999, Bedrock geologic map of the Windham quadrangle, Rockingham and Hillsborough Counties, New Hampshire, U.S. Geological Survey Open-File Report 99-8, 18 p., scale 1:24,000, <http://pubs.usgs.gov/of/of99-8/>.
19. Walsh, G.J., and Aleinikoff, J.N., 1999, U-Pb zircon age of metafelsite from the Pinney Hollow Formation: Implications for the development of the Vermont Appalachians: *American Journal of Science*, v. 299, p. 157-170, <http://earth.geology.yale.edu/~ajs/1999/02.1999.03Walsh.pdf>.
20. Ratcliffe, N.M., Harris, A.G., and Walsh, G.J., 1999, Tectonic and regional metamorphic implications of the discovery of Middle Ordovician conodonts in cover rocks east of the Green Mountain massif, Vermont: *Canadian Journal of Earth Sciences*, v. 36, no. 3, p. 371-382, [doi: 10.1139/e99-009](https://doi.org/10.1139/e99-009).
21. Walsh, G.J., Reddy, J.E., and Armstrong, T.R., 1999, Geologic mapping and collection of geologic

- structure data with a GPS receiver and a Personal Digital Assistance (PDA) computer, *in* Soller, D.R., editor, Digital Mapping Techniques '99 – Workshop Proceedings: U.S. Geological Survey Open-File Report 99-386, p. 127-131, <http://pubs.usgs.gov/openfile/of99-386/walsh.html>.
22. Burton, W.C., Armstrong, T.R., and Walsh, G.J., 1999, Bedrock geologic framework of the Mirror Lake research site, New Hampshire, *in* Morganwalp, D.W., and Buxton, H.T., editors, U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the Technical Meeting, Charleston, South Carolina, March 8-12, 1999--Volume 3 of 3--Subsurface Contamination from Point Sources: U.S. Geological Survey Water-Resources Investigations Report 99-4018C, p. 705-714, [http://toxics.usgs.gov/pubs/wri99-4018/Volume3/SectionG/3805\\_Burton/index.html](http://toxics.usgs.gov/pubs/wri99-4018/Volume3/SectionG/3805_Burton/index.html).
  24. Walsh, G.J. and Clark, S.F., Jr., 2000, Contrasting methods of fracture trend characterization in crystalline metamorphic and igneous rocks of the Windham quadrangle, New Hampshire: *Northeastern Geology and Environmental Sciences*, v. 22, no. 2, p. 109-120.
  25. Burton, W.C., Walsh, G.J., and Armstrong, T.R., 2000, Bedrock geologic map of the Hubbard Brook Experimental Forest, Grafton County, New Hampshire: U.S. Geological Survey Open-File Report 00-45, 2 plates, 25 p., scale 1:10,000. <http://pubs.usgs.gov/openfile/of00-045/>.
  26. Walsh, G.J., and Falta, C.K., 2001, Bedrock geologic map of the Rochester quadrangle, Rutland, Windsor, and Addison Counties, Vermont: U.S. Geological Survey Geologic Investigations Series Map I-2626, 14 p., scale 1:24,000, <http://pubs.er.usgs.gov/publication/i2626>.
  27. Walsh, G.J., 2001, Bedrock geology in the vicinity of the Knowles and Andreas well sites, West Newbury, Massachusetts: U.S. Geological Survey Open-File Report 01-353, 14 p., <http://pubs.usgs.gov/of/2001/of01-353/>.
  28. Walsh, G.J., 2001, Bedrock geology in the vicinity of the Rockland Avenue well site, Maynard, Massachusetts: U.S. Geological Survey Open-File Report 01-354, 15 p., <http://pubs.usgs.gov/of/2001/of01-354/>.
  29. Walsh, G.J., 2002, Bedrock geology in the vicinity of the Leicester well site, Paxton, Massachusetts: U.S. Geological Survey Open-File Report 02-433, 19 p., <http://pubs.usgs.gov/of/2002/of02-433/>.
  30. Walsh, G.J., Aleinikoff, J.N., Benziane, F., Yazidi, A., and Armstrong, T.R., 2002, U-Pb zircon geochronology of the Paleoproterozoic Tagragra de Tata inlier and its Neoproterozoic cover, western Anti-Atlas, Morocco: *Precambrian Research*, v. 117, p. 1-20, [doi: 10.1016/S0301-9268\(02\)00044-X](https://doi.org/10.1016/S0301-9268(02)00044-X).
  31. Moore, R. B., Schwarz, G. E., Clark, S. F., Jr., Walsh, G. J., and Degnan, J. R., 2002, Factors related to well yield in the fractured bedrock aquifer of New Hampshire: U.S. Geological Survey Professional Paper 1660, 51 p, <http://water.usgs.gov/pubs/pp/pp1660/>.
  32. Benziane, F., Yazidi, A., Walsh, G.J., Armstrong, T.R., Kouhen, M.A., Yazidi, M., Khamlichi, M.A., and Aleinikoff, J.N., 2002, Carte géologique au 1/50 000, Feuille Afouzar: Notes et Mémoires Service Géologique du Maroc No. 422, 71 p.
  33. Yazidi, A., Benziane, F., Walsh, G.J., Armstrong, T.R., Kouhen, M.A., Yazidi, M., and Khamlichi, M.A., 2002, Carte géologique au 1/50 000, Feuille Zawyat Si Nisser: Notes et Mémoires Service Géologique du Maroc No. 423, 69 p.
  34. Walsh, G.J., 2003, Bedrock geologic map of the New Milford quadrangle, Litchfield and Fairfield Counties Connecticut: U.S. Geological Survey Open-File Report 03-487, 49 p., scale 1:24,000, <http://pubs.usgs.gov/of/2003/of03-487/>.
  35. Walsh, G.J., Aleinikoff, J.N., and Fanning, C.M., 2004, U-Pb geochronology and evolution of

- Mesoproterozoic basement rocks, western Connecticut, *in* Tollo, R.P., Corriveau, L., McLelland, J.M., and Bartholomew, M.J., editors, Proterozoic Tectonic Evolution of the Grenville Orogen in North America: Boulder, Colorado, Geological Society of America Memoir No.197, p. 729-753, [doi: 10.1130/0-8137-1197-5.729](https://doi.org/10.1130/0-8137-1197-5.729).
36. Walsh, G.J., 2005, Bedrock geology of the New Milford quadrangle, Connecticut, *in* McHone, N.W., and Peterson, M.J., editors, New England Intercollegiate Geological Conference: Guidebook for Field Trips in Connecticut, 97th Annual Meeting, New Haven, Connecticut, Trip B5, p. 191-203.
  37. Walsh, G.J., and Satkoski, A.M., 2005, Surface gamma-ray survey of the Barre West quadrangle, Washington and Orange Counties, Vermont: U.S. Geological Survey Scientific Investigations Report 2005-5276, 19 p., <http://pubs.usgs.gov/sir/2005/5276/>.
  38. Walsh, G. J., Scott, R. B., Aleinikoff, J. N., and Armstrong, T. R., 2006, Preliminary bedrock geologic map of the Old Lyme quadrangle, New London and Middlesex Counties, Connecticut: U.S. Geological Survey Open File Report 2006-1296, scale 1:24,000, <http://pubs.usgs.gov/of/2006/1296/>.
  39. Walsh, G.J., Aleinikoff, J.N., and Wintsch, R.P., 2007, Origin of the Lyme Dome and implications for the timing of multiple Alleghanian deformational and intrusive events in southern Connecticut: American Journal of Science, v. 307, no. 1, p. 168-215, [doi: 10.2475/06.2007.06](https://doi.org/10.2475/06.2007.06).
  40. Wintsch, R.P., Aleinikoff, J.N., Walsh, G.J., Bothner, W.A., Hussey, A.M., and Fanning, C.M., 2007, SHRIMP U-Pb evidence for a Late Silurian age of metasedimentary rocks in the Merrimack and Putnam-Nashoba terranes, eastern New England: American Journal of Science, v. 307, no. 1, p. 119-167, [doi: 10.2475/01.2007.05](https://doi.org/10.2475/01.2007.05).
  41. Shapiro, A. M., Hsieh, P.A., Burton, W.C., and Walsh, G.J., 2007, Integrated multi-scale characterization of ground-water flow and chemical transport in fractured crystalline rock at the Mirror Lake site, New Hampshire, *in* Subsurface Hydrology: Data Integration for Properties and Processes, D. W. Hyndman, F. D. Day-Lewis, and K. Singha, editors, Geophysical Monograph Series, vol. 171, p. 201-226, AGU, Washington, D.C., <http://www.agu.org/books/gm/v171/>.
  42. Pierce, H.A., Walsh, G.J., Burruss, R.C., and Degnan, J.R., 2007, Borehole characterization of a methane-yielding bedrock well, Tyngsborough, Massachusetts: U.S. Geological Survey Open-File Report 2007-1399, <http://pubs.usgs.gov/of/2007/of2007-1399>.
  43. Degnan, J.R., Walsh, G.J., Flanagan, Sarah, and Burruss, R.C., 2008, Bedrock, borehole, and water-quality characterization of a methane-producing water well in Wolfeboro, New Hampshire: U.S. Geological Survey Open-File Report 2008-1333, 47 p., <http://pubs.usgs.gov/of/2008/1333>.
  44. Stone B.D., Benziane F., El Fahssi A., Yazidi A., Walsh G.J., Yazidi M., Saadane A., Ejjaouani H., and Kalai M., 2008, Carte géologique au 1/50 000, Feuille Sidi Flah: Notes et Mémoires du Service Géologique du Maroc No. 467, 113 p.
  45. Benziane F., Yazidi A., Saadane A., Yazidi M., El Fahssi A., Stone B.D., Walsh G.J., Burton W.C., Aleinikoff J.N., Ejjaouani H., and Kalai M., 2008, Carte géologique au 1/50 000, Feuille Qal'at Mgouna: Notes et Mémoires Service Géologique du Maroc No. 468, 139 p.
  46. Walsh G.J., Benziane F., Burton W.C., El Fahssi A., Yazidi A., Yazidi M., Saadane A., Aleinikoff J.N., Ejjaouani H., Harrison R.W., Stone B.D., and Kalai M., 2008, Carte géologique au 1/50 000, Feuille Bouskour: Notes et Mémoires Service Géologique du Maroc No. 469, 131 p.
  47. Harrison R.W., Yazidi A., Benziane F., Quick J.E., El Fahssi A., Stone B.D., Yazidi M., Saadane A., Walsh G.J., Aleinikoff J.N., Ejjaouani H., and Kalai M., 2008, Carte géologique au 1/50 000, Feuille Tizgui: Notes et Mémoires Service Géologique du Maroc No. 470, 131 p.

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49. Yazidi A., Benziane F., Walsh G.J., Harrison R.W., Saadane A., Yazidi M., Quick J.E., El Fahssi A., Stone B.D., Aleinikoff J.N., Ejjaouani H., and Kalai M., 2008, Carte géologique au 1/50 000, Feuille Ait Sengane: Notes et Mémoires Service Géologique du Maroc No. 472, 113 p.
50. Walsh, G., Lidke, D., Bauer, W., Goodenough, K.M., De Waele, B., and Thomas, R.J., 2008, Carte géologique de Madagascar, Feuille XY36 Maroambihy: Série de Carte Géologique échelle 1:100,000, Ministère de l'Énergie et des Mines, Projet de Gouvernance des Ressources Minérales, Antananarivo.
51. Bauer, W., Walsh, G., and Lidke, D., 2008, Carte géologique de Madagascar, Feuille X37 Sarahandrano: Série de Carte Géologique échelle 1:100,000, Ministère de l'Énergie et des Mines, Projet de Gouvernance des Ressources Minérales, Antananarivo.
52. Lidke, D., Bauer, W., De Waele, B., and Walsh, G., 2008, Carte géologique de Madagascar, Feuille XY37 Antalaha/Ambohibe: Série de Carte Géologique échelle 1:100,000, Ministère de l'Énergie et des Mines, Projet de Gouvernance des Ressources Minérales, Antananarivo.
53. Thomas, R.J., De Waele, B., Schofield, D.I., Goodenough, K.M., Horstwood, M., Tucker, R., Bauer, W., Annells, R., Howard, K., Walsh, G., Rabarimanana, M., Rafahatelo, J.M., Ralison, V., and Randriamananjara, T., 2009, Geological Evolution of the Neoproterozoic Bemarivo Belt, northern Madagascar: *Precambrian Research*, v. 172, p. 279-300, [doi:10.1016/j.precamres.2009.04.008](https://doi.org/10.1016/j.precamres.2009.04.008).
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57. Walsh, G.J., Kim, J., and Gale, M.H., 2009, Bedrock geology of the Montpelier area, Central Vermont, *in* Westerman, D., and Lathrop, A., editors, Guidebook for Field Trips in the Northeast Kingdom of Vermont and Adjacent Regions: New England Intercollegiate Geological Conference, 101st Annual Meeting, Lyndonville, Vermont, Trip C4, p. 243-260.
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