

**DORIA L. KUTRUBES  
PRESIDENT AND SR. GEOPHYSICIST**

**EDUCATION** Colorado School of Mines  
M.S., Geophysical Engineering, 1986

Bates College  
B.S., Magna Cum Laude, Geology, 1983

**EXPERIENCE**

**General Qualifications**

Ms. Kutrubes uses her 24+ years of experience in ground penetrating radar (GPR), electrical resistivity, electromagnetic (EM, SP, IP, VLF), and seismic refraction and reflection methods for solving environmental, infrastructure, geotechnical, and hydrogeologic problems. She has been on hundreds of assignments across the world, ranging from detection of lost cities, native and pre-19th Century artifacts, and burials to locating buried hazardous waste and areas of deteriorating concrete and asphalt, and voids beneath pavements, dams, and granite-block bridge abutments.

Ms Kutrubes works cooperatively with leaders in the geophysical industry to help develop and implement advanced geophysical methods and processing and imaging techniques. These methods include nonlinear refraction travelttime tomography and 3D GPR. From 1993 to 1997, she worked with the world's leading radar manufacturer, GSSI, Inc., and other radar software developers to beta-test their radar processing software and write their software manuals. She has also taught several short courses in principles and operation of GPR, including one for the Environmental and Engineering Geophysical Society (EEGS) at their March 2001 symposium.

**Environmental (21E and Brownfield )Sites:**

*GPR Specialist - Massachusetts Department of Environmental Protection*

Drafted and helped implement MADEP's Standard Operating Procedures for GPR. These procedures helped establish protocol for the set-up, collection, and interpretation of GPR data to be used as an industry-wide standard in Massachusetts.

*Project Geophysicist - Numerous Superfund Sites, including Toms River, NJ,  
Londonderry, VT, Coventry, RI, and Woburn, MA*

Designed and implemented a geophysical investigation using digital GPR, magnetometry, and EM terrain conductivity to determine the location of buried drums, sludge material, and landfill boundaries. GPR results also helped determine the

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continuity of a clay layer possibly acting as an aquitard or aquiclude at one site. Seismic refraction and VLF were also used at other sites to determine the landfill's thickness and bedrock depths, as well as locate bedrock fractures.

*Geophysicist - Characterization of Municipal Landfill Sites, Massachusetts and Maine*

Evaluated municipal landfills using electromagnetic terrain conductivity profiling to determine their extent and map possible leachate plumes for the Maine D.E.P. and others. Seismic refraction data, modeled using the SIPT2 and GRM methods, were obtained to determine bedrock depths and saturated thicknesses of unconfined aquifers at many of these sites. Seismic refraction helped locate a buried bedrock valley at one landfill and guided the subsequent placement of monitoring wells. At other landfills, EM terrain conductivity and electrical resistivity were used to determine landfill boundaries.

*Project Geophysicist - Over 2,000 Site Assessments, locations across the U.S.*

GPR, magnetic gradiometry, and EM terrain conductivity and induction methods were used to determine the location, depth, and orientation of possible underground storage tanks (USTs) and/or other potential sources of contamination. Geophysical tools were also used to locate piping associated with USTs and other utilities on-site. The majority of detected UST's were of steel construction; however, fiberglass tanks were also located at several sites.

*Geophysicist - Utility and UST Surveys, Numerous NYDOT and New York City Sites*

Conducted hundreds of utility and UST detection surveys within the proposed right-of-ways of New York State highways. Also, used GPR, magnetometry, EM terrain conductivity, and EM induction to locate utilities so that they can be avoided during the installation of monitoring wells and borings.

**Site Assessments for Military Base Closures**

*Project Geophysicist - U.S. Navy CLEAN Site, Yorktown, Virginia*

Conducted digital GPR profiling to locate underground fuel tanks (USTs), product lines, and burial trenches in which bulk volatile organic compounds had been previously disposed. The GPR survey results also successfully delineated the boundary of a sludge disposal area.

*Geophysicist and GPR Specialist - Numerous Naval and Air Force Bases, U.S.A.*

Includes work conducted at Kentile Naval Air Station, Charlestown Naval Air Station, Portsmouth Naval Air Base, South Weymouth Naval Air Station, Fort Devens, Loring Air Force Base, Pease Air Force Base, and others. Used GPR, EM terrain conductivity, and magnetometry to locate abandoned USTs, drums, leachfields and septic systems, and locate UXOs. Other work included using EM induction to locate utilities which may provide a preferential pathway for the migration of contaminants.

**Representative Infrastructure and Geotechnical Experience**

*GPR Specialist - Numerous State/Interstate Highways in U.S.A. and Internationally*

Evaluated thousands of miles of pavement to determine pavement and subbase thicknesses for numerous state highway and federal clients using PAVLAYER and DECAR software developed by Infrasense, Inc.

*GPR Specialist - Numerous State/Interstate Highways in U.S.A. and Internationally*

Worked with Infrasense, Inc. to evaluate hundreds of bridge decks in Idaho, Arizona, Rhode Island, and other states to detect concrete deterioration and delamination. Bridges were evaluated using PAVLAYER and DECAR software developed by Infrasense, Inc..

*GPR Specialist - Concrete Deterioration and Delamination Study, Rumford, Maine*

Used a ground-coupled 1.5 GHz antenna to evaluate the concrete of an above-ground concrete holding tank used to hold corrosive pulp-mill product for the Mead Paper Company. GPR determined the amount of delamination along the inside wall, between the tile and concrete, and the amount of deterioration at the inside wall and two rebar schedules. GPR also helped determine the dielectric values of the concrete along the outside portion of the wall.

*GPR Specialist - Void Surveys Beneath Concrete, Multiple U.S. Locations*

Used GPR to detect voids beneath the floor slab at one nuclear power plant and beneath several runways in New York, Boston, and Maryland. The collapse of an unreinforced concrete floor of an airplane hangar was responsible for damaging an F-14 fighter plane at the Patuxent Naval Air Station. GPR was used to map voids and concrete delamination and help determine the mechanism of failure.

*GPR Specialist - Pavement/Subbase Thickness Checks, Vicinity of Chicago, Illinois*

From 1991 to 1998, conducted approximately 120 miles of digital GPR profiling along three multi-lane roadways to verify that the roads were built to construction specifications. Thicknesses of the pavement and subbase materials were determined at 1 to 5 foot intervals with a high degree of accuracy. Ground-coupled and horn antenna radar data were collected to locate patches and determine the volume and type of material used in them. Data from these studies were successfully used by the Illinois Department of Transportation and F.B.I. to prosecute a General Contractor and assess a \$15 Million dollar fine.

*GPR Specialist - Numerous State/Interstate Highways in Connecticut and Massachusetts*

Used GPR to evaluate the location, depth, and extent of sub-pavement voids along numerous State and Interstate highways for the Massachusetts Highway Department, Connecticut D.O.T., and Iroquois Gas Transmission Company. GPR detected numerous voids underlying the high-speed lane of Route I-93, including some voids greater than 5 feet in diameter and less than 5 feet below the asphalt surface, thus preventing a potential catastrophic failure of the roadway.

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*GPR Specialist - Shallow Bedrock Profiling, Numerous Eastern Massachusetts Sites*

Used GPR to accurately determine depth and degree of fracturing/weathering of the shallow bedrock in complex geologic environments. GPR was used instead of seismic refraction to provide a more cost-effective and highly detailed picture of the overburden/bedrock interface. In one study, bedrock contour maps were generated to determine the direction of flow of DNAPLS.

*Project Geophysicist - Bedrock Profiling, Braintree-Weymouth Combined Sewer Outfall Project, MA*

Conducted a highly-detailed seismic refraction survey for the MWRA along the coast of the Fore River for purposes of profiling bedrock. Because the survey was conducted in a complex tidal environment, where organics, changing saturation conditions, and velocity inversions were prevalent, seismic data was processed using both conventional and state-of-the-art techniques developed by Dr. Jie Zhang, currently with GeoTomo LLD., to produce an accurate image of the subsurface.

*GPR Specialist - Fiberoptic Cable Alignments, Connecticut and Maine*

Acquired and interpreted GPR data along a proposed AT&T fiberoptic cable alignment to identify areas of shallow bedrock and/or till that could impede cable emplacement. Seismic refraction confirmed the GPR findings by determining the compressional seismic velocities of these materials. The results of these surveys provided estimated alignment lengths that required special trenching efforts.

*GPR Specialist - Void Surveys along Pipeline and Tunnel Alignments, Numerous Sites in New England, Texas, and Puerto Rico*

Performed a GPR survey that determined the location and extent of voids over storm pipelines, including along the Massachusetts Turnpike, and in Puerto Rico. At a Dallas, Texas site, GPR located voids, confirmed by ASTM Standard Penetration Tests, which enabled our client to obtain out-of-court damages. Also used GPR within a building, damaged by the expansion of the San Juan subway, to determine the horizontal and vertical extent of voiding. GPR and a magnetic gradiometer were also used to locate existing sanitary sewer and storm drain lines for design of our client's new systems.

*Geophysicist - Various Railroad Alignments, Maryland, Kentucky, Wyoming*

Conducted a GPR survey to evaluate the thicknesses, type, and degree of drainage of ballast and subballast materials. GPR was used to image the failure plane of the railroad embankment along one Maryland alignment. At one Kentucky site, GPR and electrical resistivity measurements also helped to identify areas of moisture build-up that caused clayey subbase material to liquefy, resulting in buckling of the rails.

*GPR Specialist - Void Detection, Nuclear Power Plant, New Jersey*

GPR was used to delineate and map the extent of voids underneath the concrete floor supporting the plant's turbine room, and helped characterize possible mechanisms of voiding.

*GPR Specialist - Multiple Granite-Block Bridge Abutment Study, Massachusetts*

GPR was used for the evaluation of granite-block bridge abutment thicknesses, and block configurations for the Massachusetts Highway Department. The study was implemented to assess abutment stability and loading capabilities of numerous bridges for their reuse in bridge renovation. Bridges were located throughout the state, including the towns of Montague, Ashland, Wellesley, and West Sturbridge.

**REPRESENTATIVE ARCHAEOLOGICAL/ FORENSIC EXPERIENCE**

*GPR Specialist - White Marble Dam in Natural Bridges State Park, North Adams, MA*

Used GPR to determine the thickness and configuration of a 156 year-old white marble block dam, believed to be the only one of its kind in North America. GPR was also used to determine bedrock depths beneath the silted-in upstream impoundment. Information derived from this survey helped engineers stabilize the dam and implement a dredging program for the upstream impoundment while preserving the dam's historical integrity.

*GPR Specialist - Helike, Greece*

Invited GPR specialist for the Smithsonian Institute and American Museum of Classical Greek Studies in Athens. GPR was used to augment archeology investigations to help locate the lost City of Helike. 1996 and 1998 GPR surveys confirmed the location of a 40 meter long ancient Greek wall and numerous building remnants from Classical Greece to Byzantine ages. Future confirmation of GPR targets may confirm the presence of Classical Greek or Mycenaean tombs and other artifacts from Classical Greece.

*GPR Specialist - The Munsee-Stockbridge Nation, Bethlehem, NY*

Conducted a highly-detailed GPR survey to locate unmarked burials adjacent to the Town's sewage treatment facility. Results from the GPR survey were used to determine possible areas where six skeletal remains, accidentally unearth during excavation and installation of a pipeline, could be repatriated.

*GPR Specialist - White Sands Missile Range*

Conducted a highly-detailed GPR survey to locate potential adobe structures associated with 11<sup>th</sup> - 13<sup>th</sup> Century Native inhabitants. Preliminary results from our ongoing interpretation of the GPR data indicates that several large buried structures, presumably remnants of adobe walls, are evident in at least 3 of the 10 areas investigated. Results from our GPR survey and complimentary magnetic gradiometer survey performed by Dr. Meade Kemrer, contractor to the WSMR will be used to preserve these significant sites.

*GPR Specialist - Warren Tavern, Charlestown, MA*

GPR was used to locate revolutionary war artifacts immediately outside of the revolutionary war period tavern. GPR also revealed a hidden passageway inside the tavern, which may have been used to conceal muskets and munitions.

*Invited Instructor/GPR Specialist - Yarmony, Colorado*

Provided GPR and magnetometry training to CSM students at the Yarmony pit-house site. An area adjacent to the known pit-house was evaluated where students were trained in the design, implementation, and interpretation of geophysical data. To date, the Yarmony pit-house is the oldest known Native American structure in North America, dating back over 6,000 B.C.

*Geophysicist - Potential Native American Sites, Eastern Massachusetts locations*

Conducted numerous GPR and magnetic surveys to determine whether several sites in eastern Massachusetts were occupied by Native Americans. GPR helped establish the horizons of interest, while magnetometry help locate potential fire hearths.

**Representative Teaching/Training Experience**

*GPR Specialist - The Jena Choctaw Tribe*

Worked with Dr. Kent Schneider of the U.S. Forestry Service and Dr. Dean Goodman of the Geoarchaeometry Laboratory to trained BIA, Jena Choctaw, and other Native-American Archaeologists from Nations across the U.S. Class participants learned radar theory, data acquisition, and processing techniques of GPR. As part of the training process, helped the Jena Choctaw Tribe locate unmarked burials from an 18<sup>th</sup> Century cemetery.

*GPR Specialist - GPR Training Services, Cambria Ice Sheet, British Columbia, Canada*

Conducted a GPR survey on top of an Alpine glacier while training other geophysicists to operate GSSI's SIR System 10A. GPR located the ice-bedrock contact and helped determine the loading pressure on the rock below.

*GPR Specialist/ Instructor - Ho Chunk Nation, Blackriver Falls, WI*

Instructed members of the Ho Chunk Nation on the principles of GPR theory, data acquisition design and implementation, and data processing and interpretation so that the tribe can locate their buried ancestors. Also, as part of the course, supervised data acquisition at one site where native burials were suspected.

**Background:**

Former Principal and Senior Geophysicist - Hager GeoScience, Inc., Waltham, MA  
Geophysicist - Geophysical Applications, Inc., Bellingham, Massachusetts  
Staff Geophysicist - Weston Geophysical Corp., Westboro, Massachusetts  
Geophysicist/hydrogeologist - Ground Water Associates, Sterling, Massachusetts  
Assistant Research Geophysicist - US Geological Survey, Geophysics Branch, Golden,CO  
Geophysical Contractor to Maine Geological Survey - Augusta, Maine

**PROFESSIONAL AFFILIATIONS**

Co-Founder of the GPR Service Providers Coalition for Action  
Environmental and Engineering Geophysical Society Member  
EEGS SAGEEP Chair 1994, 2001, 2003, Co-Chair 2004  
Society of Exploration Geophysicists  
Society of American Archeologists  
Near Surface Geological Society  
Association of Licensed Site Professionals (LSPs)

**PROFESSIONAL DEVELOPMENT AND AWARDS**

Reflection Seismology, Massachusetts Institute of Technology, 1993  
Short Course on Electrical Properties of Rock, Olhoeft, G.R., 1986  
40 Hours OSHA Health & Safety Training, 1989, 8 Hour OSHA Refresher Course, 1990-2003  
Phi Beta Kappa  
Milt Lindholm Scholar Athlete Award, Bates College, 1983  
DAR Good Citizen's Award, 1979

**PUBLICATIONS**

- Kutrubes, D.L., Andrews, M., Andrews, M., Denham, M., 2006, TIME-DEPTH IMAGING TO LOCATE BEDROCK FRACTURES AND VOIDS, SAINT JAMES, BARBADOS, presented at Symposium for the Application of Geophysics for Environmental and Engineering Applications, Denver, Colorado, April 2006.
- Heinz-Vallribera, A., Kutrubes, D.L., Olson, S.M., Lewis, L., Baker, J., Kick, J.F., 2004, Uncovering the mysteries of Gore Place: a GPR case history: Presented at Symposium for the Application of Geophysics for Environmental and Engineering Applications, Colorado Springs, CO., February 23-26.
- Kutrubes, D.L., Soter, S., Katsonopoulou, D., Heinz Vallribera, A., 2003, Ground Penetrating Radar in the Search for Ancient Helike, Symposium for the Applications of Geophysics to Environmental and Engineering Problems, April 6-10, San Antonio, TX.
- Kutrubes, D.L., 2003, Ground Penetrating Radar, Public Safety, and the FCC, Symposium for the Applications of Geophysics to Environmental and Engineering Problems, April 6-10, San Antonio, TX.
- Kutrubes, D.L., 2003, Dielectric permittivity measurements of soils, rocks, and earth materials, presented at Transportation Research Board (TRB), January, 2003, Washington D.C.
- Sussmann, T.R., Maser, K.R., Kutrubes, D.L., Heyns, F., Selig, E., 2001, Development of ground penetrating radar infrastructure condition detection: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, 5-8 March, 2001, Denver, CO.
- Kutrubes, D.L., 2000, Use of a ground-coupled monostatic antenna for determining deterioration of concrete structures: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, 21-24 February 2000, Washington, D.C., pp. 851-5.
- Kutrubes, D.L., Maser, K., 1998, Use of GPR in 2D and 3D imaging of bridge footings and scour studies: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, March 1998, Chicago, IL., pp. 893-902.
- Kutrubes, D.L., Soter, S., and Katsonopoulou, D., 1997, The search for ancient Helike: a GPR case study: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, April 1997, Reno, NV., pp. 973-982.
- Kutrubes, D.L., Zhang, J., and Hager, J. (Proofreader), 1996, Conventional processing techniques and nonlinear refraction travelttime tomography for imaging bedrock at an eastern Massachusetts coastal site: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, April 1996, Keystone, CO., pp. 215-220.

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Zhang, J., Kutrubes, D.L., and Toksoz, M.N., 1996, High-resolution shallow seismic structure imaging using grid-based nonlinear refraction traveltime tomography: Symposium for the Applications of Geophysics to Environmental and Engineering Problems, April 1996, Keystone, CO., pp. 209-214.

Morey, R.M., and Kutrubes, D.L., 1996, Hydrogeologic characterization of the groundwater remediation field laboratory, Dover AFB, Delaware, using GPR and CPT: Hydrology and Hydrogeology of Urban and Urbanizing Areas Conference, American Institute of Hydrogeology, June 1996, Boston, MA, pp. ccg1-ccg11.

Kutrubes, D.L., and Olhoeft, G.R., (unpublished), Dielectric permittivity measurements of soils saturated with fluids - predictions and applications to GPR, 22p.

Kutrubes, D.L., Blackey, M., Jenkins, T., 1994, Preservation of a historic landmark: White Marble Dam, North Adams, Massachusetts: 5th International GPR Conference, 12-16 June, 1994, Kitchner Ontario, Canada, pp. 559-568.

Kutrubes, D.L., and Zhang, J., 1994, Predictive deconvolution of GPR data using ProMAX: IEEE Dual Use Technologies and Applications Conference, 23-26, May 1994, SUNY Institute of Technology, Utica/Rome, New York, pp. 439-446.

Kutrubes, D.L., DuBois, K., and Fenner, T., 1992, GPR at a Superfund site, Vermont: 4th International Conference on GPR, 8-11 June, Rovaniemi, Finland, 6p.

Bedingfield, L., and Kutrubes, D.L., 1991, Delineation of voids beneath highways in Massachusetts: Pipeline Crossing Proceedings, ASCE Conference, 25-27 March, 1991, Denver, CO., pp. 149-160.

Bedingfield, L., and Kutrubes, D.L., 1990, GPR applications for bridges and highways in Massachusetts: Abstract, Third International Conference on GPR, 14-18 May, Denver, CO.

Kutrubes, D.L., 1988, use of GPR for detecting hazardous fluids in soils - predictions and applications: Abstract, American Geophysical Union Transactions, V. 69, no. 44, p. 1190.

Kutrubes, D.L., and Olhoeft, G.R., 1987, Dielectric permittivity measurements - applications to GPR: presented at the AGU fall meeting, 7-12 Dec., American Geophysical Union Transactions, V. 68, no. 44, pp. 1282-1283.