Selected Bibliography on Ground Penetrating Radar

by
Gary R. Olhoeft
U.S.Geological Survey
P.O.Box 25046 DFC MS964
Denver, CO 80225

The following is a selected bibliography on ground penetrating radar. It is excerpted from a more comprehensive bibliography (approximately four times larger) to be published next year in the second volume of the Society of Exploration Geophysicist's Electromagnetic Volumes, edited by Misac Nabighian.

Radar was invented during World War II and first applied to earth science problems during the 1940's and 1950's for ice sounding and planetary exploration (Evans, 1963; Thompson, 1979). Geotechnical applications of ground penetrating radar to rock and soil did not occur until the 1970's (Ulriksen, 1980). This selected bibliography is a comprehensive listing of post-1980 references (and selected pre-1980 key references) on radar applications in well logging, tomography and terrestrial surface sounding (near surface exploration).

It also contains selected pre- and post-1980 references for:

lunar and planetary exploration (Evans, 1969; Brown, 1972; Simmons et al., 1972; Hagfors and Campbell, 1973; Porcello et al., 1974; Olhoeft and Strangway, 1975; Strangway and Olhoeft, 1977; Gary and Keihm, 1978; Peeples et al., 1978; Pettengill, 1978; Thompson, 1979; Ostro, 1983; Roth et al., 1985)

airborne and spaceborne terrestrial radar (JPL, 1980, 1982; Blom and Elachi, 1981, 1987; Ulaby et al., 1982, 1986; Elachi, 1983; Ford et al., 1983, 1986; Fung, and Ulaby, 1983; Moore, 1983; Carver et al., 1985; Swift et al., 1985; Tsang et al., 1985; Cimino et al., 1986; Dobson and Ulaby, 1986; Schaber et al., 1986; Tsandoulas, 1987).

and the high frequency electrical properties of rocks (Broadhurst, 1970: Olhoeft, 1980, 1984, 1987; Sen et al., 1981; Delaney and Arcone, 1982; Hallikainen et al., 1985; Jackson and O'Neil, 1986; Kutrubes, 1986; El-Rayes and Ulaby, 1987).

Selected Bibliography

Akhadov, Y.Y., 1980, Dielectric properties of binary solutions: NY, Pergamon, 475p.

Al-Attar, A., Scott, H.F.and Daniels, D.J., 1982, Wideband measurement of microwave characteristics of soils: IEE Electronics Letters, v.18, p.194-197.

Alharthi, A., Lange, J. and Whitaker, E., 1986, Immiscible fluid flow in porous media, dielectric properties: J.Contam.Hydrol., v.1, p.107-118.

Alongi, A.V., 1973, Pavement thickness measured: voids detected by downward-looking radar in New York, Test.Ind.Res.News, Fall 1973, p.36-39.

Alsup, S.A.and Simmons, G., 1984, Ground penetrating radar: Salem, NH, Auburn Press, 61p.

Ambach, W.and Denoth, A., 1980, The dielectric behavior of snow- a study versus liquid water content: NASA Conf.Publ.2153, A.Rango, ed., Wash.DC, no.25., var.pag.

Annan, A.P., 1973, Radio interferometry depth sounding, part I, theoretical discussion: Geophysics, v.38, p.557-580.

Annan, A.P.and Davis, J.L., 1976, Impulse radar sounding in permafrost: Radio Sci., v.11, p.383-394.

Annan, A.P.and Davis, J.L., 1977, Radar range analysis for geological materials: Report of Activities, pt.B, Ottawa, Geol.Survey Canada., p.117-124.

Annan, A.P.and Davis, J.L., 1978, High frequency electrical methods for detection of freeze-thaw interfaces: Edmonton, Proceedings 3rd International Permafrost Conference, p.496-500.

Annan, A.P.and Davis, J.L., 1979, Radar sounding of bedrock and water table at Chalk River: in Hydrological and geochemical studies in the Perch Lake Basin, P.J.Barry, ed., Atomic Energy of Canada Ltd.Report AECL-6404, p.121-134.

Ansoult, M., DeBacker, L.W.and Declercq, M., 1985, Statistical relationship between apparent dielectric constant and water content in porous media: Soil Sci.Sci.Amer.J., v.49, p.47-50.

Arai, I.and Suzuki, T., 1984, Subsurface radar signal processing for noise reduction and high resolution: in Noise and clutter rejection in radars and imaging sensors, Proc.of the 1984 Int.Symp., Amsterdam, North Holland, p.679-688.

Archer, M., 1981, The determination, by microwave techniques, of the interface between pulp and froth: National Institute for Metallurgy, Randburg, So.Afr., Rep.NIM-2126, 23p.

Arcone, S.A., 1981, Distortion of model subsurface radar pulses in complex dielectrics: Rad.Sci., v.16, p.855-864.

Arcone, S.A., 1984, Field observations of electromagnetic pulse propagation in dielectric slabs: Geophysics, v.49, p.1763-1773.

Arcone, S.A., 1984, Pulse transmission through frozen silt: U.S.Army CRREL 84-17, NTIS AD-A147108, 10p.

Arcone, S.A., 1984, Radar detection of ground water: in Proc.of the ground-water detection workshop, 12-14 Jan.1982, Vicksburg, MS, E.A.Dardeau Jr., ed., U.S.Army Waterways Exp.Sta., p.68-76.

Arcone, S.A., Delaney, A.J.and Perham, R.E., 1986, Short-pulse radar investigations of freshwater ice sheets and brash ice: US Army Corps of Engin., CRREL Rep.86-6, 11p.

Arcone, S.A., Gow, A.J.and McGrew, S., 1986, Microwave dielectric, structural and salinity properties of simulated sea ice: IEEE Trans.on Geoscience and Remote Sensing, V-GE-24, p.832-839.

Arcone, S.A.and Delaney, A-J., 1982, Dielectric properties of thawed active layers overlying permafrost using radar at VHF: Rad.Sci., v.17, p.618-626.

Arcone, S.A.and Delaney, A.J., 1982, Measurement of ground dielectric properties using wide-angle reflection and refraction: U.S.Army CRREL Report 82-6, 18p.

Arcone, S.A.and Delaney, A.J., 1984, Radar investigations above the trans-Alaska pipeline near Fairbanks: Hanover, U.S.Army CRREL Report 84-27, 15p.

Arcone, S.A.and Larson, R.W., 1987, Single-horn reflectometry for in situ dielectric measurements at microwave frequencies: IEEE Trans.Geosci.Rem.Sens., v.GE-26, p.89-92.

Arulanandan, K.and Mitchell, J.K., 1968, Low frequency dielectric dispersion of clay-water-electrolyte systems: Clays and Clay Minerals, v.16, p.337-351.

Asmussen, L.E., Perkins, H.F.and Allison, H.D., 1986, Subsurface descriptions by ground-penetraing radar for watershed delineation: The Georgia Agricultural Experiment Stations, College of Agriculture, The Univ.of Georgia, Research Bu11.340, 15p.

Assal, H.M.and Mahmoud, S.F., 1986, Determination of resistivity and permittivity profiles of a layered earth in IGARSS '86 Symp.: Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.205-209

Austin, B.A., 1984, Remote-sensing in mining -- a review of techniques and applications: in Electronics in Mining Symposium, So.Afr.Inst.Electr.Eng., Marshalltown, S.A., p.l-14.

Baker, P.L., Kenyon, W.E.and Kester, J.M., 1985, EPT interpretation using a textural model: in Trans.SPWLA 26th Annual Logging Symp., p.DDl-19.

Baker, T.H.W., Davis, J.L., Hayhoe, H.N.and Topp, G.C., 1982, Locating the frozen-unfrozen interface in soils using time domain reflectometry: Can.Geotech.J., v.19, p.511-517.

Bakliwal, P.C., 1986, Comparative study of LANDSAT MSS, SALYUT-Y(TERRA) and radar(SIR-A)images for geological and geomorphological applications - a case study from Rajasthan and Gujarat: India, in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.449-452.

Balanis, C.A., Jeffrey, J.L.and Yoon, Y.K., 1978, Electrical properties of eastern bituminous coal as a function of frequency, polarization and direction of the electromagnetic wave and temperature of the sample: IEEE Trans.Geosci.Electr., v.GE-16, p.316-323.

Balanis, C.A., Shepard, P.W., Ting, F.T.C.and Kardosh, W.F., 1980, Anisotropic Electrical Properties of Coal: IEEE Trans.Geoscience and Remote Sensing, v.GE-18, No.3, p.250-256.

Ballard, Jr, R.F., 1983, Electromagnetic (radar) techniques applied to cavity detection: in Expanded abstract of the technical program, 53rd Ann.Int.Meeting and Expo., Tulsa, SEG, p.105-107.

Bansal, R., 1984, Developing experimental models for a bistatic subsurface radar: Electron.Lett.(GB), v.20, p.1042-1044.

Bartsch, N., Gruner, K., Keydel, W.and Witte, F., 1987, Contributions to oil-spill detection and analysis with radar and microwave radiometry - results of the Archimedes II campaign: IEEE Trans.Geosc.Rem.Sensing, v.GE-25, p.677-690.

Beers, R.and Morey, R., 1981, Subsurface Radar Profiling Field Tests at Low-Level Nuclear Waste Burial Sites, Maxey Flats, Kentucky and Beatty: Nevada, Geo-Centers tech.report GC-TR-79-1023, NTIS NUREG/CR-1272, NRC, 42p.

Beers, R.and Morey, R., 1981, Subsurface pulsed radar measurements: Beatty, Nevada - October 29 - November 2, 1979: Geo-Center, Newton Upper Falls, MA, GC-TR-79-1066, 21p.

Beers, R.and Morey, R., 1981, Subsurface radar profiling field tests at low-level nuclear waste burial sites: Maxey Flats, Kentucky and Beatty, Nevada: Geo-Center, Newton Upper Falls, MA, GC-TR-79-1023, 44p.

Belsher, D.R., McLaughlin, R.H., Repjar, A.G.and Bussey, H.E., 1984, Microwave detection of lost wells and unknown water-filled voids in coal mines: NBS IR-84-3017, 86p.

Benin, S.D., Klugman, I.Yu., Roman'ko, K.S.and Sokolov, I.L., 1974, Frequency dielectric method of determining salt contents on crude petroleum and petroleum products: Meas.Tech., v.17, p.1589-1592.

Benson, R.C.and Glaccum, R.A., 1979, Radar surveys for geotechnical site assessment: in Geophysical methods in geotechnical engineering, Spec.Session, Am.Soc.Civil.Engr., Atlanta, p.161-178.

Bergeron, C.J., Jr., Iuop, J.W.and Michel, G.A., II., 1987, Lateral resolution of the modified image method for sea-ice thickness : in Expanded Abstr.SEG 57th Ann.Int'l.Meeting and Expo., Oct.ll-15, 1987, p.55-58.

Berlin, GA., Tarabouni, M.A., Al-Nasser, A., Sheikho, K.M.and Larson, R.W., 1986, SIR-B subsurface imaging of a sand-buried landscape--Al Labbah plateau, Saudi Arabia: IEEE Trans.Geosci.Remote Sensing, v.GE-24, p.595-602.

Berry, W.R., Head, M.P.and Mougne, M.L, 1979, Dielectric constant logging -- a progress report: Trans.2Oth Annual SPWLA Logging Symposium, v.2, 26p.

Bertram, C.L., Campbell, K.J.and Sandler, S.S., 1972, Characteristics of sea ice, lake ice and permafrost using an impulse radar system: GSSI Report 008-72, ONR Contract N00014-71-C-0392, 67p.

Bertram, C.L., Campbell, K.J.and Sandler, S.S., 1972, Locating Large Masses of Ground Ice With an Impulse Radar System: Proc.8th Int.Symp.on Remote Sensing, Univ.Mich., Ann Arbor, Mich., Oct.2-6, p.241-260.

Bertram, C.L., Morey, R.M.and Sandler, S.S., 1974, Feasibility Study for Rapid Evaluation of Airfield Pavements: U.S.Air Force Weapons Lab., Dayton, Ohio, AFWL-TR-71-178, AD-781 793, 38p.

Bevan, B.W., 1984, Environmental effects on ground-penetrating radar: in Expanded Abstracts of the 54th Ann.Int.Meeting and Expo., Soc.Explor.Geophys., Dec 2-6, Atlanta, p.201-204.

Bevan, B.and Kenyon, J., 1975, Ground-penetrating **radar** for historical archaeology, MASCA Newsletter: Univ.of Pennsylvania, v.11, n.2, p.2-7.

Biggs, A.W., 1983, Radar and infrared remote sensing of terrain water resources, Arctic sea ice and agriculture: Kansas Univ./Center for Research, Inc., Lawrence, KS, Remote Sensing lab., AD-PO02 725/0/XPS, 22p.

Birchak, J.R., Gardner, C.G., Hipp, J.E.and Victor, J., 1974, High dielectric constant microwave probes for sensing soil moisture: Proc.IEEE, v.62, p.93-98.866

Bjelm, L., 1980, Geological interpretation with subsurface radar in peat lands: in Proc.of the 6th Int'l.Peat Congress, Aug.17-23, 1980, Duluth, MN, p.7-8.

Bjelm, L., Follin, S.G.W.and Svensson, C., 1983, A radar in geological subsurface investigations: Bull.Int.Assoc.of Eng.Geol.Paris, N.26/27, p.10-14.

Blom, K.G.and Nelson, J.S., 1980, Ground radar survey: peat deposits, St.Louis County, Minnesota, Harding-Lawson Associates, Novato, CA.

Blom, R., 1984, Radar penetration bibliography: report, Jet Propulsion Lab., Pasedena, CA, 16p.

Blom, R.G., Crippen, R.E.and Elachi, C., 1984, Detection of subsurface features in Seasat radar images of Means Valley, Mojave Desert, California: Geology, v.12, p.346-349.

Blom, R.G., Schenck, L.R. and Alley, R.E., 1987, What are the best radar wavelengths, incidence angles, and polarizations for discrimination among lava flows and sedimentary rocks? a statistical approach: IEEE Trans.Geosci.Rem.Sens., v.GE-25, p.208-213.

Blom, R.G.and Elachi, C., 1981, Spaceborne and airborne imaging radar observations of sand dunes: J.Geophys.Res.v.86, p.3061-3073.

Blom, R.and Elachi, C., 1987, Multifrequency and multipolarization radar scatterometry of sand dunes and comparison with spaceborne and airborne radar images: J.Geophys.Res., v.92, p.7877-7889.

Boerner, W.-M., Foo, B.-Y.and Eom, H.J., 1987, Interpretation of polarimetric co-polarization phase term in radar images obtained with the JPL Airborne L-Band SAR System: IEEE Trans.Geosci.and Remote Sensing, v.GE-25, p.77-82.

Bogorodskii, V.V., 1980, Active methods of sea ice thickness measurements: in Proc.Int.Workshop on remote estimation of ice thickness, 25-26 Sept.1979, C-CORE, Mem.Univ.Newfoundland, p.361-372.

Bogorodsky, V.V., 1980, Electromagnetic properties of sea ice : in Proc.Int.Workshop Remote Estimation of Sea Ice Thickness, Memorial Univ., St.John's, Newfoundland, C-CORE Pub.80-5.

Bondarenko, A.T.and Kul'kova, L.M., 1978, A study of high frequency electrical parameters of water-saturated and frozen carbonaceous rock gold deposits using radiowave spectroscopy: TSNIGRI, no.137, p.35-41.

Borgeaud, M., Kong, J.A. and Lin, F.C., 1986, Microwave remote sensing of snow-covered sea ice: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.133-138.

Bowders, J.J.Jr., Koerner, R.M.and Lord, A.E.Jr., 1982, Buried container detection using ground-probing radar: Journal of Hazardous Materials, v.7, p.l-17.

Boyne, H.S., 1985, Microwave determination of snowpack liquid water content.Final report: Dept.of Earth Sciences, Colorado State Univ., Ft.Collins, CO, (for U.S.Army Research Office), Report No.ARO 20107.1-GS, 37p.

Bradley, J.A.and Wright, D.L., 1987, Microprocessor-based data-aguisition system for a borehole radar: IEEE Trans.on Geoscience and Remote Sensing, v.GE-25, p.441-447.

Broadhurst, M.G., 1970, Complex dielectric constant and dissipation factor of foliage: Nat.Bur.Stand., Wash.D.C.Report no.NBS-9592, 50p.

Bromberg, M.L., Day, D.R.and Snable, K.R., 1986, Measurement and application of dielectric properties: IEEE Electr.Insul.Mag., v.2, n.3, p.18-24.

Brost, D.F.and Davis, L.A., 1981, Determination of oil saturation distributions in field cores by microwave spectroscopy: SPE 56th Ann.Tech.Conf.and Exhib., Paper SPE 10110, 19p.

Brown, W.E., Jr., 1972, Lunar subsurface exploration using coherent radar: in Lunar Geophysics, Z.Kopal and D.W.Strangway, eds., Reidel, Dordrecht-Holland., p.243-257.(also The Moon, v.4, p.113-127.)

Brylkin, Yu.L., 1981, Determination of the coefficient of oil and gas content of rocks by dielectric methods: Soviet Geol.and Geophys., v.22, p.93-97.

Bunget, I.and Popescu, M., 1984, Physics of solid dielectrics: Elsevier, Amsterdam, 443p.

Burdette, E.C., Cain, F.L.and Seals, J., 1980, In viva probe measurement technique for determining dielectric properties at VHF through microwave frequencies: IEEE Trans.MTT, v.MTT-28, p.414-427.

Burfoot, J.C.and Taylor, G.W., 1979, Polar dielectrics and their applications: Berkeley, Univ.of Calif.Press, 465p.

Burrel, G.A.and Peters, L.Jr., 1979, Pulse Propagation in Lossy Media Using the Low-Frequency Window for Video Pulse Radar Application: Proc.IEEE, v.67, p.981-990.

Burrell, G.A.and Peters L., Jr., 1976, The propagation of electromagnetic video pulses with application to subsurface radar for tunnel detection: The Ohio State Univ., Electroscience Lab.Report No.ESL-4460-2, AD-Al11 362/O/XPS, 71p.

Butt, K.A.and Gamberg, J.B., 1980, Technology of airborne impulse radar: in Proc.Int.Workshop on remote estimation of ice thickness, 25-26 Sept.1979, C-CORE, Mem.Univ.Newfoundland, p.385-412.

Caldecott, R., 1985, A radio frequency probe to measure soil electrical parameters: Ohio State Univ.Electroscience Lab., Report 715616-4, var.p.

Caldecott, R., Irons Jr, D.A., Moffatt, D.L., Peters Jr, L., Puskar, R.J., Toth, J.F.and Young, J.D., 1972, Electromagnetic pulse sounding for surveying underground water: Ohio State Univ.Electrosci.Lab.Rep.401X-1, 81p.

Calvert, T.J., Rau, R.N.and Wells, L.E., 1977, Electromagnetic propagation-- a new dimension in logging: Soc.Petrol.Engrs.Paper SPE-6542, 15p.

Calvet, R., 1975, Dielectric properties of montmorillonites saturated by bivalent cations: Clays and Clay Min., v.23, p.256-265.

Camillo, P.J., O'Neill, P.E.and Gurney, R.J., 1986, Estimating soil hydraulic parameters using passive microwave data: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.930-936.

Campbell, K.J.and Orange, A.S., 1974, A Continuous Profile of Sea Ice and Freshwater Ice Thickness by Impulse Radar: Polar Rec., v.17, No.106, p.31-41.

Canada Center for Mineral and Energy Technology (CANMET), 1983, Ground probing radar experiments at the Foothills Pipeline Frost Heave Test Facility: Calgary, Alberta, Earth Physics Branch, Ottawa, Open File Rept., 83-13, 63p.

Caorsi, S.and Semino, M., 1984, Dielectric permittivity of liquids by inverse numerical treatment of microwave reflection measurements: in Dielectric materials, measurements and applications, 4th Inter.Conf., 10-13 Sept 1984, London, IEE, p.271-274.

Carver, K.R., Elachi, C. and Ulaby, F.T., 1985, Microwave remote sensing from space, Proc.IEEE, v.73, p.970-996.

Castle, G.S.P.and Roberts, J., 1974, A microwave instrument for the continuous monitoring of the water content of crude oil: Proc.IEEE, v.62, p.103-108.

Chan, L.C., 1975, A Digital Processor for Transient Subsurface Radar Target Identification: M.S.Thesis, Ohio State Univ., Columbus, OH., 141p.

Chan, L.C., Moffatt, D.L.and Peters, L.Jr., 1979, A Characterization of Subsurface Radar Targets: Proc.IEEE, v.67, p.991-1000.

Chan, L.C., Moffatt, D.L.and Peters, L.Jr., 1981, Subsurface Radar Target Imaging Estimates: IEEE Trans.Antennas and Propag., v.AP-29, p.413-417.

Chan, L.C., Peters,L.Jr.and Moffatt, D.L., 1981, Improved Performance of a Subsurface Radar Target Identification System Through Antenna Design: IEEE Trans.Antennas and Propag., v.AP-29, p.307-311.

Chang, H-T., 1986, A downhole radar system for fracture detection: Trans.Geothermal Resource Council, v.10, p.217-222.

Chantry, G., 1980, High frequency dielectric reference materials: BCR Project 43, Final report of phase 1, Commission of European Communities, NTIS PB81-229403, 80p.

Chao, J., Suzuki, T.and Arai, I., 1981, Analysis of signal waveforms received by a subsurface radar: Rep.Univ.Electro-Commun.(Japan), v.32, p.ll-16.

Chapoton, A., Lebrun, A.and Wattrelot, F., 1981, Devices for in situ measurements of soil moisture using water dielectric properties at radiofrequencies and microwave frequencies: in Second Int.Coll.spectral signatures of objects in remote sensing, Bordeaux, France, 12-16 Sept., p.629-636.

Chaudhry, M.A., Haidar, A.R.and Jonscher, A.K., 1984, Dielectric effects of moisture in layered and porous materials: in Dielectric materials, measurements and applications, 4th Inter.Conf., 10-13 Sept 1984, London, IEE, p.49-52.

Chew, W.C., 1982, Response of the deep propagation tool in invaded boreholes: 57th Ann.SPE of AIME Fall Tech.Conf.Preprint No.SPE 10989, 8p.

Chew, W.C., 1987, Modelling the dielectric logging tool at high frequency : in Expanded Abstr.SEG 57th Ann.Int'l.Meeting and Expo., Oct.ll-15, 1987, p.32-34.

Chew, W.C.and Anderson, B., 1985, Propagation of electromagnetic waves through geological beds in a geophysical probing environment: Radio Sci., v.20, p.611-621.

Chew, W.C.and Gianzero, S.C., 1981, Theoretical investigation of the electromagnetic wave propagation tool: IEEE Trans.Geosci.and Rem.Sens, v.GE-19, p.l-7.

Chew, W.C.and Sen.P.N., 1982, Dielectric enhancement due to electrochemical double layer, thin double layer approximation: J.Chem.Phys., v.77, p.4683-4693.

Church, R.H., Webb, W.E.and Boyle, J.R., 1985, Ground-penetrating radar for strata control: BUMINES-RI-8954, NTIS PB86-108354/WNR, 16p.

Church, R.H.and Webb, W.E., 1986, Evaluation of a ground penetrating radar system for detecting subsurface anomalies: U.S.Bureau of Mines Report of Investigations RI-9004, 21p.

Cihlar, J.and Ulaby, F.T., 1974, Dielectric properties of soils as a function of moisture content: Univ.of Kansas, RSL Tech.Rep.177-47, 61p.

Cimino, J.B., Elachi, C.and Settle, M., 1986, SIR-B - the second shuttle imaging radar experiment: IEEE Trans.GRS, v.GE-24, p.445-452.

Clark, A.H., Quickenden, P.A.and Suggett, A, 1974, Multiple reflection time domain spectroscopy: JCS Faraday Trans.11, v.70, p.1847-1862.

Clay, C.S., Greischor, L.L.and Kan, T.K., 1974, Matched Filter Detection of Electromagnetic Transient Reflections: Geophysics, v.39, p.683-691.

Clemena, G.G., 1982, Evaluation of overlaid bridge decks with ground-penetrating radar, Virginia Highway and Transportation Research Council: Charlottesville, VA, Report No.VHTRC-82-R42, NTIS PB82-221839/XPS, 61p.

Cloude, S.R., 1983, Polarimetric techniques in radar signal processing: Microwave J., v.26, No.7, p.119-127.

Clough, J.W., 1973, Radio echo sounding, brine percolation layer: J.Glaciol., v.2, p.141-143.

Clough, J.W., 1976, Electromagnetic Lateral Waves Observed by Earth-Sounding Radars: Geophysics, v.41, Suppliment, p.1126-1128.

Clough, J.W.and Bentley, C.R., 1976, Electromagnetic sounding of glacial and shelf ice: Antarctic J.of the U.S., v.2, p.119-120.

Colbeck, S.C., 1980, Liquid distribution and the dielectric constant of wet snow: NASA Worshop on the Microwave Remote Sensing of Snowpack Properties, Fort Collins, CO, May 20-22, 1980, NASA Conf.Pub.2153, A.Rango, ed., p.21-39.

Colbeck, S.C., 1982, The geometry and permittivity of snow at high frequencies: J.Appl.Phys., v.53, p.4495-4500.

Cole, R.H., 1977, Time domain reflectometry: Annual Review of Physical Chemistry, v.28, p.283-300.

Cole, R.H.and Winsor IV, P., 1982, Fourier transform dielectric spectroscopy: in Fourier, Hadamard and Hilbert Transforms in Chemistry, A.G.Marshall, ed., NY, Plenum, p.183-206.

Collins, M.E., Schellentrager, G.W., Doolittle, J.A.and Shih, S.F., 1986, Using ground-penetrating radar to study changes in soil map unit composition in selected histosols: Soil Sci.Soc.Am.J., v.50, p.408-412.

Cook, C.W., 1982, Underground scanning with an impulse radar: Sandia Report SAND82-0470, 48p.

Cook, J.C., 1960, Proposed monocycle-pulse VHF radar for airborne ice and snow measurements: AIEE Trans.Commun.and Electron., v.79, p.588-594.

Cook, J.C., 1970, Electrical properties of bituminous coal samples: Geophysics, v.35, p.1079-1085.

Cook, J.C., 1971, A Study of Radar Exploration of Coalbeds: Teledyne Geotec., BuMines OFR 5-72, NTIS PB 207 362, 83p.

Cook, J.C., 1972, Seeing Through Rock With Radar, Conf.on Rapid Excavation and Tunnelling, Henniker, N.H., AIME, Chicago: IL., v.1, p.89-101.

Cook, J.C., 1973, Radar exploration through rock in advance of mining, Trans.SME: AIME, v.254, p.140-146.

Cook, J.C., 1974, Status of ground-Probing radar and some recent experience, Proc.Eng.Foundation Conf., Subsurface Exploration and Heavy Construction: Henniker, N.H., Aug.ll-16, ASCE, New York, N.Y., p.175-194.

Cook, J.C., 1975, Radar Transparencies of Mine and Tunnel Rocks: Geophysics, v.40, p.865-885.

Cook, J.C., 1977, Borehole-radar exploration in a coal seam: Geophysics, v.42, p.1254-1257.

Coon, J.B., Fowler, J.C.and Schafers, C.J., 1981, Experimental Uses of Short-Pulse Radar in Coal Seams: Geophysics, v.46, p.1163-1168.

Cooper, D.W., Muller, R.A.and Schertler, R.J., 1976, Remote Profiling of Lake Ice Using an S-Band Short-Pulse Radar Aboard an All-Terrain Vehicle: Radio Sci., v.11, p.375-381.

Cummings, K.D., Garland, J.C.and Tanner, D.B., 1984, Electromagnetic propagation in random composite materials: in Physics and chemistry of porous media, D.L.Johnson and P.N.Sen, eds., NY, Am.Inst.Phys., p.38-51.

Daev, D.S., Denisov, S.B., Ozolina, T.R.and Chukhvichev, V.D., 1971, The possibility of detecting fresh water encroachments with the aid of wave dielectric logging: Neftegazovaya geologiia i geofizika, no.6, p.41-44.

Dahlberg, K.E.and Ference, M.V., 1984, A quantitative test of the electromagnetic propagation (EPT) log for residual oil determination: in Trans.SPWLA 25th Ann.Logging Symp., Houston, SPWLA, p.DDDl-20.

Daily, W., 1984, Underground oil-shale retort monitoring using geotomography: Geophysics, v.49, p.1701-1707.

Daily, W.D., Lytle, R.J., Laine, E.F., Okada, J.T.and Deadrick, F.J., 1982, Geotomography of oil shale: J.Geophys.Res., v.87, p.5507-5515.

Daily, W.D.and Ramirez, A.L., 1984, In situ porosity distribution using geophysical tomography: Geophys.Res.Lttrs., v.11, p.614-616.

Daily, W.D.and Ramirez, A.L., 1987, In situ measurement of electromagnetic properties of welded tuff under compression: IEEE Trans.Geosc.Rem.Sensing, v.GE-25, p.859-861.

Dalton, F.N., Herkelrath, W.N., Rawlins, D.S.and Rhoades, J.D., 1984, Time-domain reflectometry, simultaneous measurement of soil water content and electrical conductivity with a single probe: Science, v.224, p.989.990.

Daniels, D.J., 1977, The use of radar in geophysical prospecting: Radar 1977, p.540-546.

Darracott, B.W.and Lake, M.I., 1981, An initial appraisal of ground probing radar **for** site investigation in Britain: Ground Engineering Foundation Publications Ltd, v.14, p.14-18.

Das, Y.and Boerner, W.M., 1978, On radar target shape estimate using algorithms for reconstruction from projections: IEEE Trans.Antenna Propagation, v.26, p.274-279.

David, R.A., Cook, C.W.and Stearns, S.D., 1983, Array processing techniques applied to ground penetrating radar data, Sixteenth Asilomar Conf.on Circuits, Systems and Computers (Albuquerque: NM), SAND-82-2524C, CONF-821105-4, p.117-119.

Davies, M.and others, 1972, 1977, Dielectric and related molecular processes: Specialist Periodical Reports, v.l-3, London, The Chemical Society, var.p.

Davis, B.R., Lundien, J.R.and Williamson, A.N., 1966, Feasibility study of the use of radar to detect surface and ground water: U.S.Army Engineer Waterways Exp.Sta.Tech.Rep.3-727, 50p.

Davis, D.T., Laine, E.F.and Okada, J.T., 1979, Electromagnetic burn front mapping during ARCO'S 1978 in situ coal gasification project: Lawrence Livermore National Laboratory, UCRL-52772.

Davis, D.T., Lytle, R.J. and Laine, E.F., 1979, Use of high frequency electromagnetic waves for mapping an in situ coal gasification burn front: In Situ, v.3, p.95-119.

Davis, D.T., Lytle, R.J., Lager, D.L.and Laine, E.F., 1977, Analysis of electromagnetic wave probing for underground voids: LLL, supported by US Energy Res.and Dev., W-7405-Eng-48, NTIS UCRL-52214, 21p.

Davis, D.T.and Lytle, R.J., 1977, In situ coal gasification burnfront mapping by monitoring reflected high frequency electromagnetic waves: US ERDA Contract W-7405-Eng-48, Lawrence Livermore Laboratory rep.UCRL-52325, 18p.

Davis, J.L., Annan, A.P., Black, G.and Leggatt, C.D., 1985, Geologic sounding using low-frequency radar: in Expanded Abstracts, 55th Ann.Intl.Meeting SEG, Wash.D.C., p.5-7.

Davis, J.L., Annan, A.P.and Vaughan, C.J., 1984, Placer expoloration using radar and seismic methods: in Expanded Abstracts of the 54th Ann.Int.Meeting and Expo., Soc.Explor.Geophys., Dec 2-6, Atlanta, p.306-308.

Davis, J.L., Killey, R.W.D., Annan, A.P.and Vaughan, C., 1984, Surface and borehole ground-penetrating radar surveys for mapping geological structure: in Surface and borehole geophysical methods in ground water investigations, D.M.Nielsen, ed., NWWA, Worthington, OH, p.681-712.

Davis, J.L., Scott, W.J.and Annan, A.P., 1976, Impulse radar experiments on permafrost near Tuktoyaktuk, NWT: Can.J.Earth Sci., v.13, p.1584-1590.

Davis, J.L., Topp, G.C.and Annan, A.P., 1977, Electromagnetic detection of soil water content, progress report II: in Remote sensing of soil moisture and ground water, workshop proceedings, Canadian Aeronautics and Space Institute, Ottawa, Nov.1976, p.96-109.

Davis, J.L., Topp, G.C.and Annan, A.P., 1977, Measuring soil water content in situ using time domain reflectometry techniques: Report of Activities, pt.B, Ottawa, GSC, p.33-36 .

Davis, J.L.and Annan, A.P., 1977, Electromagnetic measurements of soil moisture, progress report: Can.J.Remote Sensing, v.3(1), p.76-86.

Davis, S.R., Lytle, R.J., Lager, D.L.and Laine, E.F., 1977, Analysis of Electromagnetic Wave Probing for Underground Voids: Lawrence Livermore Laboratory, DOE Contract W-7405-ENG, Rep.UCRL-52214, 25p.

De Loor, G.P., 1983, The dielectric properties of wet materials: IEEE Trans.Geosci.and Rem.Sens., v.GE-21, p.364-369.

DeLauder, D.M.and Balanis, C.A., 1984, Numerical comparisons of short-pulse scattering models for rough surfaces: IEEE Trans.Geosci.and Rem.Sens., v.GE-22, p.585-591.

Deadrick, F.J., Hill, R.W.and Laine, E.F., 1981, High-frequency electromagnetic burn monitoring for underground coal gasification: LLL, NTIS DE82 011056, 9P.

Deadrick, F.J., Ramirez, A.L.and Lytle, R.J., 1982, In situ Fracture Mapping Using Geotomography and Brine Tracers: IEEE Transactions on Nuclear Science, v.NS-29, p.236-238.

Dean, A.M., Jr., 1977, Remote sensing of accumulated frazil and brash ice in the St.Lawrence River: U.S.Army Cold Reg.Res.and Eng.Lab., Hanover, NH, CRREL Rep.77-8.

Dean, A.M., Jr., 1981, Electromagnetic subsurface measurements: U.S.Army CRREL Report 81-23, AD-Al08 192/6/XPS, 24p.

Degauque, P., Lahlou, M.K., Cote, P. and Lagabrielle, R., 1987, Comparison between attenuation seismic tomography and hole to hole electromagnetic measurements at 200 MHz in granite sites: in Expanded Abstr.SEG 57th Ann.Int'l.Meeting and Expo., Oct.ll-15, 1987, p.843-844.

Degauque, P.and Thery, J-P., 1986, Electromagnetic subsurface radar using the transient field radiated by a wire: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.805-812.

Delaney, A.J.and Arcone, S.A., 1982, Laboratory measurements of soil electrical properties between 0.1 and 5 GHz, U.S.Army Cold Regions Research and Engineering Laboratory Report No.82-10: 7p.

Delano Jr., J.M.and Wharton, R.P., 1984, An EPT interpretation procedure and application in freshwater shaly oil sands: Trans.SPE, v.277, JPT, p.1763-1772.

Dellwig, L.F.and Moore, R.K., 1966, The geological value of simultaneously produced like- and cross-polarized radar imagery: J.Geophys.Res., v.71, p.3597-3601.

Dines, K.A.and Lytle, R.J., 1977, Iterative reconstruction of underground refractive index distributions from cross-borehole transmission data: US ERDA Contract W-7405-Eng-48, Lawrence Livermore Laboratory Re.UCRL-52348, 7p.

Dines, K.A.and Lytle, R.J., 1979, Computerized geophysical tomography: Proc.IEEE, v.67, p.1065-1073.

Dobson, M.C., Ulaby, F.T., Hallikainen, M.T.and El-Rayes, M.A., 1985, Microwave dielectric behavior of wet soil-part II, dielectric mixing models: IEEE Trans.Geosci.and Rem.Sens., v.GE-23, p.35-46.

Dobson, M.C.and Ulaby, F.T., 1986, Active microwave soil moisture research: IEEE Trans.Geosci.Rem.Sens., v.GE-24, p.23-36.

Dolphin, L.T., Beatty, W.B.and Tunzi, J.D., 1978, Radar Probing of Victorio Peak, New Mexico: Geophysics, v.43, p.1441-1448.

Domik, G.and Leberl, F., 1986, Using secondary image products to aid in understanding and interpretation of radar imagery: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.467-468.

Donelan, M.A. and Pierson, W.J.Jr., 1986, A two-scale Bragg scattering model for microwave backscatter from wind-generated waves: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.291-296.

Doolittle, J.A., 1982, Characterizing soil map units with the ground-penetrating radar: Soil Survey Horizons (Soil Sci.Soc.Am.), v.23, p.3-10.

Doolittle, J.A., 1983, Investigating histosols with the ground-penetrating radar: Soil Survey Horizons (Soil Sci.Soc.Am.), v.24, p.23-28.

Dukhin, S.S., 1971, Dielectric properties of disperse systems: in Surface and Colloid Science, v.3, E.Matijevic, ed., NY, Wiley, p.83-166.

Dukhin, S.S.and Shilov, V.N., 1972, Dielectric phenomena and the double layer in disperse systems and polyelectrolytes: NY, Wiley, 192p.

ENSCO Inc., 1977, Short-pulse radar sensors for high-wall auger guidance: phase I, feasibility, ENSCO Project 1130, USBM Contract H0262033, 56p.

Eberle, W.R., 1983, The effects of water content and water resistivity on the dispersion of resistivity and dielectric constant in quartz sand in the frequency range 100 Hz to 100 MHz: U.S.Geol.Survey Open File Report 83-0914, 35p.

El-Khamy, S.E., Mandour, I.A.and Ismail, N.E., 1983, Optimum electromagnetic pulse transmission through good conducting media: URSI National Radio Science Symposium on Electromagnetic Waves (Cairo, Egypt), p.230-236.

El-Rayes, M.A.and Ulaby, F.T., 1987, Microwave dielectric behavior of vegetation material: NASA CR-180096, N87-17393, 445p.

El-Rayes, M.A.and Ulaby, F.T., 1987, Microwave dielectric spectrum of vegetation - Part I-experimental observations: IEEE Trans.Geosc.Rem.Sensing, v.GE-25, p.541-549.

Elachi, C., 1983, Microwave and infrared satellite remote sensors: in Manual of remote sensing, 2nd ed., v.1, R.N.Colwell, ed., Am.Soc.Photogrammetry, p.571-650.

Elachi, C., Blom, R., Daily, M., Farr, T.and Saunders, R.S., 1980, Radar imaging of volcanic fields and sand dunes-- implications for VOIR: in Radar geology-- an assessment, JPL Pub1.80-61, p.114-150.

Elachi, C., Cimino, J.and Settle, M., 1986, Overview of the shuttle imaging radar-B preliminary scientific results: in Science, vol.232, p.1511-1516.

Elachi, C., Roth, L.E.and Schaber, G.G., 1984, Spaceborne radar subsurface imaging in hyperarid regions: IEEE Trans.Geosci.and Rem.Sens., v.GE-22, p.383-388.

Ellerbruch, D.A., 1978, Coal Layer Thickness Measurement Using FM-CW System in l-2 GHz Band: IEEE Trans.Geosci.Electron., v.GE-16, p.126-133.

Ellerbruch, D.A.and Adams, J.W., 1974, Microwave Measurement of Coal Layer Thickness: BuMines OFR 101-75, contract SO144086, NBS, NTIS COM 74-11643, 33p.

Ellerbruch, D.A.and Belsher, D.A., 1976, FM-CW Electromagnetic Technique of Measuring Coal Layer Thickness: NBS, NBSIR 76-840, 67p.

Ellerbruch, D.A.and Belsher, D.A., 1977, Electromagnetic Technique of Measuring Coal Layer Thickness: IEEE Trans.Geosci.Electron., v.GE-15, p.126-133.

Engman E.T.and Wang, J.R., 1987, Evaluating roughness models of radar backscatter: IEEE Trans.Geosc.Rem.Sensing, v.GE-25, p.709-713.

Eshleman, V.R., 1986, Radar glory from buried craters on icy moons: Science, v.234, p.587-589.

Evans, J.V., 1969, Radar studies of planetary surfaces: Ann.Rev.Astron.Astrophys., v.7, p.201-248.

Evans, S., 1963, Radio Techniques for the Measurement of Ice Thickness: Polar Rec., v.3, p.406-410.

Evans, S., 1965, Dielectric properties of ice and snow- a review: J.Glaciol., v.5, p.773-792.

Evans, S., 1967, Progress Report on Radio Echo Sounding: Polar Rec., v.ll.p.413-420.

Evans, S.and Smith, B.M.E., 1969, A radio equipment for depth sounding in polar ice sheets, J.Sci.Instr.: Ser.2, v.2, p.131-136.

Farr, T.G., Elachi, C., Hartl, P.and Chowdhury, K., 1986, Microwave penetration and attenuation in desert soil: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.590-594.

Fellner-Feldegg, H., 1969, The measurement of dielectrics in the time domain: J.Phys.Chem., v.73, p.616-623.

Fellner-Feldegg, H.R., 1972, Permeability, permittivity and conductivity measurements with time-domain reflectometry: Hewlett-Packard Application Note 153, Palo Alto, HP, 24p.

Fily, M.and Rothrock, D.A., 1986, Extracting sea ice data from satellite SAR imagery: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.849-854.

Finkel'steyn, M.I., 1970, Optimum form of pulses in radar sounding of sea ice: Radioeng.and Electron.Phys., v.12, p.2179-2182.

Finkel'steyn, M.I., 1974, Probing of sea ice with a sequence of video pulses: Radioeng.and Electron.Phys., v.12, p.2179-2182.

Finkel'steyn, M.I., 1977, Subsurface radar (remote sensing), Radiotekhnika: Moskva (USSR), v.32, p.6-17.

Finkel'steyn, M.I., Glushnev, N.G., Petrov, A.N.and Ivaschenko, Y.Ya., 1970, Anisotropic attenuation of radio waves in sea ice, Izvestia: Atmos.Ocean Phys., v.6, p.311-313.

Finkel'steyn, M.I., Kutev, V.A.and Vlasov, O.P., 1974, Radar sounding of groundwater underneath a sand layer: Dokl.Akad.Nauk SSSR, v.219, n.6, p.1427-1429.

Finkel'steyn, M.I., Mendel'son, V.L.and Kutev, V.A., 1977, Radar sounding of the Earth's strata: Moscow, Sovetskoye Radio Press., 173p.

Finkel'steyn, M.I., Zolotarev, V.P., Birger, A.Ya.and Bush, L.Ya., 1982, Practical use of subsurface electromagnetic radar method for peat and underground water sounding in the Latvian SSR: Izv.Akad.Nauk Latv.SSR.Ser.fi2.i tek.nauk, n.5, p.83-87.

Fischer, P.M., Follin, S.G.W.and Ulriksen, P.F., 1980, Subsurface radar survey at Hala Sultan Tekke, Cyprus: in Application of Technical Devices in Archeology.Studies in Mediterranean Archeology, v.LXIII, Paul Astroms Forlag, Goteborg, Sweden, p.48-51.

Fisher, P.M., 1980, Applications of technical devices in archeology--The use of X-rays, microscopes, electrical and electromagnetic devices and subsurface interface radar: Studies in Mediterranean Archeologyi v.63, p.1-64.

Fitzpatrick, G.J.and Foster, E.O., 1984, Application of time domain spectroscopy to dielectric materials:n i Dielectric materials, measurements and applications, 4th Inter.Conf., 10-13 Sept 1984, London, IEE, p.237-239.

Forbes, L.M., 1968, Radio Echo Exploration of the Antarctica Ice Sheet, 1967: Polar Rec., v.14, p.211-213.

Ford, J.P., Cimino, J.B. and Elachi, C., 1983, Space shuttle Columbia views the world with imaging radar: the SIR-A experiment, JPL Pub1.82-95, Pasadena, 179p.

Ford, J.P., Cimino, J.B., Holt, B.and Ruzek,M.R., 1986, Shuttle imaging radar views the earth from Challenger: the SIR-B experiment, JPL Publ. 86-10, Pasadena, 135p.

Fountain, L.S., 1986, Detection and location of leaks in geomembrane-lined liquid waste impoundments using an electrical technique: in NWWA, Surface and Borehole Geophysical Methods and Ground Water Instrumentation, Conf.and Exp., 10/15-17/86, Denver, CO, p.117-126.

Fountain, L.S., Herzid, F.X.and Owen, T.E., 1975, Detection of Subsurface Cavities by Remote Sensing Techniques: Fed.Highway Admin.Rep.FHWA-RD-75-8, NTIS PB 253-379, 81p.

Fowler, J.C., 1981, Subsurface Reflection Profiling Using Ground-Probing Radar: Min.Eng., v.33, p.1266-1270.

Fowler, J.C., Hale, S.D.and Houck, R.T., 1981, Coal Mine Hazard Detection Using Synthetic Pulse Radar: ENSCO Inc., Contract H0292025, BuMines OFR 79 81, NTIS PB 81-224412, 86p.

Fowler, J.W.and Ayubcha, A., 1986, Selection of appropriate geophysical techniques for the characterization of abandoned waste sites: in NWWA, Surface and Borehole Geophysical Methods and Ground Water Instrumentation, Conf.and Exp., 10/15-17/86, Denver, CO, p.625-656.

Freedman, R., 1986, Computer simulation of radio frequency dielectric constant logging: The Log Analyst, v.27, p.7-26.

Freedman, R.and Vogiatzis, J.P., 1979, Theory of microwave dielectric constant logging using electromagnetic wave propagation methods: Geophysics, v.44, p.969-986.

Freeman, M.S., Nottenburg, R.N.and Dubow, J.B., 1979, An automated frequency domain technique for dielectric spectroscopy of materials, J.Phys.Sci.E: Sci.Ins t., v.12, p.899-903.

Friedman, M.H., 1981, Evaluation of the Geophysical Survey Systems Inc.radar for the detection of unexploded ordnance, Army Mobility Equipment Research and Development Command: Fort Belvoir, VA, Report No.MERADCOM-2322, AD-Al01 295/4/XPS, 24p.

Fry, R-t Schotsch, J.and Stolarczyk, L., 1981, The radio imaging method (RIM) -- a means of detecting and imaging anomalous geologic structures *in* a coal seam: Proc.4th Conf.on Ground Control in Mining, Morgantown, W, p.206-211.

Fujino, K., Wakahama, G., Suzuki, M.and Matsumoto, T., 1986, Snow stratigraphy observed by an FM-CW microwave system in IGARSS '86 Symp.: Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.99-101.

Fung, A.K., 1982, A review of volume scatter theories for modelling applications: Radio Sci., v.17, p.1007-1017.

Fung, A.K.and Eom, H.J., 1983, Effects of a rough boundary surface on polarization of the scattered field from an inhomogeneous medium: IEEE Trans.Geosci.Electron., v.GE-21, p.265-270.

Fung, A.K.and Eom, H.J., 1985, A study of backscattering and emission from closely packed inhomogeneous media: IEEE Trans.Geosci.and Rem.Sens., v.GE-23, p-761-767.

Fung, A.K.and Ulaby, F.T., 1983, Matter-energy interaction in the microwave region: in Colwell, R.N., ed., Manual of Remote Sensing, v.1, 2nd ed., Am.Soc.Photogrammetry., p.115-164.

Gary, B.L.and Keihm, S.J., 1978, Interpretation of ground-based microwave measurements of the moon using a detailed regolith properties model: Prov.Lunar Planet.Sci.Conf.9th, p.2885-2900.

Gates, D.C.and Armistead, R.A., 1974, The use of advanced technologies for locating underground obstacles: Stanford Research Inst., Menlo Park, CA, NTIS PB-237 690, 166p.

Geiger, F.E.and Williams, D., 1972, Dielectric constants of soils at microwave frequencies: NASA TMX-65987, 30p.

Geng,.X.W., Yong, Y.Z., Lu, D.and Zhao, S.F., 1983, Dielectric log -- a logging method for determining oil saturation: J.Petr.Tech., v.35, p.1797-1805.

Geo-Centers, Inc., 1982, Ground Penetrating Radar--Proof of Principle Test, Oak Ridge National Laboratory: Geo-Centers, Inc., Newton Upper Falls, Mass., GC-TR-82-299, 46p.

Gilkeson, R.H.and Cartwright, K., 1983, Applications of surface electrical and shallow geothermic methods in monitoring network design: Ground Water Monitoring Review, v.3, No.3, p.30-42.

Glen, J.W.and Paren, P.G., 1975, The electrical propertries of snow and ice: J.Glaciol., v.15, p.15-38.

Glotov, V.P., Kutev, V.A.and Finkel'steyn, M.I., 1981, Realization of subsurface sounding of Earth layers with the help of a coherent radar with Doppler filtering: Radiotekh.and Elektron.(USSR), v.26, p.560-570.

Golden, L.M., 1979, The effect of surface roughness on the transmission of microwave radiation through a planetary surface: Icarus, 38, p.451-455.

Govind, S., Wilton, D.R.and Glisson, A.W., 1984, Scattering from inhomogeneous penetrable bodies of revolution: IEEE Trans.AP, v.AP-32, p.1163-1173.

Gow, A.J., 1986, Orientation textures in ice sheets of quietly frozen lakes: J.Crystal Growth, v.74, p.247-258.

Grace, J.W., Meininger, R.D.and Evans, P.M., 1978, Impulse Radar System, Report of Conceptual Phase Investigation at the RWMC, Idaho National Engineering Laboratory, EG and G Idaho: Inc., Waste Management Retrieval Projects, Contract GWA No.882320370-500, 44p.

Grace, J.W.and Meininger, R.D., 1979, Impulse Radar System, Buried Pipe Location Survey Study at TRA, Idaho National Engineering Laboratory, EG and G Idaho: Inc., TRA Project Management, Contract WR No.953514200, 45p.

Graglia, R.D.and Uslenghi, P.L.E., 1984, Electromagnetic scattering from anisotropic materials, part I: IEEE Trans.AP, v.AP-32, p.867-869.

Graham, L.C., 1974, Synthetic interferometer radar for topographic mapping: Proc.IEEE, v.62, p.763-768.

Greeley, R., Christensen, P.R., McHone, J.F., Asmerom, Y.and Zimbelman, J.R., 1984, Analysis of the Gran Desierto-Pinacate Region: Sonora, Mexico, via shuttle imaging radar: NASA CR 175711, 106p.

Grubb, R.N.and Wait, J.R., 1971, In situ measurements of the complex propagation constant in rocks for frequencies from 1 MHz to 10 MHz: Electron.Lttrs., v.7, p.506-507.

Gruen, D.W.R.and Marcelja, S., 1983, Spatially varying polarization in ice: JCFTBS, v.79, p.211-223.

Gulden, W., Ray, G.K., Minkarah, I., Cook, J.P.and Thornton, J.B., 1980, Sealing joints and cracks, thin resurfacing and locating voids under concrete slabs: Transportation Research Borad, Washington, DC, Report No.TRBTRR-752, ISBN-0-309-03062-5, NTIS PB80-215635, 38p.

Haeni, F.P., McKeegan, D.K. and Capron, D.R., 1987, Ground-penetrating radar study of the thickness and extent of sediments beneath Silver Lake, Berlin and Meriden: Connecticut, USGS WRI Report 85-4108, 19p.

Hagfors, T.and Campbell, D.B., 1973, Mapping of planetary surfaces with radar: Proc.IEEE, v.61, p.1219-1225.

Hagiwara, T., 1986, The direction of core dielectric constant and conductivity measurements: The Log Analyst, v.27, p.26-29.

Hague, P.R.and Kaczorowski, R.T., 1984, Geologic resource evaluation applications of ground penetrating radar: in Expanded Abstracts of the 54th Ann.Int.Meeting and Expo. Soc.Explor.Geophys., Dec 2-6, Atlanta, p.146-147.

Haidar, A.R.and Jonscher, A.K., 1986, The dielectric properties of zeolites in variable temperature and humidity: JCFTAR, v.82, p.3535-3551.

Hall, D.K.and Martinec, J., 1985, Remote sensing of ice and snow: NY, Chapman and Hall, 189p.

Hall, H.E., Jr., 1981, Potential use of dielectric constant log as exploration tool: Oil and Gas J., v.79, p.276, 279, 281.

Hall, P.G.and Rose, M., 1978, Dielectric properties of water adsorbed by kaolinite clays: JCS Faraday Trans., v.74, p.1221-1233.

Hallikainen, M., Ulaby, F.T., El-Rayes, M.and Dobson, C., 1984, Microwave dielectric behavior of soil: part III, the effects of frequency, soil texture and temperature, Remote Sensing Laboratory, Univ.of Kansas Center for Research Inc., RSL Tech.Rep., 545p.

Hallikainen, M.T., Ulaby, F.T., Dobson, M.C., El-Rayes, M.A.and Wu, L.-K., 1985, Microwave dielectric behavior of wet soil- part I, empirical models and experimental observations: IEEE Trans.Geosci.and Rem.Sens., v.GE-23, p.25-34.

Hallikainen, M.and Ulaby, F.T., 1986, Dielectric and scattering behaviour of snow at microwave frequencies: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.87-91.

Hansen, W., Sill, W.R.and Ward, S.H., 1973, The dielectric properties of selected basalts: Geophysics, v.38, p.l35-139.

Hanson, B.C.and Dellwig, L.F., 1973, Radar signal return from near-shore surface and shallow subsurface features Darien Province Panama: Kansas Univ./Center for Research, Inc., Lawrenve, KS, Remote Sensing Lab., NASA-CR-140291, NTIS N74-34768, 22p.

Hara, T., Ohkubo, H., Kanesaki, Y.and Caldwell, R., 1983, An application of ground probing radar to detect cavities in limestone: Oyo Corp.Tech.Note TN-43, 15p.

Harrison, C.H., 1970, Reconstruction of subglacial relief from radio echo sounding records: Geophysics, v.35, p.1099-1115.

Hartenbaum, B.A.and Rawson, G., 1980, Topical report on subsurface fracture mapping from geothermal wellbores. Phase I. Pulsed radar techniques. Phase II. Conventional logging methods. Phase III. Magnetic borehole ranging: H-Tech Labs., Inc., Santa Monica, CA, DOE/ET/27013-Tl/XPS, 139p.

Hasted, J.B., 1973, Aqueous dielectrics, London, Chapman and Hall: 302p.

Hayes, P.K., 1982, A single-probe on-site method of measuring the dielectric constant and conductivity of soft earth media over a 1 GHz bandwidth: IEEE Trans.Geosci.and Rem.Sens., v.GE-20, p.504-510.

Hayhoe, H.N, Topp, G.C.and Bailey, W.G., 1983, Measurements of soil water contents and frozen soil depth during a thaw using time domain reflectometry: Atmos.Ocean, v.21(3), p.299,310.

Heigold, P.C., Gilkeson, R.H., Cartwright, K.and Reed, P.C., 1979, Aquifer transmissivity from surficial electrical methods: Groundwater, v.17, p.338-345.

Hironaka, M.C., Hitchcock, R.D.and Forrest, J.B., 1976, Detection of voids underground and under pavements: Civil Engineering Lab.(Navy), Port Hueneme, CA, Report No.CEL-TN-1449, Ad-A030 997, 42p.

Hluchanek, J.A., 1973, Radar Investigation of the Hockley Salt Dome: M.S.Thesis, Texas A.and M.Univ., College Station, TX., 149p.

Hoekstra, P.and Delaney, A., 1974, Dielectric properties of soils at UHF and microwave frequencies: J.Geophys.Res., v.79, p.1699-1708.

Holloway, A.L., Soonawala, N.M. and Collett, L.S., 1986, Three-dimensional fracture mapping in granite excavations using ground-penetrating radar: CIM Bull., v.79, n.896, p.54-59.

Holmes, J.J.and Balanis, C.A., 1977, Electromagnetic Modeling of Reflections Inside an In Situ Gasified Coal Seam: Radio Science, v.12, p.33-40.

Holser, W.T., Brown, R.J.S., Roberts, F.A., Fredrikson, O.A.and Unterberger, R.R., 1972, Radar logging of a salt dome: Geophysics, v.37, p.889-906.

Horton, K., Isaacson, L., Morey, R.and Finnegan, E., 1981, An Evaluation of Ground Penetrating Radar and Electrical Resistivity for Assessment of the Radioactive Waste Management Complex, Idaho National Engineering Laboratory, Geo-Centers tech.report GC-TR-81-188/3, EG and G Idaho: Inc.subcontract K-9044, Task 3, 55p.

Horton, K., Morey, R.and Isaacson, L., 1982, A Predictive Model for Use with Ground-Penetrating Radar Systems, Presented at SEG Fifty-Second Annual International Meeting and Exposition: October 17-21, 1982, Dallas, TX, Technical Program Abstracts and Bibliographies, p.474-475.

Horton, K.A., Isaacson, L.and Morey, R.M., 1983, Geophysical modeling of a low-level nuclear waste disposal site: Scientific Basis for Nuclear Waste Management VI.Proc.of the Sixth Int.Symp., Boston, MA, Nov.l-4, p.595-602.

Horton, K.A., Morey, R.M., Beers, R.H., Jordan, V., Sandler, S.S.and Isaacson, L., 1981, An evaluation of ground penetrating radar for assessment of low level nuclear waste disposal sites: Geo-Centers Inc., Newton Upper Falls, Mass., Tech.Rep.GC-TR-81-171, Nuclear Regulatory Commission NUREG/CR-2212, 125p.

Horton, K.A., Morey, R.M., Isaacson, L.and Beers, R.H., 1981, The complementary nature of geophysical techniques for mapping chemical waste disposal sites, impulse radar and resistivity: in Proc.Nat.Conf.Manag.Uncontrolled Hazardous Waste Sites, Washington, DC, p.158-164.

Horton, K.A.and Morey, R.M., 1982, A Ground-Penetrating Radar Survey of the Maxey Flats Low-Level Nuclear Waste Disposal Site Fleming County: Kentucky, Geo-Centers tech.report, US NRC, Contract NRC FIN B6349, NTIS# NUREG/CR-2589, 69p.

Houck, R.T., 1984, Measuring moisture content profiles using ground probing radar: in Surface and borehole geophysical methods in ground water investigations, D.M.Nielsen, ed., NWWA, Worthington, OH, p.637-653.

Houck, R.T., 1985, Measuring the electrical properties of coal using ground-penetrating radar: IEEE Trans.Geosci.and Rem.Sens., v.GE-23, p.851-854.

Hoyer, H.G., 1978, Sounding geological strata with UHF radar: Elektronik (Germany), v.27, p.93-97.

Hoyer, W.A.and Rumble, R.C., 1976, Dielectric constant of rocks as a petrophysical parameter: SPWLA 17th Annual Logging Symp.Trans., Paper 0, 28p.

Huchital, G.S., Hutlin, R., Thoraval, Y.and Clark, B., 1981, The deep propagation tool (a new electromagnetic logging tool);presented at the 56th Annual Fall Technical Conference of the SPE: San Antonio, Texas, October 5-7, SPE 10988.

Huck, P.J., Waller, M.J., Koerner, R.M., McCabe, W.and Fowler, J.C., 1981, Monitoring and control of particulate grouting in rock: EarthTech Research Corp., Baltimore, MD, NTIS PB82-240607/XPS, 49p.

Hug, J.F., Kaupp, V.H., Waite, W.P.and MacDonald, H.C., 1986, Interferometer applications for the rectification of radar images: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.473-479.

Iizuka, K., 1984, Subsurface radars: in Noise and clutter rejection in radars and imaging sensors, Proc.of the 1984 Int.Symp., Amsterdam, North-Holland, p.15-24.

Imai, T., Sakayama, T., Hara, T.and Kanemori, T., 1985, Ground-probing radar and resistivity surveys used in archaeological investigations: in Expanded Abstracts, 55th Ann.Intl.Meeting SEG, Wash.D.C., p.7-9.

Imai, T., Sakayama, T.and Kanemori, T., 1987, Use of ground-probing radar and resistivity surveys for archeological investigations: Geophysics, v.52, p.137-150.

Inguva, R., Roberts, D.A.and Rebka, G.A., Jr., 1984, Volumetric heating of oilshales by electromagnetic methods. v.2. Electromagnetic wave propagation in dissipative dielectrics such as oil shale: DE/AS20/LC10783, 111p.

Inguva, R.and Englert, T.J., 1984, Volumetric heating of oilshales by electromagnetic methods.v.2.Dielectric modeling of oilshales II: Dept.Physics, Univ.Wyoming, Laramie, WY, for U.S.Dept.Energy, Office of Fossil Energy, DOE/LC/10783--1866-v.2, DE/AS20/LC10783, 24p.

Inguva, R.and Rajeshwar, K., 1984, Volumetric heating of oilshales by electromagnetic methods.v.2. Application of dielectric spectroscopy to chemical characterization of oilshales: DE/AS20/LC10783, 29p.

Ishimaru, A., 1984, Wave Propagation in Dense Geophysical Media--Final Report: University of Washington, Seattle, WA, U.S.Army Research Office Contract DAAG 29-81-K-0065, AD-A14311, 6p.

Ishimaru, A., 1978, Multiple scattering, turbulence: rough surfaces and remote sensing, v.2, NY, Academic, 572p.

Ishimaru, A., 1978, Single scattering and transport theory: wave propagation and scattering in random media: v.1, NY, Academic, 250p.

Iskander, M.F.and DuBow, J.B., 1983, Time- and frequency-domain techniques for measuring the dielectric properties of rocks- a review: J.Microwave Power, v.18, p.55-74.

Jackson, T.J.and O'Neill, P.E., 1986, Microwave dielectric model for aggregated soils: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.920-929.

Jesch, R.L., 1978, Dielectric measurements of five different soil textural types as functions of frequency and moisture content: Nat.Bureau of Standards, Report No.78-896, p.l-21.

Jesch, R.L.and McLaughlin, R.H., 1982, Dielectric measurements of oil shale as a function of frequency and temperature: final report 1982, LETC Contract SR-723-62-82.

Jet Propulsion Laboratory, 1980, Radar geology-- an assessment: report of the radar geology workshop, Snowmass, CO, July 16-20, 1979, JPL Pub1.80-61, 513p.

Jet Propulsion Laboratory, 1982, Shuttle active-microwave experiments (SAMEX) program: executive summary, Jet Prop.Lab, Cal.Tech., Pasadena, JPL Pub.82-59, NASA, NTIS N82-317128, 16p.

Jezek, K.C., 1985, Radar measurements of borehole geometry on the Greenland and Antarctic ice sheets: Geophysics, V.50, p.242-251.

Jezek, K.C.and Thompson, L.G., 1982, Interpretation of monopulse ice radar soundings on two Peruvian glaciers: IEEE Trans.Geosci.and Rem.Sens., v.GE-20, p.243-249.

Jha, K.K., Singh, K.P.and Singh, R.N., 1984, Measurements of reflection coefficients of stratified layers using X-band bistatic scatterometers: Proc.Indian Acad.Sci.Earth and Planet.Sci., v.93, p.117-127.

Johnson, R.W., Glaccum, R.A.and Wojtasinski, R., 1980, Application of ground penetrating radar to soil survey: Proc.of Soil and Crop Science Soc.of Florida, v.39, p.68-72.

Jones, G., 1975, Dielectric studies of zeolite systems: JCS Faraday Trans.I, v.71, p.2085-2096.

Jones, G.and Davies, M., 1975, Dielectric studies of zeolite systems: JCS Faraday Trans.I, v.71, p.1791-1808.

Jonscher, A.K., 1983, Dielectric Relaxation in Solids: London, Chelsea Dielectrics Press, 380p.

Judzis, A., Hiatt, R.E.and Williams, B., 1977, The use of microwaves in measuring the organic content of oil shale: Proc.IEEE, v.65, p.1626-1627.

Karinskii, A.D., 1974, An approximate theory of wave dielectric logging for horizontally stratified media: Izvestiia vyshikh uchebnykh zavedenii.Geologiia i razvedka, no.5, p.131-140.

Kenyon, W.E., 1984, Texture effects on megahertz dielectric properties of calcite rock samples: J.Appl.Phys., v.55, p.3153-3159.

Kenyon, W.E.and Baker, P.L., 1984, EPT interpretation in carbonates drilled with salt muds: Soc.Petr.Engrs., Houston, SPE 13192, 16p.

Kern, J.W., Hoyer, W.A.and Spann, M.M., 1976, Low porosity gas sand analysis using cation exchange and dielectric constant data: SPWLA 17th Annual Logging Symp.Trans., Paper PP, 17p.

Ketchum, R.D., Jr., 1978, An evaluation of ERIM X-L band airborne synthetic aperature radar imagery of sea ice: Naval Ocean Res.and Development Activity, NSTL Station, MS, Report No.NORDA-TN-28, Ad-A079 754/8/XPS, 26p.

Khalafalla, A.S., 1973, Effect of frequency and temperature on rock dielectric properties: Honeywell Inc.Rep.No.2816-3001-FR, [AD-766, 050/9] , 85p.

Khalafalla, A.S.and Viner, J.M., 1973, Rock Dielectrometry at Mega- and Giga-Hertz Frequencies: Presented at Meeting of URSI Int.Union Radio Sci., Boulder, CO., August, p.146-163.

Klein, L.A.and Swift, C.T., 1977, An improved model for the dielectric constant of sea water at microwave frequencies: IEEE Trans.Ant.Prop., v.AP-25, p.104-111.

Knauf, H.F., 1975, Seismic and electromagnetic tunnel detection investigation, Army Mobility Equipment Research and Development Center: Fort Belvoir, VA, Report No.USAMERDC-2151, AD-A018 984, 38p.

Knight, R.J.and Llewellyn-Jones, D.T., 1984, Measurement of the complex refractive index of sea ice and snow using a microwave untuned cavity: Rutherford Appleton Lab.RAL-84-093, NTIS PB85-138261, var.p.

Knight, R.J.and Nur, A., 1987, The dielectric constant of sandstones, 60 kHz to 4 MHz: Geophysics, v.52, p.644-654.

Koerner, R., Lord, A.E., Bowders, J.H.and Dougherty, W.W., 1982, CW microwave location of voids beneath paved areas: ASCE Geotech.Eng.Div.J., v.108, p.133-144.

Koerner, R.M., Lord, Jr.A.E., Okrasinski, T.A.and Reif.J.S., 1978, Detection of seepage and subsurface flow of liquids by microwave interference methods: Proc.Symp., Control of Hazardous Material Spills, p.287-292.

Koerner, R.M., Rief, J.S.and Burlingame, M.J., 1979, Detection methods for location of subsurface water and seepage: ASCE Geotech.Eng.Div.J., v.105, p.1301-1316.

Koerner, R.M.and Lord, A.E., 1985, Microwave system for locating faults in hazardous material dikes.Final report Sep 76-Sep 82: Drexel Univ., Philadelphia, PA, EPA/600/2 85/014, NTIS PB85-173821/XPS, 141p.

Kong, J.A., Tsang, L.and Simmons, G., 1974, Geophysical subsurface probing with radio-frequency interferometry: IEEE Trans.Ant.Prop., v.AP-22, p.616-620.

Korringa, J., 1984, The influence of pore geometry on the dielectric dispersion of clean sandstones: Geophysics, v.49, p.1760-1762.

Korringa, J.and Brown, R.J.S., 1984, On "Microwave properties of saturated reservoirs"(J.N.Lange): Geophysics, v.49, p.201-203.

Kovacs, A., 1978, Remote detection of water under ice-covered lakes on the North Slope of Alaska: Arctic, v.31, p.448-458.

Kovacs, A., Gow, A.J., Cragin, J.H.and Morey, R.M., 1982, The brine zone in the McMurdo Ice Shelf: Antarctica, U.S.Army CRREL Report 82-39, 28p.

Kovacs, A., Morey, R.M., Cox, G.F.N.and Valleau, N.C., 1987, Electromagnetic property trends in sea ice: Hanover, N.H., U.S.Corp.of Eng., CRREL Rpt.87-6, 45p.

Kovacs, A.and Gow, A.J., i977, Dielectric constant and reflection coefficient of the snow and near-surface internal layers in the McMurdo Ice Shelf: Antarctic J.of the U.S., v.12, p.137-138.

Kovacs, A.and Gow, A.J., 1977, Subsurface measurements of the Ross Ice Shelf, McMurdo Sound: Antarctic J.of the U.S., v.12, p.146-148.

Kovacs, A.and Morey, R.M., 1978, Radar anisotropy of sea ice due to preferred azimuthal orientation of the horizontal c-axis of ice crystals: J.Geophys.Res., v.83, p.171-201.

Kovacs, A.and Morey, R.M., 1979, Anisotropic properties of sea ice in the 50- to 150-MHz range: J.Geophys.Res., v.84, p.5749-5759.

Kovacs, A.and Morey, R.M., 1979, Investigations of sea ice anisotropy, electromagnetic properties, strengths and under-ice current orientation: Proc.Int.Workshop on the Remote Estimation of Sea Ice Thickness, St.John's, Newfoundland, Sept., p.109-131.

Kovacs, A.and Morey, R.M., 1979, Remote detection of massive ice in permafrost along the Alyeska Pipeline and the pump station feeder gas pipeline: in Proc.Specialty Conf.on Pipelines in Adverse Environments, ASCE, New Orleans, p.268-279.

Kovacs, A.and Morey, R.M., 1983, Detection of cavities under concrete pavement: U.S.Army CRREL Report 83-18, 41p.

Kovacs, A.and Morey, R.M., 1984, Impulse Radar Sounding of Frozen Ground, Technical Note, US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory: 18p.

Kovacs, A.and Morey, R.M., 1985, Electromagnetic measurements of multi-year sea ice using impulse radar: U.S.Army CRREL Report 85-13, 26p.

Kraft, C., 1987, Constituitive parameter measurements of fluids and soil between 500 kHz and 5 MHz using a transmission line technique: J.Geophys.Res., v.92, p.10650-10656.

Kutrubes, D.L., 1986, Dielectric permittivity measurements of soils saturated with hazardous fluids: M.Sc.Thesis, Dept.of Geophysics, Colo.School of Mines, 300p.

Lager, D.L.and Lytle, R.J., 1977, Determining a subsurface electromagnetic profile from high frequency measurements by applying reconstruction algorithms: Rad.Sci., v.12, p.249-260.

Laine, E.F. and Lytle, R.J., 1981, In situ measurments of high frequency electrical conductivity and permittivity of oil shale, Soc.Min.Engr.: AIME, v.272, p.1829-1830.

Laine, E.F., 1980, Detection of Water-filled and Air-filled Underground Cavities: Lawrence Livermore Lab., CA., Rep.UCRL-53127, BuMines Contr.HO202007, 15p.

Laine, E.F., 1987, Remote monitoring of the steam-flood enhanced oil recovery process: Geophysics, v.52, p.1457-1465.

Laine, E.F., Chakakis, N.J., Daily, W.D., Deadrick, F.J., Holladay, G.and Kishiyama, K.I., 1982, HFEM monitoring of coal gasification: Rawlins, Wyoming, Lawrence Livermore National Laboratory, UCID-19363.

Laine, E.F., Lytle, R.J.and Okada, J.T., 1980, Cross-borehole observation of soil grouting: J.Geotech.Eng.Div.ASCE, v.106, p-759-766.

Laine, E.F.and Lytle, R.J., 1982, In situ measurements of high frequency electrical conductivity and pennittivity of oil shale: Trans.Soc.Min.Engr.AIME, v.272, p.1829-1831.

Lange, J.N., 1983, Microwave properties of saturated reservoirs: Geophysics, v.48, p.367-375.

Lange, J.N.and Shope, S.S., 1981, Microwave properties of drilling fluids: Geophysics, v.46, p.322-332.

Leader, J.C., 1975, Polarization dependence in EM scattering from Rayleigh scatterers embedded in a dielectric slab: J.Appl.Phys., v.46, p.4371-4391.

Lee, J.K.and Kong, J.A., 1985, Active microwave remote sensing of an anisotropic random-medium layer: IEEE Trans.Geosci.and Rem.Sens., v.23, p.910-923.

Leggo, P.J., 1982, Geological applications of ground impulse radar, Trans.Inst.Min.Metall.: SectB, v.91, p.Bl-B5.

Leshchanskii, Y.L.and Yl'Yanychev, N.V., 1980, Calculation of the electrical parameters of sandy-clay soils at meter and centimeter wavelengths: Izv.Vyss.Ucheb.Zaved.Radiofiz., v-23, n.5, p.529-532.

Lin, C.C. and Mei, K.K., 1986, Numerical modelling of two-dimensional time-domain electromagnetic scattering by underground inhomogeneities in IGARSS '86 Symp.: Zurich, 8-11 Sep., 1986, IEEE..Cat.no.86CH2268-1, p.211-216.

Linlor, W.I., 1980, Permittivity and attenuation of wet snow between 4 and 12 ghz: J.Appl.Phys., v.51, p.2811-2816.

Liu, L., 1984, A simplified procedure for calculating earth waves in karstic terrains: Geophys.Geochem.Explor., v.8, p.199-211.

Liu, L., 1985, Electric parameters of karst strata obtained through inversion of interference curves: Geophys.Geochem.Explor., v.9, p.369-376.

Liu, L., 1986, Evaluating the normal field intensity in noisy environments for underground electromagnetic wave exploration: Computing Techn.for Geophys.and Geochem.Explor., v.8, p.237-244.

Liu, L., 1986, Some factors affecting the geological features of G-R-CT algorithms and an investigation on resolving it: in 2nd Symp.on Explor.Geophys., Oct.14-19, 1986, Xi'an, China, China Academic Publishers, p.448-449.

Liu, L., Tong, W-q.and Ji, Y-n., 1984, Improvements on the digital synthetic imaging technique using multiple-hologram in cross-hole electromagneticmethods: Acta Sinica, v.27, p.381-391.

Lloyd, T.W., Semborski, C.A.and Stolarczyk, L.G., 1986, RIM--a method of predicting coal seam discontinuities: SME aime Preprint 86-26, var.p.

Lord, A.E., Jr., Koerner, R.M.and Reif, J.S., 1979, Determination of attenuation and penetration depth of microwaves in soil: Geotech.Testing J., v.2, p.77-83.

Lowman, P.D., Jr., Harris, J., Masuoka, P.M., Singhroy, V.H.and Slaney, V.R., 1987, Shuttle imaging radar (SIR-B) investigations of the Canadian shield--Initial report: IEEE Trans.Geosci.and Remote Sensing, v.GE-25, p.55-66.

Luchinonov, V.S., 1973, Radar sensing of mountain glaciers: Sov.Phys. --Tech.Phys.(English Transl.), v.18, p.415-421.

Luchinonov, V.S., 1980, Subsurface radar sounding of stratified media.Equation of the sounding beam: Radiotekh.and Elektron.(USSR), v.25, p.1434-1437.

Luchinonov, V.S., 1982, Two equations of the subsurface radar: Radiotekh.and Elektron.(USSR), v.27, p.431-437.

Luke, C.M., Steinway, W.J.and Echard, J.D., 1982, Locating voids beneath pavement using a pulsed radar: IGARSS '82 Digest, v.2, Munich, FRG, l-4 June (IEEE Cat.No.82CH14723-6), p.FA-5-2.1-2.4.

Lundien, J.R., 1972, Determining presence, thickness and electrical properties of stratified media using swept-frequency radar: U.S.Army Engineer Topo.Labs.Tech.Rep.M-72-4, Vicksburg, 72p.

Lundien, J.R., 1984, Ground-water detection-- radar measurements of soil electrical properties: in Proc.of the ground-water detection workshop, 12-14 Jan.1982, Vicksburg, MS, E.A.Dardeau Jr., ed., U.S.Army Waterways Exp.Sta., p.45-67.

Lysne, P., 1981, A model for the high-frequency electrical response of reservoir rocks and its implications on dielectric log interpretation: SPE/DOE Low Perm.Gas Reserv.Symp.Proc., p.327-334.

Lysne, P.C., Yu, J-S-and Vittitoe, C.N., 1981, Dielectric log interpretation. Probe responses and dielectric properties of rocks: SPWLA 22nd Annual Logging Symp.Trans., v.1, Paper P, 16p.

Lytle, R.J., 1974, Measurement of Earth Medium Characteristics, Techniques, Results and Applications: IEEE Trans.on Geoscience Electronics, v.GE-12, p.81-101.

Lytle, R.J., 1977, Finding Anomalies in the Ground with Radio Waves, Energy and Technology Review: Lawrence Livermore Laboratory, Rept.UCRL-52000-77-1, p.l-6.

Lytle, R.J., Lager, D.L., Laine, E.F. and Davis, D.T., 1976, Using cross-borehole electromagnetic probing to locate a tunnel: Lawrence Livermore Laboratory Report UCRL-52166, 41p.

Lytle, R.J., Lager, D.L., Laine, E.F.and Salisbury, J.D., 1981, Monitoring Fluid Flow by Using Electromagnetic Probing: Geophys.Prosp., v.29, p.627-638.

Lytle, R.J., Lager, D.L.and Laine, E.F., 1976, Subsurface Probing by High Frequency Measurements of the Wave Tilt of Electromagnetic Surface Waves: IEEE Trans.Geoscience Electronics, v.GE-14, p.244-249.

Lytle, R.J., Laine, E.F. and Lager, D.L., 1974, Coal fracture measurements using in situ electrical methods: preliminary results, Lawrence Livermore National Laboratory, UCID-16639.

Lytle, R.J., Laine, E.F., Lager, D.L.and Okada, J.T., 1973, The Lisbourne Experiments: HF Propagation Through Permafrost Rock, Lawrence Livermore Lab., Livermore, CA.Rep.UCRL-51474, 147p.

Lytle, R.J., Laine, E.F., Lager, D.L.and Okada, J.T., 1976, Determination of the in situ High Frequency Electrical Properties of Permafrost Rock: Radio Science, v.11, p.285-293.

Lytle, R.J., Laine, E.F.and Lager, D.L., 1979, Cross-Borehole Electromagnetic Probing to Locate High Contrast Anomalies: Geophysics, v.44, p.1667-1676.

Lytle, R.J.and Dines, K.A., 1978, Impedance camera--A system for determining the spatial variation of electrical conductivity: Calif.Univ., Livermore, Rep No.UCRL--52413, 15p.

Lytle, R.J.and Lager, D.L., 1976, The Yosemite Experiments, HF Propagation Through Rock: Radio Science, v.11, p.245-252.

Lytle, R.J.and Lager, D.L., 1976, Theory Relating to Remote Electromagnetic Probing of a Non-Uniform Thickness Coal Seam: Radio Science, v.11, p.465-476.

Lytle, R.J.and Myers, G.K., 1977, Temperature Profile Determination Using Frequency Domain Reflectometry: Lawrence Livermore Laboratory, DOE, Contract W-7405-Eng 48, Rep.UCID-17091, 19p.

Maguire, T.C., Horton, K.A., Beers, R.H., Morey, R., Isaacson, L.and Jupiter, C., 1981, Evaluation of subsurface radar techniques for surveying low-level nuclear waste disposal sites: Trans.Am.Nucl.Soc., v.39, p.91-93.

Malmoud, S.F.and Wait, J.R., 1974, Geometrical Optical Approach for Electromagnetic Wave Propagation in Rectangular Mine Tunnels: Radio Science, v.9, p.1147-1158.

Mamy, J.and Chaussidon, J., 1966, Dielectric properties of montmorillonite with low water content, Internat.Clay Conf.Proc.(Jerusalem: Israel), v.1, p.375-380.

Manning, M.J.and Athavale, K.A., 1986, Dielectric properties of pyrite samples at 1100 MHz: Geophysics, v.51, p.172-182.

Maple, L.C., 1985, A crossplot approach to electromagnetic propagation tool (EPT) interpretation: in Trans.SPWLA 26th Annual Logging Symposium, p.Nl-18.

Masson, P., 1983, Preliminary geological interpretation of the SIR-A radar imagery of the Beirut-Damascus region.Comparison with LANDSAT imagery: Bull.Soc.Fr.Photogramm.and Teledetect., No.92, p.23-30.

Matzkanin, G.A., Fountain, L.S.and Tranbarger, O., 1984, Nondestructive Evaluation of Infrastructure Conditions: Annals of the New York Academy of Sciences, v.431, No.11, p.268-303.

Mazzagatti, R.P., Dowling, D.J., Sims, J.C., Bussian, A.E.and Simpson, R.S., 1983, Laboratory measurement of dielectric constant near 20 MHz: 58th Annual SPE of AIME Tech.Conf.Preprint Paper No.12097, 8p.

McCandless, S.W.and Mrazek, CV.P., 1982, Analyses of oceanic subsurface features using space based radar imagery: Underwater Systems, Inc., Rockville, MD, AD-All8 411/8/XPS, 204p.

McCauley, J.F., Breed, C.S., Schaber, G.G., McHugh, W.P., Issawi, B., Haynes, C.V., Grolier, M.J.and El Kilani, A 1986, Peleodrainages of the Eastern Sahara--The radar rivers revisted (SIR-A/B implications for a mid-Tertiary trans-African drainage system): IEEE Trans.Geosci.Remote Sens., v.GE-24, p.624-648.

McCauley, J.F., Schaber, G.G., Breed, C.S., Grolier, M.J., Haynes, C.V., Issawi, B., Elachi, C.and Blom, R., 1982, Subsurface valleys and geoarcheology of the eastern Sahara revealed by shuttle radar: Science, v.218, p.1004-1020.

Meador, R.and Cox, P., 1975, Dielectric constant logging: a salinity independent estimation of formation water volume, 50th Annual SPE of AIME Fall Mtg.Preprint No.SPE-5502, 10p.

Meneghini, R., Jones, J.A.and Gesell, L.H., 1987, Analysis of dual-wavelength surface reference radar technique: IEEE Trans.on Geoscience and Remote Sensing, v.GE-25, p.456-471.

Michiguchi, Y., Hiramoto, K., Nishi, M., Takahashi, F., Ohtaka, T.and Okada, M., 1987, Development of signal processing methods for imaging buried pipes: IEEE Trans.Geosci.and Remote Sensing, v.GE-25, p.ll-15.

Moffatt, D.L., 1971, Electromagnetic Pulse Sounding for Geological Surveying With Application in Rock Mechanics and Rapid Excavation Program: Electroscience Lab., Ohio State Univ., Columbus, OH., Semiannual Tech.Rep., BuMines/ARPA Contract H0210042, 79p., p.3190-1, .

Moffatt, D.L., 1974, Subsurface Application of Periodic Electromagnetic Video Pulse Signal: in Thru-the-Earth Electromagnetic Workshop, Golden, CO., Dec.1973, Geyer, R.G., ed., Colo.Sch.Mines Contract 60133023, BuMines OFR 16-74, NTIS PB 231 154, p.112-117.

Moffatt, D.L., 1974, Subsurface video pulse radars: Proc.Subsurf.Explor.for Underground Excav.and Heavy Constr., ASCE, p.172-194.

Moffatt, D.L.and Mains, R.K., 1975, Detection and Discrimination of Radar Targets: IEEE Trans.Antennas and Propag., v.AP-23, p.358-367.

Moffatt, D.L.and Puskar, R.J., 1976, A subsurface electromagnetic pulse radar: Geophysics, v.41, p.506-518.

Moore, D.F.and Quincy, E.A., 1976, Bayes Classification **of** subsurface Electromagnetic Responses: Radio Sci., v.11, No.4, p.395-403.

Moore, G.K.and Sheehan, C.A., 1981, Evaluation of Radar Imagery for Geologic and Cartographic Applications: Summary Report of Investigations, USGS Open-File Report 81-1358, 37~.

Moore, J.R., Echard, J.D.and Neill, C.G., 1980, Radar Detection of Voids Under Concrete Highways: Proc.IEEE Int.Radar Conf., Washington, D.C., April 28-30, p.130-135.

Moore, R.K., 1983, Imaging radar systems: in Manual of Remote Sensing, v.1, 2nd ed., R.N.Colwell, ed., Am.Soc.Photogrammetry, p.429-474.

Moore, R.K., 1983, Radar fundamentals and scatterometers: in Manual of Remote Sensing, v.1, 2nd ed., R.N.Colwell, ed., Am.Soc.Photogrammetry, p.369-428.

Morey, R., 1977, Coal thickness profiling using impulse radar: GSSI Report prepared for R.A.Hansen Co., 25p.

Morey, R.M., 1974, Application of Downward Looking Impulse Radar: Proc.13th Annu.Can.Hydrographic conf., Canada Centre for Inland Waters, Burlington, Ontario, March, p.83-99.

Morey, R.M., 1974, Continuous subsurface profiling by impulse radar: in Proc.Eng.Foundation Conf.on Subsurf.Explor.for Underground Excavation and Heavy Constr., Henniker, NH, 8/11-16/74, Am.Soc.Civil Engrs., p.213-232, .

Morey, R.M., 1975, Airborne sea ice thickness profiling using an impulse radar: Geophysical Survey Systems Inc., Burlington, MA, DOT-CG-81-75-1373, AD-A031 306, 32p.

Morey, R.M., Kovacs, A.and Cox, G.F.N., 1984, Electromagnetic properties of sea ice: U.S.Army CRREL Report 84-2, 32p.

Morey, R.M., Kovacs, A.and Cox, G.F.N., 1984, Electromagnetic properties of sea ice: Cold Region Sci.Tech., v.9, p.53-74.

Morey, R.M., Kovacs, A.and Cox, G.F.N., 1984, Authors' response to discussion on, Electromagnetic properties of sea ice: Cold Regions Sci.and Tech., v.10, p.95-97.

Morey, R.M.and Harrington, W.S.Jr., 1972, Feasibility Study of Electromagnetic Subsurface Profiling: US EPA, EPA R2-72-082, 28p.

Morey, R.M.and Kovacs, A., 1982, The effects of conductivity on high-resolution impulse radar sounding: Ross Ice Shelf, Antarctica, U.S.Army CRREL Report 82-42, 12p.

Mulla, D.J., 1985, Using Time Domain Reflectometry to Measure Frost Depth and Unfrozen Water Content in Soil: Dept.Agronomy and Soils, Wash.State Univ., Pullman, WA, Report 64, Washington Water Research Center Project No.A-129-WASH, 80p.

Mundry, E., Thierbach, R., Sender, F.and Weichart, Ii., 1983, Borehole radar probing in salt deposits: in Proc.Sixth Inter.Symp.on Salt, Salt Institute, v.1, p.585-599.

Myers, R.L., 1984, Radar Sounding Interpretation of Field Data for Detection of Sulfides, Fractures and Voids in Granite: US Department of the Interior, Bureau of Mines, Progress Report 10052, 19p.

Nasseri, C., 1981, Use of Broad-Band FM Radar in Ground Probing: MS Thesis, Univ.of Kansas.

Natterer, F., 1986, The mathematics of computerized tomography: NY, Wiley, 222p.

Neal, C.S., 1982, Radio echo determination of basal roughness characteristics on the Ross Ice Shelf: Annals of Glaciol., v.3, p.216-221.

Newton, R.W., 1977, Microwave remote sensing and its application to soil moisture detection, Texas A and M Univ.Tech.Rep.RSC-81: 500p.

Nichols, A.D., Wilhelm, J.W., Gaffield, T.W., Inkster, D.R.and Leung, S.K., 1986, A SAR for real-time ice reconnaissance: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.383-389.

Nickel, H., Sender, F., Thierbach, R.and Weichart, H., 1983, Exploring the interior of salt domes from boreholes: Geophys.Prosp., v.31, p.131-148.

Nilsson, B., 1986, A new borehole radar system, in Borehole geophysics for mining and geotechnical applications: P.G.Killeen, ed., Geol.Surv.of Canada, Paper 85-27, p.189-195.

Njoku, E.G., 1982, Passive microwave remote sensing of the earth from space--- a review: Proc.IEEE, v.70, p.728-750.

Nottenburg, R., Rajeshwar, K., Freeman, M.and Dubow, J., 1979, Effect of pore water and adsorbed moisture on the dielectric properties of Green River oil shale: Thermochimica Acta, v.31, p.39-46.

Okrasinski, T.A., Koerner, R.M.and Lord, A.E., 1978, Dielectric constant determination of soils at L band microwave freguencies: Geotech.Testing J., v.1, p.134-140.

Okrasinski, T.A., Lord Jr., A.E.and Koerner, R.M., 1978, Microwave interference detection of subsurface water, J.Geotech.Eng.Div.: Proc.ASCE, v.104, p.117-124.

Olhoeft, G.R., 1977, The electrical properties of natural clay permafrost, Can.J.Earth Sci., v.14, p.16-24.

Olhoeft, G.R., 1978, The electrical properties of permafrost: in Proc.of the Third Intl.Conf.on Permafrost, v.1, Ottawa, Natl.Res.Council, p.127-131.

Olhoeft, G.R., 1979, Impulse radar studies of near surface geological structure: in Lunar and Planetary Science X, Houston, Lunar and Planetary Institute, p.943-945.

Olhoeft, G.R., 1980, Electrical properties of rocks: in Physical properties of rocks and minerals, Y.S. Touloukian, W.R. Judd, and R.F.Roy, eds., McGraw-Hill, NY, p.257-330.

Olhoeft, G.R., 1980, Thawing of permafrost along the Trans-Alaska Pipeline: in Proc. of a Symp.on Permafrost Geophysics (no.5), Tech.Memo. 128, Nat.Res.Counci.1, Ottawa, p.103-109.

Olhoeft, G.R., 1984, Applications and limitations of ground penetrating radar: in Expanded abstracts, 54th Ann.Int.Meeting and Expo.of the Soc.of Explor.Geophys., Atlanta, p.147-148.

Olhoeft, G.R., 1986, Direct detection of hydrocarbon and organic chemicals with ground penetrating radar and complex resistivity: in Proc.of the NWWA/API Conf.on Petroleum Hydrocarbons and Organic Chemicals in Ground Water-Prevention, Detection and Restoration, Dublin OH, NWWA, p.284-305.

Olhoeft, G.R., 1987, Electrical properties from 10-3 to 10+9 Hz -- physics and chemistry: in Physics and chemistry of porous media II, AIP Conf.Proc.154, J.R.Banavar, J.Koplik, and K.W.Winkler, eds., NY, Am.Inst.Physics, p.281-298.

Olhoeft, G.R., Schaefer, B.and Johnson, G.R., 1979, Experimental measurements of surface and volume scattering processes at microwave wavelengths: in Lunar and Planetary Science X, Houston, Lunar and Planetary Institute, p.946-948.

Olhoeft, G.R.and Strangway, D.W., 1975, Dielectric properties of the first 100 meters of the moon: Earth and Planet.Sci.Lttrs., v.24, p.394-404.

Olhoeft, G.R., Watts, R.D., Frischknecht, F.C., Bradley, J.A. and Dansereau, D., 1979, Electromagnetic geophysical exploration in the National Petroleum Reserve in Alaska, in Proc.of the Symp.on Permafrost Field Methods and Permafrost Geophysics, Nat.Res.Council, Ottawa, p.184-190.

Olson, C.G.and Doolittle, J.A., 1985, Geophysical techniques for reconnaissance investigations of soils and surficial deposits in mountainous terrain: Soil Sci.Soc.Am.J., v.49, p.1490-1498.

Olsson, O., Falk, L., Forslund, O., Lundmark, L.and Sandberg, E., 1985, Investigations of fracture zones in crystalline rock by borehole radar: Swedish Geol.Survey, 10p.

Olsson, O., Falk, L., Sandberg, E., Carlsten, S.and Magnusson, K.-A., 1985, Results from borehole radar reflection measurements: in Proc.In situ experiments in granite associated with the disposal of radioactive waste, Stockholm, OECD.

Olsson, O., Forslund, O., Lundmark, L., Sandberg, E.and Falk, L 1985, The design of a borehole radar system for the detectionof fracture zones: in Proc.In situ experiments in granite associated with the disposal of radioactive waste, Stockholm, OECD.

Olsson, O., Forslund, O., Lundmark, L., Sandberg, E.and Falk, L 1986, Borehole radar-- a new technique for investigation of large rock volumes : in Expanded Abstracts with Biographies, Soc.Explor.Geophys.1986 Tech.Program, 56th Annual Intl.Meeting and Expo., Houston, Nov.2-6, p.116-118.

Olsson, O.and Nilsson, B., 1986, Some examples from borehole radar measurements, in Borehole geophysics for mining and geotechnical applications: P.G.Killeen, ed., Geol.Surv.of Canada, Paper 85-27, p.197-206.

On-Ching, Y., Rope, E.L.and Tricoles, G., 1974, Microwave imaging of buried dielectric anomalies: in Proc.Inter.IEEE/APS Symposium, June 10-12, 1974, Atlanta, GA, p.114-116.

On-Ching, Y., Rope, E.L.and Tricoles, G., 1975, Two reconstruction methods for microwave imaging of buried dielectric anomalies: IEEE Trans.Comput., v.C-24, no.4, p.381-390.

Onstott, R.G.and Moore, R.K., 1983, Radar backscatter cross-sections and ice characterization for May 1977 PT.Barrow experiment: final data report, Remote Sensing Lab., U.of Kansas, Lawrence, Office of Naval Res., US Navy, N00014-76-C-1105, NTIS AD A130042, 81p.

Ostro, S.J., 1983, Planetary radar astronomy: Rev.Geophys., v.21, p.186-196.,

Osumi, N.and Ueno, K., 1984, Microwave holographic imaging method with improved resolution: IEEE Trans.AP, v.AP-32, p.1018-1026.

Osumi, N.and Ueno, K., 1985, Microwave holographic imaging of underground objects: IEEE Trans.AP, v.AP-33, p.152-159.

Page, D.F., Venier, G.O.and Cross, F.R., 1973, Snow and Ice Depth Measurements by High Range Resolution Radar: Can.Aeronaut.and Space J., v.19, p.531-533.

Parkhomenko, E.I., 1967, Electrical properties of rocks, Plenum, NY, 314p.

Pascal, H., 1983, Further discussion on attenuation and dispersion of electromagnetic wave propagation in fluid-saturated porous rocks and applications to dielectric-constant well logging: Geophysics, v.48, p.1373-1380.

Pascal, H., Pascal, F.and Rankin, D., 1982, Some aspects of attenuation and dispersion of electromagnetic waves in fluid-saturated porous rocks and applications to dielectric constant well logging: Geophysics, v.47, p.388-394.

Patterson, D.E.and Smith, M.W., 1981, The measurement of unfrozen water content by time domain reflectometry, results from laboratory tests: Can.Geotech.Rev., v.18, p.131-144.

Patterson, D.E.and Smith, M.W., 1983, Measurement of unfrozen water content in saline permafrost using time domain reflectometry: in Permafrost, Fourth Int.Conf., Proceedings, Wash.DC, NAS, p.968-972.

Payan, I., Kunt, M.and Frei, M., 1982, Subsurface radar signal deconvolution: Signal Process., v.4, p.249-262.

Pearce, D.C., Hulse, W.M., Jr.and Walker, J.W., 1973, The application of the theory of heterogeneous dielectrics to low surface area soil systems: IEEE Trans.Geosci.Electr., v.GE-11, p.167-170.

Peeples, W.J., Sill, W.R., May, T.W., Ward, S.H., Phillips, R.J., Jordan, R.L., Abbott, E.A.and Killpack, T.J., 1978, Orbital radar evidence for lunar subsurface layering in Maria Serenitatis and Crisium: J.Geophys.Res., v.83, p.3459-3468.

Perram, J.W.and Anastasiou, N., 1981, A simple formula for the dielectric constant of an ideal polar fluid: comparison with computer simulations and experiment: JCFTBS, v.77, p.l0l-108.

Peters, L., Jr., Burrell, G.A.and Tran, H.B., 1977, A scattering model for detection of tunnels using video pulse systems: Ohio State Univ.Electrosci.Lab Report 4460-3, 43p.

Peters, L-J., Jr., 1976, Electromagnetic Transient Underground Radar(ETUR) for Geophysical Exploration, Proc.IEEE Antennas and Propag.Soc.Int.Symp.: Amherst, MA, I Oct.lO-15, 1976, APSIS 786, p.203-204.

Pethig, R., 1979, Dielectric and electronic properties of biological materials: NY, Wiley, 376p.

Petrosyan, G.M., Manukyan, A.V.and Balasanyan, S.Yu., 1982, Electrical field in presence of a dielectric plate, Izv.Akad.Nauk Armyanskoy SSR: Nauki o Zemle, v.35, n.5, p.74-79.

Pettengill, G.H., 1978, Physical properties of the planets and satellites from radar observations: Ann.Rev.Astron.Astrophys., v.17, p.265-292.

Pichot, C., Jofre, L., Peronnet, G.and Bolomey, J-C., 1985, Active microwave imaging of inhomogeneous bodies: IEEE Trans.AP, v.AP-33, p.416-425.

Pilon, J.A., 1983, General state-of-the-art review of ground penetrating radar for assessment of low-level nuclear waste disposal sites: Canada Center for Min.and Energy Technology, Earth Physics branch, Ottawa, Open-File report 83-14, 121p.

Pilon, J.A., Annan, A.P.and Davis, J.L., 1985, Monitoring permafrost soil conditions near a buried oil pipeline using ground-probing radar and time-domain reflectometry techniques: in Expanded Abstracts, 55th Ann.Intl.Meeting SEG, Wash.D.C., p.3-5.

Pilon, J.A., Lafleche, P.T. and Judge, A.S., 1987, Applications of ground probing radar in permafrost regions to granular deposits, pipeline right-of-way and frozen core dams: in Expanded Abstr.SEG 57th Ann.Int'l.Meeting and Expo., Oct.ll-15, 1987, p.73-75.

Pittman, W.E., Jr., Church, R.H., Webb, W.E.and McLendon, J.T., 1983, Ground penetrating radar --- a review of its application in the mining industry: U,S.Bureau of Mines Information Circular- 8964, 30p.

Poley, J.Ph., Nooteboom, J.J.and de Waal, P.J., 1978, Use of VHF dielectric measurements for borehole analysis: Log Analyst, v.19, p.8-30.

Pollack, J.B.and Cuzzi, J.N., 1980, Scattering by nonspherical particles of size comparable to a wavelength-- a new semi-empirical theory and its application to tropospheric aerosols: J.Atmos.Sci., v.37, p.868-881.

Poxcello, L.J., Jordan, R.L., Zelenka, J.S., Adams, .G.F., Phillips, R.J., Brown jr, W.E., Ward, S.H.and Jackson, P.L., 1974, The Apollo Lunar Sounder Radar System: Proc.IEEE, v.62, p.769.783.

Pottel, R., 1973, Dielectric properties: in Water-a comprehensive treatise, v.3, F.Franks, ed., NY, Plenum, p.401-432.

Ramdeen, T., Dissado, L.A.and Hill, R.M., 1984, Influence of adsorbed water on the dielectric response of a ceramic material: JCFTAR, v.80, p.325-340.

Ramirez, A.L., 1986, Reconstruction of simulated lineaments using geophysical tomography: Int.J.Rock Mech.Min.Sci.Geomech.Abstr., v.23, p.157-163.

Ramirez, A.L., Deadrick, F.J.and Lytle, R.J., 1982, Cross-borehole fracture mapping using electromagnetic geotomography: Lawrence Livermore Natl.Lab., Livermore, CA, UCRL-53255.

Ramirez, A.L., Lytle, R.J. and Harben, P., 1984, Crosshole geophysical methods used to investigate the near vicinity of high level waste repositories: U.S.Nuclear Regulatory Commission report NUREG/UC-3758, UCID-20060, 65p.

Ramirez, A.L.and Daily, W.D., 1987, Evaluation of alterant geophysical tomography in welded tuff: J.Geophys.Res., V.92, p.7843-7853.

Ramirez, A.L.and Lytle, R.J., 1982, A Brief Overview of Geophysical Probing Technology, Lawrence Livermore Library, NTIS #DE82011217, DOE and NRC: 16p.

Ramirez, A.L.and Lytle, R.J., 1986, Investigation of fracture flow paths using alterant geophysical tomography: Int.J.Rock Mech.Min.Sci.Geomech.Abstr., v.23, p.165-169.

Rankin, D.and Singh, R.P., 1985, Effect of clay and salinity on the dielectric properties of rock: J.Geophys.Res., v.90, p.8793-8800.

Rasmus, J.C.and Kenyon, W.E., 1985, An improved petrophysical evaluation of oomoldic Lansing-Kansas City formations utilizing conductivity and dielectric log measurements: in Trans.SPWLA 26th Annual Logging Symp., p.Vl-19.

Rau, R.N.and Wharton, R.P., 1982, Measurement of core electrical properties at ultrahigh and microwave frequencies: J.Petr.Tech., v.34, p.2689-2700.

Remotec Applications, Inc., 1982, The use of impulse radar techniques for depth profiling of peat deposits: DSS 255R, 31155-l-2630 Contract 15R81-00013, Remotec Applications, Inc., St.Johns, Newfoundland, Canada.

Richards, P.J.and Anderson, A.P., 1978, Microwave images of subsurface utilities in an urban environment: in Proc.8th European Microwave Conf.'78, p.33-37.

Robin, G.de Q., Evans, S.and Bailey, J.T., 1969, Interpretation of radio echo sounding in polar ice, Phil.Trans.Roy.Soc. (London): ser.A., v.265, p.437-505.

Robinson, L.A., Weir, W.B.and Young, L., 1974, Location and Recognition of Discontinuities in Dielectric Media Using Synthetic RF Pulses: Proc.IEEE, v.62, p.36-44.

Rohde, F.W., Hevenor, R.A.and Simental, E., 1982, Measurement techniques of electrical parameters of surface materials in the X-band region: U.S.Army Engineer Topographic Lab., Fort Belvoir, VA, ETL-0304, AD Al23 806, 55p.

Rollwitz, W.L.and King, J.D., 1978, Coal Thickness Gauge Using RRAS Techniques: Natl.Acad.Sci., Southwest Res.Inst.Contract NAS 8-32606, Final Rep., pt.1, SWRI Project 15-4967, 55p.

Rossetta Jr., J.V., 1979, Feasibility study of the measurement of bridge deck bituminous overlayment thickness by pulse radar: Geophys.Survey Systems Inc., Final Report 507-O to Comm.Mass.Dept.Pub.Works, var.pag.

Rossiter, J.R., 1977, Interpretation of radio interferometry depth sounding, with emphasis on random scattering from temperature glaciers and the lunar surface: PhD thesis, Univ.of Toronto, 220p.

Rossiter, J.R., La Torraca, G.A., Annan, A.P., Strangway, D.W.and Simmons, G., 1973, Radio interferometry depth sounding, part II, experimental results: Geophys., v.38, p.581-599.

Rossiter, J.R., Narod, B.B.and Clarke, G.K.C., 1979, Airborne radar sounding of Arctic icebergs: 5th Int.Port and Ocean Eng.Upper Artic Cond.Conf.Proc., v.1, p.289-305.

Rossiter, J.R., Strangway, D.W., Annan, A.P., Watts, R.D.and Redman, J.D., 1975, Detection of thin layers by radio interferometry: Geophys., v.40, p.299-308.

Roth, L.E., Saunders, R.S. and Schubert, G., 1985, Radar and the detection of liquid water on Mars: in Workshop on water on Mars, S.Clifford, ed., Houston, LPI Tech.Rep.85-03, p.71-73.

Roth, L.E.and Elachi, C., 1975, Coherent electromagnetic losses by scattering from volume inhomogeneities: IEEE Trans.AP, v.AP-23, p.674-675.

Row, R.V., Morey, R.M.and Bertram, C.L., 1973, Theoretical analysis of impulse propagation in dissipative medium: Geophysical Survey Systems Inc., North Billerica, MA, Technical Report TR-005-73, 85p.

Ruault, P.and Tabbagh, A., 1977, Etude experimentale de la permittivite dielectrique des sols dans la game de frequence 100 MHz- 1 GHz en vue d'une application a la teledection de l'humidite des sols: Ann.Geophys., v.36, p.33-36.

Rubin, L.A., Fowler, J.C.and Marino, G.G., 1978, Multiple borehole radar. Volume I - Subsurface site investigation by radar phase II: ENSCO, Inc., Springfield, VA, Earth Sciences Systems Div., Proj.No.ENSCO-1141, NTIS PB-288 073/O/XPS, 108p.

Rubin, L.A., Griffin, J.N.and Still, W.L., 1976, Subsurface site investigation by electromagnetic radar. Phase I.Feasability, ENSCO, Inc., Springfield, VA, Transportation and Instrumentation Sciences Div.: Proj.No.ENSCO-1067, NTIS PB-259 335, 214p.

Rubin, L.A.and Fowler, J.C., 1978, Ground Probing Radar for Delineation of Rock Features: Eng.Geol., v.12, p.163-170.

Safinya, K., Habashy, T., Randall, T., Clark, B.and Perez-Falcon, A., 1985, Experimental and theoretical study of the electromagnetic propagation tool in layered and homogenous media: SPE, Annual Tech.Conf., Paper 14188.

Sandness, G.A.and Kimball, C.S., 1982, Ground-Penetrating Radar in Characterizing and Monitoring Waste-Burial Sites, Pacific Northwest Laboratory, DOE, Contract DE-AC06-76RLO 1830, NTIS# CONF-820609-78: (Trans.Am.Nucl.Soc., v.41, p.71-72.), 6p.

Schaber, G.G., McCauley, J.F., Breed, C.S.and Olhoeft, G.R., 1986, Shuttle imaging radar-- physical controls on signal penetration and subsurface scattering in the Eastern Sahara: IEEE Trans.Geosci.and Rem.Sens., v.GE-24, p.603-623.

Schanda, E., 1986, On microwave scattering properties of heterogeneous two-component mixtures: in IGARSS '86 Symp. Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.79-84.

Sellmann, P.V., Arcone, S.A.and Delaney, A.J., 1983, Radar profiling of buried reflectors and the groundwater table: U.S.Army CRREL Report 83-11, 10p.

Sen, P., 1981, Dielectric anomaly in inhomogeneous materials with application to sedimentary rocks: Appl.Phys.Lett., v.39, p.667-668.

Sen, P., 1984, Grain shape effects on dielectric and electrical properties of rocks: Geophysics, v.49, p.586-587.

Sen, P.N., 1981, Relation of certain geometrical features to the dielectric anomaly of rocks: Geophysics, v.46, p.1714-1720.

Sen, P.N., 1982, Dielectric and acoustic response of rocks: in Macroscopic properties of disordered media, R.Burridge, S.Childress and G.Papanicolaou, eds., Berlin, Springer-Verlag, p.226-238.

Sen, P.N., Chew, W.C.and Wilkinson, D.J., 1984, Dielectric enhancement effect due to geometrical and electrochemical effects: in Physics and chemistry of porous media, AIP Conf.Proc.no.107, D.L.Johnson and P.N.Sen, eds., NY, Am.Inst.Phys., p.52-65.

Sen, P.N., Scala, C.and Cohen, M.H., 1981, A self-similar model for sedimentary rocks with application to the dielectric constant of fused glass beads: Geophysics, v.46, p.781-795.

Sen, P.N.and Chew, W.C., 1983, The frequency dependent dielectric and conductivity response of sedimentary rocks: J.Microwave Power, v.18, p.95-105.

Sender, F., Thierbach, R.and Weichart, H., 1983, Enhancement of borehole radar-proving data by new antenna system with circular directional resolution: in Expanded abstract of the technical program, 53rd Annual Int.Meeting and Expo., Tulsa, SEG, p.87-88.

Shen, L.C., 1985, Problems in dielectric-constant logging and possible routes to their solution: The Log Analyst, v.26, no.6, p.14-25.

Shen, L.C., Manning, M.J.and Price, J.M., 1984, Application of electromagnetic propagation tool in formation evaluation: in Trans.SPWLA 25th Ann.Logging Symp., Houston, SPWLA, p.Jl-15.

Shen, L.C., Savre, W.C., Price, J.M.and Athavale, K., 1985, Dielectric properties of reservoir rocks at ultra-high frequencies: Geophysics, v.50, p.692-704.

Sherman, M., 1985, The calculation of porosity from dielectric constant measurements - a study using laboratory data: in Trans.SPWLA 26th Annual Logging Symp., p.HHl-15 (also The Log Analyst, v.27, p.15-24.)

Sherman, M.M., 1983, Determination of the cementation exponent using high frequency dielectric measurements: The Log Analyst, v.24, p.5-12.

Sherman, M.M., 1987, A model for the determination of water saturation from dielectric permittivity measurements: The Log Analyst, v.28, p.282-288.

Shih, S.F., Doolittle, J.A., Myhre, D.L.and Schellentrager, G.W., 1986, Using radar for groundwater investigation: J.Irrigation and Drainage Engineering, v.112, p.llO-118.

Shih, S.F., Doolittle, J.A.and Schellentrager, G.W., 1985, Sampling design for radar application in the everglades agricultural area: Soil and Crop Sci.Soc.Florida Proceedings, v.44, p.199-203.

Shih, S.F., Myhre, D.L., Schellentrager, G.W., Carlisle, V.W.and Doolittle, J.A., 1985, Using radar to assess the soil characteristics related to citrus stress: Soil and Crop Sci.Soc.of Florida, Proceedings, v.45, p.54-59.

Shih, S.F., Myhre, D.L., Schellentrager, G.W.and Doolittle, J.A., 1985, Using radar to improve soil salinity management: Am.Soc.Agric.Eng.1985 Winter Mtg.paper no.85-2611, 25p.

Shih, S.F.and Doolittle, J.A., 1984, Using radar to investigate organic soil thickness in the Florida everglades: Soil Sci.Soc.Am.J., v.48, p.651-656.

Shmulevich, S.A., Troitskiy, V.S., Zelinskaya, M.R., Markov, M.S.and Sukhanov, A.L., 1971, Dielectric properties of rocks at a frequency of 500 MHz: Izvestiya, Physics of the Solid Earth, no.12, p.865-870.

Shuchman, R.A.and Burns, B.A., 1986, Geophysics of the marginal ice zone from SAR: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.345-352.

Shutko, A.M.and Reutov, E.M., 1982, Mixture formulas applied in estimation of dielectric and radiative characteristics of soils in grounds at microwave frequencies: IEEE Trans.Geosci.and Rem.Sens., v.GE-20, p.29-32.

Sihvola, A., 1986, Analysis of Microwave Structures and Mixing Formulae with Applications to Remote Sensing Measurements: Helsinki Univ.of Technology, Espoo, Finland, PhD Thesis, Dept.Electrical Engin., Electromagnetics Lab.Report 8, PB87-153508, var.pag.

Sihvola, A., Nyfors, E.and Tiuri, M., 1985, Mixing formulae and experimental results for the dielectric constant of snow: J.Glaciology, v.31, p.163-170.

Simmons, G., Strangway, D.W., Bannister, L., Baker, R., Cubley, D., La Torraca, G.and Watts, R., 1972, The surface electrical properties experiment: in Lunar Geophysics, Z.Kopal and D.W.Strangway, eds., Dordrecht, D.Reidel, p.258-271.

Singh, K.P., Gray, A.L., Hawkins, R.K. and O'Neil, R.A., 1986, The influence of surface oil on C- and Ku-band ocean backscatter: IEEE Trans.Geosci.and Rem.Sens., V.GE-24, p.738-744.

Singh, R.P.and Rankin, D., 1986, Effect of clay on dielectric properties of oil-sand media: J.Geophys.Res., v.91, p.3877-3882.

Sivaprasad, K.and Petrin, M.F., 1987, A computer simulation for the analysis of radar echo-sounding of polar ice sheets: IEEE Trans.Geosc.Rem.Sensing, v.GE-25, p.564-569.

Sloth, P.and Pedersen, L.T., 1986, Sea ice in the Greenland Sea observed by the Nimbus-7 SMMR: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.357-362.

Smith, B.M.and Evans, S., 1972, Radio echo sounding, absorption and scattering by water inclusions and ice lenses: J.Glaciol., v.11, p.133-146.

Smith, G.S. and King, R.W.P., 1974, The resonant linear antenna as a probe for measuring the in situ electrical properties of geological media, J.Geophys.Res., v.79, p.2623-2628.

Sobolev, G.A., Demin, V.M., Narod, B.B.and Whaite, P., 1984, Tests of piezoelectric and pulsed radio methods for quartz vein and base-metal sulfides prospecting at Giant Yellowknife Mine, NWT and Sullivan Mine, Kimberley, Canada: Geophysics, v.49, p.2178-2185.

Somerstein, S.F., Berg, M., Chang, D., Chung, H., Johnson, H., Richardson, B., Pizzicara, J.and Salisbury, W.W., 1984, Radio-frequency geotomography for remotely probing the interiors of operating mini- and commercial-sized oil-shale retorts: Geophysics, v.49, p.1288-1300.

Stacey, J.M., Johnston, E.J., Girard, M.A.and Regusters, H.A., 1985, Microwave hydrology-- a trilogy: JPL-PUB-850 21, NASA-CR-176042, 48p.

Stanfill III, D.F.and McMillan, K.S., 1985, Inspection of hazardous waste sites using ground-penetrating radar (GPR): in Proc.Nat.Conf.on Hazardous Wastes and Environmental Emergencies, Cincinnati, OH, May.

Stanfill III, D.F.and McMillan, K.S., 1985, Radar-mapping of gasoline and other hydrocarbons in the ground: in HMCRI, Washington DC, p.269-274.

Stein, J.and Kane, D.L., 1983, Monitoring the unfrozen water content of soil and snow using time domain reflectometry: Water Resour.Res., v.19, p.1573-1584.

Stewart, R.D., 1974, Radar Investigation of the Cote Blanche Salt Dome: M.S.Thesis, Texas A.and M.Univ., College Station, TX., 347p.

Stewart, R.D.and Unterberger, R.R., 1976, Seeing Through Rock Salt With Radar: Geophysics, v.41, p.123-132.

Stiles, W.H., Ulaby, F.T., Fung, A.K.and Aslam, A., 1981, Progress in radar snow research: NASA CR-166709, NTIS N87-12510, 155p.

Stiles, W.H.and Ulaby, F.T., 1981, Dielectric properties of snow: NASA CR 166764, NTIS N82-19638, 35p.

Stix, J., 1981, SEASAT satellite investigation of the structure of western Nebraska and its application to the evaluation of geothermal resources: Los Alamos Scientific Lab.LA-UR-81-1454, CONF-810557-1, 20p.

Stogryn, A., 1974, Electromagnetic scattering by random dielectric constant fluctuations in a bounded medium: Rad.Sci., v.9, p.509-518.

Stogryn, A., 1987, An analysis *of* the tensor dielectric constant of sea ice at microwave frequencies: IEEE Trans.Geosci.and Rem.Sens., v.GE-25, p.147-158.

Stogryn, A.and Desargant, G.J., 1985, The dielectric properties of sea ice at microwave frequencies: IEEE Trans.AP, v.AP-33, p.523-532.

Stolarczyk, L.G., Mondt, B.and Schotsch, J., 1986, The use of electromagnetic wave tomography for remote seam mapping and its effect on coal tonnage cost: Am.Mining Cong.Coal Convention, Pittsburgh, May 4-7, 27p.

Stotzer, E., Wegmuller, U., Happi, R.and ,Matzler, C., 1986, Dielectric and surface parameters related to microwave scatter and emission properties: in IGARSS '86 Symp., Zurich, 8-11 Sep.,, 1986, IEEE Cat.no.86CH2268-1, p.599-604.

Strangway, D.W., Simmons, G., La Torraca, G., Watts, R., Bannister, L., Baker, R., Redman, J.D.and Rossiter, J.R., 1974, Radio-frequency interferometry -- a new technique for studying glaciers: J.Glaciol., v.13, p.123-132.

Strangway, D.W.and Olhoeft, G.R., 1977, Electrical properties of planetary surfaces: Phil.Trans.Royal Soc.London A, v.285, p-441-450.

Stroud, D., Milton, G.W. and De, B.R., 1986, Analytical model for the dielectric response of brine-saturated rocks: Phys.Rev.B, v.34, p.5145-5153.

Su, S.M., 1982, Measurement of dielectric constant and conductivity of petroleum reservoir rocks at microwave frequencies: M.Sc.Thesis, Dept.of EE, Univ.of Houston.

Suggett, A., 1972, Time domain methods: in Dielectric and related molecular processes, v.1, London, The Chem.Soc., p.lOO-120.

Sugiura, R.and Sabins, F.F., Jr., 1980, The evaluation of 3 cm wavelength radar images for mapping surface deposits in the Bristol Lake-Granite Mountain area, Mojave Desert, California: in Proc.of Radar Geology Workshop, Snowmass, CO, JPL Pub1.80-61, p.439-456.

Suhler, S.A., Gwen, T.E., Hipp, J.E.and Peters, W.R., 1978, Development of a Deep Penetrating Borehole Geophysical Technique for Predicting Hazards Ahead of Coal Mining: Southwest Res.Inst.Contract H0252033, BuMines OFR 77-80, NTIS PB 80-208614, 124p.

Suhler, S.A., Tranbarger, O.and Converse, M.E., 1981, Development of a Deep Penetrating Borehole Geophysical Technique for Predicting Hazards Ahead of Coal Mining.Phase 2: Southwest Research Inst., San Antonio, TX, for U.S.Bur.Mines, Open file report OFR-130-84, 88p.

Swift, C.T., Hayes, P.S., Herd, J.S., Jones, W.L.and Delnore, V.E., 1985, Airborne microwave measurements of the southern Greenland ice sheet: J.Geophys.Res., v.90, p.1983-1994.

Tam, K.F., 1974, Dielectric property measurements of rocks in the VHF-UHF region, PhD Dissertation, Dept.of Geophysics, Texas A and M Univ.: College Station, 416p.

Tam, S.Y.K.and Keelty, J.M., 1980, Some tests of a VHF synthetic pulse sea ice thickness sensor: Proc.Int.Workshop on remote estimation of sea ice thickness, 25-26 Sept.1979, C-CORE Mem.Univ.Newfoundland, p.305-312.

Tarantolo, P.J., Jr., 1978, Electromagnetic Probing of Salt with High Frequency Radar, PhD Dissertation, Dept.of Geophysics, Texas A and M Univ.: College Station., 303p.

Tarantolo, P.J.Jr.and Unterberger, R.R., 1978, Radar Detection of Boreholes in Advance of Mining (Rock Salt): Geophys.Prospect., v.26, p.359-382,

Theis, S.W., Blanchard, B.J.and Blanchard, A.J., 1986, Utilization of active microwave roughness measurements to improve passive microwave soil moisture estimates over bare soils: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.334-339.

Thierbach, R., 1974, Electromagnetic reflections from salt deposits: J.Geophys., v.40, p.633-637.

Thierbach, R.and Mayrhofer, H., 1978, Elektromagnetische reflexionsmessungen in salzlagerstatten: in Proc.Fifth Inter.Symp.on Salt, Hamburg, Northern Ohio Geol.Soc., Cleveland, OH, p.393-403.

Thomas, J.K., Kaupp, V.H., Waite, W.P.and MacDonald, H.C., 1986, Computer-derived height from SIR-B stereo radar images: in IGARSS '86 Symp., Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.639-644.

Thompson, T.W., 1979, A review of Earth-based radar mapping of the moon: The Moon and Planets, v.20, p.179-198.

Tinga, W.R., Voss, W.A.G.and Blossey, D.F., 1973, Generalized approach to multiphase dielectric mixture theory: J.Appl.Phys., v.44, p.3897-3902.

Tiuri, M., Sihvola, A.H., Nyfors, E.G.and Hallikainen, M.T., 1984, The complex dielectric constant of snow at microwave frequencies: IEEE J.Oceanic Engin., v.OE-9, p.3770382.

Tobarias, J., Saguet, P.and Chilo, J., 1978, Determination of the water content of snow from the study of electromagnetic wave propagation in the snow cover: J.Glaciol., v.20, p.585-592.

Tomiyasu, K., 1974, Remote sensing of the earth by microwaves: Proc.IEEE, v.62, p.86-92.

Topp, G.C., Davis, J.L.and Annan, A.P., 1980, Electromagnetic determination of soil water content, measurements in coaxial transmission lines: Water Resour.Res., v.16, p.574-582.

Topp, G.C., Davis, J.L.and Annan, A.P., 1982, Electromagnetic determination of soil water content using TDR, ;I, Applications to wetting fronts and steep gradients: Soil Sci.Soc.Am.J., v.46, p.672-678.

Troitsky, V.S.and Shmulevich, S.A., 1973, Dependence of dielectric properties of rocks on their volume weight: J.Geophys.Res., v.78, p.6933-6935.

Trompeter, J., 1980, Where No Man Has Gone Before, A Report of Microwave Techniques in Subsurface Investigation: Constr.Specifier, no.11, p.38-47.

Tsandoulas, G.N., 1987, Space-based radar: Science, v.237, p.257-262.

Tsang, L., Kong, J.A.and Shin, R.T., 1985, Theory of microwave remote sensing: NY, Wiley, 613p.

Tsang, L., Kong, J.and Newton, R., 1982, Application of strong fluctuation random medium theory to scattering of electromagnetic waves from a half-space of dielectric -mixture: IEEE Trans.AP, v.AP-30, p.292-302.

Tsang, L.and Ishimaru, A., 1984, Backscattering enhancement of random discrete scatterers: J.Opt.Soc.Am.A, v.1, p.836-839.

Tseng, F.I.and Sarker, T.K., 1984, Experimental determination of resonant frequencies by transient scattering from conducting spheres and cylinders: IEEE Trans.AP, v.AP-32, p.914-918.

Tuck, G.J.and Stacey, F.D., 1978, Dielectric anisotropy as a petrofabric indicator: Tectonophysics, v.50, p.l-11.

Twersky, V,, 1982, Propagation and attenuation in composite media: in Macroscopic properties of disordered media, R.Burridge, S.Childress and G.Papanicolaou, eds., Berlin, Springer-Verlag, p.258-271.

Ulaby, F.T., Moore, R.K.and Fung, A.K., 1982, Microwave remote sensing; active and passive: v.2, radar remote sensing and surface scattering and emission theory, Reading, Addison-Wesley, p.457-1064.

Ulaby, F-T., Moore, R.K.and Fung, A.K., 1986, Microwave remote sensing;active and passive: v.3, from theory to applications, Dedham, Artech House, p.1065-2162.

Ulaby, F.T.and Carver, K.R., 1983, Passive microwave radiometry: in Manual of Remote Sensing, v.1, 2nd ed., R.N.Colwell, ed., Am.Soc.Photogrammetry, p.475-516.

Ulriksen, C.P., 1980, Investigation of peat thickness with radar: in 6th Int'l.Peat Congress, Aug.17-23, Duluth, MN, p.126-129.

Ulriksen, C.P.F., 1982, Application of impulse radar to civil engineering: PhD thesis, Dept of Eng.Geol., Lund Univ.Of Tech., Sweden, 175p. .

Underwood, J.E.and Eales, J.W., 1984, Detecting a buried crystalline waste mass with ground penetrating radar: in Surface and borehole geophysical methods in ground water investigations, D.M.Nielsen, ed., NWWA, Worthington, OH, p.654-665.

Uneo, K.and Osumi, N., 1983, Pulse-radar holography for underground object imaging, 1983 Int.Symp.Digest Antennas and Propagation (Tokyo: Japan), p.651-654.

Unterberger, R.R., 1974, Electromagnetic wave propagation in salt-- probing into salt with radar: in Fourth symposium on salt, v.2, rock mechanics and geophysics, A.H Coogan, ed., Northern Ohio Geol.Soc., Cleveland, p.ll-26.

Unterberger, R.R., 1977, Looking Through Rock With Radar: Min.Congr.J., v.63, No.6, p.38-41.

Unterberger, R.R., 1978, Radar Propagation in Rock Salt: Geophys.Prospect., v.26, p.312-328.

Unterberger, R.R., 1981, Subsurface radar applications in the Delaware Basin: Final Report, Sandia Laboratories SAND-81-7153, NTIS DE82007147, appendices+33p.

Van Gemert, M.J.C., 1973, High-frequency time-domain methods in dielectric spectroscopy: Philips res.Rept., v.28, p.530-572.

Vant, M.R., Ramseier, R.O.and Makios, V., 1978, The complex dielectric constant of sea ice at frequencies in the range 0.1-40 GHz: J.Appl.Phys., v.49, p.1264-1280.

Vaughan, C.J., 1986, Ground penetrating radar surveys used in archaeological investigations: Geophysics, v.51, p.595-604.

Vesecky, J.F., Samadani, R., Smith, M.P., Daida, J.M. and Bracewell, R.N., 1987, Observation of sea-ice dynamics using synthetic aperture radar images, automated analysis: IEEE Trans.Geosci.Rem.Sens., v.GE-26, p.38-48.

Vesecky, J.F., Samadani, R., Smith, M.P., Daida, J.M.and Bracewell, R.N., 1986, Automated remote sensing of sea ice using synthetic aperture radar in IGARSS '86 Symp.: Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.127-132.

Vickers, R.S., 1976, Evaluation of high-frequency electromagnetic sounding for uranium and mining: Stanford Research Inst., Menlo Park, CA, GJBX-27-77/XPS, 58p.

Vickers, R.S.and Dolphin, L.J., 1975, A communication on an archeological radar experiment at Chaco Canyon, New Mexico: MASCA Newsletter, v.11, no.1, n.p.

Viksne, A., Liston, T.C.and Sapp, C.D., 1969, SLR reconnaissance of Panama: Geophysics, v.34, p.54-64.

Volakis, J.L.and Peters, L., Jr., 1983, Improved identification of underground targets using video pulse radars by elimination of undesired natural resonances: IEEE Trans.AP, v.AP-31, p.334-340.

Walford, M.E.R., 1968, Field measurements of dielectric absorption in Antarctic ice and snow at very high frequencies: J.Glaciol., v.7, p.89-94.

Wang, J., Schmugge, T.and Williams, D., 1978, Dielectric constants of soils at microwave frequencies - II: NASA Tech.Paper 1238, 32p.

Wang, J.R., 1980, The dielectric properties of soil-water mixtures at microwave frequencies: Radio Sci., v.15, p.977-985.

Wang, J.R., Engman, E.T., Shiue, J.C., Rusek, M.and Steinmeier, C., 1986, The SIR-B observations of microwave backscatter dependence on soil moisture, surface roughness and vegetation covers: IEEE Trans.on Geoscience and Remote Sensing, V.GE-24, p.510-516.

Wang, J.R.and Schmugge, T.J., 1980, An empirical model for the complex dielectric permittivity of soils as a function of water content: IEEE Trans.Geosci.and Remote Sensing, v.GE-18, p.288-295.

Wang, Y-X., 1981, High-frequency dielectrical separation of microfossils: Lethaia, v.14, p.261-268.

Watts, R.D.and England, A.W., 1976, Radio-Echo Sounding of Temperate Glaciers, Ice Properties and Sounder Design Criteria: J.Glaciology, v.17, p.39-48.

Webb, W.E. and Church, R.H., 1986, Measurement of dielectric properties of minerals at microwave frequencies: U.S.Bureau of Mines RI-9035, 8p.

Weiler, R.A.and Chaussidon, J., 1968, Surface conductivity and dielectric properties of montmorillonite gels: Clays and Clay Minerals, v.16, p.147-155.

Westphal, W.B.and Sils, A., 1972, Dielectric constant and loss data: Technical report AFML-TR-72-39, Air Force Materials Laboratory, Air Force Systems Command, Wright Patterson Air Force Base, Ohio, 224p.

Weymouth, J.W.and Bevin, B.W., 1983, Combined magnetic and ground penetrating radar survey of an archaeological site in Oklahoma: Digest.1983 Int.Geosci.and Remote Sensing Symp.(IGARSS '83), v.1, p.PS.l.l/l-4.

Wiebe, M.L., 1971, Laboratory measurements of the complex dielectric constant of soils, Texas A and M Univ.: Tech.Rep.RSC-23, 19p.

Williams, L.D.and Gallagher, J.G., 1987, The relation of millimeter-wavelength backscatter to surface snow properties: IEEE Trans.Geosci.Rem.Sens., v.GE-25, p.188-194.

Wilson, J.G., Whittington, H.W.and Forde, M.C., 1984, Dielectric properties of concrete at different frequencies: in Dielectric materials, measurements and applications, 4th Inter.Conf., 10-13 Sept 1984, London, IEE, p.157-160.

Wilson, W.J., Ibbott, A.C., Parks, G.S,and Ricketts, W.B., 1986, Mm-wave imaging sensor produces moderate-resolution images: MSN and CT, v.16, p.94-99.

Winkelmolen, A.M., 1972, Dielectric anisotropy and grain orientation: MPG Bull., v.56, p.2150-2159.

Wobschall, D., 1977, A theory of the complex dielectric permittivity of soil containing water, the semidisperse model: IEEE Trans.Geosci.and Rem.Sens., v.GE-15, p.49-58.

Worthington, M.H., 1984, An introduction to geophysical tomography: First Break, v.2, p.20-26.

Wright, D.L., Olhoeft, G.R.and Watts, R.D., 1984, Ground-penetrating radar studies on Cape Cod: in Surface and borehole geophysical methods in ground water investigations, D.M.Nielsen, ed., NWWA, Worthington, OH, p.666-680.

Wright, D.L., Watts, R.D. and Bramsoe, E., 1986, Single-hole, short-pulse borehole radar experiments and a crosshole transponder: in Borehole geophysics for mining and geotechnical applications, P.G.Killeen, ed., Geol.Surv.of Canada, Paper 85-27, p.207-216.

Wright, D.L., Watts, R.D.and Bramsoe, E., 1984, A short-pulse electromagnetic transponder for hole-to-hole use: IEEE Trans.Geosci.and Rem.Sens., v.GE-22, p.720-724.

Wright, D.L.and Watts, R.D., 1982, A single-hole, short-pulse radar system: in Geophysical investigations in connection with geological disposal of radioactive waste, Ottawa, OECD/NEA, p.267-279.

Wu, Y., 1986, Some analysis about the development of underground electromagnetic waves (UEMW) method: in 2nd Symp.on Explor.Geophys., O&.14-19, 1986, Xi'an, China, China Academic Publishers, p.502-503.

Xue, D., Moore, R.K, Williams, T.H.and Onstott, R., 1986, Microwave backscatter coefficients of artificially grown first-year sea ice in IGARSS '86 Symp.: Zurich, 8-11 Sep., 1986, IEEE Cat.no.86CH2268-1, p.139-146.

Xuwen, G., 1982, A log method for determinating oil saturation in a reservoir -- phase dielectric log: SPE of AIME Int.Petrol.Eng.Mtg.(Beijing), Tech.Paper SPE 10565, p.565-627.

Yi-Yuan, D., Tiun-Ji, W.and Yuan-Jing, G., 1984, Radar measurement of glacier thickness: Microwave J., v.27, n.9, p.157-160.

Young, J.D., 1976, Radar Imaging From Ramp Response Signatures: IEEE Trans.Antennas and Propag., V.AP-24, p.276-282.

Young, J.D., 1980, Antenna development for pipe locating radar systems: June 79-May 80 report, GRI-79/0094, NTIS PB82-133307, 62p.

Young, J.D., 1983, Development of an improved radar-based underground pipe locator-Annual report: Electroscience Lab., The Ohio State Univ., Columbus, OH, ESL-529623-5, NTIS PB83-126110/XPS, 94p.

Young, J.D., 1983, Development of an improved radar-based underground pipe locator: Electroscience Lab., The Ohio State Univ., Columbus, OH, ESL-529623-6, NTIS PB85-11349/XPS, 51p.

Young, J.D.and Caldecott, R., 1973, A portable detector for plastic pipe and other underground objects: Ohio State Univ.Electrosci.Lab.Report 404X-l.

Young, K.F.and Frederikse, H.P.R., 1973, Compilation of the static dielectric constant of inorganic solids: J.Phys.Chem.Ref.Data, v.2, p.313-409.

Yu, J.D., 1981, Limitation and extension of dielectric logging: SEG 51st Ann.Intern.Mtg.and Expos.Tech.Prog.Abstr.and Biog., Paper S11.8., p.70.

Yu, J.S., 1981, Modeling the dielectric constant of earth-formation rocks: a sandstone memory of immiscible-saturation history, NTIS DE83-014526, SAND-81-0238C, 4p.

.Yu, J.S., Reardon, P.C.and Lysne, P.C., 1982, Dielectric logging with borehole mud and filtrate invasion: a transfer impedance with fast-convergence integrations, Sandia Natl.Labs, Albuquerque, DOE, DE-AC04-76DP00789, NTIS DE83005531, 59p.

Zebker, H.A.and Goldstein, R.M., 1986, Topographic mapping from interoferometric synthetic aperture radar observations: J.Geophys.Res., v.91, p.4993-4999.

Zhang, Z.and He, J., 1986, Applications of calculating technique to underground electromagnetic wave (UEMW) method: in 2nd Symp.on Explor.Geophys., Oct.14-19, 1986, Xi'an, China, China Academic Publishers, p.527-528.

Zhao, S., 1982, Study of dielectric property of rocks in a high-frequency field: Acta Petrol.Sinica (Spec.Iss.), p.63-27.

Zheng-Ou, Z., Yi-Yuan, D., Yao-Huan, G.and Shun-Ji, H., 1984, A bistatic radar for geological probing: Microwave Journal, v.27, No.5, p.257-264.

Zheng-Ou, Z., Yi-Yuan, D., Yao-Huan, G.and Shun-Ji, H., 1984, Geological measurements of dielectric constant: Microwave Journal., v.27, no.7, p.159-163.

Zhu, P.Y., Fung, A.K. and Wong, K.W., 1987, Effective propagation constants in dense random media under effective medium approximation: Rad.Sci., v.22, p.234-250.

Zinchenko, V.S.and Daev, D.S., 1972, Measurement of dielectric permeability of rocks in hydrogeological drillholes: Izvestiia vyshikh uchebnykh zavedenii.Geologiia i razvedka, no.8, p.92-95.