

## VITA

**Dr. ROGER N. ANDERSON**

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**SUMMARY:** Roger retired emeritus after 42 years at Columbia University's Lamont Doherty Earth Observatory and Data Sciences Institute. Roger has led teams that have developed the next generation of machine learning control systems for smart hydraulic fracturing, 4D seismic reservoir simulation and smart energy management of electricity, water, steam and occupancy tracking for skyscrapers. Over his CU career, he brought in more than a **Quarter Billion in “Soft Money” Research \$\$.** He also co-founded AKW Analytics, Bell Geospace, 4D Technologies, CALM Energy and vPatch Inc. He co-invented 18 patents, with 8 more pending. Roger has had technical, business, computational,

and working collaborations with Baker Hughes, Boeing, BBN, Booz, BP, Shell, Pennzoil, Con Edison, Range Resources, and has run consortiums with many others. Roger has been **in residence** at Baker Hughes, Con Edison Control Centers, the Earthquake Research Institute of the University of Tokyo, Fedex, Finmeccanica, GE, IBM Research, Kansas Geological Survey, KBR, Lockheed Martin, Rudin Management, Schlumberger, Sinclair, the Texas Energy Center, the Urban Utility Center of NYC, the United States Geological Survey, the University of California Berkeley and the University of Hawaii Manoa.

Roger has written 7 books, edited 4 others, published more than 640 scientific and engineering papers, and written and produced 15 technical videos. While at Columbia, Roger graduated 9 Ph.D. students, many of whom are now leaders in national scientific and engineering communities like the National Environmental Research Laboratory, University of Illinois, Chicago, the US Geological Survey as well the international business communities Head of IBM Research Brazil, CNRS Marcelles FR, IT director of the Commodities Trading Floor at Citibank, and Head of Risk Management Software Development for PEMCO.

Roger’s team was recently chosen as the winning University Program in General Electric’s Ecomagination Innovation Challenge, winning a \$1.2 million prize. While at the Lamont-Doherty Earth Observatory of Columbia, he founded the Borehole Research, Global Basins, 4-D Seismic, Seismic Reservoir Simulation, Portfolio Management and Energy Research Groups. Roger has been Chief Scientist of more than 20 oceanographic cruises, including in 1979, the first U.S. research ship to visit the Peoples Republic of China in the modern era. The Wall Street Journal recently characterized him as “a computer-imaging pioneer”. However, his most difficult assignment ever was as Head of Umpires for many years at the West Side Little League in Manhattan, NY.

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Homepages:

<http://akwanalytics.com>

<http://bellgeo.com/>

<http://www.calmenergyinc.com/>  
<http://leanenergy.ldeo.columbia.edu>  
<http://www.ldeo.columbia.edu/~aboulang/4d4/>  
<http://blogs.ei.columbia.edu/?s=Roger+Anderson>

### **FIELDS OF INTEREST:**

Research, Development & Deployment of Smart Infrastructure, Smart Electric Grid, Smart Building and Smart Cities Control Systems, Total Property Optimization, Smart Electric Vehicle Fleet Charging, Forecasting Package and Manufacturing Loads, Lean Energy Management, Real Options, Portfolio Management, Petroleum Reservoir Management, Alternative Energy Research, 4D Earth Imaging using Seismic & Gravity Gradiometry, Logging, Earthquake Stress Measurements, and Hydraulic Fracturing.

### **EXPERTISE:**

Unconventional oil and gas, <http://akwanalytics.com>  
 E-mail me for login/password for demo of our patented Petroleum Analytics Learning Machine™.  
 Smart Urban Commercial Office Buildings, <http://blogs.ei.columbia.edu/2013/08/16/38968/>  
 Smart Electric Grid of the Future, <http://www.earth.columbia.edu/news/2003/story09-23-03.html>  
 Computational Learning Systems, <http://www.ccls.columbia.edu/>  
 Urban Energy Management, <http://www.earth.columbia.edu/news/2003/story09-23-03.html>  
 Urban Infrastructure Management, <http://uuc1.poly.edu/>  
 Computer Aided Lean Management, [http://www.amazon.com/Computer-Aided-Lean-Management-Energy-Industry/dp/1593701578/ref=sr\\_1\\_1?ie=UTF8&s=books&qid=1263506924&sr=8-1](http://www.amazon.com/Computer-Aided-Lean-Management-Energy-Industry/dp/1593701578/ref=sr_1_1?ie=UTF8&s=books&qid=1263506924&sr=8-1)  
 Simulations of Threats to Critical Urban Infrastructure, [http://www.energypulse.net/centers/article/article\\_display.cfm?a\\_id=31](http://www.energypulse.net/centers/article/article_display.cfm?a_id=31)  
 Alternative Energy Systems, <http://www.rrc.state.tx.us/about/tepc/071604meeting.html>  
 4D Oil & Gas Exploration and Production, <http://www.ces-enterprise.com/vpatch/bp/attachments/handbook/index.html> .  
 Gravity Gradiometry, <http://www.earthinstitute.columbia.edu/news/2005/story03-01-05.html>  
 Scientific Wireline Logging, Permeability Testing, Hydraulic Fracturing, and Stress Testing, <http://www.ldeo.columbia.edu/BRG/>

### **EDUCATION:**

Ph.D. Earth Sciences, Scripps Institution of Oceanography, University of California, San Diego, 1973.  
 M.S. Geophysics, University of Oklahoma, thesis at Woods Hole Oceanographic Institution, 1971.  
 B.S. Geophysics, University of Oklahoma, 1969.

### **PERMANENT POSITIONS:**

President & CEO, AKW Analytics Inc., 2014-2018  
 Columbia University, Principal Investigator, Finmeccanica Selex Eltag-Rudin Management Smart Property Management System, 2012-2015  
 Columbia University, Principal Investigator, Fedex-GE-Con Edison Smart Electric Delivery Vehicle Deployment System, 2011-2014

Columbia University, Principal Investigator, Edison Program with Con Edison, 2006-2011.  
 Columbia University, Senior Research Scientist, Center for Computational Learning Systems, SEAS, 2006-2015 (Ret)  
 Columbia University, Adj. Professor, Dept Earth and Environmental Sciences, 1978-2015.  
 Columbia University, Lamont-Doherty Earth Observatory, Sr. Research Scientist, 1978-2006.  
 Founder and Director, Lamont Doherty Borehole Research Group, 1989-1999.  
 Founder and Director of the Lamont 4D Technology Group, 1999-2007.  
 Founder and Director, Lamont Energy Research Group, 2003-2010.  
 Marine Physical Laboratory, Scripps Institution of Oceanography, University of California, San Diego, Assistant Research Geophysicist, 1973-1974.  
 Research Associate, Lamont-Doherty Geological Observatory, Columbia University, 1974-1978.  
 Board-of-Directors, CALM Energy, Inc. 2005-2007, 2014-  
 Board-of-Directors, Bell Geospace, Inc, 1994-1999.  
 Chairman of the Board-of-Directors, vPatch Technologies, Inc. 2000-2002.

### **VISITING POSITIONS:**

Visiting Engineer, Rudin Management, New York, NY 2012-16.  
 Visiting Engineer, Consolidated Edison, New York, NY, 2004-2015.  
 Visiting Scientist, Texas Energy Center, Houston, TX, 2003-2004.  
 Visiting Scientist, The Boeing Company, Houston, TX, 2000-2003.  
 Visiting Scientist, Western Geophysical, Houston, TX, 1997-1999.  
 Visiting Scientist, Shell Exploration Production Technology Center, Bellaire, TX, 1995-1996.  
 Visiting Scientist, Pennzoil Exploration Production Co., Houston, TX, 1991-1994.  
 Visiting Scientist, Kansas Geological Survey, Lawrence, Kansas, 1986.  
 Visiting Scientist, United States Geological Survey, Menlo Park, CA, 1982.  
 Visiting Scientist SUNY, Albany NY, 1980.  
 Visiting Scientist, Earthquake Research Institute, University of Tokyo, Japan, 1978.  
 Visiting Scientist, Institute of Geophysics, University of Hawaii, 1973.  
 Visiting Scientist, Theoretical Geochemistry Group, University of California, Berkeley, 1972.  
 Research Fellow, Woods Hole Oceanographic Institution, 1969-1970.  
 Summer Fellow, Woods Hole Oceanographic Institution, 1968.  
 Research Assistant, Sinclair Oil & Gas Co., Lafayette, Louisiana, 1967.

### **LEADERSHIP:**

Roger was President and CEO of the Big Data Analytics company AKW Analytics Inc. Roger led a team of data scientists and software engineers that developed and are licensing the patented Petroleum Analytics Learning Machine™ (PALM). <http://AKWanalytics.com> .

Roger co-founded CALM Energy Inc. and CALM Water Inc. spinouts from Columbia University Ventures in 2005, <http://www.CALMEnergyInc.com> .

Roger developed business plans for Boeing Energy Systems at Clear Lake, TX, in collaboration with BP and KBR from 2000-2003. <http://leanenergy.ldeo.columbia.edu> .

Roger co-Founded the Bell Geospace, Inc. with Robin Bell and Lincoln Pratson. Bell Geospace is a Joint Venture between Columbia University, ARCH Venture Partners (an investment fund

begun at Argonne National Laboratories and the University of Chicago, (see Fortune magazine, 1998). Bell Geospace holds exclusive licenses to oil industry applications of the Bell Aerospace Gravity Gradiometry System (see Scientific American, June, 1998). Bell (now a division of Lockheed/Martin) is the inventor of these highly innovative, stealth navigation devices for the Trident Submarine program, <http://www.bellgeo.com> .

Roger was Principal Investigator of the only university proposal selected for the GE Ecomagination Challenge Innovation Prize. The international competition was one of the largest of its kind, a 10-week open innovation Challenge that received nearly 4,000 ideas from start-up companies, emerging and established businesses, and universities in more than 150 countries. The citation awarded more than \$1.1 million dollars to the Fu Foundation School for Engineering and Applied Science, Columbia University, New York, NY for new innovative control of EV Charging Stations. A new collaboration with GE, Columbia Engineering, Federal Express, and Con Edison to enable the conversion from hydrocarbon to electric delivery vehicles in New York City. Columbia's technology manages load and delivery and links electrical vehicle charging stations to the utility's electric distribution management system in real-time. In addition to providing funding, GE will supply expertise from its Digital Energy division and GE's Global Research Center to support this program. <http://engineering.columbia.edu/smart-grid-project-wins-ge-grant> .

Roger Co-invented and managed SEISRES, an integrated team of his 4D Technology Group with 4 employees from Western-Atlas, 2 from IBM's Thomas Watson Research Laboratory at Yorkville Heights, NY, and several contract researchers from 1996 through 1999. The team worked on a 3-year, \$4 million computational development project funded by Baker-Hughes International to couple computational inversion, seismic reservoir modeling and simulation software into a command-and-control environment for efficient drainage of hydrocarbons and other fluids from subsurface oil and gas reservoirs, <http://leanenergy.ldeo.columbia.edu> .

Roger managed a team of 10 software developers that created more than 500,000 lines of code relating to new and novel methods for processing and interpretation of 4-D seismic data in the early 1990's. 3 patents for this and associated invention's, were licensed by Columbia to Baker Hughes International in 1996. <http://leanenergy.ldeo.columbia.edu> .

Roger put together an Innovation Team from Columbia's CCLS, Selex Elsag, subsidiaries of Italy's second largest conglomerate Finmeccanica (FNM), and Rudin Management, the largest private owner of large office buildings (>200,000 sq. ft.) in Manhattan. The team is developing a Smart Property Management System that will incorporate the CCLS Total Property Optimizer. FNM will market the product suite worldwide beginning in 2013., <http://blogs.ei.columbia.edu/2013/08/16/38968/> , <http://engineering.columbia.edu/innovative-building-operating-system-provides-brain-smarter-cities> .

Roger was Proposal Manager and Principal Investigator of Columbia's participation in the 2010-2012 Secure Interoperable, Open Smart Grid Demonstration Project, a \$94 million/3 year program funded by the Department of Energy and the New York Public Service Commission. Partners include Con Edison as the prime contractor, and the Boeing Company, CALM Energy, The Prosser Group, New York Economic Development Corp, Viridity Energy, Rudin Management, and Verizon Business, <http://www.earth.columbia.edu/news/2003/story09-23-03.html> .

Roger led a team of from 10 to 15 scientists, engineers and graduate students at Columbia developing software for control of the smart electric grid of New York City as part of the Edison Project with Con Edison since 2003. In addition, the joint team has improved the performance of the existing New York City underground distribution system by more than 20%. Software code capital expensed at >\$10,000,000 has been delivered via Columbia's Technology Ventures office to Con Edison since December, 2005. Con Edison has realized a Return-On-Investment (ROI) of more than 4:1 from this investment, so far. Sixteen patents have been generated, with 3 jointly owned by Columbia University and Con Edison. Winning the DOE Smart Grid Stimulus Demonstration is directly attributed by Con Edison to the successful team brought to Con Edison by Roger (John Miksad, Executive VP). <http://www.earth.columbia.edu/news/2005/story06-01-05e.html> .

Roger published a White Paper on the Smart Electric Grid while at the Texas Energy Center in Houston, TX with Nobel Prize winners Rick Smalley of Rice University and Paul Chu of the University of Houston in 2003-2004. <http://leanenergy.ldeo.columbia.edu> .

Roger co-Founded the Lamont's Portfolio Management (PM) Consortium with John Howell, former executive of Shell Oil Company. PM specialized in portfolio management services for oil, gas and electric company decision makers. PM's specialty is the development of human interaction technologies that allow a company to optimize their upstream business metrics (growth, profit, net present value mix) through interaction with their property portfolio, <http://leanenergy.ldeo.columbia.edu> .

Roger co-Founded the Lamont/Penn State 4D Seismic Monitoring Consortium with Penn State University, that assembled and managed research into the techniques for tracking drainage of oil and gas in several offshore oil fields in the Gulf of Mexico and North Sea, <http://leanenergy.ldeo.columbia.edu> .

Roger was the Principal Investigator, Department of Energy's "Dynamic Enhanced Recovery" Project from 1991-1994. Roger supervised a \$20 million cost-sharing project with industry in which he directed three Ph.D. scientists, a Petroleum Engineer and two computer visualization professionals, 3 Ph.D. students and several support personnel at Lamont, as well as scientists at 6 university, 4 service companies, and Pennzoil Exploration and Production Co., in the drilling, logging and testing of an experimental well into an active fault system in the Gulf of Mexico, <http://www.gulfbase.org/organization/view.php?oid=gbrn> .

Roger co-Founded the Global Basins Research Network, with Lawrence Cathles of Cornell University. GBRN is an Internet consortium of 6 universities and several computer and software companies. The GBRN is an Internet organization for the description and overall process modeling of hydrocarbon and mineral formation and migration in sedimentary basins, <http://www.gulfbase.org/organization/view.php?oid=gbrn> .

Roger was the Principal Investigator for Wireline Logging of Deep Observation and Sampling of the Earth's Continental Crust, with Mark Zoback of Stanford University. This initial effort grew into the SAFOD project to drill and instrument the San Andreas Fault via a Research Drillhole in California. This well is testing the forces that are driving the San Andreas Fault at great depth, [http://earthquake.usgs.gov/research/parkfield/safod\\_pbo.php](http://earthquake.usgs.gov/research/parkfield/safod_pbo.php) .

Roger was the Principal Investigator: Naval Undersea Laboratory, New London Connecticut, to develop subsurface electrical images of the continental margins for the United States Navy. We investigated new methods to better image the geological structure of the continental margins through the instrumentation of deep, offshore boreholes.

Roger also was a Consultant to the Director of the IBM Watson Research Laboratory (1993-94), Yorktown Heights, NY. He assisted in the planning for conversion of Physical and Numerically Intensive Computing projects into the Worldwide Chemicals, Petroleum & Mining Research Division within Business Analytics and Mathematical Sciences.

Roger founded and led from 1984 to 1994 the Borehole Research Group at the Lamont-Doherty Earth Observatory. He was Principal Investigator of the wireline logging program for the Scientific Ocean Drilling Project, and Schlumberger's largest offshore U.S. client during this time. His team developed a subsurface straddle-packer system for permeability and pore pressure measurement so that new technologies for predicting hydraulic permeability from acoustic permeability could be tested, <http://www.ldeo.columbia.edu/BRG/> .

Roger also was Principal Investigator for an IBM-Supported Research Program to Study Ground Water Hydrology beneath the world's largest microprocessor assembly plant in Fishkill, New York.

Roger was the co-director of the Lamont-Doherty Earth Observatory Heat Flow Group with Marcus Langseth from 1974 to 1984. Lamont's ocean research ship is now named after Marcus. [http://en.wikipedia.org/wiki/RV\\_Marcus\\_Langseth](http://en.wikipedia.org/wiki/RV_Marcus_Langseth) .

### **SCIENTIFIC AND ENGINEERING PUBLICATIONS:**

**For continuously updated list, go to Roger N. Anderson in Scholar.Google.com**

[https://scholar.google.com/citations?hl=en&user=OKv6LbwAAAAJ&view\\_op=list\\_works&sortby=pubdate](https://scholar.google.com/citations?hl=en&user=OKv6LbwAAAAJ&view_op=list_works&sortby=pubdate)

### **PATENTS GRANTED:**

1. Anderson, R.N., Hobart, M.A., and Van Steveninck, W., EXPLORING FOR SUBSURFACE HYDROCARBONS BY SEA-FLOOR TEMPERATURE GRADIENTS PREFERABLY USING A MULTIPLEXED THERMISTER PROBE, **United States Letters Patent 4,676,664**. Australian patent No. 572,544 issued 1988. Canadian patent No. 1,219,078 issued 1987. <https://patents.google.com/patent/US4676664A/en> .

2. Anderson, R.N., METHOD FOR MONITORING TEMPERATURE-VS-DEPTH CHARACTERISTICS OF HYDRAULIC FRACTURING IN A BOREHOLE DURING AND AFTER HYDRAULIC FRACTURE TREATMENTS, **United States Letters Patent 4,832,121**. <https://patents.google.com/patent/US4832121> .

3. Anderson, R.N. and Williams, C.F., METHOD OF LOCATING OIL AND GAS HORIZONS USING A WELLBORE HEAT FLOW LOG, **United States Letters Patent 4,947,682**.  
<https://patents.google.com/patent/US4947682> .
4. Anderson, R.N. and He, W., METHOD AND APPARATUS FOR PETROLEUM AND GAS EXPLORATION, **United States Letters Patent 5,311,484A**.  
<https://patents.google.com/patent/US5311484> .
5. Anderson, R.N. Boulanger, A., Bagdonas, E.P., He, W., Sun, Y.F., and Xu, L., METHOD FOR IDENTIFYING SUBSURFACE FLUID MIGRATIONAL PATHWAYS USING 3-D AND 4-D SEISMIC IMAGING, **United States Letters Patent 5,586,082**.  
<https://patents.google.com/patent/US5586082> .
6. R. N. Anderson, and He, W., METHOD FOR INVERTING REFLECTION TRACE DATA FROM 3-D AND 4-D SEISMIC SURVEYS AND IDENTIFYING SUBSURFACE FLUID AND PATHWAYS IN AND AMONG HYDROCARBON RESERVOIRS BASED ON IMPEDANCE MODELS **United States Letters Patent 5,798,982**.  
<https://patents.google.com/patent/US5798982/und> .
7. Anderson, R.N., Boulanger, A., Mello, U., He, W., Winston, J., Wiggins, W., and Xu, L., PETROLEUM RESERVOIR SIMULATION AND CHARACTERIZATION SYSTEM AND METHOD, **United States Letters Patent 6,826,483**. **Australian Patent Number 572,544**, **Canadian Patent No. 1,219,078**.  
<http://www.google.com/patents?hl=en&lr=&vid=USPAT6826483&id=pH4SAAAEBAJ&oi=fnd&dq=%22ANDERSON,+ROGER+N%22&printsec=abstract#v=onepage&q=&f=false> .
8. Anderson, R.N., and Boulanger, A., INNERVATED STOCHASTIC CONTROLLER FOR REAL TIME BUSINESS DECISION-MAKING SUPPORT, **United States Letters Patent 7,395,252**.  
<http://www.google.com/patents?hl=en&lr=&vid=USPAT7395252&id=qDCrAAAEBAJ&oi=fnd&dq=%22ANDERSON,+ROGER+N%22&printsec=abstract#v=onepage&q=&f=false> .
9. Anderson, R.N., Boulanger, A., Waltz, D.L., Long, P., Arias, M., Gross, P., Becker, H., Kressner, A., Mastrocinque, M., Koenig, M., Johnson, J.A., SYSTEM AND METHOD FOR GRADING ELECTRICITY DISTRIBUTION NETWORK FEEDERS SUSCEPTIBLE TO IMPENDING FAILURE, **United States Letters Patent 7,945,524**.  
<http://www.google.com/patents?vid=7945524&printsec=overview> .
10. Anderson, R.N., Boulanger, A., Long, P.M., Servedio, R.A., SYSTEMS AND METHODS FOR MARTINGALE BOOSTING IN MACHINE LEARNING, **United States Letters Patent 8,036,996 B2**.  
<http://www.google.com/patents?vid=8036996&printsec=overview> .
11. Anderson, R.N., Boulanger, A., He, W., Mello, U., Xu, L., MARTINGALE CONTROL OF PRODUCTION FOR OPTIMAL PROFITABILITY OF OIL AND GAS FIELDS, **United States Letters Patent Number 8,560,476**.  
<https://www.google.com/patents/US8560476?dq=8560476&hl=en&sa=X&ei=iqVtUpHICrar4AOvjIHADA&ved=0CDcQ6AEwAA> .

12. Anderson, R.N., Blick R., Boulanger, A. Chow, M. Mastrocinque, M., CONTINGENCY ANALYSIS TOOL FOR ELECTRIC DISTRIBUTION GRID MANAGMENT, **United States Letters Patent 8,583,405 B2.**

<http://www.google.com/patents/US8583405> .

13. Anderson, R.N., Boulanger, A., and Chow, M., CAPITAL ASSET PLANNING SYSTEM, **United States Letters Patent 8,725,625.**

<http://www.google.com/patents/US8725625> .

14. Anderson, R.N., Boulanger, Albert G.; Wu, Leon, METRICS MONITORING AND FINANCIAL VALIDATION SYSTEM (M2FVS) FOR TRACKING PERFORMANCE FROM CAPITAL OPERATIONS, AND MAINTENANCE INVESTMENTS DURING SMART GRID MANAGEMENT OF ELECTRIC TRANSMISSION AND DISTRIBUTION SYSTEMS, **United States Letters Patent 8,725,665.**

<https://www.google.com/patents/US8725665?dq=8725665&hl=en&sa=X&ei=YIzJU4G8KliSyASc-oCQBg&ved=0CB4Q6AEwAA> .

15. Anderson, R. N., Boulanger, Albert; Rudin, Cynthia; Waltz, David L.; Salieb- Aouissi, Ansaf; Chow, Maggie; Dutta, Haimonti; Gross, Phil; Huang, Bert; Jerome, Steve; Isaac, Delfina; Passonneau, Rebecca J.; Radeva, Axinia; Wu, Leon L.; Kressner, Artie, MACHINE LEARNING FOR POWER GRIDS, **United States Letters Patent 8,751,421.**

<https://www.google.com/patents/US8751421?dq=8751421&hl=en&sa=X&ei=pIzJU6m0KcqxYATf74HYCA&ved=0CB4Q6AEwAA> .

16. Anderson, R.N., Boulanger, A., Blick, R., Gross, P., Kressner, A., Mastrocinque, M., DECISION SUPPORT CONTROL CENTERS, **United States Letters Patent 8,972,066 B2.**

<https://patents.google.com/patent/US8972066B2/en> .

17. Anderson, R.N., Boulanger, A. Johnson, J., DYNAMIC CONTINGENCY AVOIDANCE AND MITIGATION SYSTEM, **United States Letters Patent 20120072039A1,**

<https://patents.google.com/patent/US20120072039A1/en?q=US20120072039A1> .

**with Continuation 9,395,707 B2.** <https://patents.google.com/patent/US9395707B2/en> .

18. Anderson, R.N., A. A. Kressner, L. Wu, B. Xui, PETROLEUM ANALYTICS LEARNING MACHINE SYSTEM WITH MACHINE LEARNING ANALYTICS PRODUCTS FOR THE UPSTREAM AND MIDSTREAM OIL AND GAS INDUSTRY, CLAIMS 1-19. **United States Letters Patent 10,430,725, Oct 01, 2019).** ENERGY ANALYTICS LEARNING MACHINE SYSTEM, **Continuation Patent Nov 01, 2019.**

<http://pdfaiw.uspto.gov/.aiw?PageNum=0&docid=20170364795&IDKey=6A0C72997F16&HomeUrl=http%3A%2F%2Fappft.uspto.gov%2Fnetacgi%2Fnph-Parser%3FSect1%3DPTO1%2526Sect2%3DHITOFF%2526d%3DPG01%2526p%3D1%2526u%3D%25252Fnethtml%25252FPTO%25252Fsrchnum.html%2526r%3D1%2526f%3DG%25261%3D50%2526s1%3D%25252220170364795%252522.PGNR.%2526OS%3DDN%2F20170364795%2526RS%3DDN%2F20170364795> .

**with Continuation ENERGY ANALYTICS LEARNING MACHINE, CLAIMS 20-32, FILED AUG 12, 2019.**

**COMPUTATIONAL LEARNING SYSTEMS© AVAILABLE FOR NON-EXCLUSIVE**



**LICENSING FROM COLUMBIA UNIVERSITY TECHNOLOGY VENTURES:**

<http://techventures.columbia.edu/industry/start-licensing-process>

1. Anderson, R.N., Boulanger, A., Powell, W., Jeong, V., Defourny, B., Simao, H., ADAPTIVE STOCHASTIC CONTROL FOR LOAD AND SOURCE CONTROL, **United States Letters Patent Application, issued August, 2011.**

<https://docs.google.com/file/d/0B7Am-1xPqJfYcWkzVTFwR1ICcWM/edit?usp=sharing&pli=1>

2. Anderson, R. N.; Wu, Leon L.; Boulanger, Albert; Winter, Rebecca; Solomon, David; Gilbert, John J.; Boniberger, Eugene M.; Kressner, Arthur A., ADAPTIVE STOCHASTIC CONTROLLER FOR ENERGY EFFICIENCY AND SMART BUILDINGS, **PCT Patent Application 070050.4640, issued Sept 20, 2012.**

<https://docs.google.com/file/d/0B7Am-1xPqJfYQnNJQnAyRTBHMfK/edit?pli=1> .

3. Anderson, R.N., Boulanger A., Bhandari V., Gagneja A, Kressner K, Solomon, D., Wu Leon, FORECASTING SYSTEM USING MACHINE LEARNING AND ENSEMBLE METHODS, **United States Letters Patent Application, US2013/069,762, November, 2012.**

<http://www.google.com/patents/WO2014075108A2?cl=en> .

4. Anderson, Roger N., Albert Boulanger, and Arthur A. Kressner, ADAPTIVE STOCHASTIC CONTROLLER FOR DISTRIBUTED ELECTRICAL ENERGY STORAGE MANAGEMENT. **United States Letters Patent Application. European Patent Application EP 2,539,725, January, 2013.**

<http://www.google.com/patents/WO2011106519A1?cl=en>

5. Anderson, R.N., Boulanger, A., Wu, Leon, Mcinerney, K., Teravainen, T., Chakraborty, B., ADAPTIVE STOCHASTIC CONTROL FOR DYNAMIC TREATMENT OF CYBER-PHYSICAL SYSTEMS, **WIPO Patent Application 2013023178, February, 2013.**

<https://www.google.com/patents/WO2013023178A1?cl=en&dq=PCT/US12/050439&hl=en&sa=X&ei=cxZgUuzxO5H64AOe4IAQ&ved=0CDkQ6AEwAA>

6. Anderson, R.N., Boulanger A., Bhandari V., Gagneja A, Kressner K, Sarkar S., Wu Leon, Li X, MACHINE LEARNING FORECASTING SYSTEM FOR DISTRIBUTION FACILITY BUILDING LOADS AND ELECTRIC DELIVERY VEHICLE CHARGING, **United States Letters Patent Application 61/724,714, November, 2013.**

<https://docs.google.com/file/d/0B7Am-1xPqJfYV2FpRC1pa1RuU28/edit?usp=sharing&pli=1> .

7. Anderson, R.N., Boulanger, Albert G., Teravainen, Timothy, Wu, Leon Li, METRICS AND SEMIPARAMETRIC MODEL FOR ESTIMATING FAILURE RATE AND MEAN TIME BETWEEN FAILURES (MTBF) FOR RELIABILITY IMPROVEMENT OF AN INFRASTRUCTURE, **WIPO Patent Application 2012142278, March, 2014.**

<https://docs.google.com/file/d/0B7Am-1xPqJfYRGNGd1RCOVJXT1E/edit?pli=1> .

8. Anderson, R. N.; Wu, Leon L.; Boulanger, Albert; Gilbert, John J.; Boniberger, Eugene M.; Kressner, Arthur A., TOTAL PROPERTY OPTIMIZATION SYSTEM FOR ENERGY EFFICIENCY AND SMART BUILDINGS, **PCT Patent Application pending, July, 2014.**

<https://docs.google.com/file/d/0B7Am-1xPqJfYckdjU2RMNVJzSkU/edit?pli=1> .  
<http://innovation.columbia.edu/technologies/CU12084-a>

9. Roger N Anderson, Albert Boulanger, Arthur A Kressner (2012) ADAPTIVE STOCHASTIC CONTROLLER FOR DISTRIBUTED ELECTRICAL ENERGY STORAGE MANAGEMENT, US Patent, **US20130158725A1**.

<https://patents.google.com/patent/US20130158725> .

10. Roger N Anderson, Albert Boulanger, Samantha Cook, John Johnson (2010) METHODS AND SYSTEMS OF DETERMINING THE EFFECTIVENESS OF CAPITAL IMPROVEMENT PROJECTS, US Patent, **WO 2009/117742**.

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### **BOOKS AND CHAPTERS:**

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<a href="#">Evidence for excess pore pressures in southwest Indian Ocean sediments</a>	3	1	131	130
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<a href="#">Forecasting Energy Demand in Large Commercial Buildings Using Support Vector Machine Regression</a>	7	5	1728	3939
<a href="#">Gravity gradiometry resurfaces</a>	5	11	475	1494
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### **HISTORY AND PEER REVIEWED SCIENTIFIC & ENGINEERING PUBLICATIONS:**

#### **1965**

Anderson, R.N., Waurika High School, OK. Valedictorian of a class of 32 in town of 2000. Later developed efficiency software to run a NYC Skyscraper that had 6000+ people come in and out of that one building every day.

**1966**

Anderson, R.N., Doodlebugger, Petty Geophysical Field Seismic Crews, Sinclair Oil & Gas Co., Woodward, OK.

**1967**

Anderson, R.N. Offshore Research Assistant, Sinclair Oil & Gas Co., out of Lafayette, LA.

**1968**

Anderson, R.N., Summer Research Fellow, Woods Hole Oceanographic Institution, Woods Hole, MA, for "Students who would not otherwise be exposed to Oceanography."

**1969**

Anderson, R.N., B.S. Geophysics, University of Oklahoma, Graduate Research Associate, University of Oklahoma, Norman, OK.

Research Fellow, Woods Hole Oceanographic Institution, Woods Hole, MA,

**1970**

Anderson, R.N., Research Fellow, Woods Hole Oceanographic Institution, Woods Hole, MA. Cruise 54, R/V ATLANTIS II, Woods Hole Oceanographic Institution, Galapagos and Eastern Pacific Spreading Centers, Thermal Conductivity Scientist.

**1971**

Anderson, R.N., M.S. Geophysics, University of Oklahoma, thesis at Woods Hole Oceanographic Institution, 1971.

PhD Student, Scripps Institution of Oceanography, La Jolla, CA.

1. Sclater, J.G., R.N. Anderson, and M.L. Bell, The elevation of ridges and the evolution of the central eastern Pacific, *Journal of Geophysical Research*, 76, 7888-7915, 1971.

**1972**

Anderson, R.N., PhD Student, Scripps Institution of Oceanography, La Jolla, CA. Southtow, Leg 7, R.V. WASHINGTON, , Joint Woods Hole-Scripps study of the Galapagos Spreading Center, Pacific Ocean, Heat Flow Scientist.

Southtow, Leg 8, R.V. WASHINGTON, Joint Woods Hole-Scripps study of the Galapagos Spreading Center, Pacific Ocean, Chief Scientist.

Cruise Coordinator, Iguana Expedition, SIO.

Visiting Scientist, Prof. Harold Helgeson, Theoretical Geochemistry Group, University of California, Berkeley, CA.

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**1973**

Anderson, R.N., Ph.D. Oceanography, Scripps Institution of Oceanography, University of

California, San Diego.

Research Scientist, Scripps Institution of Oceanography, La Jolla, CA.

Tasaday, Leg 8, R.V. WASHINGTON, SIO, Mariana Trough, Pacific Ocean. Chief Scientist. Cruise Coordinator. Tasaday Expedition, SIO.

Visiting Scientist, Institute of Geophysics, University of Hawaii, Manoa.

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### **1974**

Anderson, R.N., Research Scientist, Scripps Institution of Oceanography, La Jolla, CA.

Cocotow, Leg 4, R.V. MELVILLE, SIO, Galapagos Ridge, Pacific Ocean, Chief Scientist. Cruise Coordinator, Tasaday Expedition, SIO.

Anderson, R.N., Research Scientist, Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY.

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### **1975**

Anderson, R.N., On Assignment: R.V. JEAN CHARCOT, CNEXO, Brest, France: Bay of Biscay study, Atlantic Ocean, Heat Flow Scientist.

Cruise 33, Leg 2, R.V. VEMA, LDEO, Southeast Indian Ridge, Indian Ocean, Heat Flow Scientist.

Co-Director of the Heat Flow Laboratory, LDEO, with Marcus Langseth. Lamont's 3D seismic research ship is now named the R/V Marcus Langseth.

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**1976**

Anderson, R.N., On Assignment: Cruise 20, Leg, R.V. CONRAD, LDEO, Philippine Sea Basin, Pacific Ocean, Heat Flow Scientist

Cruise 20, Leg 7, R.V. CONRAD, LDEO, Philippine Sea Basin, Pacific Ocean, Chief Scientist. Teacher in NSF High School Science Honors Program, Columbia University 1976-

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**1977**

-Anderson, R.N., On Assignment: Cruise 34, Leg 8, R.V. VEMA, LDEO, Crozet Basin, Indian Ocean, Chief Scientist.

-Teacher in NSF High School Science Honors Program, Columbia University.

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**1978**

-Anderson, R.N., Promoted to Sr. Research Scientist and Adjunct Professor, Dept Earth and Environmental sciences, LDEO and Columbia GSAS.

-Mariana, Leg 4, R.V. WASHINGTON, SIO, Mariana Back-Arc Basin, Pacific Ocean, Chief Scientist.

-Creator of EESC V1053, **Planet Earth**, Columbia College Core Curriculum Science Requirement Course. 1978-2015.

-Teacher in NSF High School Science Honors Program, Columbia University.

-Visiting Scientist, Earthquake Research Institute, University of Tokyo, Japan

24. Anderson, R.N., M.A. Hobart, R.P. Von Herzen and D.J. Fornari, Geophysical surveys on the East Pacific Rise, *Geophysical J. Roy. Astron. Soc.*, 54, 141, 1978.
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### **1979**

- Anderson, R.N., On Assignment: Cruise 22, Leg 5, R.V. CONRAD, LDEO, Costa Rica Rift, Pacific Ocean, Chief Scientist.
  - D.V. GLOMAR CHALLENGER, Legs 68 and 69, Drill-Stem-Test Scientist.
  - Teacher in NSF High School Science Honors Program, Columbia University.
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### **1980**

- Anderson, R.N., On Assignment: Cruise 36, Leg 6, R.V. VEMA, LDEO, South China Margin, Pacific Ocean, Chief Scientist.
  - Teacher in NSF High School Science Honors Program, Columbia University.
  - Visiting Scientist SUNY Albany, NY.
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### **1981**

- Anderson, R.N., On Assignment: Auburn, New York, Empire State Geothermal Power Research Project well to test deeply-buried, hot water for power production, with Mark Zoback, Stanford.
- D.V. GLOMAR CHALLENGER, Leg 83, Costa Rica Rift, Pacific Ocean, Co-Chief Scientist.



-Rama 10, R.V. WASHINGTON, SIO, Mariana Trough, Pacific Ocean, Chief Scientist.  
-Wells to measure ground water hydrology around a chemical spill at IBM Fishkill Chip Plant.  
-Teacher in NSF High School Science Honors Program, Columbia University.

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### 1982

-Anderson, R.N., On Assignment: Visiting Scientist, United States Geological Survey, Menlo Park, CA.

-Oroville, CA USGS well to test the state-of-stress near the Oroville Reservoir after the 1975 Oroville earthquake, with Mark Zoback, Stanford.

-Visiting Scientist, United States Geological Survey, Menlo Park, CA

-Editor: Anderson, R.N., J. Honnorez, K. Becker, et al, INITIAL REPORTS OF THE DEEP SEA DRILLING PROJECT, VOL. 83.

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### 1983

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-Anderson, R.N.: Founder, Borehole Research Group, Lamont-Doherty Earth Observatory, Columbia University.

-Laredo, Texas, Cox Petroleum Exploration Well, El Gatita #1, Joint Cox/Halliburton Well Services test of new Hydraulic Fracture orientation techniques for Determining In Situ Stress, Hydraulic Fracture Scientist, 1984.

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### **1986**

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-Kent Cliffs, New York, Empire State Electrical Energy Research Corporation well to test the state-of-stress near the India Point Nuclear Power Plant, with Mark Zoback, Stanford).  
-D.V. JOIDES RESOLUTION, Leg 111, Costa Rica Rift, Pacific Ocean, Logging Scientist.
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### 1987

-Anderson, R.N., On Assignment: Co-Founder, Global Basins Research Network, an Internet consortium of 6 universities and several computer and software companies for the process modeling of hydrocarbon and mineral formation and migration in sedimentary basins.

-Moodus, Connecticut, Empire State Electrical Energy Research Corporation well to test the state-of-stress near the Connecticut Yankee Nuclear Power Plant, with Mark Zoback, Stanford.

- Principal Investigator: Naval Undersea Laboratory, New London Connecticut, to develop subsurface electrical images of the continental margins for the United States Navy. We investigated new methods to better image the geological structure of the continental margins through the instrumentation of deep, offshore boreholes.

-Ocean Drilling Program Logging Schools: Institute of Ocean Sciences Annual Meeting, Cambridge, England, January, Institute Francais for Research in the Oceans Annual Meeting, Paris, France, January, Bundesanstalt fur Geowissenschaften un Rohstoffe Annual Meeting, Hannover, Germany, February, Information Handling Panel, Ocean Drilling Program, New York, August, Deutsch Geological Society Annual Meeting, Hannover, Germany, October. 1987.

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- Ocean Drilling Program Logging Schools: Canadian Geological Association Annual Meeting, Montreal, May, International Union of Geology Annual Meeting, Washington, D.C., July, National Environmental Research Council Annual Meeting, London, September, 1989.
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- Founding Editor: SCIENTIFIC DRILLING, Springer-Verlag Journal, (1990-1993).
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### **1991**

-Anderson, R.N., On Assignment: Visiting Scientist, Pennzoil Exploration Production Co., Houston, TX.

-Principal Investigator, Department of Energy's "Dynamic Enhanced Recovery" Project from 1991-1994. Roger supervised the \$20 million cost-sharing project with industry that drilled a Fluid Migration Pathway in a Growth Fault in the Gulf of Mexico Eugene Island Block 330 Field.

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### **1992**

-Anderson, R.N., On Assignment: Visiting Scientist, Pennzoil Exploration Production Co., Houston, TX.

-Eugene Island Block 330 DOE Field Demonstration drilling program and 4D seismic monitoring project.

-Sited and supervised aspects of Pennzoil well A20-ST and slim-hole deepening of A10-ST, included coring, logging, testing, and hydraulic "frac-pack" fracturing.

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### **1993**

-Anderson, R.N., On Assignment: Visiting Scientist, Pennzoil Exploration Production Co., Houston, TX.

-Eugene Island Block 330 DOE Field Demonstration drilling program and 4D seismic monitoring project. Sited and supervised aspects of Pennzoil well A20-ST and slim-hole deepening of A10-ST, included coring, logging, testing, and hydraulic “frac-pack” hydrofracturing.

-Co-Founded the Lamont/Penn State 4D Seismic Monitoring Consortium that assembled and managed research into the techniques for tracking drainage of oil and gas in several offshore oil fields in the Gulf of Mexico and North Sea.

-Co-Founder of 4D Technologies, Inc., licensed by Columbia to Baker Hughes International, 1993.

-Consultant to Director of IBM Watson Research Lab, Yorktown Heights, NY, and assisted in conversion of Physical and Numerically Intensive Computing divisions into the Worldwide Chemicals, Petroleum & Mining Research Division within Business Analytics and Mathematical Sciences.

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### **1994.**

-Anderson, R.N., On Assignment: Visiting Scientist, Pennzoil Exploration Production Co., Houston, TX.

-Co-Founder and Board-of-Directors, Bell Geospace, Inc., a Joint Venture between Columbia University, ARCH Venture Partners (an investment fund begun at Argonne National Laboratories and the University of Chicago). Bell Geospace holds exclusive licenses to highly innovative devices using a patented Gravity Gradiometry System for stealth navigation of Nuclear Submarines. Bell Geospace is now co-owned by Lockheed/Martin, 1994.

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- Future, Oil and Gas Journal, April 26, 1993.
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## **1995**

-Anderson, R.N., On Assignment: Visiting Scientist, Shell Exploration Production Technology Center, Bellaire, TX. 1995-1996.

-Monitoring of South Timbalier 295, 4D Seismic Drainage, offshore LA.

-Gulf of Mexico Ultradeep Perdido BAHA Drilling Project Team, offshore Texas, VSP Inversion, Project analysis with Shell Offshore, Inc., and funded by LLL, DOE, 1995-1996.

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-Co-invented and managed SEISRES, an integrated team that worked on a 3-year, \$4 million computational development project funded by Baker-Hughes International to couple seismic inversion, reservoir modeling and fluid flow simulation software into a command-and-control environment for efficiently managing drainage of hydrocarbons and other fluids from subsurface oil and gas reservoirs, 1996.

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-South Timbalier 295 4D Seismic Monitoring, offshore Louisiana, with Shell, Inc. in Bellaire Research Lab, Houston, TX.

- Co-Founded the Lamont's Portfolio Management (PM) Consortium with John Howell, former executive of Shell Oil Company, 1998.
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-Co-Founder and Chairman of the Board-of-Directors, vPatch Technologies, Inc.

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-Anderson, R.N., On Assignment: Boeing/KBR, Design of Composites for Ultradeepwater Drilling Platforms Clear Lake TX.

-Co-Creator of SIPA W4300, Alternative Energy Resources Course, Columbia University School of International and Public Affairs Graduate School, taught till 2005.

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-Anderson, R.N., with Con Edison to develop a feeder susceptibility to failure ML system.

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-President and CEO of the Big Data Analytics company AKW Analytics Inc. that developed and are selling the patented Petroleum Analytics Learning Machine™ (PALM) the Oil and Gas E&P business, both conventional and unconventional (Shale Oil & Gas).

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497. Vaibhav Suri, R.N. Anderson, A. Boulanger, Retrospective study comparing actual Skyscraper building data to the recommendations of the CCLS Adaptive Stochastic Controller, for the coldest part of the year 2014, Tech Report, 2015.
498. Boulanger, A. R.N. Anderson, et.al., Improvement in Total Property Optimizer Forecast Performance and Automation using Ensemble Methods and Unsupervised Learning, Tech Report, 2015.
499. Boulanger, A., R.N. Anderson, et. al, Advantages of Ensemble Learning Model Based on Hidden Markov Model (HMM) for Total Property Optimizer, Tech Report, v2, 2015.
500. Anderson, R.N., A. Boulanger, et al, Rudin Commercial Buildings Energy Savings, Tech Report, 2015.
501. Anderson, R.N., A. Boulanger, et al, Residential Building Total Property Optimizer, Tech Report, 2015.
502. Anderson, R.N., A. Boulanger, et al, Di-BOSS User's Manual, 2015.
503. Anderson, R.N., A. Boulanger, et al, Scaling Down Total Property Optimizer Machine Learning From Commercial to Large Residential Buildings, Tech Report, 2015.
504. Anderson, R.N., A. Boulanger, et al, Di-BOSS Digital Building Operating System For Commercial Buildings, Intelligent Buildings, 2015.
505. Gilbert, J., Anderson, R.N., A. Boulanger, et al, Di-BOSS: The Digital Building Operating System of the Future, Buildings Finally Get a Brain, CTBUH, 2015.
506. Anderson, R.N., A. Boulanger, et al, Large Scale Energy Efficiency Improvements in New York City and other Vertical Cities, Tech Report, 2015.
507. Patent 16. Anderson, R.N., Boulanger, A., Blick, R., Gross, P., Kressner, A., Mastrocinque, M., DECISION SUPPORT CONTROL CENTERS, **United States Letters Patent 8,972,066 B2**.  
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508. Anderson, R.N., L.Wu, B.Xie, Brain Project, Interim Report, 0129, 2015.
509. Anderson, R. N., L.Wu, B.Xie, Brain Project, Phase 1 Final Report 0507, 2015.
510. Anderson, R.N., Rudin Management, Skyscrapers and the Internet of Things, Video, Intel, 2015.

## **2016**

-Anderson, R. N., On Assignment: Range Resources, Big Data Machine Learning, AKW Analytics, South Point, PA, 2016.

511. Anderson, R.N., L. Wu, B. Xie, AKW Brochure for URTeC, 2016.
512. Anderson, R.N., Welcome to AKW Analytics, Tech Report, 2016.
513. Anderson, R.N., AKW PALM Decision Engine, Tech Report, 2016.
514. Anderson, R.N., Green SMART GRID Keynote, Arizona State University, 2016.
515. Patent 17. Anderson, R.N., Boulanger, A. Johnson, J., DYNAMIC CONTINGENCY AVOIDANCE AND MITIGATION SYSTEM, **United States Letters Patent 9,395,707**  
<https://patents.google.com/patent/US9395707B2/en> .
516. Roger N. Anderson, Boyi Xie, Leon Wu, Arthur A. Kressner, AKW Analytics Inc, Joseph H. Frantz, Jr., Matthew A. Ockree, Kenneth G. Brown, Range Resources - Appalachia, LLC, Peter Carragher, Mark A. McLane, Rose & Associates, LLP, Using Machine Learning to Identify the Highest Wet Gas Producing Mix of Hydraulic Fracture Classes and Technology Improvements in the Marcellus Shale, *URTeC paper #2430481*, 2016.
517. Roger N. Anderson, Boyi Xie, Leon Wu, Arthur A. Kressner, AKW Analytics Inc, Joseph H. Frantz, Jr., Matthew A. Ockree, Kenneth G. Brown, Range Resources - Appalachia, LLC Petroleum Analytics Learning Machine to Forecast Production in the Wet Gas Marcellus Shale,

URTeC paper #2426612, 2016.

518. [Building is the Network Chapter 7: Blackout of 2003 and the Smart Grid Project](#), 2016.
519. [Building is the Network Chapter 8 345 Park and the Testbed](#), 2016.
520. Building is the Network [Chapter 9: Machine Learning: Internet of Metcalfe and Power of Tesla/Edison joined by the Brain of Kandel The Nervous System of buildings meets the Brain of Kandel](#), 2016.
521. Building is the Network Chapter 10 Di-BOSS = Brain and OS, 2016.

## **2017**

-Anderson, R. N., On Assignment: CrownQuest Exploration and Production, Midland Basin, Permian Basin, TX.

522. Anderson, R.N., L. Wu, B. Xie, Top 10 Machine Learning Companies in Oil & Gas = AKW Analytics, CIO Magazine, 2017.
523. Anderson, R.N., Introduction to AKW Analytics, Shell Worldwide Science Forum, 2017.
524. Anderson, R.N. Artificial Intelligence and Machine Learning Extended to Asset and Risk Assessment in Shale Oil and Gas Fields, 2017.
525. Anderson, R.N., 'Petroleum Analytics Learning Machine' For Optimizing the Internet of Things of Today's Digital Oil Field-To-Refinery Petroleum System, *IEEE paper S38214\_1477*, in Workshop: Big Data Analytics and the Internet of Things, Dec. 20, 2017.
526. Anderson, R.N., L. Wu, B. Xie, Asset Valuation and Risk Assessment Using Artificial Intelligence / Machine Learning, Big Data Analytics and Artificial Intelligence In the Oil and Gas Industry, 2017.
527. [Building is the Network Chapter 11 Sandy amd 80 Pine Transformation](#), 2017.
528. Building is the Network [Chapter 12: From Di--BOSS to Smart Cities](#), 2017.
529. [Building is the Network Chapter 13 From Smart Cities to Planet Inspired](#), 2017.
530. Building is the Network, Chapter 14: Rick Smalley and a Smart Planet Earth, 2017.

## **2018**

531. Anderson, R.N., A. Boulanger, Interconnected power grid and building management system for blackout mitigation, Tech Report, 2018.
532. Anderson, R.N., A. Boulanger, Predictive algorithm for identifying points of failure in the smart energy grid, Tech Report, 2018.
533. Anderson, R.N., A. Boulanger, Machine learning software for optimization of building energy usage, Tech Report, 2018.
534. Anderson, R.N., Natural Similarity to Eugene Island 330 Deepwater Gulf of Mexico, 2018.
535. Patent 18. Anderson, R.N., A. A. Kressner, L. Wu, B. Xui, PETROLEUM ANALYTICS LEARNING MACHINE SYSTEM WITH MACHINE LEARNING ANALYTICS PRODUCTS FOR THE UPSTREAM AND MIDSTREAM OIL AND GAS INDUSTRY, PCT Patent Application US 15/409,425, October, 2015 (Granted Aug. 2019).  
<http://pdfaiw.uspto.gov/.aiw?PageNum=0&docid=20170364795&IDKey=6A0C72997F16&HomeUrl=http%3A%2F%2Fappft.uspto.gov%2Fnetacgi%2Fnph-Parser%3Fsect1%3DPTO1%2526sect2%3DHITOFF%2526d%3DPG01%2526p%3D1%2526u%3D%25252Fnethtml%25252FPTO%25252Fsrchnum.html%2526r%3D1%2526f%3DG%2526l%3D50%2526s1%3D%25252220170364795%252522.PGNR.%2526OS%3DDN%2F20170364795%2526RS%3DDN%2F20170364795> .

**TEACHING AT COLUMBIA UNIVERSITY:**

1978 – 2015, Creator of EESC V1053, **Planet Earth**, Columbia College Science Requirement.

- 2001-2005, Co-Creator of SIPA W4300, **Alternative Energy Resources**, Columbia University School of International and Public Affairs.

**COLUMBIA PH.D.'S GRANTED UNDER ROGER'S DIRECTION:**

1982 **Dallas Abbott**

Adjunct Research Scientist  
Lamont Doherty Earth Observatory  
Columbia University  
Palisades, New York

1984 **Carol Stein (nee Geller)**

Professor  
Dept of Sciences  
University of Illinois, Chicago  
Visiting Professor  
Northwestern University  
Chicago, Illinois

1985 **Robin Newmark**

Executive Director, Strategic Initiatives  
National Renewable Energy Laboratory  
U.S. Department of Energy  
Golden, Colorado

1985 **David Goldberg**

Lamont Research Professor and Associate-Director  
Lamont-Doherty Earth Observatory, and  
Director  
Borehole Research Group  
Columbia University  
Palisades, New York

1989 **Colin Williams**

Senior Scientist and Director Geothermal Research  
United States Geological Survey  
Menlo Park, California

1990 **Philippe Pezard**

Director  
Borehole Research Group  
Marseilles Institute of Technology/CNRS  
Marseilles, France

1994 **Ulisses Mello**

Director  
IBM Research Center

San Paolo, Brazil

1996 **Wei He**  
IT Coordinator  
Trading Floors  
Citicorp  
New York, NY

1996 **Liqing Xu**  
Sr Risk Analyst  
PEMCO  
New York, NY

2000 **Guilles Guerin**  
Research Scientist  
Borehole Research Group  
Lamont-Doherty Earth Observatory  
Palisades, New York

2015 **Leon Wu**  
Founder and CEO  
Brisk Point Inc.  
New York, NY

**U. S. DEPARTMENT OF DEFENSE SECURITY CLEARANCE:** Secret (retired)

**TV ANALYST:**

ABC Nightly News  
ABC Nightline  
Bloomberg Television  
Canadian Broadcasting System  
CNN  
PBS  
CNNfn  
NY1  
BBC/PBS

**KEYNOTE PRESENTATIONS:**

1. Tectonic Processes of the Cocos Plate, International Geological Congress, Mexico City, 1973.
2. Intermediate Wavelength Magnetic Anomalies in the Ocean Basins, Chapman Conference on Long Wavelength Magnetic Anomalies, American Geophysical Union, Colorado Springs, CO, 1975.
3. Subduction Processes and Dehydration, International Union of Geodesy and Geophysics, Tokyo, 1978.

4. Chemical Effects of Subduction, American Geophysical Union, Special Session on Subduction Processes, Washington, D.C., 1979.
5. Physics and Chemistry of Ridge Axis Processes, NATO Conference, Cambridge, England, 1982.
6. Scientific Well Logging, Continental Scientific Drilling, American Institute of Mining Engineers, New York, 1984.
7. Conference Organizer for New Techniques in Scientific Well Logging, Lamont-Doherty Geological Observatory Industrial Associates, May, 1985.
8. Geophysical and Geochemical Data Acquisition -- in situ, Core Drilling for Ultradeep Scientific Targets: An Engineering Challenge, Engineering Foundation Conference, Dillard, Georgia, April, 1986.
9. Hydrogeological Processes at Mid-Ocean Ridges, Union Session, American Geophysical Union, Baltimore, 1986.
10. Well Logging, Cajon Pass Scientific Drill Hole, Tectonophysics, Special Session, American Geophysical Union, Baltimore, 1986.
11. Subduction Zone Water Budget, Kayko Conference, Tokyo, Japan, Nov. 1986.
12. New Techniques in logging of oil-field wells, Borehole Geophysics in Hydrology, U.S. Geological Survey, Water Resources Division, Reston, VA, 1987.
13. Geochemical Logging in the Oceanic Crust, Deutsche Geologische Gesellschaft, Hannover, 1987.
14. Geochemical Logging in the Ocean Drilling Program, American Geophysical Union, Union Session Speaker, 1987.
15. Conference Organizer, New Techniques in Geophysical and Geochemical Well Logging, Lamont-Doherty Geological Observatory, Industrial Associates Meeting, May, 1987.
16. Well logging in the Ocean Drilling Program, Technical Seminar on Research Boreholes, Society of Professional Well Log Analysts, Denver, 1989
17. Geochemical logging in the ODP, in Borehole Elemental Analysis Workshop, Society of Professional Well Log Analysts Lafayette, 1990
18. Dynamic Enhanced Recovery Technologies, Geophysics Luncheon, Society of Exploration Geophysicists, Houston, TX, Nov. 1991.
19. Workshop Organizer, Dynamic Exploitation Technologies, Society of Exploration Geophysicists, Oct. 1992.
20. 4-D Seismic Interpretation, Landmark Graphics International Users Conference, Keynote Speaker, Houston, Tx, Nov. 1993.
21. 4-D Seismic Interpretation Technologies,, Houston Geophysical Society, Jan, 1994.
22. The Pathfinder well, Symposium on Hydrocarbon Migration, American Association of Petroleum Geologists, Denver, 1994.
23. 4-D Mapping of Drainage in the Eugene Island 330 Field, Archie Conference, May, 1995.
24. The Future of Visualization, Archie Conference Workshop, May, 1995.
25. 4-D Reservoir Monitoring in Eugene Island, Offshore Technologies Conference Keynote Address, May, 1996.
26. 4-D Reservoir Monitoring--the Visualization Challenge, Am. Assoc. Petr. Geol. Annual Convention, invited paper, May, 1996.
27. 4-D Reservoir Monitoring--the Geophysical Challenge, Am. Assoc. Petr. Geol. Annual Convention, invited paper, May, 1996.
28. Successes and Pitfalls of 3-D Seismic, LSU Basins Research Center Conference, Houston, November, 1996.



29. AAPG Workshop in Reservoir Characterization, The Woodlands, Oct. 1996.
30. Petroleum Network Education Conference Short Course, 4-D Seismic Monitoring, Houston, June 15, 1997.
31. SMU Center for Earth and Man, November, 1997.
32. Baker Institute, Rice University, Energy technologies, November, 1998.
33. Silicon Graphics Visualization Summit, Galveston, Tx, 1999.
34. Silicon Graphics, Worldwide Visualization Summit, Oslo, Norway, 1999.
35. Rocky Mountain Geophysical Society, Denver, 1999.
36. Offshore Technology Conference, Keynote Speaker, 2000.
37. ThreatSim, a decision support simulator for urban infrastructure, at Con Edison, New York, November, 2002.
38. Future Natural Gas Supplies and the Ultra Deepwater Gulf of Mexico, (invited) Science Committee, U.S. House of Representatives, Feb. 26, 2003.
39. ThreatSim, a decision support simulator for Urban Infrastructure, at the Urban Utility Center, Polytechnic Institute of NYU, January, 2003.
40. The Future of the Electric Grid, Aspen Global Change Institute, July, 2003
41. Shocked by the Dark, Columbia University 250<sup>th</sup> Anniversary lecture series, Oct, 2003
42. The Distributed Storage-Generation “Smart” Electric Grid of the Future, The10-50 Solution: Technologies and Policies for a Low-Carbon Future, PEW Center for Global Climate Change and the National Energy Policy Council, PEW Foundation, March, 2004.
42. Nanotechnology and Energy: Electricity Transmission, Storage and the Grid, Baker Institute, Rice University, November 12-14, 2005.
43. New York Academy of Sciences, Energy System Research & Innovation: New York City Electricity - Past, Present, Future, February 21, 2006.
44. Written testimony, New York State Public Service Commission, Long Island City Blackout of summer, 2007.
45. Testified before Connecticut state legislature committee on energy and the environment, Feb. 2008.
46. New York City Smart Grid of the Future, PSERC, Arizona State University, Feb. 2008.
47. Popular Mechanics and the National Science Foundation present Bridges to the Future, a Webcast discussion exploring the best ideas for improving American Infrastructure, invited participant on Smart Grid panel, broadcast from NSF headquarters, April 10, 2008.
48. Green for the Green Environment Keynote, Con Edison Public Outreach Conference, NY, 2009
49. Smart Grid, Arizona State University, New Directions in Research, May, 2009
50. Arizona and the Smart Grid, Arizona State University, SkySong, 2011
51. Arizona Solar Summit, Glendale, 2011
52. Harvard Club, Hydraulic Fracturing, 2012
53. U.S. Italian Scientific Society, Rome, 2013
54. Machine Learning Conference, Finmeccanica, Rome, 2013
55. Di-BOSS, Green Buildings, NYC, 2014
56. Di-BOSS, CTBUH Tall Buildings of the World, NYC, 2015
57. IEEE Workshop on Big Data Analytics and the Internet of Things, 2017

#### **INVITED ENERGY PRESENTATIONS:**

Amoco, Tulsa, Oklahoma; Houston, Texas; New Orleans, Louisiana  
 Exxon, Houston, Texas  
 Arco, Plano, Houston, Texas

Phillips Petroleum, Bartlesville, Oklahoma  
 SOHIO, Dallas, Texas  
 Conoco, Ponca City, Oklahoma, Lafayette, Louisiana  
 Gulf, Pittsburgh, Pennsylvania  
 Halliburton, Duncan, Oklahoma  
 Schlumberger-Doll Research, Ridgefield, Connecticut  
 Schlumberger Well Services, Houston, Texas  
 Nippon Schlumberger, K.K., Tokyo, Japan  
 British Petroleum, London, England  
 Texaco, New Orleans, Louisiana  
 Premier Oil, London  
 Shell Oil, London, Houston, New Orleans  
 Royal Dutch Shell, Den Hague, Houston  
 AGIP, Milan, Italy  
 Chevron, Lafayette, New Orleans, Louisiana  
 IBM Thomas J. Watson Research Center, Yorktown Heights, New York  
 Pennzoil, Houston, Lafayette  
 BBN, Boston  
 Houston Geological Society  
 Tulsa Geological Society  
 Ft. Worth Geological Society  
 USGS, Coastal Studies Center, St. Petersburg, Fla.  
 Energy Research Clearing House, The Woodlands, Tx  
 Statoil, Trondheim, Norway  
 Norsk Hydro, Bergen, Norway  
 Dodge and Cox, San Francisco  
 Western Geophysical, Europe, Africa, Middle East  
 Offshore Technologies Conference  
 Lean Energy Management, BP America Corporate Headquarters, NYC  
 Edison Program, Technology Seminar, Learning Center, Con Edison  
 First Energy, Akron Ohio, Computer-Aided Lean Management  
 Office of Emergency Management, NYC  
 CenterPoint, Houston, TX  
 Oncor, Dallas, TX  
 Arizona State University

#### **4D SEISMIC RESERVOIR MONITORING SHORT COURSES:**

- Shell Wood Creek, July, 1996
- Western Geophysical, Rome and Cairo, Sept, 1996
- Texaco E&P New Orleans, Nov, 1996
- Prudential Securities, Dec, 1996
- Norsk Hydro, May, 1997
- Shell Aberdeen, June, 1997
- Western Geophysical, London, Aug. 1997
- 4-D Workshop, Crouse Technical Services, Dallas, 1998

- 4-D Workshop, Energy Logistics and Oil and Gas Journal, Aberdeen, 1998.

### **OCEAN DRILLING PROGRAM LOGGING SCHOOLS:**

- Ocean Research Institute, Tokyo, Japan, Nov. 1985.
- Institute of Ocean Sciences, Cambridge, England, Jan. 1987.
- Institute Francais for Research in the Oceans, Paris, France, Jan. 1987.
- Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany, 1987.
- Information Handling Panel, Ocean Drilling Program, New York, Aug. 1987.
- Deutsch Geological Society Annual Meeting, Hannover, Oct. 1987.
- Geological Society of America, Nov. 1988
- American Geophysical Union, San Francisco, Dec. 1988.
- Canadian Geological Association, Montreal, May, 1989
- International Union of Geology, Washington, D.C., July, 1989
- National Environmental Research Council, London, September, 1989
- Ocean Drilling Program, Texas A&M, Jan., 1990
- American Association of Petroleum Geologists, June, 1990
- Australian Geological Society, Brisbane, October, 1990

### **COMMUNITY SERVICE:**

West Side Little League, Head of Umpires, Manhattan, NY  
 Houston Museum of Natural Sciences, Wiess Energy Hall, Design Committee  
 American Association of Petroleum Geologists, Distinguished Lecturer  
 Scholastic Magazine, Advisory Board, Super Science for Kids  
 National Science Foundation, High School Science Honors Program, Columbia University  
 Office of Naval Research, National Advisory Committee, Deep Sea Diving Submersible ALVIN  
 Ocean Drilling Program, Executive and Planning Committees  
 Science Lecturer, Bronx High School of Science, NY

### **PROFESSIONAL ORGANIZATIONS:**

IEEE, Computer Sciences  
 American Geophysical Union  
 American Association of Petroleum Geologists  
 Society of Exploration Geophysicists  
 Society of Petroleum Engineers  
 Society of Professional Well Log Analysts