
Associate

Expertise

Seismic source mechanics, seismic imaging, engineering rock physics, microseismic and acoustic emission (AE) monitoring, applied seismology, induced seismicity

Education

Ph.D. (Geophysics) 1981, Council National Academic Awards, U.K.

PGCE (Education) 1976, University of London, U.K.

M.Sc. (Rock Mechanics) 1974, University of Newcastle-upon-Tyne, U.K.

B.Sc. Hons (Earth Sciences) 1973, University of London, U.K.

Honors & Awards

Willet G Miller Gold Medal of the Royal Society of Canada (awarded once every two years for outstanding research in any field of the earth sciences), 2009

Fellow of the Royal Society of Canada (FRSC) 2007

John A. Franklin Award for Outstanding Contributions in the Field of Rock Engineering, Canadian Geotechnical Society 2005

President, British Geophysical Association 1999-2003

Golden Apple Award for Teaching Excellence, Queen's University Engineering Society 1986

Storey Miller Prize for the top graduating student at the University of London, UK for the Post Graduate Certificate in Education (Double distinction in Theory and Practice of Education) 1976

Science Research Council (SRC) Graduate Scholarship to undertake graduate studies 1973-1974

Professional Qualifications

Chartered Professional Engineer (C.Eng.) U.K. 1986

Chartered Professional Geologist (C.Geol.) U.K. 1983

Professional Experience

Current Appointments

2007 – present

University of Toronto, Canada

Vice-President (Research)

2002 – 2009

Director, Lassonde Institute

2002 – present

Keck Chair of Seismology and Rock Mechanics

2002 – present

Professor, Department of Civil Engineering (Cross-appointed to Departments of Physics and Geology)

1997 – present

Applied Seismology Consultants Ltd. U.K., Scientific Director

Previous Appointments

2004 – 2007	<i>University of Toronto, Canada, Chair, Department of Civil Engineering</i>
1999 – 2002	<i>University of Liverpool, U.K., Chair of Earth Sciences</i>
	<i>Keele University, U.K.</i>
1995 – 1998	<i>Chair, Department of Earth Sciences</i>
1993 – 1999	<i>Professor, Applied Seismology and Rock Physics</i>
1984 – 1993	<i>Queen's University, Kingston, Canada, Professor, Engineering Seismology</i>
1980 – 1984	<i>University of Hull, U.K., Lecturer, Geophysics</i>
1976 – 1980	<i>Sunderland Polytechnic (now University of Sunderland), U.K., Lecturer, Applied Geology</i>

Research Summary

Professor Young's research is focused on three broad areas: seismic source mechanics; seismic imaging and rock physics; and utilizing data from nuclear waste management sites, mines, fluid injection and extraction sites, and natural earthquakes. The objectives of this applied seismological research are to improve the current understanding of fracture nucleation, coalescence and propagation processes due to mechanical, thermal and hydraulic loading, and to provide techniques to monitor the volumetric extent of damage and rock failure. Rock fracture processes are operative at all scales in the Earth and are fundamental to natural tectonic processes within the Earth, and are of prime significance to the strength and behavior of rock as an engineering material. Current projects include the study of rock fracture micromechanics and seismicity using a massively parallel supercomputer and new acoustic crack detection equipment designed by Professor Young. This science will allow 3D micromechanical models of fracture processes to be validated.

Synergistic Activities

- A. Professor Young has pioneered many of the techniques used today in the application of commercial microseismic processing in the petroleum, geothermal, mining and engineering industries, and continues to develop techniques that monitor the volumetric extent of damage and rock failure. He is the founder of Applied Seismology Consultants Ltd. (ASC), a company specializing in the application of seismology to the engineered environment, providing commercial microseismic services and technical development for evaluating fracture networks in a range of industries. ASC merged with Itasca in 2009 and is now an Itasca International Company, collaborating with other Itasca companies to provide validation of numerical models using fracture information processed and interpreted from microseismic data, and correlating this with equivalent information obtained from Itasca's models. This technology has been applied most recently in an international project funded by leading mining companies (including Rio Tinto, Newcrest Mining Limited, CODELCO Chile, Sandvik Mining and Construction, LKAB (Sweden), BHP Billiton Nickel West; BHP Billiton Diamonds Inc. and BHP Copper Inc., Orica Australia Pty Ltd., ValleInco, Xstrata Queensland Ltd, Anglo American Chile Limitada, and De Beers), and it also has been applied in radioactive-waste feasibility studies (for AECL, SKB, ANDRA, IPSN, SCK:CEN) and rock testing experiments.

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- B. With ASC, Professor Young provides software and consulting services (data processing and interpretation) on microseismic monitoring projects for Enhanced Geothermal Systems. These include the first commercial geothermal power plant in the European Union, as well as in one of the leading geothermal production areas in the United States. Microseismic monitoring in the latter case is applied to evaluation of the performance of engineered fracture systems for steam generation during hydrofracture treatments and secure broadcasting of results on-line for engineers to evaluate in real-time.
 - C. ASC has provided consulting and software services to the petroleum industry for the past 11 years, including sub-contracts to Shell, BP, ENI, EXXON, CSIRO, NGI and Schlumberger, among others. Over the past four years Professor Young and his ASC team have developed and applied commercial microseismic acquisition and processing technologies for Halliburton Energy Services (HES) and Pinnacle Technologies, for hydrofracture treatments in petroleum reservoirs. These technologies have included the entire data path from acquisition, through real-time processing and data networking, post-processing and advanced interpretation techniques. Most recently, development of new commercial technologies has focused on more effective and novel approaches to obtain greater information from microseismic data sets on fracture positions, distributions and mechanics, and interpreting of these in coordination with dynamic numerical models. The work with HES and Pinnacle exposes ASC to leading petroleum operators in the U.S. and around the world, including Chevron, EOG, OXY, Williams, Devon, Continental, Anadarko, Conoco, Chesapeake, Pioneer, and PRIMEXX among many others.
 - D. With scientific direction from Professor Young, ASC supplies the InSite Seismic Processor, a leading commercial microseismic acquisition, processing, data-networking and visualization software system. (Licensees include leading petroleum, service, geothermal, and radioactive-waste companies, as well as leading universities for use in fundamental research.) The InSite software is a commercial tool for passive seismological studies, ranging in scale from acoustic emissions in the laboratory, through microseismics around underground excavations and petroleum and geothermal fields, and up to regional-scale earthquakes. ASC also specializes in high-frequency data-acquisition systems, including unique continuous ultrasonic acquisition and surveying technologies for monitoring rock fracturing in laboratory and underground experiments (INERIS France, ANDRA France, ENS France, NGI Norway, INGV Italy, CSIRO Australia).