**THE UNIVERSITY OF BRITISH COLUMBIA**

***Curriculum Vitae for Faculty Members***

**Date: August 2020** (updated). [Some UBC sections removed or shortened to limit length of CV]

**1.** **SURNAME**: CLOWES **FIRST** **NAME**: Ronald

 **MIDDLE NAME(S)**: Martin

**2.** **DEPARTMENT/SCHOOL:** Earth, Ocean & Atmospheric Sciences

**3.** **FACULTY**: Science

**4.** **PRESENT RANK**: Professor Emeritus **SINCE**: July 1, 2007

**5.** **POST-SECONDARY EDUCATION**

 **University or Institution Degree Subject Area Dates**

 University of Calgary Physics 1960-1962

 University of Alberta B.Sc. (Hon.) Physics 1962-1964

 University of Alberta M.Sc. Geophysics 1964-1966

 University of Alberta Ph.D. Geophysics 1966-1969

**6. EMPLOYMENT RECORD**

*(a) Prior to coming to UBC*

 **University, Company or Organization Rank or Title Dates**

 Australian National University, Canberra,

 Department of Geophysics & Geochemistry Honorary Research Fellow 1969-1970

*(b) At UBC*

 **Rank or Title Dates**

 Assistant Professor August 15, 1970

 Associate Professor July 1, 1977

 Professor July 1, 1983 – June 30, 2007

 Director, LITHOPROBE May 1987 – March 2005

 Professsor Emeritus July 1, 2007 – present

*(c) Date of granting of tenure at U.B.C.:* July 1, 1975

**7. LEAVES OF ABSENCE**

 **University, Company or Organization**

 **at which Leave was taken Type of Leave Dates**

 University of British Columbia and Swiss Federal Sabbatical July 1, 2006 to

 Institute of Technology, Zurich, Switzerland June 30, 2007

 University of British Columbia Administrative leave July 1, 2003 to

 June 30, 2004

 Institute of Geophysics, Copenhagen University, Study leave as Visiting July 1, 1979 to

 Copenhagen; and Laboratory for Geophysics, Associate Professor June 30, 1980

 Aarhus University, Aarhus, Denmark

**8. TEACHING**

*(a) Areas of special interest and accomplishments*

 Exploration Geophysics: development of lectures and laboratories for GEOP 321 (Seismology) and GEOP 421 (Applied Geophysical Laboratory); to 1987. After being appointed as Director of Lithoprobe in May 1987, I was seconded from teaching responsibilities at UBC. In 2001-02, I returned to a 50% position in EOS and resumed teaching. In 2003-04, I was on administrative leave. As the recipient of a Canada Council for the Arts Killam Research Fellowship for 2004-2006, I was relieved from teaching.

*(b) Courses Taught at UBC* [Information deleted]

*(c) Graduate Students Supervised*

**Student Name Program Type Year Principal Co-Supervisor(s)**

 **Start Finish Supervisor**

Aimee Bertrand M.Sc. 1970 1972 R.M. Clowes

Geoffrey Bennett M.Sc. 1971 1973 R.M. Clowes R.M. Ellis

G.J. Pareja M.Sc. 1975 R.M. Ellis R.M. Clowes

Stanislav Knize Ph.D. 1970 1976 R.M. Clowes

George Spence M.Sc. 1976 R.M. Clowes R.M. Ellis

Steven Malecek M.Sc. 1973 1976 R.M. Clowes

Steven Lynch M.Sc. 1975 1977 R.M. Clowes

William Cumming M.Sc. 1974 1977 R.M. Clowes

Allan Thorleifson M.Sc. 1976 1978 R.M. Clowes

Henry P.Y. Cheung M.Sc. 1976 1978 R.M. Clowes

Shlomo Levy M.Sc. 1979 R.M. Clowes

Daniel Au Ph.D. 1981 R.M. Clowes

D. Neil Bird M.Sc. 1981 R.M. Clowes R.M. Ellis

James R. Horn M.Sc. 1982 R.M. Clowes R.M. Ellis

David A. Waldron M.Sc. 1982 R.M. Clowes

Donald White M.Sc. 1983 R.M. Clowes

Julian J. Cabrera M.Sc. 1983 R.M. Clowes D.W. Oldenburg

George D. Spence Ph.D. 1984 R.M. Clowes R.M. Ellis

Ian F. Jones Ph.D. 1985 R.M. Clowes R.M. Ellis

David A. Mackie M.Sc. 1985 R.M. Clowes

Sonya Dehler M.Sc. 1986 R.M. Clowes

Chris J. Pike M.Sc. 1986 R.M. Clowes

Jeff J. Drew M.Sc. 1987 R.M. Clowes

Constance R. Cudrak M.Sc. 1988 R.M. Clowes

Donald J. White Ph.D. 1985 1989 R.M. Clowes

Elizabeth Hasselgren M.Sc. 1987 1991 R.M. Clowes [Includes 1 yr. employment]

Sonya A. Dehler Ph.D. 1986 1991 R.M. Clowes

Deirdre M. O’Leary M.Sc. 1990 1992 R.M. Clowes

John A. Hole Ph.D. 1986 1993 R.M. Clowes

Michael J. Perz M.Sc. 1990 1993 R.M. Clowes

Weimin Zhang M.Sc. 1992 1997 R.M. Clowes [incl. 1.5 yr employment]

Carl Wang M.Sc. 1992 1997 R.M. Clowes [incl. 2.5 yr employment]

Denise Long M.Sc. 1994 1998 R.M. Clowes R.M. Ellis

 [incl. 0.5 yr employment]

Kim Welford M.Sc. 1997 1999 R.M. Clowes

Andrew Gorman Ph.D. 1994 2000 R.M. Clowes

Kate Bone M.Sc. 1999 2002 L. Kennedy R.M. Clowes

Kim Welford Ph.D. 2000 2004 R.M. Clowes

Alastair McClymont M.Sc. 2002 2004 R.M. Clowes

Jounada Oueity Ph.D. 2003 2010 R.M. Clowes

David Moore M.A.Sc. 2005 2008 R.M. Clowes

Soo-Kyung Miong M.Sc. 2005 withdrew R.M. Clowes

Vishal Kumar M.Sc. 2006 2009 F. Herrmann R.M. Clowes

Brendan Smithyman Ph.D. 2007 2013 R.M.Clowes

*(d) Continuing Education Activities*

*(e) Visiting Lecturer (indicate university/organization and dates)*

*(f) Other*

Postdoctoral Fellows:

Eva Gens-Lenartowicz, 1982-85: Ph.D., Moscow, USSR

Andrew J. Calvert, 1987-90: Ph.D. (1985), Cambridge University, U.K.; awarded U.B.C. Killam Postdoctorate Fellowship (1987-89).

Phil Hammer, 1992 - 1994: Ph.D. (1991), Scripps Institution of Oceanography, UCSD, San Diego, CA; awarded NSERC Postdoctoral Fellowship.

David Baird, 1994 - 1996: Ph.D. (1994), Cornell University, Ithaca, NY.

Holger Mandler, 1995 - 1998: Ph.D. (1995), Alfred Wegener Institute, University of Bremen, Bremerhavn, Germany; awarded DAAD and DGF Postdoctoral Fellowships from Germany.

Gabriela Fernandez Viejo, 1997 - 1999: Ph.D. (1997), University of Barcelona, Barcelona, Spain; awarded Postdoctoral Fellowship from Spain.

Baishali Roy, 1997 - 1999: Ph.D. (1997), University of Western Ontario, London.

Kumar Ramachandran, 2002 - 2003: Ph.D. (2001), University of Victoria, B.C.

Kim Welford, 11/2004 - 6/2005: Ph.D. (2004), UBC

Research Associates

Phil Hammer, 1995 - 2011: Ph.D. (1991), Scripps Institution of Oceanography, UCSD, San Diego, CA.

Gabriela Fernandez Viejo, 2002 - 2003: Ph.D. University of Barcelona, Barcelona, Spain.

### Visiting Scientists

Ms. Martina Demartin, Instituto per la Geofisica della Litosfera, Reparto Geofisica Applicato, Milano, Italy - 1985, 8 months.

Dr. Josep Muñoz, Geological Survey of Barcelona, Barcelona, Spain - 1988, 4 months.

**9. SCHOLARLY AND PROFESSIONAL ACTIVITIES**

*(a) Areas of special interest and accomplishments*

 **Research areas of interest:**

The general objective of my research programs is a more complete understanding of the present structure and past evolution of the lithosphere of the North American continent and continental margins, and the geotectonic processes associated with that evolution, through seismic reflection, refraction/wide-angle reflection (R/WAR) and related geophysical studies. This objective is achieved by (1) specific projects in characteristic regions of Canada which generally include field acquisition of data, and analysis and interpretation of these and related data (including concurrent development of new methodologies as necessary); (2) integration of these geophysical results with geological and other geophysical information; and (3) syntheses and comparisons of results and information from a range of such studies. As Director of Lithoprobe, I have enjoyed the opportunity to expand both my interests and my knowledge in earth sciences, particularly as they relate to the Canadian landmass and offshore margins. As such, my geological areas of interest have expanded from offshore west coast and British Columbia to most regions of Canada. Lithoprobe provides the framework within which much research related to these interests has been possible for the past 20 years.

**Major accomplishments [with students, postdoctoral fellows and colleagues]:**

My U.B.C. controlled-source seismic group established a world-class marine seismic program to investigate geological structures off the west coast of Canada (1971-1989). The initial reflection and refraction program included a sonobuoy system (free drifting) and hydrophone system cabled to a receiving ship; the controlled sources were explosive charges. Subsequently, the R/WAR program expanded to include ocean bottom seismographs with 3-component geophone plus hydrophone recording and using airguns as the seismic source. Among some of our accomplishments, (1) we carried out the first seismic refraction tomography experiment across an oceanic spreading center (the Juan de Fuca Ridge), prior to similar studies by Woods Hole Oceanographic Institute, Woods Hole, MA and Scripps Institution of Oceanography, La Jolla, CA; and (2) analysis of both P- and S-wave arrivals from OBS studies over the Juan de Fuca plate provided the first in-situ confirmation of upper mantle anisotropy predicted from laboratory studies of ophiolite samples (oceanic lithosphere obducted and now emplaced on land) and enabled evaluation of Poisson's ratio with depth in the oceanic crust.

We carried out the first detailed R/WAR and reflection study across an active subduction zone, delineating characteristics of the subducting plate, the overriding plate and the boundary between them. The refraction work led to a new ray tracing interpretation procedure, which was distributed to about 50 institutions worldwide. The combined reflection/refraction studies extending landward above the subducting plate are still widely referenced. Based on this research, follow-up work by scientists at the Geological Survey of Canada, Pacific in Sidney, BC has defined much more clearly the seismic hazard on the west coast from a megathrust earthquake. An offshore-onshore study in the Queen Charlotte Basin provided new information about the basin and led to the development of a new approach for analysis (based on finite-difference procedures) by my Ph.D. student, a technique that was developed further by him and other scientists.

 Research through Lithoprobe has focussed on regions of the southern and northern Cordilleras, the Trans-Hudson Orogen, the Slave province-Wopmay orogen and the crystalline basement beneath the Western Canada Sedimentary Basin. In all these regions, we have provided exciting new information and results, which have modified or clarified prevailing views of tectonic development. As Director and as an active scientist, I believe that I have contributed substantially to the new and outstanding results achieved in these regions and to the international recognition of Lithoprobe as the pre-eminent project for the study of the continental lithosphere in the world.

 In the early 2000s, we accomplished a unique research experiment – seismic reflection techniques were applied, for the first time, to image a thin (1-5 m), diamondiferous kimberlite dyke from subcrop to depths >1300 m. The project was instigated after inquiries and discussions with two diamond companies. The technical problem of imaging such a thin body is non-trivial. Our approach was to carry out a theoretical study to determine feasibility and optimal parameters, obtain physical properties values from drillcore samples, carry out a survey with appropriate parameters, carefully process the data to provide an image of the dyke and compare this image with drill hole results. We were spectacularly successful; the dyke was imaged exceedingly well such that topography on it and lateral variations within it could be discerned. Two papers and many conference presentations (invited and contributed) highlight our results. The success of this research is well recognized within the diamond industry and has led to one further field survey by one company and plans for follow-up seismic studies by both companies. We have introduced a new exploration tool for specific types of kimberlite bodies.

*(b) Research or equivalent grants (indicate under COMP whether grants were obtained competitively (C) or non-competitively (NC))* [1998-99 to 2012-13].

**Granting Subject $ Year Principal Co-Investigator(s)**

 **Agency COMP Per Year Investigator**

NSERC Research Seismic reflection, refraction C 100,100 1998-99 R.M. Clowes

 Individual and other geophysical studies
 of lithospheric structure

NSERC Seismic data enhancement NC 22,424 1998-99 R.M. Clowes

 Lithoprobe and analysis for THOT

 1994 reflection survey

NSERC Industrially Enhanced imaging of C 19,212 1998-99 R.M. Clowes

 Oriented Research Guichon Creek Batholith, BC,

 to delineate structures hosting

 porphyry copper deposits

NSERC Research Lithoprobe Phase V: The C 4,000,000 1998-99 R.M. Clowes

 Networks Evolution of a Continent [on behalf of

 Revealed Lithoprobe researchers]

NSERC Research Seismic reflection, refraction C 105,105 1999-2000 R.M. Clowes

 Individual and other geophysical studies

 of lithospheric structure

NSERC Hardware upgrade for the NC 31,493 1999-2000 R.M. Clowes

 Lithoprobe UBC Lithoprobe seismic

 Remote site

NSERC Research Lithoprobe Phase V: The C 3,805,000 1999-2000 R.M. Clowes

 Networks Evolution of a Continent [on behalf of Lithoprobe

 Revealed researchers

NSERC Research Seismic reflection, refraction C 89,700 2000-01 R.M. Clowes

 Individual and other geophysical studies

 of lithospheric structure

NSERC Research Lithoprobe Phase V: The C 1,300,000 2000-01 R.M. Clowes

 Networks Evolution of a Continent [on behalf of Lithoprobe

 Revealed researchers]

Winspear Investigation of feasibility NC 35,000 2000-01 R.M. Clowes

 Resources & parameters for a seismic

 reflection survey of a

 kimberlite dyke in the

#  Snap Lake region, NWT

NSERC Research Seismic reflection, refraction C 89,700 2001-02 R.M. Clowes

 Individual and other geophysical studies

 of lithospheric structure

NSERC RPP Mapping kimberlite dykes in C 54,850 2001-02 R.M. Clowes

 Collaborative R & D the Snap Lake region, NWT

 with seismic reflection

 technology – a unique

 experiment

Diamondex Resources To establish whether the NC 403,740 2001-02 R.M. Clowes

 & DeBeers Canada kimberlite dyke can be

 Mining mapped through application

 of the seismic reflection

 method

NSERC Lithoprobe Software upgrade for the NC 12,800 2001-02 R.M. Clowes

 UBC Lithoprobe seismic

 remote site

NSERC Research Lithoprobe Phase V: The C 640,000 2001-02 R.M. Clowes

##  Networks Evolution of a Continent [on behalf of Lithoprobe

 Revealed researchers]

NSERC Research Seismic reflection, refraction C 89,700 2002-03 R.M. Clowes

 Individual and other geophysical studies

 of lithospheric structure

NSERC RPP Mapping kimberlite dykes in C 47,280 2002-03 R.M. Clowes

 Collaborative R & D the Snap Lake region, NWT

 with seismic reflection

 technology – a unique

 experiment

Diamondex Resources To establish whether the NC 0 2002-03 R.M. Clowes

 & DeBeers Canada kimberlite dyke can be 4,700 2003-04

 Mining mapped through application

 of the seismic reflection

 method

 NSERC Lithoprobe; SNORCLE Transect: Extending NC 30,000 2002-2003 R.M. Clowes

 Line 2A westward; quantitative

 analyses of seismic reflections

NSERC Research Lithoprobe Phase V: The C 585,000 2002-03 R.M. Clowes

##  Networks Evolution of a Continent [on behalf of Lithoprobe

 Revealed researchers]

NSERC Research Seismic reflection, refraction C 89,700 2003-04 R.M. Clowes

 Individual and other geophysical studies

 of lithospheric structure

NSERC CRO BATHOLITHS: Generation & C 0 2003-04 R.M. Clowes

 Grant evolution of crust in continental 188,880 2004-05

 magmatic arcs 79,740 2005-06

 78,200 2006-07

NSERC RPP Mapping kimberlite dykes in C 18,000 2003-04 R.M. Clowes

 Collaborative R & D the Snap Lake region, NWT

 with seismic reflection

 technology – a unique

 experiment

Diamondex Resources To establish whether the NC 4,700 2003-04 R.M. Clowes

 & DeBeers Canada kimberlite dyke can be

 Mining mapped through application

 of the seismic reflection

 method

NSERC Lithoprobe SNORCLE Transect: Extend- NC 10,500 2003-04 R.M. Clowes

 Ing Line 2A westward; quanti-

 tative analyses of seismic

 reflections

NSERC Research Lithospheric structure derived C 99,180 2004-05 R.M. Clowes

 Individual from seismic reflection,

 refraction and other geophysical

 studies

NSERC CRO BATHOLITHS: Generation & C 188,880 2004-05 R.M. Clowes

 Grant evolution of crust in continental 79,740 2005-06

 magmatic arcs 78,200 2006-07

NSERC Research Lithospheric structure derived C 99,180 2005-06 R.M. Clowes

 Individual from seismic reflection,

 refraction and other geophysical

 studies

NSERC CRO BATHOLITHS: Generation & C 44,140 2005-06 R.M. Clowes

 Grant evolution of crust in continental 220,980 2006-07

 magmatic arcs 81,700 2007-08

NSERC Research Lithospheric structure derived C 99,180 2006-07 R.M. Clowes

 Individual from seismic reflection, 99,180 2007-08

 refraction and other geophysical 99,180 2008-09

 studies

NSERC CRO BATHOLITHS: Generation & C 50,140 2006-07 R.M. Clowes

 Grant evolution of crust in continental 11,000 2007-08

 magmatic arcs

Geoscience BC Enhanced velocity structure from C 20,967 2008-09 R.M. Clowes

 waveform tomography of seismic 20,967 2009-10

 first-arrival data: Application to

 Nechako Basin

NSERC Research Lithospheric structure and tectonics C 63,600 2009-10 R.M. Clowes

 based on seismic reflection, refraction 43,200 2010-11

 and other geophysical studies 43,200 2011-12

 [Final NSERC grants; funded as 14,500 2012-13

 as requested]

*(c) Research or equivalent contracts (indicate under COMP whether grants were obtained competitively (C) or non-competitively (NC). [last 10 years only]*

*(d) Invited Presentations*

 Recent keynote or invited lectures at conferences [since 2002]:

October 2013 International Meeting on Precambrian Evolution and Deep Exploration of the Continental Lithosphere, Beijing, China. Title: “*LITHOPROBE*: Benefits of the Canadian multidisciplinary Earth science project & relevance for *SINOPROBE”.* Full expenses paid.

October 2013 International Meeting on Precambrian Evolution and Deep Exploration of the Continental Lithosphere, Beijing, China. Title: “Seismic probing and geology: An essential combination illustrated by 30 Years of *LITHOPROBE* interpretations”. Full expenses paid.

November 2011 International Symposium on Deep Exploration into the Lithosphere, Beijing, China. Title: “The application of high resolution seismic reflection studies to mineral exploration Full expenses paid.

November 2011 International Symposium on Deep Exploration into the Lithosphere, Beijing, China. Title: “A lithospheric cross section of the North American continent: Scientific, economic and social benefits of the Canadian *LITHOPROBE* project”. Full expenses paid.

June 2007: GAC NUNA conference on “The pulse of the Earth and planetary evolution”, Sudbury, Ontario. Title: “Seismic imaging of magmatic underplates and intrusions: Results from *LITHOPROBE*”.

June 2006: GSA Penrose conference on “When did plate tectonics begin?”, Lander, Wyoming. Title: “Seismic evidence for Paleoproterozoic and Archean plate tectonic structures”.

February 2006: EarthScope GeoFrame 2006, NSF-sponsored meeting, St. Louis, Missouri. Title: “EarthScope and the GeoFramework concept – Lessons from Lithoprobe”; all expenses paid.

September 2005: EarthScope in the Northern Rockies, NSF-sponsored workshop, Bozeman, Montana. Title: “The Lithoprobe Experience: Active-source seismology and other Earth Science – An essential combination for understanding tectonic evolution”; all expenses paid.

October 2004 4th World Conference of Science Journalists. Montreal, QC. Invited presentation in series "Breaking Science News Press Conference". Title: "A new view of the continent beneath our feet - Lithoprobe's scientific, economic and social contributions."

September 2004: Geoscience Summit 2004. Ottawa, ON. Title: "Lithoprobe - Lessons and benefits from a successful megaproject".

June 2004: Incorporated Research Institutes for Seismology 20th Annual workshop. Tucson, AZ. Title: "Reflection, refraction and teleseismic imaging of the lithospheric mantle: A Lithoprobe view of upper mantle heterogeneity"; all expenses paid.

February 2004: Symposium on Seismic heterogeneity in the Earth's mantle. Copenhagen, Denmark. Title: "Seismic reflection images of the upper mantle from the Canadian Lithoprobe project: Implication for fine-scale heterogeneity"; partial expenses paid.

August 2002: Remote Views and Exploration of Antarctic Lithosphere Workshop (NSF funded), Denver, CO. Title: "Canada's Lithoprobe project: Multidisciplinary transect studies of Precambrian regions"; all expenses paid.

May 2002: John Lewry Symposium, GAC/MAC Annual meeting, Saskatoon, SK. Title: "Crustal structure and tectonic development of the western Trans-Hudson Orogen and Hearne Wyoming craton".

 Recent invited lectures, separate from conferences [since 2002]:

Apr 2013 Two seminars, University of Oklahoma, Norman; full expenses paid. Title 1: “A new view of the continent beneath our feet – Lithoprobe’s transcontinental lithospheric cross section”. Title 2: “Snap Lake seismic survey: The first *exploration-scale* seismic reflection survey to successfully image a thin, diamondiferous, kimberlite dyke”.

2008-09 CSEG Distinguished Lecture Tour: ~ 30 requests for presentations from universities and other organizations. Title: “A new view of the continent beneath our feet – Lithoprobe’s scientific, economic and social contributions”. Full expenses paid.

Apr 2008 Invited presentation at the special Alan Green Symposium, ETH Zurich, Switzerland.

The invited presentation, “The Canadian Lithoprobe project – Multidisciplinary Earth science studies reveal the evolution of a contintent”, was made at a number of institutions and organizations:

Jan 2007 Department of Geology, University of Oviedo, Oviedo, Spain; full expenses paid.

Nov 2006 Eotvos Lorand Geophysical Institute and Hungarian Geophysical and Geological societes, Budapest, Hungary; local expenses paid.

School of Cosmic Physics, Dublin Institute for Advanced Studies, Dublin, Ireland; full expenses paid.

Oct 2006 Department of Earth Sciences, Swiss Federal Institute of Technology, Zurich, Switzerland

The invited presentation, “High-resolution seismic reflection imaging of a thin, diamondiferous kimberlite dyke – A case history”, was made at two universities:

Jan 2007 Department of Geology, University of Oviedo, Oviedo, Spain; full expenses paid.

Nov 2006 Applied and Environmental Geophysics Group, Institute of Geophysics, Swiss Federal Institute of Technology, Zurich, Switzerland.

Dec 2006 Colloquium, Institute of Geophysics, Swiss Federal Institute of Technology, Zurich, Switzerland. Title: "The *Lithoprobe* SNORCLE Transect: Geophysical results across 4 Ga of Earth history in northwestern Canada”.

Nov 2006 Colloquium, Department of Earth Sciences, University of Mainz, Mainz, Germany. Title: “Seismic studies in the Canadian Lithoprobe project: Evidence for plate tectonics in the Paleoproterozoic and Archean eras”; full expenses paid.

Sept 2006 Colloquium, Department of Earth & Ocean Sciences, UBC. Title: “*Lithoprobe:* Collaborative, multidisciplinary studies reveal the evolution of a continent ─ A template for future Earth Science megaprojects?”

February 2005 Korean universities and related organizations. Four lectures as special invitee of Seoul National University and the Korean Crustal Seismic Project; full expenses paid for the week-long visit.

April, 2004 Lew Parker Lecturer at Colorado College, Colorado Springs. Two lectures: (1) Lithoprobe - Multidisciplinary Earth science studies reveal the evolution of a continent; (2) Seismic reflection imaging of diamondiferous kimberlite dykes in NWT: A unique experiment; full expenses paid.

January, 2004 Collins Lecturer at Carleton University, Ottawa, ON. Topic: Lithoprobe: Multidisciplinary Earth science studies reveal the evolution of a continent; all expenses paid.

June-July, 2003 Japan universities and other organizations. Seven talks on various subjects under the sponsorship of a fellowship from the Japan Society for the Promotion of Science; full expenses paid for the 4-week visit.

November, 2002 Finland Lithospheric Program Biannual Meeting, Special International speaker. Title: “Crustal growth and recycling: an overview of Lithoprobe results”; full expenses paid.

November, 2002 Department of Geosciences, Oulu University, Oulu, Finland. Title: “Deep structure and seismic reflection studies in Precambrian mining regions: Examples from the Canadian Lithoprobe project”; full expenses paid.

September, 2002 Europrobe Meeting, Stockholm, Sweden. Title: “Crustal growth and recycling: an overview of Lithoprobe results”; all internal expenses paid.

April 2002: University of Wyoming, Laramie, WY. Title: "Crustal growth and recycling – an overview of Lithoprobe results"; partial expenses paid.

 *(e) Other Presentations (since 2000) [\* denotes presenter]*

Many submitted conference presentatiatons with students and postdoctoral fellows; list deleted.

*(f) Other [Short Courses Presented]*

October 2013 SINOPROBE and Chinese Academy of Geological Sciences, Beijing, China. 2-day short course given by Prof. An Yin, UCLA, Los Angesles, CA; and me. I gave 6 presentations over the 2 days and participated in much discussion.

April 2011 SINOPROBE and Chinese Academy of Geological Sciences, Beijing, China. 3-day short course given by Dr. Walter Mooney, USGS, Menlo Park, CA; Prof. Alfred Kröner, Univ. of Mainz, Mainz, Germany; and me. I gave 9 presentations over the 3 days and participated in much discussion..

September 2001: Chinese Academy of Geological Sciences, Beijing, China. 22 hours of lectures on Lithoprobe over 5 days; all expenses paid.

*(g) Conference Participation (Organizer, Keynote Speaker, etc.)*

 National and international conferences and symposia organized: [Since 1999 only]

2004: Organizer and Keynote Speaker, Lithoprobe Celebratory Conference: From parameters to processes - Revealing the evolution of a continent, October 12 - 15, Toronto, ON.

2003 Co-convenor, with D. Gee (convenor, Sweden), S. Daly (U.K.), I. Kukkonen (Finland), S. Gregersen (Denmark), W. Rabbel (Germany) and S. Hjelt (Finland). Special Session TS3 – The deep structure of continents: focus on results from Europrobe and Lithoprobe, at the Joint Meeting of the European Union of Geosciences, American Geophysical Union and European Geophysical Society, April 5-11, Nice, France.

2003 Convenor with co-covenor P.T.C. Hammer (UBC). Special Session 22 – 4 Billion years of tectonic evolution in NW Canada: Lithospheric lessons from multidisciplinary studies, at the Annual Meeting of the Geological Association of Canada, May 25-28, Vancouver.

1999 Convenor, with co-convenors P. Candela (U.S.A.), S. Maschenkov (Russia) and L. Pedersen (Sweden) of joint symposium JSS44, "Structure of the continental lithosphere from integrated geophysical geological and geochemical studies", at the quadrennial meeting of the International Union of Geology and Geophysics, July 18-30, 1999, Birmingham, England.

1999 Co-convenor with R. England (U. of Cambridge, England), R. Hobbs (U. of Cambridge, England) and C. Juhlin (Uppsala U., Sweden) of Symposium G1, "Integrated studies of the continental lithosphere based on deep seismic profiling", at the biannual meeting of the European Union of Geosciences, 28 March - 1 April, 1999, Strasbourg, France.

**10. SERVICE TO THE UNIVERSITY**

*(a) Memberships on committees, including offices held and dates* [Information deleted]

**11. SERVICE TO THE COMMUNITY**

*(a) Memberships on scholarly societies, including offices held and dates*

 Geological Association of Canada

 Canadian Geophysical Union

 Canadian Society of Exploration Geophysicists

 American Geophysical Union

 Geological Society of America

 Society of Exploration Geophysicists

 Fellow, Royal Society of Canada

*(b) Memberships on other societies, including offices held and dates*

*(c) Memberships on scholarly committees, including offices held and dates*

 1971-74: Member, Subcommittee on Exploration Geophysics of Associate Committee on Geodesy and Geophysics of the National Research Council.

 1976- 84: Member, COCRUST (Consortium for Crustal Reconnaissance present Using Seismic Techniques), now LITHOPROBE Seismology Group.

 1981-87: Member, Transect B2 (Cordillera) Working Group for the North American Continent-Ocean Transect Program; and Member Working Group on the Pacific Margin; both of the Canadian Committee on the Dynamics and Evolution of the Lithosphere.

 1985: Member, Logan Medal Selection Committee for the Geological Association of Canada.

 1986-88: Member, Advisory Board for the U.S. Trans-Alaska Lithosphere Investigation (TALI) program.

 1987-88: Member, NSF Review Panel on Lithospheric Seismology in the Continental Lithosphere Program.

 1987-1989: Member, External Advisory Committee on Geophysics to the Geological Survey of Canada.

 1990-1993: Member, Steering Committee for NATMAP, the national geoscience mapping project.

 1991: Chairman, Selection Committee for the J. Tuzo Wilson Medal award of the Canadian Geophysical Union.

 1994: Member, Advisory Committee and Invited Speaker, Lithospheric Science Workshop (sponsored by NSF and Air Force Office of Scientific Research), Taos, New Mexico.

 1995-1997: Member, Committee on the Arthur L. Day Medal, Geological Society of America.

 1995-1997: Member (Chair 1997), Committee on the George P. Woollard Award, Geological Society of America.

 1995-2004 Member, Advisory Committee for Earth Systems Evolution Program, Canadian Institute for Advanced Research.

 1997-2000 Member, Selection Committee for the Willet G. Miller Medal, Royal Society of Canada.

1998-2000: Member, NSERC Northern Task Force Committee

1999-2003 Member, Science and Advisory Board, Institute for Pacific Ocean Science & Technology

2001-2004 Member, Fellowship Selection Committee, Earth, Ocean and Atmospheric Sciences, Royal Society of Canada

2002-2004 Councilor, Geological Society of America

2002-2003 Chair, Committee on Penrose Medal Award, Geological Society of America

2003-2004 Chair, Committee on Day Medal Award, Geological Society of America

2003-2006 Member, NSERC Research Networks Selection Committee

2011-2015 Scientific Advisor, SinoProbe Deep Exploration of the Earth, Chinese Academy of Geological Sciences, China; the major Earth science project in China – Phase I

2015-2018 Member, Fellowship Selection Committee, Earth, Ocean and Atmospheric Sciences, Royal Society of Canada

2015- Member, Academic Advisory Board, SinoProbe Center-China Deep Exploration Center, Ministry of Land and Resources and China Geological Survey, China; continuation and expansion of SinoProbe as a new entity.

*(d) Memberships on other committees, including offices held and dates*

*(e) Editorships (list journal and dates)*

 1984-2007 Associate Editor, Canadian Journal of Earth Sciences

 2009-2010 Guest Editor, Lithoprobe special issues, Canadian Journal of Earth Sciences

*(f) Reviewer (journal, agency, etc. including dates)*

**12. AWARDS AND DISTINCTIONS**

*(a) Awards for Teaching (indicate name of award, awarding organizations, date)*

*(b) Awards for Scholarship (indicate name of award, awarding organizations, date)*

 1966 Best Paper Award (Conference presentation), Canadian Society of Exploration Geophysicists

 1968 Best Paper Award for papers published in *GEOPHYSICS*, Society of Exploration
Geophysicists, U.S.A.

 1969/70 National Research Council of Canada, Postdoctoral Fellowship

 1981 Best Paper Award (Conference presentation), Canadian Society of Exploration Geophysicists

 1987/88 U.B.C. Walter Isaak Killam Memorial Faculty Research Fellowship [declined to accept position of Director, Lithoprobe]

 1987/88 Canada Council Killam Research Fellowship (renewable for a second year) [declined to accept position of Director, Lithoprobe]

 1988 Past President's Medal (“for a recent outstanding accomplishment in earth science research”), Geological Association of Canada

 1993 George P. Woollard Award (“for outstanding contributions to geology through the application of the principles and techniques of geophysics”; first Canadian recipient) Geological Society of America

 1994 Fellow, Royal Society of Canada

 1995 Honorary Member, Canadian Society of Exploration Geophysicists (highest society award for scientific contributions)

 1995 Distinguished Fellow (“in recognition of substantial contributions to the geosciences”), Geological Association of Canada

1. Distinguished Lecturer Award, Canadian Institute of Mining, Metallurgy and Petroleum
2. UBC Killam Research Prize
3. J. Tuzo Wilson Medal for "outstanding contributions to Canadian geophysics", Canadian Geophysical Union

1998 Named a Member, Order of Canada (Canada's highest civilian honor)

2002 Queen's Golden Jubilee Medal ("for contributions to Canada")

2003 Visiting Fellowship, Japan Society for the Promotion of Science, Japan

2004-2006 Canada Council Killam Research Fellowship

 2005 Logan Medal, Geological Association of Canada (highest society award; for "sustained distinguished achievement in Canadian earth science")

 2008-2009 Canadian Society of Exploration Geophysicists 2009 Distinguished Lecturer

2012 Queen's Diamond Jubilee Medal ("for contributions to Canada")

*(c) Awards for Service (indicate name of award, awarding organizations, date)*

*(d) Other Awards*

**THE UNIVERSITY OF BRITISH COLUMBIA**

***Publications Record***

**SURNAME**: CLOWES **FIRST** **NAME**: Ronald **Initials**:

 **MIDDLE NAME(S)**: Martin **Date**: August, 2015

**1. REFEREED PUBLICATIONS**

*(a) Journals*

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 2. Kanasewich, E.R., **R.M. Clowes,** and C.H. McCloughan. A buried Precambrian rift in western Canada, Tectonophysics, 8, 513-527 (1969).

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 5. Bertrand, A.E.S. and **R.M. Clowes**. Seismic array evidence for a two-layer core transition zone, Phys. Earth Planet. Int., 8, 251-268 (1974).

 6. Bennett, G.T., **R.M. Clowes** and R.M. Ellis. A seismic refraction survey along the southern Rocky Mountain Trench, Canada, Bull. Seismol. Soc.Am., 65, 37-54 (1975).

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 8. Sketchley, D.J. and **R.M. Clowes**. A gravity survey of the igneous body at Little Mountain, Vancouver B.C., J. Can. Soc. Exploration Geophys., 12, 64-74 (1976).

 9. Spence, G.D., R.M. Ellis and **R.M. Clowes**. Gravity evidence against a high-angle fault crossing the Rocky Mountain Trench near Radium, British Columbia, Can. J. Earth Sci., 14, 25-31 (1977).

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 11. **Clowes, R.M**. A marine deep seismic sounding system, Can. J. Earth Sci., 14, 1276-1285 (1977).

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 13. Cumming, W.B., **R.M. Clowes** and R.M. Ellis. Crustal structure from a seismic refraction profile across southern British Columbia, Can. J. Earth Sci., 16 1024-1040 (1979).

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 15. Whittall, K.P. and **R.M. Clowes**. A simple, efficient method for the calculation of traveltimes and ray paths in laterally inhomogeneous media, J. Can. Soc. Exploration Geophys., 15, 21-29 (1979).

 16. Levy, S. and **R.M. Clowes**. Debubbling: a generalized linear inverse approach, Geophys. Prosp., 28, 840-858 (1980).

 17. **Clowes, R.M.,** A.J. Thorleifson and S. Lynch. Winona basin, West Coast Canada: crustal structure from marine seismic studies, J. Geophys. Res., 86, 225-242 (1981).

 18. Cheung, H.P.Y. and **R.M. Clowes**. Crustal structure from P and S wave analyses: ocean bottom seismometer results in the northeast Pacific, Geophys. J.R. astr. Soc., 65, 47-73 (1981).

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5. **Clowes, R.M**., F. Cook, Z. Hajnal, J. Hall, J. Lewry, S. Lucas, and R. Wardle. Canada's Lithoprobe Project (collaborative, multidisciplinary geoscience research leads to new understanding of continental evolution). Episodes, 22, 3-20 (1999).
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14. Snyder, D.B., **R.M. Clowes**, F.A. Cook, P. Erdmer, C. Evenchick, A.J. van der Velden and K.W. Hall. Proterozoic prism arrests suspect terranes: Insights into the ancient Cordilleran margin from seismic reflection data. GSA Today, 12 (no. 10, October), 4-10 (2002).

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**4. PATENTS**