A. BIOGRAPHICAL INFORMATION

1. Personal

Name: Wm. Richard Peltier

Citizenship: Canadian

Office address: Department of Physics
University of Toronto
Toronto, Ontario
M5S 1A7 Canada

Office tel.: 416-978-2938
Fax : 416-978-8905

E- mail: peltier@atmosp.physics.utoronto.ca
Web: http://www.atmosp.physics.utoronto.ca/~peltier/

2. Degrees

B.Sc., Physics, 1967, University of British Columbia.

M.Sc., Physics, 1969, University of Toronto.

Ph.D., Physics, 1971, University of Toronto.

Thesis: "Thermal Stability of non-Boussinesq Configurations"

Supervisor: Professor C.O. Hines

3. Employment

present appointment - University Professor, 1993-present

date of appointment to graduate school - 1973

date of tenure award - 1977

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Lecturer, 1971-72, Department of Physics, University of Toronto

Visiting Fellow, 1972-73, CIRES, University of Colorado

Visiting Assistant Professor, 1973-74, Department of Physics, University of Toronto

Consultant, Summer 1974, CIRES-INSTAAR, University of Colorado

Assistant Professor, 1974-77, Department of Physics, University of Toronto

Consultant, Summer 1975, CIRES-INSTAAR, University of Colorado

Visiting Associate Professor, Spring 1976, Geophysics and Space Physics, U.C.L.A.

Associate Professor, 1977-79, Department of Physics, University of Toronto

Visiting Professor, Spring 1978, Geophysics and Space Physics, U.C.L.A.

Steacie Fellowship Leave, 1978-79, NCAR, Boulder, Colorado

Guggenheim Fellowship Leave, 1987-1988, DAMTP and Bullard Laboratories, Cambridge University, U.K.

Full Professor, 1979-1993, Department of Physics, University of Toronto

Principal Investigator, the Climate System History and Dynamics Collaborative Research Network, 1996-2004.

Sabbatical Leave, 2002-2003, Professeur Invité, Institute de Physique du Globe de Paris, Université Paris VII

Professor Invité, Institute de Physique du Globe de Paris, Université Paris VII, Summer 2004

Principal Investigator, the Polar Climate Stability Network, 2005-2011

Scientific Director, SciNet facility for High Performance Computation, 2008-

Adjunct Professor, Dept of Earth Sciences, University of Waterloo, July 2005-continuing.

Director, Centre for Global Change Science, The University of Toronto, 2005-

Visiting Professor, Dept. of Earth Sciences and Bjerknes Center for Marine Research, University of Bergen, Bergen, Norway, Summer 2006.

Professeur Invité, Ecole Normale Superieure, Paris, summer, 2009

4. Honours

Alfred P. Sloan Foundation Fellowship, 1977-1979

E.W.R. Steacie Memorial Fellowship of NSERC, 1978-1980

Kirk Bryan Award of the Geological Society of America, 1980

Killam Senior Research Fellowship of the Canada Council, 1980-82

L.G. Weeks Distinguished Lecturer, Department of Geology and Geophysics, University of Wisconsin, Madison, 1985

Fellow of the American Geophysical Union, 1986_

Fellow of the Royal Society of Canada, 1986_

John Simon Guggenheim Memorial Foundation Fellowship, 1986-1988

Fellow of Clare Hall, Cambridge University, U.K., 1988_

Cecil and Ida Green Fellow, UC San Diego, 1988 (declined in favour of Cambridge sabbatical)

Lady Margaret Lecturer, and Norman Sosnow Distinguished Visiting Scholar, Christs College, Cambridge, Fall Term 1988

Senior Fellow of Massey College, U. Toronto, 1989-

Fellow of the American Meteorological Society, 1991-

Patterson Medal of the Atmospheric Environment Service of Canada (DOE), 1992

University Professor (highest rank held by ~30 faculty), University of Toronto, 1993-

IUGG Union Lecturer - Boulder, Colorado General Assembly, 1995

Distinguished Visiting Lecturer, Global Change Institute, Pennsylvania State University, 1995

Walter H. Elsasser Memorial Lecturer, John's Hopkins University, Baltimore, 1996

Benjamin Meeker Visiting Professor, Department of Mathematics, University of Bristol, England, 1996

Presidents Lecture, IAMAS/IAPSO General Assembly, Melbourne, Australia, 1997

H. Burr Steinback Visiting Scholar, Woods Hole Oceanographic Institution, Summer 1997

Climate Center Visiting Scholar, LDEO, Columbia University, 1998

Sloan Foundation Lecturer, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, 1998

Distinguished Lecturer of the Canadian Geophysical Union, 1999-2000. (Gave a total of 20 lectures at Canadian Universities in the period October 1999 through March 2000)

R.F. Flint Lecturer, Yale University, New Haven, Connecticut, 2001

Science Watch listing as the fifth most highly cited Earth Scientist internationally in the decade 1991-2001 (based upon analysis of the Highly Cited project (Science Watch magazine, volume 12, no. 6, Nov.-Dec. 2001); this included analysis of all Earth science disciplines; geology, geophysics, atmospheric science, oceanography, etc.).

IAMAS “Sushi Lecturer”, IUGG General Assembly, Sapporo, Japan, 2003

Elected as Foreign Member to Fellowship in the Norwegian Academy of Science and Letters, 2004

Bancroft Award of the Royal Society of Canada, 2004

J. Tuzo Wilson Medal of the Canadian Geophysical Union, 2004

The Vetlesen Prize of the G. Unger Vetlesen Foundation of New York, 2004

Leiv Eriksson Fellowship of the National Research Council of Norway, 2006

Miroslaw Romanowski Medal of the Royal Society of Canada, 2006

DSc, honoris causa, The University of Waterloo, 2007

Milutin Milankovic Medal of the European Geosciences Union, 2008

Milutin Milankovic Medal Lecture, EGU meeting, Vienna, Austria, April 2008

CAP Gold Medal for Achievement in Physics, 2009

Bower Award and Prize for Achievement in Science of the Franklin Institute of Philadelphia, 2010

Bower Prize Lecture, University of Pennsylvania, Philadelphia, May 2010

Charles A. Whitten Medal of the American Geophysical Union, 2010

CAP Gold Medal Lecture, Memorial University, St. John’s, Newfoundland, June 2011

Gerhard Herzberg Canada Gold Medal in Science and Engineering of NSERC, 2011

Killam Prize in Natural Science of the Canada Council, 2012

Killam Prize Lecture, University of Alberta, November 14, 2013

Guptill Lectures, Department of Physics and Atmospheric Science, Dalhousie University, 1 departmental and 1 public, November 18, 2014.

5. Professional Affiliations

Canadian Association of Physicists

Canadian Geophysical Union - Past President

Canadian Meteorological and Oceanographic Society

Royal Astronomical Society - Fellow

Royal Meteorological Society - Fellow

European Geosciences Union

American Geophysical Union - Elected Fellow

American Meteorological Society - Elected Fellow

Geological Society of America

American Physical Society

B. ACADEMIC HISTORY

6a. Research Endeavours

atmospheric and oceanic waves and turbulence - continuing lines of research include work on Kelvin-Helmholtz and Holmboe modes of mixing, especially the process of three dimensionalization in free shear layers, internal waves forced by topography, Rossby waves forced by topography and differential heating and stratified turbulence processes.

geophysical fluid dynamics - a central focus of current activity concerns the issues of "balance" and the stability of the "slow manifold", issues that are being addressed in the context of a search for the spontaneous emission of internal wave radiation in high resolution baroclinic wave life-cycle simulations, using both oceanographic (gulf stream) and atmospheric (jet stream) models.

physics of the planetary interior - a major line of research continues to consist of work on the mantle convection problem, both from the perspective of a-priori numerical models in which the main issue is the impact of pressure induced phase transitions on the radial mixing length, and from the perspective of theory based upon seismic tomographic imaging of internal mantle density heterogeneity. A recent focus has been upon the influence of the electronic spin transition in iron on the radial mixing length of the circulation. A cornerstone of this effort continues to be the development and application of detailed viscoelastic models of the glacial isostatic adjustment process directed towards mantle viscosity measurement.

planetary climate – beginning in the early 1990's the focus of research shifted onto problems related to the evolution of the global climate system from the Late Quaternary into the modern era in which the issue of greenhouse induced global warming has become a central concern internationally. The core of this work initially involved analyses of the geodetically important problem of global sea level change, including the impact of global warming on the globally

averaged rate of sea level rise due to the increase in mean surface temperature. This work was an outgrowth of the development of the theory of global glacial isostatic adjustment which provided for the first time a detailed method whereby the melting of land ice could be mapped directly into a prediction of the space dependent rate of sea level rise. This theory now provides the basic methodology whereby modern tide gauge recordings and satellite based sea surface altimetry (TOPEX/POSEIDON data) may be filtered so as to optimally remove the contamination due to the glaciation and deglaciation of the surface that occurred during the Late Quaternary ice-age (the UofT product is distributed internationally through the Permanent Service for Mean Sea Level at http://www.pol.ac.uk/psmsl). The same theory has delivered accurate models of the topography and ice distribution in the deep past that are now employed universally to provide the surface boundary conditions required for the reconstruction of past states of the climate system using modern coupled atmosphere ocean general circulation models (this UofT product is distributed internationally through http://www-lsce.cea.fr/pmip2). Significant contributions are now being made in this area of climate system simulation by the Toronto group using the supercomputer system funded by the Canadian Foundation for Innovation (see publication list for examples). Time dependent ice thickness data sets from the ICE-5G (VM2) model of the GIA process, whose predictions have been confirmed by the GRACE time dependent gravity field measurements, have been distributed for use by the climatology and geodesy communities through http://www.sbl.statkart.no/projects/pgs/ice_models/Peltier_Ice-5G_v1.2 and through the web site of WRP hosted at Toronto.

6b. Research Awards (from 1987 only):

1987-88 Natural Sciences and Engineering Research Council of Canada (Operating)	$ 75,000
1987-88 Atmospheric Environment Service	$ 30,000
1987-88 Natural Sciences and Engineering Research Council of Canada, Infrastructure (OCLSC Supercomputer, Principal Investigator W.R.P. with 20 co-applicants)	$150,000
1988-89 CRAY Research Inc. Research Grant (60 K$ for CPU time only)	$ 83,000
1988-89 Natural Sciences and Engineering Research Council of Canada (Operating)	$ 75,000
1988-89 Atmospheric Environment Service	$ 23,000
1988-89 Natural Sciences and Engineering Research Council of Canada Infrastructure (OCLSC Supercomputer, Principal Investigator W.R.P. with 50 co-applicants)	$194,000

1989-90
CRAY Research Inc.
Research Grant (60 K$ for CPU time only) $ 85,000

1989-90
Natural Sciences and Engineering
Research Council of Canada (Operating) $ 80,000

1989-90
Natural Sciences and Engineering Research
Council of Canada (Infrastructure) $ 50,000

1989-90
Natural Sciences and Engineering
Research Council of Canada (OCLSC Supercomputer,
Principal Investigator, W.R.P. with 65 co-applicants) $194,000

1989-90
Atmospheric Environment Service $ 24,000

1989-90
Natural Sciences and Engineering Research Council of
Canada (Special Collaborative Research Grant, Canadian
Global Change Program, Royal Society of Canada, with
Digby McLaren, Bill Fyfe and Michael Dence) $250,000

1990-91
Natural Sciences and Engineering Research
Council of Canada (Operating) $ 80,000

_____ The following was for purchase of a new computer
system for the atmospheric physics group in the Department of Physics

1990-91
Natural Sciences and Engineering Research Council of
of Canada (Equipment, Principal Investigator
W.R. Peltier with Cho, Drummond,
List, Moore and Shepherd) $143,000
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1990-91
Natural Sciences and Engineering Research Council
of Canada (Infrastructure, Principal Investigator
W.R.P. with other group members) $ 45,000

1990-91
Cray Research Inc. - (Design of a new FEM-Multigrid
based AGCM) _ 60K$ for CPU time only. This grant
has primarily been employed to fund a Postdoctoral
Fellow working in the area of software development. $ 85,000

1990-91 Natural Sciences and Engineering Research Council of Canada (OCLSC Supercomputer, Principal Investigator W.R.P. plus 65 co-applicants)	$194,000
1990-91 Atmospheric Environment Service of Canada NSERC Research Grant	$ 36,000
1991-92 Department of External Affairs and International Trade - NSERC, Japan Science and Technology Fund (Arctic Cyclones and Climate)	$128,075
1991-92 Natural Sciences and Engineering Research Council of Canada (Operating)	$ 80,000
1991-92 U.S. National Oceanographic and Atmospheric Administration (Relative Sea Level Change). Funding arranged by international transfer through the Department of Supply and Services (DSS) by action of the Federal Department of Energy, Mines and Resources (EMR)	$ 57,500
1991-92 Cray Research Inc.(Design of a new FEM - Multigrid based AGCM) - 35 K$ for CPU time only	$ 56,000
1991-92 Natural Sciences and Engineering Research Council of Canada (Infrastructure, Principal Investigator W.R.P., with Cho, Drummond, List, Moore and Shepherd)	$ 45,000
1991-92 Atmospheric Environment Service of Canada NSERC Research Grant	$ 32,360
1991-92 Atmospheric Environment Service of Canada NSERC Equipment Grant in further support of the grant from the Japan Science and Technology Fund	$ 35,000
_____ The following were all connected with the NATO ARW "Ice in the Climate System"	
1992 NATO, Conference Grant as invited Director of the NATO Advanced Research Workshop at Aussois, France, September 6-11, 1992.	$1,500,000 Belgian Francs

1992
Canadian Climate Centre Grant in support
of the NATO ARW at Aussois $ 10,000

1992
Canadian Global Change Program Grant
in support of the NATO ARW at Aussois $ 10,000

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1992-93
Natural Sciences and Engineering Research Council
of Canada (Operating, first instalment of a three year award) $119,371

1992-93
Natural Sciences and Engineering Research Council of
Canada Infrastructure, Principal Investigator W.R.P. with
Cho, Drummond, List, Moore and Shepherd) $ 35,000

1992-93
Atmospheric Environment Service of
NSERC, science subvention $ 36,000

1992-93
Department of External Affairs and International Trade
NSERC, Japan Science and Technology Fund $102,600

1992-93
US National Oceanic and Atmospheric Administration
(Relative Sea Level Change) - arranged by International
transfer through DSS with support from the Federal
Department of Energy, Mines and Resources (EMR) $ 89,000

1993-94
Natural Sciences and Engineering Research Council
of Canada (Operating, 2nd instalment of a three year award) $119,371

1993-94
Natural Sciences and Engineering Research Council of
Canada (Infrastructure, Principal Investigator W.R.P.
with Cho, Drummond, List, Moore and Shepherd) $ 35,000

1993-94
Atmospheric Environment Service of Canada
- NSERC, Science Subvention $ 36,000

1993-94
Department of External Affairs and International
Trade - NSERC, Japan Science and Technology Fund $ 92,500

1993-94

US National Oceanic and Atmospheric Administration (Relative Sea Level Change) - arranged by International transfer through DSS with support from the Federal Department of Energy, Mines and Resources (EMR)	$ 32,000
1993-94 University of Toronto - University Professors Special Grant	$ 5,000
1993-94 CRAY Research Inc. - Supercomputer Time on the Y-MP multi-processor system at Mendota Heights, Minnesota	1000 hours
1994-95 Natural Sciences and Engineering of Canada (Operating, Third instalment of a three year award)	$119,371
1994-95 Natural Sciences and Engineering Research Council of Canada (Infrastructure, Principal Investigator, W.R.P. with Cho, Drummond, List, Moore and Shepherd)	$ 35,000
1994-95 Atmospheric Environment Service of Canada - NSERC, Science Subvention	$ 36,000
1994-95 University of Toronto - University Professors Grant	$ 5,000
1994-95 CRAY Research Inc. - Supercomputer time on the C90 multi-processor system at Eagan, Minnesota	1200 hours
1994-95 US National Oceanographic and Atmospheric Administration (Relative Sea Level Change) - Arranged by international transfer through DSS with support from the Federal Dept. of Energy, Mines and Resources	$ 34,250
1995-96 Natural Sciences and Engineering Research Council of Canada (Operating, First Instalment of Five-Year award)	$141,400
1995-1998 NSERC/AES Collaborative Special Project (Climate System History and Dynamics) Principle Investigator, W.R.P., plus 9 co-investigators and 10 associate investigators, W.R. Peltier portion 1995-1996, including $524,000 for Cray J916 computer system	$3,700,000 $ 750,000
1995-96	

Natural Sciences and Engineering Research Council of Canada (Infrastructure, Principal Investigator W.R.P. with Cho, Drummond, List, Moore and Shepherd)	$ 35,000
1995-96 Atmospheric Environment Service of Canada - NSERC, Science Subvention	$ 26,000
1995-96 University of Toronto University Professors Grant	$ 5,000
1996-97 Natural Sciences and Engineering Research Council Council of Canada (Operating, Second Instalment of a five year award)	$ 141,400
1996-97 NSERC/AES Collaborative Special Project (Climate System History and Dynamics Principle Investigator, W.R.P. plus 9 Co-investigators), Toronto portion	$ 410,000
1996-97 Atmospheric Environment Service of Canada Science Subvention (Atmospheric Fluid Mechanics)	$ 25,000
1996-97 University of Toronto, University Professors Grant	$ 5,000
1997-98 Natural Sciences and Engineering Research Council of Canada (Operating, third instalment of a five-year award).	$ 141,400
1997-98 NSERC/AES Collaborative Special Project (Climate System History and Dynamics, Principle Investigator W.R.P. plus 9 Co-investigators) Toronto portion	$ 240,000
1997-98 Atmospheric Environment Service of Canada Science Subvention (Atmospheric Fluid Mechanics)	$ 16,000
1997-98 University of Toronto University Professors Grant	$ 5,000
1998-1999 Natural Sciences and Engineering Research Council of Canada (Operating, fourth instalment of a five-year award)	$ 155,590

1998-1999
NSERC/AES Research Networks Grant (Climate System History and Dynamics, Principal Investigator W.R.P. plus 9 Co-Investigators) Funding for five years at the level of 1.1M$/year Toronto portion $ 250,000

1998-1999
Atmospheric Environment Service of Canada Science Subvention (Atmospheric Fluid Dynamics) $ 16,000

1998-1999
University of Toronto
University Professors Grant $ 5,000

1999-2000
Natural Sciences and Engineering Research Council of Canada (Research Grant, fifth instalment of a five-year award, inflated from the amount of the initial award of $141,400 because of across-the-board increases to NSERC funding) $163,317

1999-2000
NSERC/AES Research Networks Grant (Climate System History and Dynamics, Principle Investigator, W.R.P. plus 9 Co-Investigators) Funding for five years (1997-2002) at the level of −1.1M$/year, Toronto portion $210,000

1999-2005
CFI-OIT-U.ofT.-Computer Vendors. PSciNet - The Physical Sciences Computer Network (Principle Investigator, W.R.P. plus 8 Co-investigators). Funding for the acquisition of High Performance Computer Systems for Chemical Physics (Dept. of Chemistry), CITA, and Atmospheric Physics (Dept. of Physics). Funding for a six-year program including hardware acquisition and machine maintenance $7,380,000

2000-2001
Natural Sciences and Engineering Research Council of Canada (Research Grant, first instalment of a four-year award, an increase from the previous award of $141,400 per annum) $150,000

2000-2001
Natural Sciences and Engineering Research Council of Canada (HPC personnel support grant from the MFA award to C3.ca for support of PSciNet personnel at the University of Toronto) $80,000

2000-2001
NSERC/AES Research Networks Grant
(Climate System History and Dynamics, Principle Investigator W.R.P. plus 9 Co-Investigators)

Funding for five years (1997-2003) at the level of ~1.1 M$/year, Toronto portion	$210,000
2000-2001 Natural Sciences and Engineering Research Council of Canada, Major Facilities Access Grant to C3.ca, W.R.P. co-signatory (first year of three year award)	$800,000
2001-2002 Natural Sciences and Engineering Research Council of Canada (Research Grant, second instalment of a four-year award)	$150,000
2001-2002 Natural Sciences and Engineering Research Council of Canada, Major Facilities Access Grant to C3.ca, W.R.P. co-signatory (second year of three years award)	$800,000
2001-2002 C3.ca award in support of the University of Toronto PSciNet systems	$80,000
2001-2002 NSERC/AES Research Network Grant (Climate System History and Dynamics, Principle Investigator, W.R.P. + 9 co-investigators. Funding for five years (1998-2003) at the rate of ~1.1M$/year, Toronto portion to W.R.P.	$210,000
2001-2002 University of Toronto Grant to W.R.P. as holder of the rank of University Professor	$10,000
2002-2003 Natural Sciences and Engineering Research Council of Canada (Research Grant, third instalment of a four-year award)	$150,000
2002-2003 Natural Sciences and Engineering Research Council of Canada (Major Facilities Access Grant to C3.ca, Andrew Pollard PI, W.R.P. Co-signatory (one year award))	$600,000
2002-2003 NSERC Research Network Grant (Climate System History and Dynamics, P.I., W.R.P. + 9 co-investigators. Funding for five years at the rate of ~$810,000/year, Toronto portion for W.R.P.	~$140,000
2002-2003 University of Toronto Grant to W.R.P. as holder of the rank of University Professor	$ 10,000

2002-2003
NSERC Funding of the Canadian Water Network derived subproject grant for research in paleohydrology $ 15,000

2002-2003
GEOIDE National Centre of Excellence grant for work on a time dependent geoide for Canada` $ 27,000

2002-2003
Canadian Foundation for Innovation Grant for PsciNet II acquisition of computer systems for the University of Toronto matched by Ontario Innovation Trust. Separate systems acquired for High Energy Physics/Quantum Optics, Aero/Bio Fluid Mechanics (UTIAS/Mech. and Ind. Eng.) and Geophysical Fluid Dynamics. WRP as P.I. with 7 co-signatories $11,141,342

2003-2004
Natural Sciences and Engineering Research Council of Canada (Research Grant, 4th installment of a four-year award) Atmospheric and Geophysical Fluid Dynamics $150,000

2003-2004
University of Toronto Grant to W.R.P. as holder of the rank of University Professor $10,000

2003-2004
GEOIDE National Centre of Excellence grant for work on a time dependent geoide for Canada $27,000

2003-2004
NSERC funding from the Canadian Water Network for work in the area of paleohydrology $15,000

2003-2004
CFI funding for personnel support for operation of the NEC SX-6 vector supercomputer $198,000

2004-2005
Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 1st instalment of a five-year award Atmospheric and Geophysical Fluid Dynamics $122,300

2004-2005
CFI funding for personnel support for operation of the NEC-SC6 vector supercomputer $198,000

2004-2005
University of Toronto Grant to W.R.P. as holder of the rank of University Professor $10,000

2004-2005 GEOIDE National Centre of Excellence grant for work on a time dependent geoide for Canada	$32,000
2004-2005 Canadian Water Network National Centre of Excellence grant for work in the area of paleohydrology	$15,000
2005-2006 Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 2nd instalment of a five-year award. Atmospheric and Geophysical Fluid Dynamics	$122,300
2005-2006 CFI funding for personnel support for operation of the NEC SX-6 vector supercomputer	$198,000
2005-2006 University of Toronto Grant to W.R.P as holder of the rank of University Professor	$10,000
2005-2006 Canadian Water Network National Centre of Excellence grant for work in the area of paleohydrology	$35,000
2005-2006 CFCAS Research Network Grant for support of the Polar Climate Stability Network. This involves the five-years support for the work of PI's under the leadership of W.R.P. at a total amount of $5.275M. The W.R.P. portion is	$235,000
2006-2007 Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 3rd instalment of a five-year award, Atmospheric and Geophysical Fluid Dynamics	$122,300
2006-2007 CFI funding (IOT funds/for operation of the NEC SX-6 vector supercomputer	$198,000
2006-2007 CFCAS Research Network Grant for support of the Polar Climate Stability Network. Total support is $5.275M over five years. The W.R.P. portion for 2006-2007 is:	$235,000
2006-2007 University of Toronto grant to W.R.P. as holder of the rank of University Professor	$10,000

2007-2008
Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 4th instalment of a five-year award, Atmospheric and Geophysical Fluid Dynamics $122,300

2007-2008
CFI funding (IOT funds/for operation of the NEC SX-6 vector supercomputer $198,000

2007-2008
CFCAS Research Network Grant for support of the Polar Climate Stability Network. Total support is $5.275M over five years. The W.R.P. portion for 2007-2008 is: $235,000

2007-2008
University of Toronto grant to W.R.P. as holder of the rank of University Professor $10,000

2008-2009
CFCAS Research Network Grant for support of the Polar Climate Stability Network. Total support is $5.275M over five years. The W.R.P. portion for 2008-2009 is, PI: Paul Kushner: $235,000

2008-2012
SciNet component of the National Platform Fund Award Canadian Foundation for Innovation $15,000,000

2008-2012
SciNet – Ontario Government CFI Matching Fund To the SciNet NDF Award $15,000,000

2008-2012
SciNet – Ontario Government ORF-RE award-support of SciNet operations $8,000,000

2008-2009
Natural Sciences and Engineering Research Council of Canada, Discovery Grant,5th instalment of a five-year award, Atmospheric and Geophysical Fluid Dynamics $122,300

2008-2009
University of Toronto grant to W.R.P. as holder of the rank of University Professor $10,000

2008-2009
CNW grant, 1st instalment of a 3-year award, Climate change and continental scale hydrology" $60,000

2008-2009
NWMO grant, 1st instalment of a 3-year award
"Long Term Climate Change" $90,000

2008-2009
CFCAS – Paleo-synopses and dynamics of sea-ice cover
in the Arctic Ocean and Subarctic Canada $100,000

2009-2010
CFCAS Research Network Grant for support of the
Polar Climate Stability Network. Total support is
$5.275M over five years. The W.R.P. portion for
2009-2010 is: $235,000

2009-2010
NWMO grant, 2nd instalment of a 3-year award
"Long Term Climate Change" $90,000

2009-2010
CWN grant, 2nd instalment of a 3-year award,
Climate change and continental scale hydrology" $60,000

2009-2010
University of Toronto grant to W.R.P. as holder of
the rank of University Professor $10,000

2009-2010
CFCAS – Paleo-synopses and dynamics of sea-ice cover
in the Arctic Ocean and Subarctic Canada $100,000

2009-2010
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant,1st instalment of a five-year
award, Atmospheric and Geophysical Fluid Dynamics $145,000

2010-2011
NWMO grant, 3rd instalment of a 3-year award
"Long Term Climate Change" $90,000

2010-2011
CNW grant, 3rd instalment of a 3-year award,
Climate change and continental scale hydrology" $60,000

2010-2011
University of Toronto grant to W.R.P. as holder of
the rank of University Professor $10,000

2010-2011
OME grant, one year award "Dynamically
Downscaled climate scenarios for Ontario and the

Great Lakes Basin" $90,000

2010-2011
CFCAS – Paleo-synopses and dynamics of sea-ice cover
in the Arctic Ocean and Subarctic Canada $100,000

2010-2011
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant, 2nd instalment of a five-year
award, "Atmospheric and Geophysical Fluid Dynamics" $145,000

2011-2012
NWMO, 1st instalment of a three-year grant
"Development of the University of Toronto
Glacial Systems Model" $100,000

2011-2012
NOAA (USA), 1st instalment of a three-year grant
"Advanced Regional and Decadal Predictions of Coastal
Inundation for the US Atlantic and Gulf coasts" $32,580

2011-2012
University of Toronto grant to W.R.P. as holder of
the rank of University Professor $10,000

2011-2012
OME grant, one year award "Dynamically
Downscaled climate scenarios for Ontario
And the Great Lakes Basin" $85,000

2011-2012
Natural Sciences and Engineering research Council Strategic Grant
Paul Kushner PI
Climate change in the Arctic (WRP portion) $60,000

2011-2012
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant, 3rd, instalment of a five-year
award, "Atmospheric and Geophysical Fluid Dynamics" $145,000

2012-2013
University of Toronto grant to W.R.P. as holder of
the rank of University Professor $10,000

2012-2013
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant,
"Atmospheric and Geophysical Fluid Dynamics". $200,000
- This includes the Supplement to the original grant following
from the award of the Gerhard Herzberg Canada Gold
Medal in Science and Engineering, 2011.

2012-2014
Suncor Inc, 1st instalment of a two-year ward
"High resolution 3D Analyses of the Impact of Climate Change on Surface Water and Groundwater Resources In the Athabasca River Basin" $240,000

2012-2013
NWMO, 2nd instalment of a three-year grant
"Development of the University of Toronto Glacial Systems Model" $100,000

2012-2013
NOAA (USA), 2nd instalment of a three-year grant
"Advanced Regional and Decadal Predictions of Coastal Inundation for the US Atlantic and Gulf coasts" $49,207

2013-2014
University of Toronto grant to W.R.P. as holder of the rank of University Professor $10,000

2013-2014
NWMO, 3rd instalment of a three-year grant
"Development of the University of Toronto Glacial Systems Model" $100,000

2013-2014
Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 3rd instalment of a five-year award, "Atmospheric and Geophysical Fluid Dynamics". $200,000
- This includes the Supplement to the original grant following from the award of the Gerhard Herzberg Canada Gold Medal in Science and Engineering, 2011.

2013-2014
NOAA (USA), 3rd instalment of a three-year grant
"Advanced Regional and Decadal Predictions of Coastal Inundation for the US Atlantic and Gulf coasts" $15,926

2014-2015
University of Toronto grant to W.R.P. as holder of the rank of University Professor $10,000

2014-2015
Natural Sciences and Engineering Research Council of Canada, Discovery Grant, 4th instalment of a five-year award, "Atmospheric and Geophysical Fluid Dynamics".
- This includes the Supplement to the original grant following from the award of the Gerhard Herzberg Canada Gold Medal in Science and Engineering, 2011. $200,000

2014-2015
NWMO, 1st instalment of three-year grant
"Development of the University of Toronto Glacial
Systems Model" $140,000

2015
MOECC
"High Resolution Climate Change Projections for
Ontario and the Great Lakes Basin Region: Phase 1 $90,000

2015-2016
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant, 4th instalment of a five-year
award, "Atmospheric and Geophysical Fluid Dynamics".
- This includes the Supplement to the original grant following
from the award of the Gerhard Herzberg Canada Gold
Medal in Science and Engineering, 2011. $200,000

2015-2016
University of Toronto grant to W.R.P. as holder of
the rank of University Professor $10,000

2015-2016
NWMO, 1st instalment of three-year grant
"Development of the University of Toronto Glacial
Systems Model" $140,000

2016-2017
University of Toronto grant to W.R.P. as holder of
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2016-2017
Natural Sciences and Engineering Research Council
of Canada, Discovery Grant, 4th instalment of a five-year
award, "Atmospheric and Geophysical Fluid Dynamics".
- This includes the Supplement to the original grant following
from the award of the Gerhard Herzberg Canada Gold
Medal in Science and Engineering, 2011. $200,000

2016-2017
NWMO, 2nd instalment of three-year grant
"Development of the University of Toronto Glacial
Systems Model" $140,000

2016-2017
NSERC – CRD No. 488594-2015
"Climate forcing impacts upon uncertainties in
Boundary conditions of a repository for spent
Nuclear fuel caused by a re-glaciation of
The Canadian Shield"
1st instalment of a 2-year grant $94,000

2016-2021
Large Parallel System Upgrade for SciNet
Canada Foundation for Innovation (CFI)
Cyber Infrastructure Fund $10,000,000

2016-2021
Large Parallel System Upgrade for SciNet
Ontario Ministry of Research and Innovation $10,000,000

C. SCHOLARLY AND PROFESSIONAL WORK

7. Refereed Publications

a. Articles

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X20. W.R. Peltier and T.L. Clark, "The evolution and stability of finite amplitude mountain waves. Part II: Surface wave drag and severe downslope windstorms", *J. Atmos. Sci.*, **36**, 1498-1529, 1979.

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c. <u>Book reviews, Encyclopedia articles, Papers in Conference Proceedings, Non-Technical Articles, Technical Reports</u>

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38. W.R. Peltier, “A Design Basis Glacier Scenario”, Technical Consultant’s Report No. 06819-REP-01200-10069-R00 for Ontario Power Generation, 73 pages, 2001.

39. W.R. Peltier, “Long term climate change-glaciation”, Technical Consultants Report No. 0689-REP-01220-10113-R00 for Ontario Power Generation, 64 pages, 2003.

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42. Dennis Duffy, David Humphreys, Ross Newkirk, Richard Peltier. External Review Report for a new UOIT B.Sc. programme in Energy and the Environment for the Postsecondary Education Quality Assessment Board of Ontario, 26 pages, 2004.

43. W.R. Peltier, “Permafrost influences upon the subsurface”, Technical Consultants Report No. 06819-REP-01200-10134-R00 for Ontario Power Generation, 32 pages, 2005.

44. W.R. Peltier, “Sub-glacial hydrology effects upon spent fuel repository safety”, Technical Consultants Report No. 06820-REP-01200-10135 for Ontario Power Generation, 20 pages, 2006.

45. John R. Dudeney, W. Richard Peltier and Francisco J. Navarro, “Antarctic Research in Findland 1998-2005”, International Evaluation Report for the Academy of Findland, 56 pages, 2006.

46. W.R. Peltier, “Review of The Phanerozoic Carbon Cycle by Robert A. Berner”, American Journal of Science, 306, 774-776, 2006.

47. Bill Wakeham (Chair), Martin Barstow, Donal Bradley, Sir Mike Brady, Christine Davies, Carlos Frenk, Sir Richard Friend, Jorgen Kjerns and Richard Peltier, RCUK Physics Review Report, 93 pp., September, 2008.

48. W.R. Peltier, “Climate models: Are they compatible with Geological constraints on Earth System processes?”, Geoscience Canada, vol. 37, Number 4, 174-179, 2010.

49. W.R. Peltier, “Mantle Viscosity, Encyclopedia of Solid Earth Geophysics, Springer, Berlin, pp. 869-876, 2011.

d. Books

1. W.R. Peltier, ed., Mantle Convection, Gordon and Breach Science Publ. Inc., New York, 857 pp., 1989.

2. W.R. Peltier, ed., Ice in the Climate System, Springer-Verlag Publ. Inc., Berlin, 673 pp., 1993.

3. W.R. Peltier, The Ice Age Earth: Geodynamics and Climate Dynamics, Cambridge University Press, invited, to be completed in 2016.

8. Papers Presented at Meetings and Symposia

numerous but no record

9. Invited Lectures

1. "The viscosity of the Earth's mantle", *CAP meeting*, St. John's, Newfoundland, 1974.

2. "Visco-elastic Earth models", *Gordon Conference* in Geophysics, New Hampshire, 1974.

3. "Viscous-gravitational relaxation", *WHOI/MIT* summer school in GFD, Woods Hole Massachusetts, 1975.

4. "A normal mode formulation for glacial isostasy", *Penrose Conference*, Vail, Colorado, 1975.

5. "Mountain lee waves and Seismic Sea Waves", York University CRESS, 1975.

6. "Glacial isostatic adjustment", Earth Physics, Ottawa, 1975.

7. "Case study of a squall line trigger mechanism", University of Colorado, CIRES, 1975.

8. "Ice sheets, oceans, and the Earth's shape", Princeton University, 1976.

9. "Geophysical fluid dynamics", eight lectures, UCLA, Spring 1976.

10. "The inverse problem for mantle viscosity", IGPP La Jolla, California, Spring 1976.

11. "Visco-elastic models of planets", Lawrence Livermore Laboratories, 1976.

12. "Ice sheets, oceans and the Earth's shape: their response to climatic change", University of Chicago, 1976.

13. "Postglacial sea levels", Dalhousie University, 1977.

14. "Ice sheets, oceans and the Earth's shape", IUGG Stockholm Conference on Postglacial Sea levels, Sweden, 1977.

15. "Glacial Isostasy", IASPEI Durham England Conference on Numerical methods in Geodynamics, 1977.

16. "Glacial Isostasy and the viscosity of the planetary mantle", 3 lectures, *NATO Summer School* in Corsica, France, on the Dynamics of the Earth's Interior, 1977.

17. "Internal waves and turbulence", 2 lectures, Harvard University, 1978.

18. "Geophysical fluid dynamics", 5 lectures, UCLA, 1978.

19. "Postglacial rebound and mantle convection", Columbia University, 1978.

20. "Resonant instabilities of nonlinear internal waves" University of Chicago, 1978.

21. "A finite element model of postglacial sea level variations", Cal. Inst. Tech., 1978.

22. "Mantle convection", Jet Propulsion Laboratory, Cal Tech, Pasadena, California, 1978.

23. "The stability of finite amplitude internal waves", NCAR, Boulder, Colorado, 1979.

24. "Mantle convection and viscosity", Enrico Fermi Summer School in Physics, Lago di Como, Italy, 1979.

25. "The viscosities of the planetary mantle", IUGG Canberra Australia, 1979.

26. "Mantle convection", IUGG International Geodynamics Project Workshop U.W.O., 1979.

27. "The inverse problem for mantle viscosity", Northwestern University, 1979.

28. "Mantle convection and viscosity", M.I.T, 1979.

29. "Breaking internal waves and the turbulence cascade in stratified flows", Harvard University, 1979.

30. "Continental Drift", Department of Physics, University of Montreal, 1979.

31. "Glacial Isostasy and Climatic Change", Courant Institute of Mathematical Sciences, (New York University), 1980.

32. "Mantle convection as a boundary layer phenomenon", Columbia University, 1980.

33. "Parameterized mantle convection", IUGG sponsored mathematical methods Conference at UCLA, 1980.

34. "Internal waves and Turbulence", Florida State University, 1980.

35. "A new method for inferring the volume concentration of radioactivity in the Earth's mantle", Georgia Institute of Technology, 1980.

36. "Mantle convection as a boundary layer phenomenon", State University of New York at Buffalo, 1981.

37. "Mantle convection as a boundary layer phenomenon", NATO Advance Study Institute, University of Newcastle_upon_Tyne, England, 1981.

38. "Thermal evolution of the Earth since accretion", American Geophysical Union Spring Meeting, Session in Precambrian tectonics, 1981.

39. "The Dynamics of the ice Age earth", Department of Physics, University of Western Ontario, 1981.

40. "Mantle Viscosity Stratification: a Constraint on the Style of Convective Mixing", American Geophysical Union Fall Meeting, San Francisco, 1981.

41. Three Lectures. "Glacial Isostasy and Climatic Change", "1_2 Chaos: the Transition to

Turbulence in Stratified Parallel Flows", "Resonant Amplification of Topographically Forced Internal Waves", Harvard University, 1982.

42. "The thickness of the continental lithosphere", International Conference on Mathematical Geophysics, Chateau de Bonas, Bonas, France, 1982.

43. "The rheology of planetary interiors", Keynote address at the annual meeting of the Rheological Society of America, Northwestern University, 1982.

44. "Acceleration in the node of LAGEOS", NASA, Washington, D.C., January 1983.

45. "The Pleistocene Ice Age", Department of Geology, University of Toronto, January 1983.

46. "Turbulence transition in stratified parallel flows", Eng. Found. Conf. Santa Barbara, California, March 1983.

47. Two lectures on the Ice Age, Department of Physics, Trent University, March 1983.

48. "RSL constraints on the timing of the last deglaciation", NATO Conf. Airlie House Virginia, May 1983.

49. "Glacial isostasy and climatic change", Northwestern University, 1983.

50. "Glacial isostasy and the viscosity of Earth's mantle", Columbia University, August 1983.

51. "Convection in the Earth", Columbia University, November 1983.

52. "Mantle viscosity and Pleistocene Climatic Change", Northwestern University, January 1984.

53. "Space geodesy and geodynamics", Earth Physics EMR Ottawa, January 1984.

54. "A theory of the Ice Age Cycle", Brown University, February 1984.

55. "The transition to turbulence in nonlinear KH billows", Princeton University, Geophysical Fluid Dynamics Laboratory, February 1984.

56. Two invited lectures. (1) "The transition to turbulence in finite amplitude Kelvin_Helmholtz billows" and (2) "A model of the ice age cycle". To the annual meeting of the *Canadian Geophysical Union* and the *Canadian Meteorological and Oceanographic Society*. Halifax, Nova Scotia, May 1984.

57. Two invited lectures. (1) "Mantle convection and plate tectonics", and (2) "Glacial isostatic adjustment and the theory of Pleistocene ice ages". The University of Oslo, Oslo, Norway, June 1984.

58. Two invited lectures. (1) "Radial structure of the mantle convective circulation", and (2) "The viscosity of the earth's mantle". At the IUG meeting in Moscow, USSR, August, 1984.

59. "Slow changes in the Earth's shape and gravitational field: signatures of glacial isostasy". Chapman conference on Vertical Crustal motion, measurement and modelling. Harpers' Ferry West Virginia, October 1984.

60. "The kinematic, gravitational, and thermal signatures of mantle convection and glacial isostasy". NASA Conference on the Geopotential Research Mission. University of Maryland, October 29_31, 1984.

61. "Pleistocene deglaciation, glacial isostatic adjustment, and variations in the level of the sea". All Union Symposium on sea level variations and climatic change, San Francisco, AGU, December 1984. (Sponsored by the National Academy of Science).

62. "Mantle Convection and lateral heterogeneity". Colloquium to the Earth Physics Branch of E.M. and R., Ottawa, Ontario, March, 1985.

63. "Glacial isostasy and relative sea level change". Annual meeting of the CGU, University of New Brunswick, Fredericton, N.B., May, 1985.

64. "A model of the ice age cycle". *NATO ASI* and *European Solvay Conference* on Dynamical Systems Models in the Geosciences, Crete, Greece, July, 1985.

65. "Sea Level variations in the ice age". IAPSO session on sea level variations and climatic change, Honolulu, Hawaii, August, 1985.

66. Two invited lectures to sessions at the IASPEI meeting. "Mantle discontinuities and internal buoyancy: the distinction between phase change and chemical discontinuities", and "Mantle convection and lateral heterogeneity", Tokyo, Japan, August, 1985.

67. "Glacial Isostasy and the Ice Age". All Laboratory Scientific Colloquium, the *Goddard Space Flight Center*, Greenbelt, Maryland, October, 1985.

68. Two lectures, "An astronomical theory of the ice age cycle" and "Glacial isostasy and the ice age" as L.G. Weeks distinguished lecturer to the Department of Geology and Geophysics, The University of Wisconsin, Madison, October, 1985.

69. "The transition to turbulence in finite amplitude Kelvin_Helmholtz billows". *CCIW*, Burlington, Ontario, January 21, 1986.

70. "Mantle phase transitions and glacial isostasy". The University of California at Berkeley, February 4, 1986.

71. Two lectures, "Cyclogenesis in frontal zones" and "Sea level variations in the ice age", University of Washington, Seattle, February 1986.

72. Two lectures, "Glacial isostasy and the astronomical theory of ice ages" and "Breaking waves in stratified rotating flows" to the Departments of Geophysics and Applied Mathematics and Theoretical Physics, Cambridge University, Cambridge, England, February 1986.

73. "Mantle convection". *The Royal Astronomical Society*, London, England, February 4, 1986.

74. "Glacial isostasy and the astronomical theory of the ice age". Harvard University, Cambridge, Massachussetts, April 16, 1986.

75. "Glacial isostasy and the ice age", The University of Maine, Orono Maine, April 1986.

76. "Mantle convection and seismic tomography", The *Circumpacific Conference*, Singapore, August 1986.

77. "The resonant amplification of nonlinear mountain waves", invited paper to the special symposium on topographic effects at the *European Centre for Medium Range Weather Forecasts*, Reading, England, September, 1986.

78. "Nonseparable Baroclinic Instability and the Origin of Frontal Cyclones", Department of Meteorology, The University of Reading, Reading, England 1986.

79. Two Lectures, "Mantle convection and seismic tomography" and "Nonseparable baroclinic instability and the origin of frontal cyclones", The Massachussetts Institute of Technology (MIT), Boston, October, 1986.

80. "Space geodesy and geodynamics", Department of Physics, University of Montreal, Montreal, November, 1986.

81. "Glacial isostasy and the astronomical theory of ice ages", California Institute of Technology, (Cal Tech), Pasadena, California, February, 1987.

82. "Sea level variations and climate change", invited paper to the "Fourth AMS Conference on Climate Variations: Climate Update", (organizer G. North) Baltimore, Maryland, March, 1987.

83. "Mantle convection and seismic tomography", invited paper to the All Union session on Earth System Science (organizer R. Price) at the AGU Spring Meeting in Baltimore, Maryland, May 1987.

84. "Mantle convection and seismic tomography", Goddard Space Flight Center, Greenbelt, Maryland, September, 1987.

85. "The Astronomical Theory of Ice Ages", Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge University, U.K., October, 1987.

86. "Breaking Internal Waves", Department of Meteorology, The University of Reading, Reading, U.K., October, 1987.

87. "Cyclogenesis in Frontal Zones", The Hooke Institute, Oxford University, Oxford, U.K., October, 1987.

88. "Glacial Isostatic Adjustment and Pleistocene Climatic Change", Departments of Geology, Geography and Geophysics, The University of Edinburgh, Edinburgh, U.K., November, 1987.

89. "Vortex Merging Instabilities", Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge University, Cambridge, U.K., November, 1987.

90. "Global Models of Glacial Isostasy", The Scott Polar Research Institute, Cambridge University, Cambridge, U.K., November 1987.

91. "Mantle Convection and Seismic Tomography", Bullard Laboratories, Dept. of Earth Sciences, Cambridge University, Cambridge, U.K., December 1987.

92. "Global Models of Glacial Isostasy", Department of Geology, Cornell University, Ithaca, N.Y., February, 1988.

93. "Global Models of Glacial Isostasy", NATO Advanced Studies Institute on Seismicity of Glaciated Cratons, Vordingbord, Denmark, May, 1988.

94. "The Anatomy of the 10^5 Year Ice Age Cycle", Columbia University _ The Lamont_Doherty Observatory, May, 1988.

95. "Nonlinear Waves in Fluids: The Olympic Connection", Second Inaugural Meeting of the Nonlinear Studies Group, Dept. of Physics, University of Toronto, May, 1988.

96. "Ice Ages of Planet Earth", Lady Margaret Lecture to the Fellows and students of Christs College, Cambridge University, U.K., October, 1988.

97. "Breaking internal waves and wave, mean-flow interaction", Department of Meteorology, University of Stockholm, Sweden, October, 1988.

98. "Glacial Isostatic Adjustment Effects on tide gauge measures of the secular rate of change of global sea level", Woods Hole Oceanographic Institution, to the meeting of the IAPSO Commission on Mean Sea Level, Woods Hole, Massachusetts, November, 1988.

99. "Breaking internal waves and wave, mean-flow interaction", Department of Meteorology, McGill University, Montreal, November, 1988.

100. "Mantle convection and core mantle boundary topography", SEDI Symposium, AGU Meeting, San Francisco, December, 1988.

101. "Breaking Internal Waves and Wave, Mean-Flow Interaction", UTME Fluid Mechanics Seminar, University of Toronto, February, 1989.

102. "Global Change", Physics Club, University of Western Ontario, March, 1989.

103. "Hydrodynamic Instability and Transition", to the Geophysical Fluid Dynamics Laboratory and the Department of Geology and Geophysics, Princeton University, March, 1989.

104. "Models of Paleoclimatic Change", IUGS meeting on Global Change, Interlaken, Switzerland, April, 1989.

105. "Breaking Internal Waves and the Origin of the Chinook", Supercomputer Institute, University of Minnesota, May, 1989.

106. "Global Sea Level Rise and the Greenhouse Effect: Might they be connected?", Florida State University, Tallahassee, Florida, May, 1989.

107. "Models of the Mid-Pleistocene Climatic Transition", Royal Society of Edinburgh, Symposium on Late Cenozoic Ice Ages, Edinburgh, Scotland, June, 1989.

108. "Mantle Convection and Seismic Tomography", IGC, Washington, D.C., Symposium on Large Scale Earth Structure, July, 1989.

109. "Supercomputer Models of Whole Mantle Convection", IGC, Washington, D.C., Symposium on Supercomputers in the Earth Sciences, July, 1989.

110. "A short course of 5 lectures entitled Glacial Isostasy and the ice age" to the Institute for Quaternary Research, University of Washington, Seattle, October 2 - October 7, 1989.

111. "Breaking internal waves and wave-mean flow interaction", to the Department of the Atmospheric Sciences, University of Washington, Seattle, October 6, 1989.

112. "The rheology of the planetary mantle", Keynote address to the *First Inter-American Conference on Rheology*, Montreal, Quebec, October 25, 1989.

113. "How the climate system works: the role of ice sheets", Lehigh University (part of a 2 day "trio performance" on climate change with Suki Manabe of Princeton University and Wally Broecker of Columbia University), October 26-27, 1989.

114. "Breaking internal waves and wave, mean-flow interaction", NASA, The Goddard Institute for Space Studies (GISS), New York City, October 30, 1989.

115. "Postglacial sea level change", The Lamont Doherty Geological Observatory of Columbia University, November 1, 1989.

116. "Glacial isostasy and the ice age", The Lamont Doherty Geological Observatory of Columbia University, All Laboratory Colloquium, November 3, 1989.

117. "Global sea level rise: a geophysical signature of climate change", The Goddard Space Flight Centre, Washington, D.C., November 14, 1989.

118. "Global sea level rise: a geophysical signature of climate change", The Bedford Institute of Oceanography, Halifax, Nova Scotia, November 27, 1989.

119. "Geodetic Signatures of Glacial Isostasy", *AGU Fall Meeting*, San Francisco, December, 1989.

120. "Global Sea Level Rise: a geophysical signature of global change", *AGU Fall Meeting, Union Session*, San Francisco, December, 1989.

121. "Planetary Thermal History", *AGU Fall Meeting, Union Session*, San Francisco, December, 1989.

122. "Planetary Dynamics in the Ice Age", Departments of Physics and Geology, McMaster University, Hamilton, February 6, 1990.

123. "Global Sea Level Rise: a geophysical signature of global change", Geophysical Sciences Department, Yale University, New Haven, Connect., February 21, 1990.

124. "Small Scale Models of Large Scale Processes", *Recherche en Prevision Numerique and Instit. for Mesoscale Res*., Dorval, Quebec, March 6, 1990.

125. "Global Change and Canada", *First Annual Assembly of the Canadian Global Change Program*, Toronto, Ontario, April 18, 1990.

126. "Global Sea Level Rise", Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, May 2, 1990.

127. "Canada and Global Change", McGill University, Centre for Climate and Global Change Research, May 9, 1990.

128. "Pleistocene Glaciation and Global Dynamics", *Plenary Address to the Canadian Geophysical Union*, Ottawa, Ontario, May 23, 1990.

129. "Global Sea Level Rise and Global Change", *Plenary Address to the Canadian Meteorological and Oceanographic Society*, Victoria, B.C., May 30, 1990.

130. "Breaking Internal Waves and Wave_Mean Flow Interaction", Symposium on Nonlinear Phenomena in Atmospheric and Oceanographic Sciences, IMA, U. Minnesota, June 6, 1990.

131. "Mantle Viscosity and Convection", to the Symposium on Chaotic processes in the Geological Sciences, Institute of Mathematics and its Applications (IMA), U. Minnesota, June 11, 1990.

132. "Global Warming???", *Plenary Address to the Annual Meeting of the Canadian Association of Physicists*, St. John's, Newfoundland, June 19, 1990.

133. "Global Warming", Invited address to the *National Roundtable on the Environment and the Economy* (Geraldine Kenney-Wallace, Chair), Four Seasons Hotel, Toronto, Ontario, July 24, 1990.

134. "The ICE_3G Model of Late Pleistocene Deglaciation: Construction, Verification and Applications", NATO Summer School on the Rheology of the Planetary Interior, Erice, Italy, August 2, 1990.

135. "The Canadian Global Change Program", Meeting of the Scientific Advisory Committee for the International Geosphere-Biosphere Program, Paris, France, September 4, 1990.

136. "Paleoclimatology, Solid Earth Geophysics and Global Change", on the occasion of a Scientific Symposium to mark the opening of the new Earth Sciences Building, Memorial University, St. John's, Newfoundland, September 24, 1990.

137. "Breaking internal waves", U. California at Berkeley, December 4, 1990.

138. "Glacial Isostasy and the free air gravity anomaly as a constraint on deep mantle viscosity", *AGU winter meeting*, San Francisco, December 3, 1990.

139. "Radiocarbon dating and postglacial sea level", NATO Advanced Study Institute, Erice, Italy, December, 1990.

140. "Canadian initiatives in Global Change", Meeting of the Chairpersons of the National Committees for the IGBP, *The Royal Society*, London, England, February 4, 1991.

141. "Orbital Forcing and Response", Meeting of the Scientific Steering Committee of the IGBP core project on Past Global Changes (PAGES), Mainz, FRG, March 14, 1991.

142. "Chaotic convection and the Thermal Evolution of Planets", as Canadian Association of Physicists lecturer to the Department of Physics, Laurentian University, Sudbury, Ontario, April 2, 1991.

143. "Imaging hydrodynamic complexity with supercomputers", to the meeting of the *American Physical Society*, Rochester, New York, April 5, 1991.

144. "Mesoscale structure in mid-latitude cyclones", to the meeting of the *Japan-Canada Project*, Tokyo, Japan, April 17, 1991.

145. "Canadian initiatives in geophysics from space", to the special scientific meeting held on the occasion of the 1991 CGU meeting on prospects for a Canadian Institute for Space Research, Banff, Alberta, May 9, 1991.

146. "Models of the Ice Age Cycle", to the *NATO Advanced Research Workshop* on Paleoclimate Modelling, Paris, France (Saclay) May 29, 1991. Also scientific summary on "Theoretical Models" together with John Imbrie of Brown University, May 31, 1991.

147. "Imaging hydrodynamic complexity with supercomputers", to the 4th annual Canadian Supercomputer Symposium, University of New Brunswick, June 3, 1991.

148. "Japanese and Canadian Environmental Issues", as Canadian respondent to the speech of Dr. Jiro Kondo (Chairman of the Science Council of Japan) at the Japan-Canada Workshop on the Environment, Department of External Affairs and International Trade, Crush Conference Room, Ottawa, June 26, 1991.

149. "Current Status of the Astronomical Theory of Ice Ages", to the NASA sponsored Symposium in Orbital, Rotational, and Climate Interactions, John's Hopkins University, July 9, 1991.

150. "International and National Programs in Global Environmental Change", to the NSERC Special Collaborative Grants Committee, Ottawa, Ontario, Canada, July 19, 1991.

151. "Glacial Isostasy and Global Sea Level Rise", Union Symposium to the IUGG Assembly, Vienna, Austria, August 18, 1991.

152. "The Canadian Global Change Program", to the Workshop on Ocean Circulation Modelling, the Canadian Climate Program, Pacific Geoscience Centre, Victoria, British Columbia, October 24, 1991.

153. "Models of astronomically forced climate change", to the Dahlem Conference on Global Changes in the Perspective of the Past, Berlin, Germany, December 7-14, 1991.

154. "Mantle Phase transitions and layered chaotic convection", Department of Geology, U. Toronto, January 14, 1992.

155. "Mantle Phase transitions and layered chaotic convection", Ottawa-Carleton Institute of Physics, Carleton and Ottawa Universities, Ontario, January 30, 1992.

156. "Mantle convection and seismic tomography", Harvard University, Cambridge, MA, February 4, 1992.

157. "The Greenhouse Effect", Toronto area physicians and surgeons dinner meeting (The Aesculapian Club), The York Club, Toronto, March 20, 1992.

158. "Mantle phase transitions and layered chaotic convection", Queen's University, Kingston, Ontario, March 24, 1992.

159. "Major issues in Paleoclimate Research", to the Toronto Workshop on Climate System Research, Toronto, Ontario, May 5, 1992.

160. A Series of Lectures in Geophysical Fluid Dynamics and Paleoenvironmental Reconstruction at the Universit de Louvain la Neuve, Belgium, May 16-26, 1992.

161. "The Greenhouse Effect", The Engineering Society of Ontario, Toronto, May 28, 1992.

162. "Phase Transition Physics and Mantle Mixing", CGU-AGU joint meeting, Montreal, Quebec, May 14, 1992.

163. "Future research trends in the atmospheric sciences", to the Special Session on Future Research Trends in the Earth Sciences, GAC meeting, Wolfville, Nova Scotia, May 26, 1992.

164. "Global models of late Pleistocene deglaciation based upon geophysical models of postglacial sea level change", Lamont-Doherty Geological Observatory, Columbia University, June 1, 1992.

165. "Mantle phase transitions and layered chaotic convection", IUGG Mathematical Geophysics Meeting, Taxco, Mexico, June 21, 1992.

166. "Breaking internal waves over localized topography", as principal lecturer to the Canadian Applied Mathematics Society Meeting on Wave Phenomena II: Modern Theory and Applications, June 15-18, Edmonton, Alberta, 1992.

167. "Ice age climate: the chaotic dynamics of orbitally forced models of the 10^5 year cycle", to the Nato Advanced Studies Institute on Long Timescale Climate Variations, as Principal Lecturer, Siena, Italy, October 6, 1992.

168. "Environmental Physics" for the Arts and Science Saturday mini-lecture series at the University of Toronto, October 17, 1992.

169. "Mantle viscosity, phase transitions, and layered chaotic convection", California Institute of Technology (Cal Tech), Pasadena, California, November 16, 1992.

170. "Breaking internal waves over localized topography", U. Cal. San Diego, Dept. of Physical Oceanography, Scripps Institution of Oceanography, November 18, 1992.

171. "Mantle phase transitions and chaotic convection", U. Cal. San Diego, Institute of Geophysics and Planetary Physics, November 19, 1992.

172. "The astronomical theory of ice ages", to the Royal Canadian Institute, November 29, Toronto, 1992.

173. "Mantle phase transitions and layered convection", to the special session on Mantle Discontinuities at the winter meeting of the AGU, San Francisco, CA, December 7, 1992.

174. "Mantle viscosity and global dynamics: The Compatibility of Inferences from Glacial Isostasy and Convection Related Constraints", to the special all Union Symposium entitled "500 years after the voyage of Columbus: the changing shape of the earth", winter meeting of the AGU, San Francisco, CA, December 8, 1992.

175. "Breaking Internal Waves over Localized Topography", Centre for Earth and Ocean Research, University of Victoria, March 5, 1993.

176. "Global Dynamics of Planetary Evolution", Lecture for the Symposium entitled "The Connected Earth" inaugurating the Program in Earth and Ocean Sciences of the University of British Columbia, March 5-6, 1993.

177. "Pattern Forming Instabilities in Baroclinic Jets", to the Fields Institute for Research in Mathematical Science Seminar on Applications of Pattern Formation, U. Waterloo, March 26, 1993.

178. "Mantle convection with multiple phase transformations", Goddard Space Flight Center, NASA, Greenbelt, Maryland, April 20, 1993.

179. "Phase transition modulated mantle mixing", Institute for Terrestrial Magnetism and the Geophysical Laboratory of the Carnegie Institution, Washington, D.C., April 23, 1993.

180. "Phase transition modulated mantle mixing: implications for the Wilson Cycle", All Union Session, AGU Spring Meeting, Baltimore, MD, May 24, 1993.

181. "The asthenosphere beneath the continents: evidence of boundary layer instability", Asthenospheres Session, AGU Spring Meeting, Baltimore, MD, May 26, 1993.

182. "Mantle viscosity constraints from postglacial rsl variations in the far field", Rheology Session, AGU Spring Meeting, Baltimore, MD, May 28, 1993.

183. "The asthenosphere beneath the continents: evidence of boundary layer instability", Mantle Convection Workshop, Isle d'Olron, France, June 22, 1993.

184. "Mantle phase transitions and layered convection", Mantle Convection Workshop, Los Alamos National Laboratory, Los Alamos, New Mexico, July 13, 1993.

185. "Constraints on tomography based models of mantle mixing", Mantle Convection Workshop, Los Alamos National Laboratory, Los Alamos, New Mexico, July 13, 1993.

186. "Mantle convection with multiple phase transitions", Mantle Dynamics Workshop, Pistina, Czech Republic, July 29, 1993.

187. "A new model of late Pleistocene deglaciation suitable for use in GCM paleoclimate model experiments", PAGES Workshop, Berne, Switzerland, August 24, 1993.

188. "Tropopause folds in a high resolution model of a baroclinic wave life cycle", to the NATO ARW on Troposphere-Stratosphere Exchange, Cambridge U., Cambridge, England, September 7, 1993.

189. "Glacial isostatic adjustment and ice age paleotopography", NATO ARW on strategies for use of paleoclimate data sets in climate model intercomparison and evaluation, Aussois, France, October 23, 1993.

190. "Nonlinear dynamics and long timescale climate system evolution", Institute for Environmental Sciences, University of Toronto, November 18, 1993.

191. Two Lectures "Isostatic adjustment based reconstructions of great continental ice sheets at LGM" and "Global energy balance coupled ice sheet models of the ice-age cycle" to the NSF sponsored meeting on the Laurentide Ice Sheet, Corvallis, Oregon, December 3-4, 1993.

192. "Glacial isostatic adjustment: A complete gravitationally self-consistent theory with time dependent ocean functions", to the AGU Union Symposium "From Artificial Satellites to the Origin of the Solar System": A tribute to Bill Kaula, San Francisco, California, December 6, 1993.

193. "The Laurentide ice sheet: reconstruction via postglacial rsP inversion and climate model prediction", AGU Fall meeting, December 9, San Francisco, California, 1993.

194. "Breaking internal waves over localized topography", Winter meeting of DASP (CAP Division of Aeronomy and Space Physics), York University, February 21, 1994.

195. "Mantle phase transitions and layered chaotic convection", Northwestern University, Evanston, Illinois, February 25, 1994.

196. "Three dimensionalization of barotropic vortices on the f-plane", Max Planck Institute for Meteorology, Hamburg, Germany, March 17, 1994.

197. "A standard model for the global process of glacial isostatic adjustment", International Earth Rotation Service meeting, Paris Observatory, Paris, France, March 21, 1994.

198. "Breaking internal waves and wave, mean flow interaction", Canadian Network for Space Research, Lake Louise, Alberta, March 25, 1994.

199. "Gravity Wave Drag", Physics Department Colloquium, University of Western Ontario, London, Ontario, March 30, 1994.

200. "Ice Age Geodynamics", to the LOGAN Club, Geological Survey of Canada, Ottawa, Ontario, April 7, 1994.

201. "Breaking Internal Waves", Atmospheric Environment Service of Canada, Dufferin Street Laboratories, Toronto, Ontario, April 21, 1994.

202. "Phase transition effects on mantle mixing", to the 4th International SEDI Symposium, Whistler Mountain, B.C., Canada, August 10, 1994.

203. "Ice age paleotopography", to the joint US-Russian workshop on 'Paleocalibration of Climate Sensitivity', Silver Spring, Maryland, August 15, 1994.

204. "Sea level variations through the ice age:", for the 2nd Forum Annuel en Sciences Marine du Quebec, Quebec City, November 24-25, 1994.

205. "Topographically Self-Consistent Sea Levels and LGM Ice Sheet reconstructions", Special Session on Advances in Modelling former northern hemisphere ice sheets, San Francisco, CA, December 5, 1994.

206. “Earth rotation and glacial isostasy”, to the special AGU Union Symposium entitled "From the Earth's Deep Interior to Jupiter's Red Spot: The Continuing Legacy of Ray Hide", San Francisco, CA, December 6, 1994.

207. "Vortex erosion and amalgamation in a new model of large scale flow on a sphere", CERCA, Montreal, January 18, 1995.

208. "Phase transition modulated mixing and the viscosity of the deep mantle", to the Royal Society of London discussion meeting on Developments in High-Pressure, High-Temperature Research and the Study of the Earth's Deep Interior, London, England, January 24-25, 1995.

209. "The mixing transition in stratified parallel flows", Department of Mathematics, U. of Newcastle-upon-Tyne, January 27, 1995.

210. "Mixing in the mantle of the Earth and in the stratosphere of Jupiter", Dept. of Geophysics and Astronomy, University of British Columbia, February 6, 1995.

211. "Postglacial variations in the level of the sea", As Distinguished Visiting Lecturer to the Global Change Institute, Pennsylvania State University, State College Pennsylvania, February 23, 1995.

212. "Phase transition effects on mantle mixing", Department of Physics, McMaster University, Hamilton, Ontario, March 8, 1995.

213. "Mixing in the mantle of the Earth and 'unmixing' in the stratosphere of Jupiter", Department of Physics, Syracuse University, Syracuse, N.Y., March 23, 1995.

214. "Earth rotation and geoidal effects of past and present climate change: Global glacial isostasy", to the special EGS1 Symposium on Geophysical Effects of Past and Present Climate Change, EGS Meeting, Hamburg, Germany, March 4, 1995.

215. "Vortex erosion and amalgamation in a new model of large scale flow on the sphere", EGS Meeting, Hamburg, Germany, March 5, 1995.

216. "Mantle convection and global seismic tomography: towards a geodynamically self-consistent inference of mantle viscosity", EGS Meeting, Hamburg, Germany, March 6, 1995.

217. "Global glacial isostatic adjustment: a reference model", to the International Earth Rotation Service Workshop, Paris Observatory, Paris, France, May 10, 1995.

218. "Global glacial isostatic adjustment: a probe of deep Earth structure", Institute du Physique du Globe, Paris, France, May 12, 1995.

219. "Global glacial isostatic adjustment and postglacial relative sea level change", to the EISMINT Workshop on ice sheet-lithosphere interactions, Fort William, Scotland, May 18, 1995.

220. "Earth rotation through the ice age", American Geophysical Union, Baltimore, May 30, 1995.

221. "Topographically self-consistent post-glacial sea levels", American Geophysical Union, Baltimore, May 30, 1995.

222. "VLBI baseline variations from the ICE-4G model of postglacial rebound", American Geophysical Union, Baltimore, May 30, 1995.

223. "Dynamic Complexity in three geophysical fluids", IUGG Union Lecture, Boulder, Colorado, General Assembly, July 6, 1995.

224. "Mantle viscosity from the formal inversion of the geodetic signatures of postglacial rebound", to the IUGG Union Symposium on Inverse Theory, Boulder, CO, July 10, 1995.

225. "Three Lectures on glacial isostasy and relative sea level change", to the EISMINT Summer School on Ice Sheet Modelling, Grindelwald, Switzerland, Sept. 1-6, 1995.

226. "Breaking internal waves and the nonlinear critical layer", to the EUROMECH Conference on stratified flows, Lyon, France, Sept. 7, 1995.

227. "Dansgaard-Oeschger Oscillations", to the First GAIM Science Conference, Garmisch-Partenkirchen, Germany, September 25, 1995.

228. "Dansgaard-Oeschger Oscillations", Keynote address to the Fifth International Conference on Paleoceanography, Halifax, Nova Scotia, October 12, 1995.

229. "Paleoclimate modelling", to the meeting of the Canadian Climate Research Network, Halifax, Nova Scotia, October 13, 1995.

230. "Ice Ages", to the Department of Atmospheric Sciences of the Chinese Academy of Sciences, Beijing, China, October 30, 1995.

231. "Glacial Isostatic Adjustment and Global Sea Level Rise", AGU Conference on global sea levels, Key Biscayne, Florida, November 15, 1995.

232. "Breaking Atmospheric Waves", At the British Meteorological Office, Bracknell, England, November 21, 1995.

223. "The Inverse Problem for Mantle Viscosity", Bullard Labs., Cambridge University, England, November 22, 1995.

234. "Phase transition effects on Mantle Mixing", Department of Applied Mathematics and Theoretical Physics, Cambridge University, England, November 23, 1995.

235. "The Inverse Problem for Mantle Viscosity", Imperial College London, England, November 24, 1995.

236. "Ice Age Terminations and Terrigenous Dust", Niels Bohr Institute, The University of Copenhagen, Denmark, November 27, 1995.

237. "Dynamic Complexity in Three Geophysical Fluids", Niels Bohr Institute, The University of Copenhagen, Denmark, November 27, 1995.

238. "Glacial Isostatic Adjustment: A Probe of Earth's Deep Interior", California Institute of Technology, December 6, 1995.

239. "The Inverse Problem for Mantle Viscosity", IGPP- Scripps Institution of Oceanography, University of California at San Diego, December 8, 1995.

240. "Global Glacial Isostatic Adjustment", Departments of Ocean Sciences and Geophysics, University of California at Santa Cruz, Santa Cruz, California, December 10, 1995.

241. "Glacial Isostatic Adjustment and Earth Rotation", to the San Francisco AGU Union Session on Studies of Earth Rotation, San Francisco, California, December 14, 1995.

242. "Global Sea Level Rise and Glacial Isostasy", to the San Francisco AGU Union Session on Geophysical Effects of Climate Change, San Francisco, California, December 17, 1995.

243. "Geophysical Constraints on the Melting of Ice Sheets and Glaciers - the Mark Meier Symposium", San Francisco AGU, San Francisco, California, December 13, 1995.

244. "An explicit model of the 100 kyr ice-age cycle", LDEO-Columbia University, March 27, 1996.

245. "Dynamics of the ice-age Earth", Dept. of Earth Sc., U. Western Ontario, London, April 3, 1996.

246. "Three lecturers as Walter H. Elsasser Memorial Lecturer, Department of Earth and Planetary Sciences, The John's Hopkins University, April 15-17, 1996.
(1) "Dynamics of the Ice-Age Earth"
(2) "Coherent Structures in Stratified Rotating Turbulence"
(3) "Mantle convection: models a-priori and models tomographic"

247. Dansgaard-Oeschger Oscillations", IGBP Scientific Congress, Bad Mnstereifel, Germany, April 20, 1996.

248. "Dynamic complexity in three geophysical fluids", as Benjamin Meeker Visiting Professor to the Department of Mathematics, University of Bristol, England, May 3, 1996.

249. "The free air gravity constraint on mantle tomography based convection models", to the Special Symposium on Global Change at the EGS meeting, The Hague, May 6, 1996 (with Giovanni Pari).

250. "Earth system interconnections in global change: ice sheets, oceans and the Earth's shape", keynote address to the Symposium on Global Change at the EGS meeting, The Hague, May 8, 1996.

251. "Glacial isostatic adjustment and global sea level rise", to the EGS Symposium on Global Change, The Hague, May 9, 1996.

252. "Dynamics of the Ice-Age Earth", as Benjamin Meeker Visiting Professor, to the Dept. of Geology, University of Bristol, England, May 16, 1996.

253. "The inverse problem for mantle viscosity", Spring AGU meeting, Baltimore, May 210, 1996.

254. "Dansgaard-Oeschger Oscillations", Spring AGU meeting, Baltimore, May 22, 1996.

255. "The free air gravity constraint on sub-continental mantle dynamics", Spring AGU meeting, Baltimore, May 21, 1996. (with Giovanni Pari)

256. "Dansgaard-Oeschger Oscillations", Department of Earth Sciences, Cambridge University, Cambridge, England, May 28, 1996.

257. "Secondary instability and coherence in stratified rotating flows", Dept. of Meteorology, Reading University, Reading, England, May 30, 1996.

258. "Secondary instability and coherence in stratified-rotating flows", Dept. of Mathematics, U. of Exeter, England, June 7, 1996.

259. "Dynamics of the ice-age Earth", Dept. of Earth Sciences, Oxford University, England, June 10, 1996.

260. "Glacial isostatic adjustment and mantle viscosity", Western Pacific Geophysics Meeting, Brisbane, Australia, July 23, 1996.

261. "Antarctic signatures of postglacial rebound", Western Pacific Geophysics Meeting, Brisbane, Australia, July 24, 1996.

262. "Internal boundary layer stability in phase transition modulated mantle convection", Western Pacific Geophysics Meeting, Brisbane, Australia, July 24, 1996 (with Sam Butler).

263. "Coherent structure formation and destruction", to the Symposium on Stratified Rotating Turbulence, NCAR, Boulder, CO, August 1, 1996.

264. "Vortex erosion and amalgamation in a new model of large scale flow on the sphere", to the Symposium on High Performance Research at the University of Alberta, Edmonton, Alberta, September 18, 1996.

265. "Dynamics of the Ice-Age Earth", to the Institute of Geophysics and Space Physics, University of Alberta, Edmonton, Alberta, September 19, 1996.

266. "Dynamic complexity in three geophysical fluids", All Laboratory Colloquium, Goddard Space Flight Center, Greenbelt, Maryland, October 11, 1996.

267. "Coherent Structure Creation and Destruction", The Courant Institute of Mathematical Sciences, New York University, November 6, 1996.

268. "The Ice-Age Earth", Sigma Xi Lecture, University of Toronto, Nov. 6, 1996.

269. "Dynamics of the Ice-Age Earth", Woods Hole Oceanographic Institution, Woods-Hole Massachussetts, February 13, 1997.

270. "Climate and Dynamics of the Ice-Age Earth", Massachussetts Institute of Technology (MIT), February 14, 1997.

271. "Dynamic Complexity in Three Geophysical Fluids", University of California all System

Conference on Nonlinear Dynamics", one of four invited speakers, San Diego, California, February 22-23, 1997.

272. "Postglacial variations in the Level of the Sea", to the European Scientific Conference on Postglacial Sea Level Change in 4-Dimensions, Blarney, Ireland, March 9, 1997.

273. "Phase Transition Modulated Mixing in the Mantle of the Earth", to the Europhysics Symposium on Scale Invariance at Les Houches, France, March 11, 1997.

274. "Phase transition effects upon mantle mixing", to the European Union of Geosciences, Strassbourg, France, March 23, 1997.

275. "The Dynamics of the Ice-Age Earth", The Pennsylvania State University, State College, Pennsylvania, April 8, 1997.

276. Four Invited Lectures on "Ice-Age Geodynamics", to the European Geophysical Society meeting, Vienna, Austria, April 21-26, 1997.

277. "Dynamics of the Ice-Age Earth", and "Mantle Convection and the Avalanche effect", Dept. of Geology and Geophysics, U. Minnesota, May 1-2, 1997.

278. "Vortex erosion and amalgamation in a new model of large scale flow on the sphere", Canadian CFD Society, Victoria, British Columbia, May 26, 1997.

279. "Postglacial Variations in the level of the sea", to the Union Session of global sea level change", Baltimore AGU, May 29, 1997.

280. "CSHD: A Canadian program in paleoclimatology", CMOS meeting, Saskatoon, Saskatchewan, June 2, 1997.

281. "Global glacial isostasy and relative sea level history", to the British Geological Society meeting on Coastal Tectonics, Burlington House, London, England, June 18, 1997.

282. "Coherent structures in geophysical fluids: their creation and destruction", as President's Lecture to the IAMAS/IAPSO General Assembly in Melbourne, Australia, July 3, 1997.

283. Three lectures as H. Burr Steinback visiting scholar to the Woods Hole Oceanographic Institution, July 14-19, 1997:
(1) Mantle viscosity and postglacial variations in the level of the sea
(2) Mantle convection: the influence of solid-solid phase transformations
(3) Coherent structures in geophysical fluids: their creation and destruction

284. "A reference model for the internal visco-elastic stratification of the Earth", to the IASPEI General Assembly in Thessaloniki, Greece, August 19, 1997.

285. "Planetary response to the ice-age: a probe of the visco-elastic structure of Earth's deep interior", to the IASPEI General Assembly in Thessaloniki, Greece, August 21, 1997.

286. "The geodetic response of the Antarctic continent to the last deglaciation event of the current ice-age", to the IAG General Assembly, Rio de Janeiro, Brazil, Sept. 4, 1997.

287. "The theory of ice-age induced variations in the Earth's shape", to the IAG General Assembly, Rio de Janeiro, Brazil, Sept. 5, 1997.

288. "Sea level variations in the ice-age", to the OECD Symposium on the Stability of Coastal Wetlands at Royal Hollaway College, Univ. of London, England, Sept. 16, 1997.

289. "Coherent structures in geophysical fluids: their creation and destruction", to the Annual General Members Meeting of the University Corporation for Atmospheric Research, Boulder, CO, October 8, 1997.

290. "Nonseparable problems in hydrodynamic stability", Applied Mathematics Seminar, Department of Mathematics, Univ. of Toronto, November 28, 1997.

291. "Ice-age climate oscillators", to the Sloan Foundation Symposium on the Known and the Unknowable in Geophysical Science, at the Santa Fe Institute, Santa Fe, New Mexico, November 6, 1997.

292. "Rapid climate change and the oceans", NCAR paleoclimate modelling meeting, Boulder, CO, February 18, 1998.

293. "Modelling ice-age climate", European EISMINT workshop, Aussois, France, March 13, 1998.

294. "The 100 kyr ice-age cycle: models that work", as Climate Center Visiting Scholar at the Lamont Doherty Earth Observatory of Columbia University, April 13, 1998.

295. "The Dansgaard Oeschger Oscillation: a hydrodynamic theory", as Climate Center Visiting Scholar, LDEO, Columbia University, April 14, 1998.

296. "Thermohaline Fibrillation", as Sloan Foundation Lecturer at the Woods Hole Oceanographic Institution, Woods Hole, Massachussetts, April 15, 19998.

297. "Earth's response to the late-Pleistocene glacial cycle and current global change", EGS meeting, Nice, France, April 20, 1998.

298. "The inverse problem for mantle viscosity: new results based upon joint inversion of glacial isostatic adjustment data", EGS meeting, Nice, France, April 20, 1998.

299. "Mantle viscosity, glacial isostasy and the anomalous gravity field", EGS meeting, Nice, France, April 21, 1998.

300. "Postglacial sea level history and coastal tectonics", EGS meeting, Nice, France, April 21, 1998.

301. "Dansgaard-Oeschger oscillations: a hydrodynamic theory", EGS meeting, Nice, France, April 23, 1998.

302. "Global glacial isostasy and climate system history", Goddard Space Flight Center, All Laboratory Colloquium, June 11, Greenbelt, Maryland, 1998.

303. "The anatomy of the mixing transition in stratified parallel flows", Developments in Geophysical Turbulence Symposium, NCAR, Boulder, CO, June 15, 1998.

304. "A hydrodynamic theory of the Dansgaard-Oeschger oscillation", to the International Conference on Paleoceanography, Lisbon, Portugal, August 23, 1998.

305. "Glacial isostasy and the ice-age", to the GFZ Laboratory, Potsdam, Germany, September 24, 1998.

306. "Mantle convection: models a-priori and models tomographic", to the GFZ Laboratory, Potsdam, Germany, September 25, 1998.

307. "Space geodetic signatures of glacial isostatic adjustment", to the workshop of the International Earth Rotation Service, Potsdam, Germany, September 29, 1998.

308. "The 100 kyr ice-age cycle: models that work", to the Quaternary Research Center of the University of Washington, Seattle, Washington, October 22, 1998.

309. "The upscale turbulent cascade: shear layers, cyclones and gas giant bands", to the Department of Atmospheric Sciences, University of Washington, Seattle, Washington, October 23, 1998.

310. "Geophysical constraints on ice-sheet form and history", Geological Society of America meeting, Toronto, Ontario, October 26, 1998.

311. Keynote Address, European Science Conference, Albufera, Portugal, February 13-18, 1999, "The global viscoelastic theory of glacial isostatic adjustment and sea level change".

312. U3 Union Symposium on Earth System Models and Earth System Predictability, Birmingham, UK, July 21, 1999, "The 100 kyr late Pleistocene ice-age cycle".

313. Ice sheets, Oceans and the Earth's Shape Symposium, Birmingham, U.K., July 23, 1999, "Ice-Age Ice-Sheet Rheology".

314-315. Two Lectures, University of Alberta, Pacific Institute of Mathematical Sciences, Summer School in Fluid Mechanics, August 15-18, 1999, "Irrerversible Mixing in Density Stratified Parallel Flows", and "The Upscale Turbulent Cascade: Shear Layers, Cyclones and Gas Giant Bands".

316. Vening-Meinesz Conference of the EGS, Loiri Porto, Sardinia, Oct.2-8, 1999, "Global sea level rise and glacial isostatic adjustment".

317. Massachussetts Institute of Technology, Department of Mathematics, Full Departmental Colloquium, October 25, "The upscale turbulent cascade: shear layers, cyclones and gas giants bands", 1999.

318. LOICZ Workshop, U. Hawaii, Honolulu, November 7, 1999, "The global viscoelastic theory of postglacial sea level history".

319. International Geological Correlation Project on Coastal Tectonics and Sea Level History, U. Hawaii, Honolulu, Nov. 8-11, 1999, "On the superposed influences of coastal tectonics and glacial isostasy in Holocene sea level history".

320. Media Conference, AGU Meeting, San Francisco, California, December 13, 1999, "Dansgaard-Oeschger Oscillations and Rapid Climate Change". Lead-in to Session on Rapid Climate

Change and the Thermohaline Circulation. Organized by W.R.P.

321-340. Distinguished Lecturer of the Canadian Geophysical Union for 1999-2000
Université du Quebec à Montréal, Oct. 15, 1999, "Ice Age Climate Dynamics"
York University, Oct. 27, 1999, "Ice Age Climate Dynamics"
University of Western Ontario, Oct. 29, 1999, "Mantle convection, mixing and Earth evolution"
University of Victoria, Nov. 3, 1999, "Mantle convection, mixing and Earth evolution"
Pacific Geosciences Centre, Victoria, Nov. 4, 1999, "Ice-age climate dynamics"
University of Calgary, Nov. 5,1999, "Ice-age climate dynamics"
University of British Columbia, Nov. 24, 1999, "Ice-age climate dynamics"
University of Alberta, Edmonton, Nov. 25, 1999, "Mantle convection, mixing and Earth evolution"
University of Saskatchewan, Saskatoon, Nov. 26, 1999, "Mantle convection, mixing and Earth evolution"
Dalhousie University, Dec. 8, 1999, "Ice-age climate dynamics"
Atlantic Geoscience Centre, Dec. 9, 1999, "Mantle convection, mixing and Earth evolution"
University of Toronto, Dept. of Physics, January 6, 2000, "Ice-Age Climate Dynamics"
McGill University, January 13, 2000, "Mantle convection, mixing and Earth evolution"
Memorial University, January 14, 2000, "Dynamics of the Ice-age Earth"
U. Waterloo, January 27, 2000, "Dynamics of the Ice-age Earth"
University of New Brunswick, February 17, 2000, "Ice-age climate dynamics"
University of New Brunswick, February 18, 2000, "Mantle convection, mixing and Earth evolution"
McMaster University, March 2, 2000, "Dynamics of the Ice-Age Earth"
Queen's University, March 16, 2000, "Mantle convection, mixing and Earth evolution"
Queen's University, March 17, 2000, "Ice-Age Climate Dynamics"

341. McMaster University, Department of Physics and Astronomy Colloquium, February 13, 2000 "The upscale turbulent cascade: shear layers, cyclones and gas giant bands".

342. U. Waterloo, Dept. of Mathematics, March 9, 2000, "The upscale turbulent cascade: shear layers, cyclones and gas giant bands"

343. "Subsynoptic scale baroclinic instability", EGS meeting, Nice, France, April 25, 2000.

344. "Geoid height time dependence from glacial isostatic adjustment: A target for GRACE", EGS meeting, Nice, France, April 27, 2000.

345. "Dynamics of the Ice-Age Earth", keynote address, CGU meeting, Banff, Alberta, May 25, 2000.

346. "Earth Evolution and Global Climate Change", keynote address, GeoCanada 2000 Conference, Calgary, Alberta, May 29, 2000.

347. "A NeoProterozoic Snowball Earth?", International Conference on Mathematical Geophysics, Villefranche-sur-mer, France, June 21, 2000.

348. "The upscale turbulent cascade: shear layers, cyclones and Gas Giant bands", keynote address to the Meteorology at the Millennium Conference celebrating the 150th anniversary of the Royal Meteorological Society, Cambridge, England, July 12, 2000.

349. "Earth Physics and Global Glacial Isostatic Adjustment", keynote address to the IAG sponsored

international conference on Gravity, Geoid and Geodynamics, Banff, Alberta, July 31, 2000.

350. "Carbon Dioxide and Climate", Physics and Astronomy colloquium, York University, September 19, 2000.

351. "Northern Hemisphere - Southern Hemisphere teleconnections as constraints on the late Pleistocene deglaciation of West Antarctica", West Antarctica Ice-Sheet meeting, Reston, Virginia, September 28, 2000.

352. "On eustatic sea level history: LGM to Holocene:, EPILOG meeting, Mt. Hood, Oregon, October 1, 2000.

353. "Ice in the climate system: Paleoclimatological perspectives", Toyota Conference, Mikkabi-Shizuoko, Japan, October 5, 2000.

354. "Late glacial inundation of the Patagonian Shelf", keynote address to the IGCP sponsored Conference entitled Patagonia 2000, Porto Madryn, Argentina, October 31, 2000.

355. "Ice-Age Paleoclimatology", Geophysical Fluid Dynamics Laboratory, Princeton University, November 30, 2000.

356. "The rheology of the Earth", Department of Geosciences, Princeton University, November 31, 2000.

357. "Ice-Age Paleoclimatology", to the Earth System-Evolution program of the Canadian Institute for Advanced Research, Mt. Gabriel, Quebec, December 5, 2000.

358. "Global Sea Level Rise", at the American Geophysical Union Fall Meeting, San Francisco, CA, December 15, 2000.

359. "The climate of the Last Glacial Maximum: an ocean-centric perspective", AGU Fall Meeting, San Francisco, CA, December 18, 2000.

360. "The NeoProterozoic Snowball Earth", to the Meteorological Service of Canada, Toronto, Ontario, January 11, 2001.

361. A series of three lectures for the European Course on Atmospheres (ERCA), at the Université
362. De Grenoble, Grenoble, France, January 17-19, 2001.
363. (a) The cryosphere and climate: sea ice, land ice and snow
(b) Glacial Inception: a successful experiment with the atmospheric general circulation model of the Canadian Climate Centre
(c) The 100 kyr ice-age cycle of the late Pleistocene epoch.

364. "Snowball Earth: Impacts of a Dynamical Ocean", AGU Union Symposium, Boston, MA, May 29, 2001.

365. "Mixing efficiency in Stratified Fluids", WAVES-3 International Fluid Mechanics Symposium, U. Alberta, Edmonton, June 14, 2001.

366. "The Glacial History and Glacial Isostatic Adjustment of Antarctica", ANTEC Workshop, Siena, Italy, July 12, 2001.

367. "Glacial inception in the Greenhouse", American Meteorological Society Meeting on Global Warming and the next ice-age", Halifax, Nova Scotia, August 23, 2001.

368. "Global glacial isostasy, the geoid and three dimensional crustal motion", keynote talk, IUG Symposium on Recent Crustal Movements, Helsinki, Finland, August 29, 2001.

369. "On the post-glacial isostatic adjustment of the British Isles and the shallow viscoelstic structure of the Earth", keynote talk, IGCP 437 Meeting, Durham, England, September 5, 2001.

370. "Orbital and suborbital substructure of the 100 kyr ice-age cycle: an heirarchy of models", Columbia University, LDEO, October 11, 2001.

371. "Global glacial isostasy and relative sea level history", keynote address, INQUA Symposium, Taipei, Taiwan, October 19, 2001 (cancelled due to airline "instability").

372. "The 100 kyr ice age cycle: variations on a theme of Barry Saltzman", as Flint Lecturer at Yale University, New Haven Connecticut, and keynote speaker at a Symposium in honour of Barry Saltzman, November 2, 2001.

373. "A design basis glacier scenario for study of the safety of a repository for spent nuclear fuel on the Ontario portion of the Canadian Shield", Ontario Power Generation, November 7, 2001.

374. "Mantle viscosity, glacial isostatic adjustment and postglacial relative sea level history", Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography, La Jolla, California, December 6, 2001.

375. "Continental ice sheets at LGM: sea level constraints upon regional form and total volume", Fall meeting of the American Geophysical Union, San Francisco, CA, December 10, 2001.

376. "The 100 kyr ice-age cycle: inception and demise", Fall meeting of the American Geophysical Union, San Francisco, CA, December 11, 2001.

377. Two lectures for the European Research Course on Atmospheres (ERCA),
378. University of Grenoble, Grenoble, France.
"The Cryosphere and Climate" - January 30, 2002
"Glacial Inception in the Greenhouse" - January 31, 2002

379. "Mantle Convection" to the Fluid Dynamics Institute of the University of Grenoble (LEGI), Grenoble, France, January 31, 2002.

380. "Icosahedral Hydrodynamics: Shear Layers, Cyclones and Gas Giant Bands", to the Applied Mathematics Department, University of Toronto, February 11, 2002.

381. "Viscoelastic Earth Models and Paleoclimatological Implications", for the Frontier System for Global Change Research, Yokohama, Japan, March 1, 2002.

382. "Icosahedral models of spherical hydrodynamics", to the International meeting on the Next Generation Climate Model, Awaji, Yumebutai, Japan, March 5, 2002.

383. "Mantle Viscosity: Newtonian or Non-Newtonian?", to the meeting on Nonlinear Continuum

Mechanics and the Geodynamo, Institute for Mathematics and its Applications, U. Minnesota, March 21, 2002.

384. "The Ice-Age Earth: Geodynamics and Climate Dynamics", Department of Physics, University of Utrecht, Utrecht, The Netherlands, April 17, 2002.

385. "Dynamics of the Ice-Age Earth", as keynote speaker to the Dutch Earth Sciences Conference (NAC), Veldhoven, The Netherlands, April 18, 2002.

386. "Earth rotation and geoide constraints upon the modern rate of global sea level rise", to the EGS meeting, Nice, France, April 24, 2002.

387. "The glacial history of Greenland: new insights from ice mechanical reconstructions and relative sea level observations", EGS meeting, Nice, France, April 25, 2002.

388. "Space Geodetic, Absolute Gravity and Relative Sea Level Constraints require a multi-domed Laurentide Ice-Sheet", All Union Symposium, American Geophysical Union, Spring meeting, Washington, D.C., May 28, 2002.

389. "Nonlinear Hydrodynamic Waves", to the 27th International Conference on Mathematical Geophysics, Villa Gualino, Torino, Italy, June 17, 2002.

390. "Last Glacial Maximum Climate with Resolved ENSO and NAO", to the meeting of the International Conference on the Paleoclimate Model Intercomparison Project, St. John's College, Cambridge, England, June 25, 2002.

391. "Absolute Sea Level and Glacial Isostatic Adjustment", keynote address to the International Conference on Vertical Crustal Motion and Sea Level, Toulouse, France, September 18, 2002.

392. "The mixing transition in stratified parallel flows", to the Ladyx Laboratory of the Ecole Polytechnique at Pallaiseau, France, September 24, 2002.

393. "Space Geodetic constraints on Global Glacial Isostatic Adjustment", keynote address to the Weiko A. Heiskanen Symposium in honour of W.H. Kaula, Ohio State University, Columbus, Ohio, October 2, 2002.

394. "Global glacial isostatic adjustment and the tilting of the South American continent", to the meeting of the International Association of Geodesy on Recent Crustal Deformation in South America, Santiago Chile, October 23, 2002.

395. "The impact of rotational feedback upon the sea level highstand along the coast of Argentinian Patagonia", to the annual meeting of the Chilean Earth Science Society, with simultaneous translation to Spanish, October 24, 2002.

396. "The Barbados coral record of postglacial relative sea level history: central node in a pole-equator-pole sea level transect of the Americas", keynote address to the GCP437 meeting in Barbados on Quaternary Sea Level Change, Barbados, October 27, 2002.

397. "The Laurentide Ice-Sheet at Last Glacial Maximum", keynote address to the special symposium at the fall meeting of the Geological Association of America in honour of the retirement of John Andrews of the University of Colorado, Denver, Colorado, October 29, 2002.

398. "The Barbados coral record of postglacial relative sea level history", to the Laboratoire des Sciences de Climat et de l'Environment, (LSCE), Saclay, France, November 7, 2002.

399. "Ice Age Climate Variability", for the Ecole Normale Superieur, Paris, France, November 13, 2002.

400. "Ice Age Climate Variability", for the sub-department of Atmospheric, Oceanographic and Planetary Science, Oxford University, Oxford, England, November 15, 2002.

401. "Global glacial isostatic adjustment: a probe of Earth's deep interior and of surface climate processes", to the Department of Geophysics and Geology, Oxford University, Oxford, England, November 15, 2002.

402. "Ice Age Climate Variability", for the CEREGE Laboratory, Aix-en-Provence, France, November 19, 2002.

403. "Global glacial isostatic adjustment", to the Institut de Physique du Globe de Paris, Paris, France, November 21, 2002.

404. "Mantle convection and low frequency climate variability", to the Institute de Physique du Globe de Paris, France, December 12, 2002.

405. "Postglacial variations in the level of the sea: implications for climate dynamics and solid Earth geophysics", to the Graduate School of the University of Grenoble, Grenoble, France, January 14, 2003.

406. Two Lectures for the European Research Course on Atmospheres, Grenoble, France, ERCA "Ice-age climate variability", January 14, 2003.

407. "Glacial inception in the greenhouse", January 15, 2003.

408. "Paleoclimate implications of postglacial variations in the level of the sea", Department of Physics and Astronomy, Trent University, Peterborough, Ontario, February 25, 2003.

409. "Climate predictability: the case of glacial inception", to the Sloan Foundation Workshop on the Known, the Unknown and the Unknowable in Predictability of Weather", Savanagh, Georgia, February 17-19, 2003.

410. "The ICE-5G model of latest Quaternary deglaciation", keynote talk, MOTIF project implementation meeting, Paris, France, March 17-18, 2003.

411. "The late Pleistocene Ice-Age Cycle: An intersection between climate dynamics and global hydrology", keynote invited talk to the national meeting of the Canadian Water Network, A National Centre of Excellence, St. John, N.B., March 25, 2003.

412. "Climate dynamics in deep time", IAMAS "Sushi" Lecture at the IUGG General Assembly in Sapporo, Japan, July 3, 2003.

413. "A revised model of geoide height time dependence due to glacial isostatic adjustment: IUGG General Assembly, Sapporo Japan, July 9, 2003.

414. "Mixing efficiency in stratified parallel flows", IUGG General Assembly, Sapporo, Japan, July 12, 2003.

415. "A revised model of the last deglaciation event of the current ice-age", International PMIP Symposium at the INQUA Congress in Reno, Nevada, July 25, 2003.

416. "Global glacial isostatic adjustment: high stands and low stands in postglacial variations in the level of the sea", Keynote Plenary address at the INQUA Congress in Reno, Nevada, July 29, 2003.

417. "The Climate of the Earth at Last Glacial Maximum: Millennium timescale integrations with the NCAR CCSM", Bjerknes Center for Marine Research, The University of Bergen, Norway, September 1, 2003.

418. "Recent advances in the global theory of the glacial isostatic adjustment process", Geophysical Laboratory, The University of Bergen, Norway, September 2, 2003.

419. "Postglacial Sea Level History", to the mini-Conference on Sea Level, Lamont-Doherty Earth Observatory of Columbia University, N.Y., October 22, 2003.

420. "Arctic and Global Sea Level Rise", to the CliC Implementation meeting in Victoria, British Columbia, Nov. 30, 2003.

421. "Climate Dynamics in Deep Time", Department of Earth, Atmospheric and Planetary Sciences, MIT, Cambridge, MA, December 3, 2003.

422. "Postglacial variations in the level of the sea: interpreting the records", School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea, February 23, 2004.

423. "Global glacial isostasy and relative sea level history: interpreting the records", Dept. of Earth Sciences, University of Athens, Athens, Greece, March 23, 2004.

424. "Global Sea Level Rise", European Geophysical Union Meeting, Nice, France. Press Conference, April 28, 2004.

425. "Neoproterozoic glacial extremes: How plausible is the "Snowball scenario?", AGU-CGU Joint Assembly, Union Session, Montreal, Quebec, May 19, 2004.

426. "Geoide height time dependence and global glacial isostasy: The ICE-5G (VM2) model and GRACE, AGU-CGU Joint Assembly, Union Session, Montreal, Quebec, May 17, 2004.

427. "Climate Change Puzzles", AGU-CGU Joint Assembly, Public Lecture, Montreal, Quebec, May 18, 2004.

428. "On the resonant generation of internal solitary waves", Canadian Symposium on Fluid Dynamics, Halifax, Nova Scotia, June 15, 2004.

429. "Long term climate change and the glaciation of the Laurentian Platform", Research Conference on the Safety Case for a Repository for Spent Nuclear Fuel, Nottawasaga Inn, Aliston, Ontario, June 23, 2004.

430. "On the resonant generation of internal solitary waves", Ecole Normale Superieur, Paris, France, July 29, 2004.

431. "The ICE-5G (VM2) model of Late Pleistocene Glaciation", to the Laboratoire des Sciences de Climat et de l'Environment (LSCE), Saclay, France, July 13, 2004.

432. "A new model based and data constrained inference of the LGM depression of eustatic sea level, to the International Geological Congress, Florence, Italy, August 21, 2004.

433. "Postglacial Coastal Evolution: Ice-Ocean-Solid Earth Interactions in a period of rapid climate change", to the International Geological Congress, Florence, Italy, August 26, 2004.

434. "Continental Ice Sheet Inception and Demise: the response to Milankovitch forcing", International Milankovitch Symposium, Belgrade, Serbia, September 1, 2004.

435. "A new Canadian programme in Earth System Evolution: the Polar Climate Stability Network", to the Canadian Earth Science Summit, Ottawa, Ontario, October 16, 2004.

436. "The Younger-Dryas Climate Reversal: A new hypothesis", to the Lamont-Doherty Earth Observatory of Columbia University on the occasion of the visit to New York City for the Vetlesen Prize Ceremony, November 8, 2004.

437. "Canada Post-Kyoto", to the Colloque Canada Royaume-Uni (The UK-Canada Colloquium sponsored by Queens University and the Institute for Research on Public Policy), Quebec City, November 14, 2004.

438. "The Polar Climate Stability Network", to the CFCAS Review Committee for Network funding, Montreal, Quebec, December 3, 2004.

439. "The surface heat flow constraint upon mantle convection and Earth evolution", Winter AGU meeting, San Francisco, California, December 16, 2004.

440. "The origin of the Younger-Dryas climate reversal", to the meeting of the Paleoclimate Modeling Intercomparison Project (PMIP), Giens, France, April 5, 2005.

441. "Long term climate change impacts on a spent fuel repository", Canadian Nuclear Commission, Ottawa, Ontario, May 11, 2005.

442. "Long term climate change: Implications for the safety of a repository for spent nuclear fuel in the Canadian Shield", Nottawasaga Inn, Alliston, Ontario, June 16, 2005.

443. "Precise models of the deglaciation of the North American Continent", for the RAPID workshop, University of Bristol, U.K., June 20, 2005. (given using the Access Grid facility at NCAR in Boulder, Colorado).

444. "Rapid climate change, the intensity of the Atlantic MOC and high latitude - low latitude teleconnections", Keynote Address to the NCAR CCSM Workshop, Breckenridge, Colorado, June 22, 2005.

445. "Rapid climate change, the intensity of the Atlantic MOC and high latitude - low latitude

teleconnections", Aspen Institute for Global Change, Aspen, Colorado, July 11, 2005.

446. "Rapid climate change, the intensity of the Atlantic MOC, and high latitude - low latitude teleconnections", School of Physics, Peking University, Beijing, China, August 3, 2005.

447. "Rapid climate change, the intensity of the Atlantic MOC, and high latitude - low latitude teleconnections", Institute of Geodesy and Geophysics, the Chinese Academy of Science, Wuhan City, Hubei State, China, August 9, 2005.

448. "Long term climate change: Implications for the safety of a used fuel repository in a Canadian Shield setting", for the AMIGO meeting of the International Nuclear Energy Agency, Kingsbridge Conference Centre, King City, Ontario, September 20, 2005.

449. "Rapid climate change and the Arctic: evidence from paleoclimatology", Keynote Colloquium introducing a new WHOI series on Arctic climate change. Woods Hole Oceanographic Institution, Woods Hole, MA, October 27, 2005.

450. "Rapid climate change, freshwater runoff from the continents and the strength of the Atlantic MOC: An analysis of the Younger-Dryas cold reversal", Department of Earth, Atmospheric and Planetary Science, MIT, Cambridge, MA, October 28, 2005.

451. "The Younger Dryas cold reversal", Montreal Earth Observatory, Montreal, Quebec, October 14, 2005.

452. "Earth rotation and global glacial isostatic adjustment", Jet Propulsion Laboratory of the California Institute of Technology, Pasadena, California, October 25, 2005.

453. "Rapid climate change, freshwater runoff from the continents and the strength of the Atlantic MOC: An analysis of the Younger-Dryas cold reversal", Department of Atmospheric Sciences, UCLA, Los Angeles, California, October 26, 2005.

454. "Global Warming", To the University of Toronto 'Natural Philosophers Club', Toronto, March 14, 2006.

455. "Earth Evolution and Climate: A Brief History", in the University Professors Lecture Series, sponsored by the Global Knowledge Foundation, George Ignatieff Theatre, Toronto, March 27, 2006.

456. "Global Warming", To the 2nd year Chemical Engineering class in the environmental option, invited by Professor Greg Evans, April 6, 2006.

457. "An Arctic Trigger for the Younger-Dryas cold reversal", European Geophysical Union, Vienna, Austria, April 4, 2006.

458. "Arctic Ocean forcing of the Younger-Dryas cold reversal", keynote address to the Open Scientific Meeting of the Polar Climate Stability Network, GAC-MAC meeting, Montreal, Quebec, May 15, 2006.

459. "Geoide Height Time Dependence and Global Glacial Isostatic Adjustment: The Critical Influencing of Rotational Feedback", Spring AGU meeting, invited paper in the session on the time Dependent Gravitational Field of the planet, May 24, 2006.

460. "Global glaciation and deglaciation chronologies: Towards the development of the ICE-6G model", Invited presentation to the OURMEN project workshop, Royal Dutch Meteorological Agency, Utrecht, The Netherlands, June 6, 2006.

461. "Global glacial isostasy and relative sea level history", to the Bjerknes Centre for Climate Research, University of Bergen, Norway, June 15, 2006.

462. "The Glacial-Interglacial Eustatic sea level rise: 21 ka to present" IPCC Lead authors Meeting, Solstrand Conference Centre, Bergen, Norway, June 26, 2006.

463. "The climate of the Earth at Last Glacial Maximum", Nansen Centre for Oceanographic Research, University of Bergen, June 30, 2006.

464. "A carbon dioxide "attractor" in the Neoproterozoic", Keynote invited talk, Snowball Earth 2006 Conference, Monte Verita Conference Centre, Ascona, Switzerland, July 16-21, 2006.

465. "Global glacial isostatic adjustment and postglacial sea level history", Department of Earth Sciences, University of Bergen, August 28, 2006.

466. "Postglacial sea level history: North American and Caribbean constraints on the impact due to global warming", Keynote Address, Pardee Symposium, GSA meeting, Philadelphia, USA, October 22, 2006.

467. "Global Warming", Science and Medicine Round Table, Massey College, University of Toronto, November 13, 2006.

468. "Global Warming" as Panelist at the event organized for Science for Peace entitled "Global Climate change and the Carbon Crisis", Toronto, December 1, 2006.

469. "Global Warming and Global Sea Level Rise", Department of Biological Sciences, Queen's University, Kingston, Ontario, January 18, 2007.

470. "A Carbon dioxide "attractor" in the Neoproterozoic", Department of Earth Sciences, Queens University, Kingston, Ontario, January 19, 2007.

471. "The IPCC AR4 Report on Global Warming: Lessons from the past", CFCAS Sponsored Media Event, IDRC, Ottawa, Ontario, February 2, 2007.

472. "Global Warming and Global Sea Level Rise", Department of Chemical Engineering, University of Toronto, February 7, 2007.

473. "The glaciation of the North American continent", Gartner Lee Associated, Markham, Ontario, February 11, 2007.

474. "Global Warming: The IPCC Fourth Assessment Report, for the Bill C30 Committee on the Clean Air Act, Parliament Buildings, Ottawa, February 19, 2007.

475. "Global Warming: the latest assessment" as lead speaker to the "Leading Canada towards Sustainability Symposium", Medical Sciences Auditorium, The University of Toronto, February 21, 2007.

476. "Global Warming: the latest assessment", keynote speaker for the Annual General Meeting of the Lake Simcoe Conservation Authority, Newmarket Municipal Offices, Newmarket, Ontario, February 23, 2007.

477. "Global Warming", Oakville City Council and Community groups, Oakville, Ontario, April 14, 2007.

478. "A carbon dioxide attractor in the Neoproterozoic", EGU meeting, Vienna, Austria, April 17, 2007.

479. "Rotational Feedback in global glacial isostatic adjustment", EGU meeting, Vienna, Austria, April 18, 2007.

480. "Downslope windstorms and morning glories: Analogues from the coastal ocean" (with Marek Stastna of U. Waterloo), EGU meeting, Vienna, Austria, April 20, 2007.

481. "Dynamics of the Ice-Age Earth", Cambridge University and Schlumberger Research, Cambridge, England, May 3, 2007.

482. "Snowball Earth prevention by DOC remineralisation", Ecole Normale Superieur, Paris, France, June 18, 2007.

483. "Snowball Earth prevention by DOC remineralisation", Clarendon Laboratory, Oxford Univ., June 26, 2007.

484. "Downslope windstorms and morning glories: analogues from the coastal oceans", IUGG General Assembly, Perugia, Italy, July 5, 2007.

485. "Global Warming", to the Interdisciplinary Round Table on Climate Change and Energy Strategies, Wasan Island, Lake Rouseau, Ontario, September 14-16, 2007.

486. "Global Warming", As respondent to a presentation at the UofT Conference organized by the Law School on a Climate Change Policy for Canada, Hart House, Uoft., Nov. 1, 2007.

487. "Dynamics of the Ice-Age Earth", Department of Earth and Planetary Sciences, The University of Washington, Seattle, WA, USA, Nov. 8, 2007.

488. "Snowball Earth Prevention by dissolved organic carbon re-mineralization", for the World University Network by Video Conference from the new MaRS Centre on College St. Approximately 14 universities from North America and Europe participated. This was to inaugurate UofT joining the WUN network, Nov. 11, 2007.

488. "Global Warming: The IPCC AR4", York University, Department of Environment, Toronto, Ontario, January 24, 2008.

489. "Global Warming: The Latest Assessment". As Keynote Speaker for the Best in Science Symposium of the Ontario Ministry of the Environment, Toronto, Ontario, March 7, 2008.

490. "Recent Advances in the modelling of continental ice-sheet evolution: Lessons from the ICE-5G

project", The Leverhulme Climate Symposium, Cambridge University (March 9-12) and at the Royal Society London (March 13), England, 2008.

491. Geodynamics and Climate Dynamics of the Ice-Age Earth", Dept. of Earth Science, University of Illinois at Champaign-Urbana, March 28, 2008.

492. "Ice in the Climate System", for a Northumberland Learning Connection, Cobourg, Ontario, April 10, 2008.

493. "The Late Quaternary ice-age cycle: Milankovic Plus!", Milankovic Medal Lecture, European Geosciences Union, Vienna, Austria, April 16, 2008.

494. "Advances in the modelling of continental ice-sheet evolution", Nuclear Waste Management Organization (NWMO), Toronto, May 15, 2008.

495. "The influence of rotational feedback on postglacial relative sea level history", AMQUA meeting, Pennsylvania State University, College Park, June 6, 2008.

496. "New insights in glacial systems modelling", Nuclear Waste Management Organization (NWMO), Hockley Valley Report, Ontario, June 10, 2008.

497. "Convection in the Mantle of the Earth and in the weather layer of Jupiter", Symposium in honor of David Yuen, Zurich, Switzerland, June 13, 2008.

498. "Global sea level rise and the Earth's shape and gravitational field", at the meeting of the British Association for the Advancement of Science, Liverpool, UK, September 9, 2008.

499. "The Late Quaternary Ice-Age Cycle: Milankovic Plus!", Proudman Lecture, Proudman Oceanographic Laboratory, Liverpool, UK, September 10, 2008.

500. "Space Geodetic constraints on global sea level rise and global warming", Overture Lecture for the incoming 3rd year engineering science students, University of Toronto, September 12, 2008.

501. "Global Warming", for the course of Andrew Green of the Faculty of Law on the subject of Global Change Policy, University of Toronto, September 24, 2008.

502. "Climate Change Tipping Points", for the course of Janice Stein of the Department of Political Sciences on Global Change, University of Toronto, October 7, 2008.

503. "Climate models: Are they consistent with geological observations", for the Gussow-Nuna Conference on the Geoscience of Climate Change, Banff, Alberta, October 20, 2008.

504. "Arctic Climate Change: Lessons from the past", CFCAS Symposium entitled "The Lowdown on the Meltdown", on the subject of high latitude climate change, Ottawa, November 25, 2008.

505. "The Budget of Global Sea Level Rise", Intergovernmental Panel on Climate Change", Honolulu, Hawaii, March 6, 2009.

506. "The lowdown on the meltdown: global warming at the poles", President's Circle lecture, University of Toronto, March, 10, 2009.

507. "Dynamics of the Ice-Age Earth", Woods-Hole Oceanographic Institution, Woods-Hole Massachusetts, March 12, 2009.

508. "Jovian Jets", Department of Applied Mathematics, The University of Waterloo, March 19, 2009.

509. "Science funding in Canada: the case of the Foundations" CAUT Council meeting, Chateau Laurier, Ottawa, April 23, 2009.

510. "Dynamics of the Ice-Age Earth: Sea Level budget closure in the era of GRACE", Dept. of Earth Science, Oxford U., May 15, 2009.

511. "Polar ice-sheet stability and global sea level rise", Joint AGU-CGU meeting, Toronto, May 26, 2009 (with Gordan Stuhne).

512. "Climate and the cryosphere: Past and Future", Keynote address, CMOS general assembly, Halifax, Nova Scotia, June 1, 2009

513. "A new numerical structure for the University of Toronto Glacial Systems Model: the case of Greenland", Nuclear Waste Management Org. Seminar, Orangeville, Ontario, June 9, 2009, (with Gordan Stuhne).

514. "Dynamics of the Ice-Age Earth", Dept. Terre, Atmosphere, Ocean of the Ecole Normale Superieure, Paris, June 21, 2009.

515. "Greenhouse gas amplification of the power of the Sun: Global warming from space", to the Space Canada Symposium, Ontario Science Centre, September 8, 2009.

516. "Global warming and Canada", Parliament Hill, Ottawa, Centre Block, event for members of parliament sponsored by the Pembina Institute, September 29, 2009.

517. "Global Warming of a virtual Earth", Keynote speaker, IBM Sponsored Science and Innovation Summit, IBM Software Lab., Markham, Ontario, October 1, 2009.

518. "Global Warming from Space", Physics Colloquium, University of Waterloo, November 26, 2009.

519. "Closure of the budget of global sea level rise", American Geophysical Union Fall Meeting, San Francisco, CA, December 18, 2009.

520. "Global models of relative sea level history", Elsevier Lecture, Keynote Address to the meeting of the British Quaternary Association, Durham, England, January 6, 2010.

521. "Global Warming from Space", Royal Canadian Institute, Toronto, January 24, 2010

522. "Dynamics of the Ice-Age Earth", Dept. of Earth and Planetary Science, Rutgers University, New Jersey, January 30, 2010.

523. "Global warming and closure of the budget of global sea level rise: the GRACE satellites", Princeton University, Geophysical Fluid Dynamics Laboratory, New Jersey, January 31, 2010.

524. “Tidal friction and the orbit of the Moon”, Lamont-Doherty Earth Observatory of Columbia University, February 1, 2010.

525. “Regional Climate Modelling for Ontario”, Climate Science Workshop, Black Creek Pioneer Village, Toronto, February 5, 2010.

526. “Global Warming from Space”, Physics Colloquium, Queen’s University, Kingston, Ontario, March 5, 2010.

527. “Global Climate Change”, Keynote presentation to the Canada 150 Roundtable hosted by Liberal MP’s Bryan Wilfert and John McCallum, Markham Townhall Council Chamber, March 27, 2010.

528. “The Early Anthropogenic Hypothesis”, CIFAR Workshop on Human – Environment Interactions, Vancouver, B.C., May 5, 2010.

529. “Internal Waves in the Atmosphere and Oceans and Explicit Models of the Internal Tide”, Mathematical Geophysical Conference, Pisa, Italy, June 8, 2010.

530. “The Younger-Dryas Climate Reversal”, Department of Earth, Atmospheric and Planetary Science, Massachussets Institute of Technology (KIT), November 17, 2010.

531. “The Younger-Dryas Climate Reversal”, Department of earth Sciences, Louisiana State University, Batton-Rouge, Louisiana, November 19, 2010.

532. “Dynamics of the Ice-Age Earth”, Department of earth Sciences, Louisiana State University, Batton-Rouge, Louisiana, November 19, 2010.

533. “Dynamics of the Ice-Age Earth”, SCUGOG public lecture for the Department of Earth Sciences of the University of Western Ontario, London, Ontario, March 24, 2011.

534. “Sea Level History along the West coast of the North American Continent”, US National Academy of Science Workshop, Portland, Oregon, March 29, 2011.

535. “Arctic freshwater forcing of the Younger-Dryas climate reversal”, EGU Assembly, Vienna, Austria with Veronique Mariotti, April 4, 2011.

536. “Secular trends in Earth Rotation parameters in the GRACE era”, EGU Assembly, Vienna, Austria, with Kevin Roy, April 5, 2011.

537. “Geoid Stokes coefficients variations due to global glacial isostatic adjustment”, EGU Assembly, Vienna, Austria, April 7, 2011.

538. “The Younger-Dryas cold reversal and its impact upon human migration patterns”, Canadian Institute for Advanced Research workshop on Human Environment Interactions, Vancouver, B.C., May 3-6, 2011.

539. “Angular Momentum of the Warming Earth”, Keynote Lecture at the Congress of the Canadian

Association of Physicists, St. John's Newfoundland, June 16, 2011.

540. "Secular trends in Earth rotation parameters in the GRACE era", IUGG General Assembly, Melbourne, Australia with Kevin Roy, July 4, 2011.

541. "Glacial isostasy and the Geoid: Rotational Feedback again", IUGG General Assembly, Melbourne, Australia with Rosemarie Drummond and Kevin Roy, July 5, 2011.

542. "The Younger-Dryas Cold Reversal: Ice-Earth-Ocean Interactions During a Period of Rapid Climate Change", Invited paper to the XVIII INQUA Congress session on The Enigmatic Younger-Dryas, Bern, Switzerland, July 25, 2011.

543. "Downscaling of Global Warming Projections over Northeastern Alberta and the Athabasca River Basin", Suncor Inc., Fort McMurray, Alberta, August 4, 2011.

544. "Global Warming: the latest analyses", for the School of Public Policy (undergraduate course of Andrew Green), September 21, 2011.

545. "Climate Impact of Freshwater Forcing of the Ocean General Circulation: The Origins of the Younger-Dryas", invited talk to the Third Santa Fe Conference on Global and Regional Climate Change, Santa Fe, NM, November 3, 2011.

546. "The Younger-Dryas Climate Reversal: Impacts upon Human Migration Patterns", to the CIFAR Workshop on Human Environment Interactions, San Francisco, California, December 2, 2011.

547. "Climate Change and Canada", lecture for the Law School course entitled "Environmental Law", organized by Dennis Mahony and John Terry, January 28, 2012.

548. "Applications of GRACE time-dependent gravity measurements to the understanding of land surface hydrology", Keynote talk to the ISSI Workshop on The Earth's Hydrological Cycle, Bern, Switzerland, February 7, 2012.

549. "Response to the citation from Suzanne Fortier", NSERC President, on the Award of the 2012 Gerhard Hertzberg Canada Gold Medal in Science and Engineering, Rideau Hill, Ottawa, February 27, 2012.

550. "Global Warming Futures for Canada", East Block, Parliament Hall, Ottawa, Senate Hearing before the Committee on the Environment, the Economy and Natural Resources, Ottawa, Ontario, March 27, 2012.

551. "The Lowdown on the Meltdown", to NSERC staff, NSERC Headquarters, Ottawa, Ontario, March 28, 2012.

552. "The Lowdown on the Meltdown", to the "Bacon n'Eggheads" breakfast meeting, Centre Block, Parliament Hall, Ottawa, March 29, 2012.

553. "Global warming "futures": How reliable are the model projections", the Gerhard Hertzberg Canada Gold Medal in Science and Engineering lecture, introduction by NSERC President

Suzanne Fortier, Ted Rogers School of Management, Ryerson University, Wednesday, October 24, 2012.

554. "Climate change and Canada", lecture for the UofT Law School course in Environmental Law, organized by Dennis Maloney and John Terry, January 15, 2013.

555. "The ICE-6G-C (VM5a) model of the global process of glacial isostatic adjustment", EGU meeting, Vienna, Austria, with Donald Argus and Rosemarie Drummond, April 8, 2013.

556. "The ice-age North Atlantic Ocean", for the ATLATIAR conference, Bilbao, Spain, May 17, 2013.

557. "Holocene relative sea level change from near field, intermediate, and far field locations", with Benjamin Horton of Rutgers University, Palsea meeting, Rome, October, 2013.

558. "Past climate tests of future climate projections: Testing climate model veracity", Killam Prize Lecture, University of Alberta, November 14, 2013.

559. "Advanced regional and decadal predictions of coastal inundation for the US Atlantic and Gulf coasts", AGU meeting, San Francisco, December 6, 2013.

560. "Climate change and Canada", lecture for the UofT Law School course on Environmental Law offered by Dennis Maloney and John Terry, January 17, 2014.

561. "The visco-elastic Earth: Ice-age geodynamic constraints and global implications", Woodhouse Symposium, Oxford University, March 28, 2014.

562. "Holocene relative sea level changes from North America and the Caribbean", with Benjamin Horton, EGU meeting, Vienna, Austria, April 29, 2014.

563. "Climate, Tectonics and the Mechanisms of continental glaciation through Earth history", Massachusetts Institute of Technology (MIT), September 22, 2014.

564. "Dansgaard-Oeschger Oscillations in a comprehensive model of glacial climate: a "kicked" salt oscillator in the Atlantic", All Laboratory Colloquium, MIT, September 24, 2014.

565. "Millennium timescale climate variability in the ice-age", Harvard University, Boston, MA, October 10, 2014.

566. "What's Up in the Arctic", for UofT in your Neighborhood, Barbara Frum Library, Toronto, October 28, 2014.

567. "Turbulent diapycnal mixing and the ocean overturning circulatory", Frontiers of Geophysical Fluid Dynamics Meeting, Ecole Normale Superieure, Paris, France, November 7, 2014.

568. "Angular momentum of the warming Earth", Guptill Technical Lecture, Department of Physics and Atmospheric Science, Dalhousie University, November 18, 2014.

569. "Global Sea Level: From Ice-Age to Space-Age", Guptill public lecture, Department of Physics

and Atmospheric Science, Dalhousie University, November 18 evening, 2014.

570. "Global warming projections for Ontario and the Great Lakes Basin", Keynote Lecture, Best in Science Symposium, Ontario Ministry of the Environment and Climate Change, November 27, 2014.

571. "Dynamically downscaled climate change projections for Ontario and the Great Lakes Basin", ECO Climate Data Roundtable, Toronto, MaRS, January 2015.

572. "Global Warming: Truth and Consequences", College of Senior Scholars, University of Toronto, April 9, 2015.

573. "New analyses of long term climate change in support of a safety case for a spent fuel depository", with Gordan Stuhne, NWMO meeting on the Safety Case for a Repository for Spent Nuclear Fuel in Canada, June 10, 2015.

574. "The Dansgaard-Oeschger Oscillation and the turbulent diapycnal diffusivity of mass in the oceans", Banff International Research Station (BIRS), meeting in Oaxaca, Mexico on "Mathematics of Layers and Interfaces", November 8-13, 2015.

575. "COP 21 and the Global Warming Grisis", Public Lecture, Alliance Francaise de Toronto, November 25, 2015.

576. Contribution of an Interview in the Series Research 2 Reality concerning the work of WRP in the area of Climate Research. Organized by Prof. Molly Soichet of UofT. Interview released on Twitter etc. on January 8, 2016.

577. "Global Warming Impacts at the Regional Scale", Introductory Lecture, University of Toronto, Climate Change Law course, Faculty of Law, January 20, 2016.

578. "Global Warming Futures", Dignitas International, Pivot Group, Toronto, Ontario, February 23, 2016.

579. "Dynamical Downscaling of climate changes projections over mountainous topography", Desert Research Institute, Las Vegas, Nevada, March 4, 2016.

580. "Flavors of Stratified Turbulence" for the meeting entitled, "Stratified Turbulence in the 21st Century – new insights on an increasingly important problems", A Theo Murphy meeting of the Royal Society of London, March 21-22, 2016. Chicheley Hall, U.K. with preliminary talks at Cambridge University

581. "Dynamical downscaling of climate change projections for Ontario and the Great Lakes Basin using the WRF regional climate model", Adaptation Canada, Shaw Conference Centre, Ottawa, Ontario April 14, 2016. Lead talk for the session on dynamical downscaling.

582. "The Dansgaard-Oeschger, oscillation: Small scale stratified turbulence drives a global-scale relaxation oscillation of the ocean circulation", Multi-scale Phenomena in Weather and Climate, A Fields Institute Programme, Univ. of Toronto, April 25-29, 2016.

583. "Ocean turbulence and global climate variability in the ice-age", Public evening lecture. Computational Mathematics Colloquium 10th Anniversary, University of Waterloo, May 11, 2016.

584 International Conference on Theoretical and Applied Mechanics. Keynote Lecture for the Opening of the Conference. Attendance ~4000, Montreal, Quebec, August 21-26, 2016.

D. LIST OF COURSES (since 1974)

a. Undergraduate Courses Taught

1974-77 **PHY 130Y - Mechanics/Waves/and Thermal Physics**. Lectures based on the text by Armstrong and King of the same title. Supplementary material added.

1977-78 **PHY 354 - Macroscopic Physics**. A course based upon classical thermodynamics at the level of M. Zemansky (*Heat and Thermodynamics*) but including considerable additional material on Continuous Media, in particular a complete development of the classical field theories of fluid dynamics and infinitesimal elasticity.

1980-82 **PHY 253S - An Introduction to Theoretical Physics**. A course based upon the ideas of tensor analysis, linear vector spaces, and geometry. Applications to classical theories of fields, the special theory of relativity, and quantum mechanics.

1979-86 **PHY 215F -Geophysics Lectures** (14) on the physics of atmospheres in a course shared with C.H. Chapman. These lectures were based upon the book *"Atmospheres"* by R.M. Goody and J.C.G. Walker and consisted of a brief introduction to the ideas of dynamics, thermodynamics, and radiative transfer in the context of a comparative study of the atmospheres of the planets in our solar system.

1979-80 **PHY 444 - Atmospheric Physics Lectures** (26) on the dynamics of the Earth's atmosphere beginning with a development of the hydrodynamic equations and concentrating on the derivation of dynamical models for large scale circulation systems, principally those based upon Quasi-geostrophic theory. Barotropic and baroclinic stability theory, mid-latitude cyclogenesis, Rossby waves forced by differential heating and topography, Laboratory models of the general circulation -the annulus.

1983-84 **PHY 446 - Atmospheric Radiation**

1983-93 **PHY 458 - Planetary Fluid Dynamics**

1984-88 **PHY 354 - Macroscopic Physics**

1988-93 **PHY 354 - Nonlinear Dynamics** - Lectures (39) on thermodynamics, hydrodynamics, and nonlinear dynamical systems. Lectures accompanied by a series of novel numerical laboratories based upon the new physics department UPSCALE facility.

1993-95 **ENV 235 - Physics and Chemistry of Planet Earth** - A new course on earth systems taught in collaboration with S. Whittington and G.F. West for the Division of the Environment.

1995- **PHY 460S - Nonlinear Physics** - Lectures (26) on dynamical systems, chaos, solitary

waves, 1-D maps and nonlinear phenomenology in physics. Responsible for the design of the course and the numerical laboratory exercises on which it is partly based.

1995- **SCI 199Y - A Blue Planet** - 52 hours of seminar discussion on Global Environmental Change

b. Graduate Courses Taught

1973-78-86-92 **PHY 5110 - Atmospheric Dynamics.** An advanced course on the application of hydrodynamic theory to planetary atmospheres in four sections: (I) The field equations of classical hydrodynamics, (II) The dynamics of stratified non-rotating flows, (III) The dynamics of rotating stratified flows, (IV) Motions of planetary scale. Special attention to the use of perturbation theory to provide simple analytical models for the basic fluid mechanical processes. Class notes - no text.

1979-80 **PHY 5260 - Atmospheric Waves.** A course concerned with the main types of wave propagation in stratified rotating fluids and with the most important mechanisms of instability. Internal gravity waves and long wavelength Rossby waves are discussed in detail as are the mechanisms of parallel shear and baroclinic instability. The general characteristics of wave-mean flow interaction are considered and illustrated through discussion of the phenomena of stratospheric sudden warming and of Quasi-biennial oscillation.

1983-84 **PHY 5280 -Atmospheric Waves and Instabilities**
1984-80-90-95 **Geophysical Fluid Dynamics.**

1985-87-89 **PHY 5211F -Advanced Atmospheric Dynamics**

2007-2016 **PHY 2502 – Climate System Dynamics**

c. Theses Supervised

i. BSc and BASc Students (11 theses total until 2003)

Peter Cary (1978), Ralph Stevens (1980), Atul Nautyal (1983), Alessandro Forte (1983), Philip Mansfield (1984), Max Allen (1988), Don Henderson (1990), Jonas Mureiko (1991), Gordan Stuhne (1992), Shawn Marshall (1992), Patrick Gill (2000 - Mr. Gill won first prize in the national CAP Physics Examination competition in this, his fourth year of undergraduate study), John W. Crowley (2006), Ivy Tan (2009), Deepak Chandran, (2009).

ii. M.Sc. Students

1. S.Y. Fan, "*Mountain lee waves and seismic sea waves*", 1974-75.

2. J.E. Donnegani, "*Acoustic gravity wave propagation from a severe storm*", 1974-75.

3. P.S. King, "*Uniqueness of temperature profiles derived from satellite radiance measurements*", 1974-75.

4. D. Hudak, "*Mountain waves: a nonlinear stream function vorticity model*", 1974-75.

5. B.E. Ley, "*Wave generation and frontal collapse*", 1975-76.

6. R.J. Morris, "*Lee waves: a convective trigger mechanism*", 1975-76.

7. J. Hall, "*Numerical simulations of finite amplitude KH waves*", 1976-77.

8. K. Higuchi, "*The initiation of prefrontal squall lines*", 1976-77.

9. P. Chen, "*Mountain waves: a linear approach*", 1977-78.

10. D. Patrick, "*Severe downslope windstorms*", 1977-78.

11. P. Wu "*Viscous gravitational relaxation and glacial isostasy*", 1977-78.

12. A. Simard, "*Ship waves in the lee of topography*", 1979-80.

13. R. Chagnon, "*Stratospheric sudden warming and tropospheric blocking*", 1979-80.

14. I. Kay, "*Convection in a spherical shell with solid_solid phase transitions*", 1980-82.

15. S. Polavarapu, "*Lagrangian models of atmospheric frontogenesis*", 1982-84.

16. A. Forte, "*The gravitational and thermal signatures of plate tectonics*", 1983-85.

17. M. Tushingham, "*Mantle viscosity from postglacial rebound data*", 1983-85.

18. W. Smyth, "*The non_linear Holmboe wave and the genesis of solitons in stably stratified parallel flow*", 1984-1986.

19. L. Solheim, "*Axi-symmetric spherical convection at high Rayleigh number: a model of Planetary thermal history*", 1984-1986.

20. J. Bush, "*Chaos in MHD systems and the dynamo theory of the earth's magnetic field*", 1986-1988. Completed Ph.D. at Harvard University and now Associate Professor of Mathematics at the Massachusetts Institute of Technology.

21. J. Scinocca, "*Nonlinear topographically forced internal waves*", 1986-1988.

22. Andrew Bush, "*Frontal Cyclogenesis and the Origins of Imbalance*", 1989-90.

23. Lin Lin, "*A spherical multigrid model of mantle convection with solid-solid phase transformations"*, 1992-93.

24. Gordan Stuhne, "*Barotropic chaos in a new finite element model of large scale flow on the sphere*", 1993-94.

25. Guido Vettoretti, "*Climate system history and dynamics: An initial simulation with the CCC GCM of the climate at 6000 kyr BP*", 1993-94.

26. Kui Xu, "*Glacial isostatic adjustment effects on modern variations of relative sea level*", 1993-94.

27. Pavel Potylitsine, "*Vorticity dynamics with stratification and rotation*", 1994-95.

28. Samuel Leonard Butler, "*Avalanche effects in mantle mixing with phase transitions*", 1994-95.

29. Amit Ghosh, "*Stratospheric Sudden Warming in the Ice-Age*", 1996-97.

30. Jana Tharmaratnam, "*A numerical model of mantle convection*", 1997-1998.

31. Qiong Zheng, "*Global Climate Change during Deglaciation*", 2000-2001.

32. Christopher Harlow, "*Jelly sandwich models of the deformation of the shallow viscoelastic structure of the Earth*", 2002-2003.

33. Yonggang Liu, "Mantle *mixing and the endothermic phase transformation at 660 km depth"*, 2003-2004.

34. Mohammed Hamidian, "*The Fluid mechanics of ENSO"*, 2004-2005.

35. Xiaolu Yu, "*The influence of solar variability on climate change during the industrial era*", 2005-2006.

36. Alireza Mashayekhi, "*Turbulent Mixing in the Oceans*", 2008-2010

37. Keven Roy, "*Space Geodetic Constraints on polar land ice melting"*, 2009-2010

38. Jun Yang, "*Snowball Earth"* (Jun is on secondment for two years from the Chinese Academy of Science), 2009-2011.

39. Deepak Chandan, "*An internal loading theory for the mantle convection process based upon seismic tomographic imaging*", 2010-2011.

40. Cai Durbin, "*Mantle convection and surface tectonics*", 2011-2012

41. Hesam Salehipour, "*A discontinuous Galerkin formulation of oceanic tides with paleoclimate applications*", 2011-2012

42. Ryan Li, "*Global warming impacts on sea level rise"*, 2015-2016

iii. <u>Ph.D. Students</u>

1. P.A. Davis, "*Wave mechanics and the stability of atmospheric shear flows*", 1974-77. Now Director of Environmental Research with Atomic Energy of Canada Limited.

2. H.N. Sharpe, "*A thermal history model for the Earth with parameterized convection*", 1975-77. Now Research Scientist with SOHIO Ltd.

3. P. Chuk-K. Wu, "*The viscosity of the deep mantle*", 1978-1982. Now Full Professor of Geophysics at the University of Calgary.

4. G.P. Klaassen, "*The transition to turbulence in stratified parallel flows*", 1979-1982. Now Associate Professor of Earth and Atmospheric Science at York University.

5. I. Halevy, "*Solar terrestrial weather relations*", 1978-84. Now Private Sector Consultant in the city of Toronto.

6. B. Ley, "*Internal waves in the Warm Sector*", 1976-84. (part-time student from 1979). Now Research Scientist with the Ontario Ministry of the Environment.

7. D. Wolf, "*Dynamics of the Continental Lithosphere*", 1982-85. Now Head of the System Theory and Modelling Section in the area of geodynamics of the GeoForschungsZentrum in Potsdam, Germany.

8. W. Hyde, "*An Astronomical Theory of the Pleistocene Ice Age*", 1978-85. Now Research Associate Professor at Duke University in South Carolina.

9. R. Laprise, "*The resonant amplification of topographically forced internal waves*", 1984-1987. Now Full Professor of Earth and Atmospheric Sciences at the Universit du Quebec à Montreal, in Montreal, Quebec.

10. S. Polavarapu, "*Midlatitude Cyclones and Cyclogenesis*", 1984-1989. Now Research Scientist with the Meteorological Service of Canada in Downsview, Ontario and Adjunct Professor of Physics in the University of Toronto.

11. A.M. Forte, "*Mantle convection and tomographically inferred a-spherical earth structure*", 1985-1989. Now Full Professor and Tier 1 Canada Research Chair with the GEOTOP Laboratory, joint UQAM/McGill/Concordia U's, Montreal, Quebec.

12. M. Tushingham, "*Post glacial rebound and relative sea level histories in the Canadian high Arctic*", 1985-1989. Now Scientific Officer with the Department of the Environment of the Federal Government in Ottawa.

13. G. Deblonde, "*Astronomically forced ice ages on a geographically realistic earth*", 1986-1990. Now Research Scientist with Recherche en Prevision Numerique of the Meteorological Service of Canada in Dorval, Quebec.

14. W. Smyth, "*Holmboe waves and the transition to turbulence in stratified parallel flows*", 1986-1990. Now Full Professor of Oceanography at Oregon State University in Corvallis, Oregon, USA.

15. J.X. Mitrovica, "*The inverse problem for mantle viscosity*", 1986-1991. Now Full Professor of of Geophysics, Harvard University, Boston, USA.

16. J. Scinocca, "*The nonlinear critical layer for topographically forced internal waves*", 1988-1991. Now Research Scientist with the Canadian Climate Centre for Modelling and analysis (CCCMA) of the Meteorological Service of Canada at U. Victoria, B.C.

17. L. Solheim, "*Mantle phase transitions and chaotic mixing*", 1986-1992. Now Research Scientist with the Canadian Climate Centre for modelling and analysis (CCCma), U. Victoria, Victoria, B.C.

18. Andrew B.G. Bush, "*Cyclogenesis in the atmosphere and Gulf Stream ring formation in the Oceans*", 1990-1994. Now Full Professor of Earth and Atmospheric Science at U. Alberta,

Edmonton, Canada.

19. Bruce Sutherland, "*Mixing and internal wave generation in dynamically unstable stratified jets*", 1991-1994. Now Full Professor of Mathematics at the University of Alberta in Edmonton, Alberta, Canada.

20. Dong Mei Zhang, "*Nonlinear Dynamics of Chemical Waves in the Belousov-Zabotinsky Reaction*", 1991-1994. Now working in the private sector on computer systems and software.

21. Kotaro Sakai, "*Thermohaline ocean circulation effects in a model of the ice age cycle*", 1991-1996. Former Staff Scientist at the Frontier Institute for Global Change Research in Tokyo, Japan. (Deceased)

22. Giovanni Pari, "*Seismic Tomography, Mantle Mixing and Radial Heat Transfer*", 1992-1997. Now employed in the private sector in Ottawa, Ontario.

23. Yasuhiro Yamazaki, "*Small scale structures in large scale baroclinic instability",* 1993-2000. Now Senior Lecturer at the School of Geography, Politics and Sociology, University of Newcastle Upon Tyne, England.

24. Gordan Stuhne, "*Classical Hydrodynamics on the Sphere: Gas giant phenomenology and novel numerical methodology*", 1994-1999. Currently Research Associate working in the area of climate model software design at the Department of Physics, University of Toronto.

25. Guido Vettoretti, "*Paleoclimate Tests of a Model of the Atmospheric General Circulation*", 1994-2001. Now Research Associate in Physics at the University of Toronto working in the area of paleoclimate modelling and in charge of operating the NEC SX-6 computer system.

26. Pavel Potylitsin, "*Rotating-Stratified Turbulence*", 1995-2000.
Now working in the area of financial mathematics in New York.

27. Samuel Butler, "*Pressure Induced Phase transitions and Mantle Mixing*", 1995-2000.
Now Full Professor of Earth Sciences in the Department of Earth Sciences of the University of Saskatchewan.

28. Jean-Michel Lemieux, "*Impact of the Wisconsinian Glaciation on Canadian Continental Groundwater Flow*", 2001-2006. Joint Toronto-Waterloo thesis. Now Associate Professor in the Department of Earth Science at Laval University.

29. Yonggang Liu, "*Climate Dynamics of the Neoproterozoic Eon*", 2004-2011.
Currently a Professor in Peking University in Beijing, China.

30. Heather Andres, "*Greenland Ice-Sheet Stability*", 2007-2015.

31. Alireza Mashayekhi, "*Turbulent mixing in the oceans"*, 2010-2013. Currently PDF at MIT.

32. Jun Yang, "*Snowball Earth*" 2010-11 (on secondment from the Chinese Academy of Science for a Period of two years while working towards his PhD degree with salary paid by the Chinese Government). Currently PDF at the University of Chicago.

33. Keven Roy, "*Space geodetic constraints on polar land ice melting*", 2010-

34. Deepak Chandan, "*Mantle dynamics and Climate: the case of the Pliocene warm period*", 2010-

35. Andre Erler, "*Downscaling of global warming projections*", 2011-2015

36. Hesam Salehipour, "*Tidally induced mixing in the abyssal ocean*", 2012-

37. Fengyi Xie, "*Dynamical downscaling of climate over the Great Lakes Basin*", 2015-

38. Charles Pan, "Mixing in stratified flow over topography", 2015-

39. Yiling Huo, "Warming impacts upon landscapes at high elevation: Tibet", 2016-

iii. Postdoctoral Fellows and Research Associates

1. D.A. Yuen, Ph.D. UCLA, 1978-1980. Funded through American N.S.F. and NATO scholarships. Models of the rheology of the mantle. (Currently Full Professor of Geophysics at the University of Minnesota).

2. H.N. Sharpe, Ph.D. Toronto, 1978-79. Galerkin models for convection with internal heat generation. (Currently research scientist with SOHIO).

3. G. Jarvis, Ph.D. Cambridge, 1979-1981. Funded through NSERC two year postdoctoral fellowship. Mantle convection and related tectonic processes. (Currently Full Professor of Geophysics and Chair of the Department of Earth and Atmospheric Sciences at York University in Toronto, Ontario).

4. R. Sabadini, (1979-1981), on leave from Instituto di Geofisica of the University of Bologna, Italy. Funded by the Italian Government. Rotational response of the earth to deglaciation. (Currently Full Professor of Geophysics at the University of Milan).

5. P. Wu, Ph.D. Toronto, 1982. Rotational response of the earth to deglaciation. (Currently Full Professor of Geophysics at the University of Calgary in Calgary, Alberta).

6. R.A. Drummond, Ph.D. Oxford, 1980-. Glacial isostatic adjustment and relative sea level change analyses. (Full time Research Associate).

7. G.W.K. Moore, Ph.D. Princeton, 1983-1985. Funded by an NSERC two-year Postdoctoral Fellowship. Hydrodynamic stability of Atmospheric Fronts. (Currently Associate Professor of Physics at the University of Toronto).

8. G.P. Klaassen, Ph.D. Toronto, 1984-85. The turbulence transition in stably stratified parallel flows. (Currently Associate Professor of Earth and Atmospheric Science at York University, in Toronto, Ontario).

9. Detlef Wolf, Ph.D. Toronto, 1985-86. Visco-elastic models of the earth. Funded by one year NSERC postdoctoral fellowship. (Currently Head of the System Theory and Modelling Section of the GeoForschungsZentrum in Potsdam, Germany).

10. X.N. Ding, 1984-85. Associate Professor of Geophysics, Beijing University. On one year sabbatical leave supported by the Chinese Government.

11. S. Karpik, Ph.D. Waterloo, 1987-1990. Design of an anelastic, nonhydrostatic, general circulation model. Funded by grants from CRAY Canada Inc. (Currently Director of Computer and Information Sciences with the Ontario Science Centre).

12. Moshe Olim, Ph.D. Victoria, 1990-1992. Design of an anelastic nonhydrostatic general circulation model. Funded by grants from Cray Canada. (Currently Senior Staff Engineer specializing in modelling with FSI International in Chaska, Minnesota).

13. W.D. Smyth, Ph.D. Toronto, 1991-1992. Two dimensional turbulence. Funded through NSERC grants. (Currently Research Associate Professor in the Department of Oceanography at the University of Oregon in Corvallis).

14. C.C. Caulfield, Ph.D. Cambridge U., 1992-1994. Three dimensionalization of turbulence in the stratified mixing layer. Funded by the Japan-Science and Technology Fund of the Department of External Affairs and International Trade. (Currently Associate Professor of Fluid Mechanics and Environmental Engineering at the University of California in San Diego, California, USA).

15. Xianhua Jiang, Ph.D. York U., 1993-1995. Development of a three dimensional model of the post glacial rebound process with laterally heterogeneous viscosity. Mantle viscosity inverse theory. (Currently employed in the private sector by Rogers Cable Systems Inc.).

16. Lev Tarasov, Ph.D., Toronto, 1995-. Introduction of a detailed theory of glacial isostatic adjustment into a model of the ice-age cycle.

17. Peter Fawcett, Ph.D., Pennsylvania State University, 1995-1997. General circulation modelling of past climate regimes. (Currently Associate Professor of Geology at the University of New Mexico in Alberquerque, New Mexico).

18. Keith Alverson, Ph.D., M.I.T., 1996-1998. Ice-Age cycle related variations in the oceanic thermohaline circulation and atmospheric pCO_2. (Currently Director of the PAGES Core Project Office in Berne, Switzerland).

19. Yakov Afanasyev, Ph.D. Moscow, 1995-1999. Three dimensional turbulence in stratified flow over topography. (Currently Full Professor of Physics and Oceanography at Memorial University of Newfoundland).

20. Xiaoqing Li, Ph.D. Oxford, 1997-1998. AGCM reconstructions of past climate regimes. (Currently employed in the software development industry in Toronto, Ontario).

21. Zhengrong R. Peng, Ph.D., Memorial University, 1996-1997. Postglacial Rebound. (Currently employed in the private sector in the petroleum industry in Calgary, Alberta).

22. Dong-Mei Zhang, Ph.D., U. Toronto, 1995-1998. Development of a global data base of relative sea level histories. Now employed in the software development industry in Toronto, Ontario.

23. Jonathan Wiley, Ph.D. Cambridge University, 1999-2000. Phase transition effects on mixing in the planetary mantle. (Currently Associatet Professor of Applied Mathematics with the University of Hong Kong).

24. Larry P. Solheim, Ph.D., Toronto, 1998-2002. Environmental simulation on the NEC SX5 vector

computer system. (Now with the Canadian Climate Centre for modelling and analysis of the Meteorological Service of Canada in Victoria, British Columbia).

25. Mark Stastna, Ph.D., Waterloo, 2001-2004. Mixing in stratified flows over topography: oceanographic applications. (Currently Associate Professor of Applied Mathematics with the University of Waterloo, Waterloo, Ontario).

26. Guido Vettoretti, Ph.D., Toronto, 2004-. Simulation of ancient climates using modern coupled atmosphere ocean climate models, (Research Associate).

27. Gordan Stuhne, Ph.D., Toronto, 2004-. Further development of the University of Toronto Glacial Systems model including the process of ice-earth-ocean interaction, (Research Associate)

28. Marc D'Orgeville, Ph.D., EFREMER-French Oceanographic Laboratory, Brest, France, 2005-2008. Downscaling DP global warming projections over Southern Ontario and the Great Lakes Basin and the analysis of precipitation extremes.

29. Stephen Griffiths, Ph.D., Cambridge University, 2006-2008. Global ocean tides and tidal mixing: ice-age to present. Currently Lecturer in the Department of Applied Mathematics of the University of Leeds in the UK.

30. William T. Hyde, Ph.D., Toronto, 2006-2009. Modelling ancient climates, (Research Associate).

31. Hosein Shahnas, Ph.D., Middle East Technical University, Turkey, 2009-2013. Three dimensional models of mantle convection.

32. Jonathan Gula, Ph.D., ENS-Paris, 2009-2011. Regional Climate Modeling of the Global Warming Process.

33. Marc D'Orgeville, , Ph.D., EFREMER-French Oceanographic Laboratory, Brest, France, 2012-2015. Downscaling DP global warming projections over Southern Ontario and the Great Lakes Basin and the analysis of precipitation extremes.

34. Hosein Shahnas, Ph.D., Middle East Technical University Turkey. 2013-2015. Three dimensional models of mantle convection. (Research Associate)

35. Pu Guo, Ph.D., Chinese Oceanography Laboratory. 2015-2016. Tidal dissipation and mixing in the South China sea.

E. ADMINISTRATIVE POSITIONS

a. Within the University

1975-76 Physics Department Committee on the Undergraduate Core Curriculum

Physics Department Colloquium Committee

Physics Department Appointment Committees:

1977-78 for experimental atmospheric science

1978-80 for dynamic meteorology

1978-79	for mathematical earth science.
1981	Tenure Committee
1981	University Professor's Committee; for the appointment of University Professors
1982	Member, Departmental Curriculum Committee.
	Member, Appointment Committee for experimental atmospheric science.
1983-87	Graduate Admissions Committee
1983	Special Committee on the graduate program
1983-84	High Energy Theoretical Physics Appointment Committee
1984-86	Committee for University of Toronto acquisition of a vector computer.
1984	Tenure Committee
1984-86	Grievance Review Panel of the University of Toronto
1984-85	Physics Department Colloquium Committee
1984-85	Member, Appointment Committee for the Erindale position in Atmospheric Science.
1986-87	Appointment Committee for geophysics
1986	Appointment Committee for atmospheric science
	Search Committee for a new chairman for the Department of Physics.
1988	Departmental Planning Committee _ development of a new five year staffing plan for the Department of Physics
1988	Chairman - Appointment Committee for Theoretical Condensed Matter Physics.
1989-92	Departmental Planning Committee
1990	Department of Physics Standards and Evaluations Committee
1990-92	Chairman of the Supercomputer Users Group of the University of Toronto
1990-91	Member of the Task Force on Large Scale Computation of the Vice-President Research
1991	Chairman of the Department of Physics Appointments Committee
1991-92	Member of the Management Board of the Ontario Centre for Large Scale Computation
1990-92	Chairman of the NSERC sponsored Peer Review Board for distribution of time on the OCLSC vector supercomputer.
1991	Chairman of the Search Committee for a new Director of the IsoTrace Laboratory.
1991	Chairman of a promotion review reading committee.

1992- Member of the Steering Committee for the new Division of the Environment within the Faculty of Arts and Science.

1992- Member of the Steering Committee for the Development of an Environmental Physics Option for Engineering Science within the Faculty of Applied Science.

1992- Chairman of a tenure review reading committee.

1992- Chairman - Appointment Committee for Theoretical High Energy Physics

1992- Member of the Advisory Committee to the Master of Massey College.

1992- Member of the Department of Physics Planning Committee

1994- Member of the Academic Board of the University of Toronto

1994 Member of the High Energy Physics Appointments Committee

1997 Chair of the High Energy Physics Appointments Committee

1998-2001 Member of the Decanal Promotions Committee of the Faculty of Arts and Science

Member of the Physics Department Computing Committee

1999 Leader of the PSciNet proposal to the CFI for support of High Performance Computing in the Faculty of Arts and Science of the University of Toronto. Proposal in the amount of approximately 12M$ now at second stage of the review process.

2001 - Chair of the appointment committee in Theoretical Condensed Matter Physics which led to “double” Canada Research Chair appointments for Yong-Baek Kim and Hai-Young Kee. The work of this committee is continuing.

2005 - Director of the Centre for Global Change Science

2008 - Scientific Director of SciNet

Member of the National Initiatives Committee

b. Outside the University

1976-79 Member of NSERC Grant Selection Committee for Space Science and Astronomy

1979 Member of the membership committee of the University Corporation for Atmospheric Research, NCAR, Boulder, Colorado.

1980 Chairman of the above committee.

1978-80 Member of the scientific committee of the Canadian Meteorological Organization.

1979 Organizer Symposium 10 of the International Union of Geophysics and Geodesy Meeting in Canberra, Australia.

1981	Organizer of Symposium on the Thermal History of the Earth, IASPEI Meeting, London, Ontario.
1980	Guest Editor: Physics of the Earth and Planetary Interiors, vol. 24, no. 4, 1981. Special issue on the dynamics of the core and mantle and dynamo theory.
1981-84	Member of Working Group 9 [Processes and Properties of the Earth that govern lithospheric evolution] of the I.C.L. (Inter-Union Commission on the Lithosphere).
1981-84	Chairman, NSERC Committee on Vector Computer Access which established the first Canadian program of Research Council Supported use of supercomputers
1981-84	Associate Editor. Journal of Geophysical Research.
1982-present	Editorial Board. Journal of Geophysical and Astrophysical Fluid Dynamics.
1983-88	Associate Editor. Journal of Pure and Applied Geophysics
1984-86	National Science Foundation (US) member of a Panel of Experts on Land ice and sea level: Polar Research Board Sponsorship. Under the Chairmanship of Mark Meier.
1984-86	National Academy of Sciences (US). Member of the review panel on sea level variations and climate change. Under the chairmanship of Roger Revelle.
1984-87	Member of the IASPEI Subcommittee on Quantitative Geodynamics.
1984-87	Chairman of the NSERC Time Allocation Committee for access to the Cray_1s and CRAY XMP 28 vector computers at Dorval Quebec.
1984	Member of the Science Subvention Awards Panel of the Atmospheric Environment Service of Canada.
1984	Organizer and Chairman of the one day symposium on Time Dependent Processes and Rheology at the 15th Conference on Mathematical Geophysics at Loen Norway, June 1984.
1985-89	Vice chairman of Working Group 6 of the International Lithosphere Program and leader of the section on dynamical modelling.
1986	Organizer and Chairman of a one day symposium on mantle convection at the 16th Conference on Mathematical Geophysics at Oosterbeek, the Netherlands, June 1986.
1986-87	Consultant to the NSERC Task Force on Supercomputing in Canada.
1986	External examiner of the These d'Etat of Henri_Claude Nataf at Orsay, France in June 1986.
1987	Organizer and Chairman of IASPEI Symposium 3 (Dynamic Thermal Regimes and the Deformation of the Lithosphere), Vancouver BC, August 1987. General Assembly of the International Union of Geodesy and Geophysics.

1987-1992 Member of the Inter-University Supercomputer Advisory Board which advised on the operation of the Ontario Centre for Large Scale Computation.

1988-1992 Chairman of the Natural Sciences Research Committee of the Canadian Global Change Program of the Royal Society of Canada.

1988-89 Member of the Editorial Board of Reviews of Geophysics

1988 Co-organizer of the 17th Conference on Mathematical Geophysics at Blanes, the Costa Brava, Spain, June 1988.

1986-93 Vice-Chairman of the "Union Mathematical Geophysics Committee" (of the International Union of Geodesy and Geophysics). Appointed by Secretary General Dr. Paul Melchior, September 1986.

1989-92 Member of the Committee on Atmospheric and Oceanographic Waves and Stability of the American Meteorological Society (Appointed by STAC Commissioner James L. Rasmussen).

1988-92 Member of the Climate Research Committee of the U.S. National Academy of Sciences (R.E. Dickenson, Chairman).

1989 Member of the Japan-Canada Complimentary Study of the Science Council of Canada (Chaired by Geraldine Kenney-Wallace). Organized visits by Japanese scientists to Canada and spent one week in Tokyo on return mission.

1989-95 Member of the Board of Directors of the Canadian Global Change Program

1989-92 Chairman of the Canadian National Committee for the International Geosphere-Biosphere Programme.

1990 Chaired a Committee of 18 Canadian scientists which visited Japan in Spring 1990 to discuss possible joint research on problems of Global Change.

1990-97 Member of the Scientific Steering Committee of the International Geosphere-Biosphere Programme (IGBP) of the International Council of Scientific Unions (Chaired by James McCarthy of Harvard University).

1990-96 Member of the Executive of the Scientific Steering Committee of the IGBP Core Project entitled PAGES (for Past Global Changes). Co-Chaired by Jack Eddy of NCAR and Hans Oeschger of the University of Berne, Switzerland which is the location of the Core Project Office.

1991-93 President of the Canadian Geophysical Union.

1991-93 Member of the Scientific Programs Evaluation Committee (SPEC) of the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. This is the pre-eminent institution for research in Atmospheric Science and Oceanography and the newly formed SPEC Committee (with 6 members) is responsible for reviewing its scientific agenda and recommending/formulating a specific scientific path for the future (members are William Hooke, Chuck Leith, Dimitri Mihalas, Richard Peltier, Susan Soloman, and Michael

Wallace).

1992 Member of the External Review Committee of the Department of Physics of the University of Victoria, February 17-20.

1992 Chairman of the Green Plan Workshop on a Climate Change Network for Canada Toronto, May 4-5, 1992.

1992 Co-chairman of the joint meeting of the Canadian Geophysical Union and the American Geophysical Union held May 12-15, 1992 in Montreal, Quebec (attendance was approximately 4000 people).

1992-1996 Member of the Scientific Steering Committee of the IGBP Core Project GAIM (Global Analysis Interpretation Modelling). Chaired by Barrien Moore of the University of New Hampshire.

1992 Co-organizor (with Albert Tarantola of IPG_Paris) of the 19th IUGG Meeting on Mathematical Geophysics in Taxco, Mexico, June, 1992.

1992 Director (invited) of the NATO Advanced Research Workshop on Ice in the Climate System at Aussois, France (Alpes), September 7-11, 1992.

1992 Invited Editor of the Special Issue of the Canadian Association of Physicists Periodical Physics in Canada on the subject of **Physics and the Environment: A New Subdiscipline**. This special issue appeared in Fall - 1993 and included eight technical articles by Canadian physicists (including the lead article by W.R.P.).

1992-1998 Elected Member of the Board of Trustees of the University Corporation for Atmospheric Research (UCAR) which operates the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. This group develops and oversees research and operational policy for the Corporation. Re-elected for a second three year term in October 1995.

1993-1999 Chairman of the Committee on Mathematical Geophysics of the International Union of Geophysics and Geodesy, IUGG (Appointed by the Secretary General, Paul Melchior). This is the main group operating internationally for the promotion of theoretical research in all of the geophysical sciences. Continuing (through 1999) appointment.

1993-94 Elected Member of the Board of Directors of CIRAC, The Canadian Institute for Research in Atmospheric Chemistry.

1993-95 Member of the NSERC Grant Selection Committee for Environmental Earth Science.

1994-95 Member of the Board of Directors of the Ontario High Performance Computing Network that investigated establishing a supercomputer facility for the Provincial Government of Ontario.

1996- Chairman of the Climate Research Committee of the Canadian Climate Research Board

1996- Associate Editor of the Journal of Geophysical and Astrophysical Fluid Dynamics (with Andrew Soward, Fritz Busse, Gary Glatzmeier and T. Yamagata).

1997 Co-organizer of the Sloan Foundation sponsored meeting on the future of the geophysical

sciences, entitled "Earth System Predictability: the unknown and the unknowable", at the Santa Fe Institute, Santa Fe, New Mexico, November, 1997.

1998-2000 Organizing Committee for the 50th Anniversary Meeting in the Year 2000 of the Royal Meteorological Society and a Principle Invited Speaker. Meeting held in June 2000 at St. John's College, Cambridge University.

1998 External examiner of the Thèse presenté par Masa Kageyama pour l'obtention du GRADE DE DOCTEUR from the Laboratoire des Sciences du Climate et de l'Environnement, CEA Saclay, France, November, 1998.

1998-2003 Chairman of the Earth Science Liaison Committee of NSERC. This group is responsible for organizing and stimulating the contents of the next Reallocation Report for NSERC in the areas of solid and environmental Earth Science.

1998-2000 Member of the Fellowship Selection Committee of the Earth and Ocean Sciences Division of the Royal Society of Canada.

1999-2003 Co-Chair of the Earth Sciences Reallocation Report Committee of NSERC. This group is responsible for actually drafting the report.

1998-2004 Member of the Fellowship Selection Committee of the American Geophysical Union.

2002-2004 Co-Chair of the joint meeting of the Canadian Geophysical Union and the American Geophysical Union held in Montreal, Quebec in the Spring of 2004.

2004- Lead Author for Chapter 6, "Paleoclimatology", of the Fourth Scientific Assessment of Climate Change by the IPCC (Intergovernmental Panel on Climate Change).

2009- Member of the Ontario High Performance Computing Council

Associate Editor of the Journal Geophysical and Astrophysical Fluid Dynamics