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Dr Robert Missotten  
IGCP Secretary  
UNESCO  
1, rue Miollis  
75732 Paris Cedex 15,  
FRANCE

Dear Dr. Missotten

**New IGCP Project Proposal**

Please find enclosed a proposal for a new IGCP project (commencing in 2008) for the consideration of the IGCP Scientific Board.

I'd be grateful if you would acknowledge receipt of this proposal by email and let me know what the timetable is for the consideration and announcements on new proposals.

Yours sincerely,

**Dr. Bruce R. Goleby** (Chairman of Working Group)  
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28 September 2007

**INTERNATIONAL GEOSCIENCE PROGRAMME (IGCP)**

**Project Proposal Form**



**IMPORTANT:** Please fill in the boxes below using a computer and following closely the instructions provided at the bottom of this form, print a copy, sign it, and send it to:

**IGCP Secretariat  
Division of Ecological and Earth Sciences  
UNESCO  
1 rue Miollis  
F-75732 Paris Cedex 15  
France**

*Another copy should be sent as an attachment via e-mail to: [igcp@unesco.org](mailto:igcp@unesco.org)*

Proposals must reach Paris by October 15th in order to be considered for funding for the following year.

1. Indicate the topic into which the project falls:

- (i) *Topics of particular interest to IGCP*
  - 1.1 Geoscience of the Water Cycle
  - 1.2 Geohazards
  - 1.3 Earth Resources
  - 1.4 Global Change and Life Evolution
  - 1.5 The Deep Earth -----X
- (ii) *Annually defined topics* .....
- (iii) *Other relevant topics in basic/applied geoscience*

If this is a Young Scientist Project proposal please tick here

**2. Short title of the project:**

Crustal Architecture and Landscape Evolution

### 3. Full title of the project:

Crustal Architecture and Images –Structural controls on landscapes, resources and hazards

### 4. Proposed by:

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**5. Scale of the project:**

- sub-continental/regional
- continental
- inter-continental
- **global** -----X

**6. Brief outline of the project**

This project will focus on that part of planet Earth that has the most significance for the world's communities, namely **the Earth's crust, that outer part of the planet on which we all live.** The project will make available to communities-at-large a wealth of information and seismic imaging that is commonly only available to research workers but yet has a profound effect on how we think of the **landscapes, natural environments and their controlling geological processes and tectonic influences.**

An understanding of crustal architecture and tectonic history/processes is **fundamental to any appreciation and understanding of landscapes, surface geology and natural hazards** at a local, regional and global scale.

The project aims to **bridge the gap between scientific effort and the public interest** and give a real insight into nature of the major geological processes in the outer 50-70 km of the Earth that directly affect our lives.

Through the project's **web site development** phase, it will link and archive images and sources of information on crustal architecture from world-wide seismic imaging programs. Through the sponsorship of key international symposia the project will **foster international cooperation and knowledge transfer.**

The project has widespread **relevance** to decision making in the areas of natural resource development, urban and national infrastructure planning, university teaching, groundwater management and natural hazard assessment on all continents.

#### 7. Estimated duration of the project:

- 3 years
- 4 years
- 5 years       -----X

#### 8. Full description of the project (sections 8.1 through 8.10)

##### 8.1 Aims and background:

Seismic imaging has, in the last 50 years, enabled earth scientists to examine, in some considerable detail, **the architecture of the Earth's crustal rocks** and develop ideas on the tectonic processes throughout geological time that have led to this present-day architecture. **Tectonic processes determine the landscape topography and microclimates within which people live, the resources that are hosted by near-surface rock formations, and the natural hazards inherent in various regions around the world.** Coupled with other geophysical techniques, seismic imaging can now produce a remarkably good picture of near-surface structure across the continents and their margins that are relevant to community decision-making at local, national and international levels.

The project will have two main aims; one to facilitate the bringing together of earth imaging scientists from around the world at sponsored conferences, the second to provide

links to earth imaging web sites as well as providing archive images and sources of information on crustal architecture from world-wide seismic imaging programs.

This project will **build on the results of earlier IGCP projects** (in particular IGCP Project 474 – Images of the Earth’s Crust <http://www.earthscrust.org> ) that have examined tectonic processes and seismic imaging results. It will bring together earth scientists from around the world to focus the strengths inherent in a number of major geoscience research institutions and international associations to make available to worldwide scientific and educational audiences and the general public, the best examples of images of the interior of the Earth’s crust and lithosphere across a variety of significant structural provinces from all parts of the globe.

The project may be viewed as creating **an archive of knowledge on crustal architecture** for the long-term benefit of both the lay person and the professional. This aim may be seen as part of a wider objective to foster the spread and application of geoscience knowledge to issues related to the **pursuit of international social, economic and cultural goals and sustainable development**. The project will be relevant to natural resource exploration, understanding large scale heat distribution around the world and, as well, potential local geothermal resources, the distribution and management of groundwater resources and the study and mitigation of natural hazards such as earthquakes.

Most Earth-science theory flows from an understanding of the geology at the surface of the Earth. This project will generate the collaboration to show and **make available seismic research images** of depth sections across representative orogenic belts, rifts, continental margins, etc. Many of the earlier results available today are from developed nations. However, there are **still vast tracts of the world’s continents and their margins that are relatively unexplored**. In making the results available in a global scientific context, they will be available and have meaning to researchers and educators in developing nations.

This project will bring together earth scientists regularly from around the world to examine in more detail the crustal architecture across tectonic provinces from key areas. The project will support **regular scientific meetings** of seismologists and other earth scientists focussed on imaging the Earth’s crust. Importantly, the project will **inherit and support the successor to an earlier IGCP Project 474 web site <http://www.earthscrust.org> to make seismic images readily available to the general public** and encourage regular contact between those with a scientific and educational role in crustal architecture.

### **BIBLIOGRAPHY**

Web site and symposia information supported by IGCP Project 474 (predecessor to the present project proposal).

TECTONOPHYSICS Volume 388, Issues 1-4, Pages 1-297 (13 September 2004) - Edited by F. J. Davey and L. E. A. Jones  
Papers presented at the 10<sup>th</sup> **International Symposium on Deep Seismic Reflection Probing of the Continents and Their Margins**, Taupo, **New Zealand**, 6-10 January 2003

TECTONOPHYSICS, Vol. 420, Issues 1-2, Pages 1-344 (26 June 2006) - Edited by D. B



Snyder, D. W. Eaton and C. A. Hurich

Papers presented at the **11<sup>th</sup> International Symposium on Deep Seismic Reflection Probing of the Continents and Their Margins**, Mont-Tremblant, Quebec, **Canada**, 26 September - 1 October 2004

TECTONOPHYSICS, in press.

Papers presented at the **12th International Symposium on Deep Seismic Probing of the Continents and Their Margins** - Shonan Village Center, Hayama, Tokyo, **Japan**, September 24 - 29, 2006.

GEOLOGICAL SOCIETY OF AUSTRALIA, Abstracts 81 – Edited by M.T.D. Wingate and S.A. Pisarevsky

Abstracts of papers presented at the **Supercontinents and Earth Evolution Symposium**, Fremantle, Western **Australia**, 26-30 September, 2005

**IGCP Project 474 web site** – Images of the Earth's Crust & Upper Mantle, "Inner" Space, the Continents and their Margins – <http://www.earthscrust.org>

**Symposia with IGCP Project 474 sponsorship in progress:**

18-20 September, 2007 - International Earth Imaging Symposium – **Models of the Earth's Crust and Upper Mantle** - Saint-Petersburg, **Russia** – in cooperation with Ministry of Natural Resources of the Russian Federation, Russian Federal Agency on Resource Management (ROSNEDRA), and Russian Academy of Sciences.

22-26 October 2007 **Seismic Images of Crustal and Upper Mantle Architecture: a focus on the African continent**. Port Edward (south of Durban), **South Africa**. - in cooperation with the South African Geophysical Association (SAGA) Biennial Technical Meeting and Exhibition.

6-14 August, 2008 **Images of the Earth's Crust** – Symposium within Earth Interior, Lithosphere, session 33<sup>rd</sup> International Geological Congress, Oslo, **Norway**.

September, 2008 - **13th International Symposium on Deep Seismic Probing of the Continents and Their Margins** – hosted by the Geological Survey of Finland, Helsinki, **Finland**.

8.2 Significance:

Any **true understanding of landscapes, surface geology and natural hazards** requires an understanding of the tectonic processes that have resulted in the present-day terrains. This understanding can be accomplished only through an appreciation of deep crustal architecture that is revealed by seismic profiling, wide angle or tomography techniques. Projects involving deep seismic profiling across the continents, their margins and the deep ocean basins are very expensive and usually require national and international budgets of many millions of dollars. Many countries cannot usually fund such projects alone and thus

**international cooperation** is required for the results of such projects to flow to the wider scientific community and the public.

This proposed IGCP project will advance the wider understanding of landscapes and surface geology through **knowledge transfer and geological understanding** of the processes within the Earth's deep crust and lithosphere that have led to the present-day terrains.

The Working Group of geoscientists proposing this IGCP project believe that they are well-equipped to **provide leadership within the international seismological community** and take an active role in not only bringing together seismologists at regular specialist meetings but are also in a good position to **bridge the gap between the specialist scientific community and the public.**

**Web-based communication** is a key element within the proposed project. The web site <http://www.earthscrust.org> will provide an ongoing repository for information on crustal architecture using seismic profiling techniques and a resource for the public and wider scientific community. The project Working Group includes many **leading exponents of deep seismic profiling methods** who are actively involved in generating geological and geophysical research.

The funding sought from IGCP/UNESCO/IUGS is very important to the viability of the project because 1) it will provide **seed monies that help enable keynote speakers and students attend international symposia** supported by the project, and 2) it will provide support for the **development of the project web site**, a critical facility for long-term links/network connections to sources of information and data.

**IGCP funding is a catalyst.** It demonstrates to institutional organisations and universities the willingness of the wider international community to support projects of this nature. This in turn is a powerful influence on the provision of further support funding by national bodies and institutions. The IGCP seed funding is always well targetted. In most cases national and academic institutions provide the major funding for the project activities.

### 8.3. Present state of activities in the field of the proposed project:

**Upper crustal seismic profiling** is conducted on a large scale by the petroleum exploration industry both onshore and offshore, by academic institutions and by national geological surveys. The targets for such exploration are usually sedimentary sequences at less than 5km in depth. **Deep seismic profiling targets** are commonly the underlying basement rocks that make up the fabric of the continents on which we live. Deep seismic profiling also obtains upper crustal information but sometimes at a reduced resolution. The fundamental crustal architecture tells us much about the nature of basement structures, faults, fluid flow paths, compositions and tectonic processes. These are aspects of the earth sciences that have a direct input in to mineral exploration, earthquake risk management, and the study of groundwater processes, rock compositions, volcanism, and landscape development. Such deep crustal architecture also often plays an important role in

controlling the structural patterns and depositional environments of sedimentary basins and their resources.

Such seismic investigations, commonly resource industry driven, are conducted in many countries such as Spain, Canada, Finland, Australia, USA, Russia, etc. Deep seismic profiling investigations are commonly conducted by state and university research institutions at the pre-release stage of **exploration lease area management**. The aim is to provide background deep structural information that will attract the exploration companies to mineral or petroleum lease areas. There are vast tracts of the world's continents that do not have such information and **there is a huge potential for further work in Asia, Africa and South America and the application of deep seismic imaging.**

In other areas the prime targets for deep seismic profiling and imaging are earthquake-related. These countries include New Zealand and Japan. Studies of **earthquake-prone areas** are a matter of public safety and infrastructure investment. Hence there is a need to better understand the crustal architecture as an input to earthquake risk assessment. There are many such areas around the world and deep seismic imaging is arguably the best tool for such research. Many national institutions in earthquake prone countries sponsor such research.

This proposed IGCP project will **enable and foster communication between earth scientists involved in seismic profiling around the world and provide an international forum for the dissemination of results through regular symposia and the provision of a public web site.** Information and images will thus be made readily available to the general public for scrutiny, education and decision-making. The proposed project has no plans to conduct deep seismic profiling in the field. Such profiling is beyond the financial resources of IGCP.

There are currently regular symposia/meetings sponsored by IGCP Project 474 that are well respected within the seismological community. It is intended to focus on the continuation of this **program of fostering appropriate symposia and expanding/developing the project web site** for the benefit of the international community. In particular, the project **will actively seek to sponsor symposia in non-traditional countries** where seismic imaging and the educational benefits flowing from such work is not traditionally available.

Attached to this proposal are letters of support from institutions and professional organizations around the world

#### 8.4 Workplan (items by year):

It is intended that the project continue to **develop a web site** that gives ready access to information on crustal architecture principally determined by seismic methods. The project will also sponsor and support **symposia focussed on deep seismic profiling and imaging techniques** aimed at further enhancing our knowledge of crustal architecture around the world.

### **Web Site Development:**

Years 2008 to 2013: Web site content will be increased **continuously throughout the 5-year life of the project** by commissioning and seeking reviews and research material from specific target areas such as the Antarctic, Africa, South America, central/southern Asia, and northern Eurasia. Working Group members will actively seek target material and information and also links to other related and appropriate key web sites.

It is most important that the archive of seismic profiling and imaging projects be professionally maintained either as review information or a meta-data to source primary and secondary sources of information. Geoscience Australia (Australia's national geological survey and based in Canberra) has agreed to host and manage the web site information for the 5-year life of the project.

### **SYMPOSIA SPONSORSHIP:**

It is most important that seismologists from around the world are encouraged to share information on deep seismic profiling and imaging techniques and the geological interpretation of the images so produced. **Knowledge communication** is a key to the success of the proposed IGCP project

IGCP Project 474 sponsored sessions at regular **biennial meetings of deep seismic profiling researchers** around the world. The more recent ones have been in New Zealand (Jan. 2003), Canada (Sept-Oct. 2004), and Japan (Sept. 2006). The next one is scheduled for Finland (Sept. 2008). These specialist meetings are highly regarded by international seismologists. It is intended that **the proposed IGCP project will provide sponsorship of deep seismic profiling meetings in 2008, 2010, 2012.**

The integration of deep seismic profiling and imaging results with the wider geological community requires sponsorship of regional meetings with specific targets and often with a focus on a particular area of research. Such meetings will include the **2008 IGC meeting in Norway, the 2011 IUGG meeting in Australia** and the **2012 IGC meeting in Australia.**

The proposed project will also target **"greenfield" areas** such as those in continental Asia, Africa and South America. Symposia will be identified and sponsored for years 2009, 2011 and 2013 that link with other geological meetings and groups. An example of such a meeting is the 2007 IGCP Project 474 symposium/session in South Africa in cooperation with the South African Geophysical Association biennial meeting. China would seem to be a standout area for such a meeting bearing in mind the enormous effort devoted to deep seismic profiling and imaging in that country.

Seismic imaging requires the encouragement of **specialist technical meetings** to develop techniques for processing and interpreting the large amounts of data commonly acquired during seismic projects in this modern era. North America and Europe are currently the focus of large seismic imaging programs. It is envisaged that the Proposed IGCP project will jointly sponsor 1-2 small specialist meetings in the period 2008-2013 in cooperation with IASPEI, ILP and other IGCP projects.

#### 8.5 Results expected:

- a) in basic sciences
- b) in applied sciences and technology
- c) in respect of benefit to society

- 1) Years 2008 to 2013: The growth and expansion of the project web site with its focus on the delivery of information and data on deep seismic profiling/imaging and crustal architecture will **greatly enhance the availability of information** to the academic community, research institutions, teaching institutions at all levels, and the general public. The interpretation of such data will bring an enhanced appreciation of how deep geological structures influence landscapes and the tectonic processes affecting peoples lives. The website development will be equally appropriate to basic sciences, applied sciences and to the general public interests/education.
- 2) Years 2008, 2010, 2012: The specialist deep seismic profiling/imaging symposia will **enhance the cooperation between seismologists** from around the world and enable technological knowledge transfer at the forefront of the seismological sciences. These symposia will contribute directly to the basic and applied sciences. Student participation is particularly encouraged at these symposia.
- 3) Years 2009, 2011, 2013 (and possibly others): The regional seismic imaging symposia will build on the geological sciences in these particular regions/countries and, in particular, will encourage an **integrated approach to the interpretation of deep seismic profiling/imaging with other geological disciplines** in terms of mineralization, oil/gas prospectivity, landscape evolution/development, groundwater flows, geothermal and natural hazard risk assessment. Such symposia will have a direct input to basic sciences in the region, applied sciences in terms of technology transfer, and benefits to the economic prosperity of a region or country. The project will target "greenfield" regions as the focus of such symposia. Such symposia will have direct applied scientific benefits and societal benefits to the region/country as a whole. Student participation will be particularly encouraged at regional symposia.
- 4) Years 2009, 2011 (and possibly others): The specialist workshops will deliver enhanced cooperation and **technology transfer at the forefront of the seismological sciences**, be they in data processing, imaging, mathematical algorithm development, interpretation, or displaying of results. Such specialist workshops will encourage international cooperation and have direct benefits for basic and applied sciences.

#### 8.6 Participation:

- a) what countries or institutions (or individuals) have already agreed to co-operate?
- b) what countries and institutions are likely to participate in the project?

**The members of the Working Group proposing this IGCP project are from among**

**the foremost geoscience research institutions and surveys in the world.** All the institutions currently have significant capabilities and programs in the field of seismic profiling, imaging and interpretation. Their contact details are contained in Section 4 of this IGCP proposal document.

All the individuals listed have a significant record in the fields of geoscience research, seismology and scientific publishing. All have made a commitment to the project and its aims over the next 5 years with the approval of their institutions. All are committed to bridging the gap between their specialist science, the teaching professions and the public. All are committed to making links to countries and areas where the seismological sciences are less well developed and to “greenfield” regions where the application deep seismic imaging can contribute significantly to knowledge of landscape development, resource management and natural hazard research.

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**Dr. Douglas Finlayson**, retired ex-Geoscience Australia, AUSTRALIA

Various letters of support from research and survey institutions/associations, including IASPEI and IGCP (Australia) are attached to this proposal document.

#### 8.7 Location of major field activities:

**The project will not be conducting any field activities.**

The cost of deep seismic profiling is above and beyond the funding provided by IGCP/UNESCO. All research institutions and national geological surveys engaged in deep seismic profiling and imaging almost always do so for their own particular regional economic benefits to the nation/region whether they be resource-related or natural-hazard-related. In a few circumstances various countries conduct pure geoscience research to further basic knowledge on geological processes that have a bearing on crustal architecture and rock compositions/resource accumulations.

The **location of symposia** sponsored by the proposed project will be determined by host countries and negotiations as part of an orderly program of international scientific meetings. It is intended, however, that the project target some regions not traditionally the

focus of deep seismic profiling meetings for example, South America, Africa, Asia, Russia. Such meetings inevitably are more difficult to organize and fund.

#### 8.8 Location of major laboratory research (assured co-operation of laboratories):

**No laboratory work is envisaged** for this project.

It has been proposed that some historical deep seismic profiling information be researched by contract, possibly by students. This material would be added to the content on the project web site.

#### 8.9 Budget

The project seeks funding of US\$15,000 per year from IGCP/IUGS. These funds will be used as follows:

**Website development**.....US\$5000

There are necessary and unavoidable costs associated with the research and development of any web site. The web site for this project is the ongoing and lasting legacy of the project and its maintenance and updating are an essential element of the project as a whole. This requires professional skills of a high order that require funding. Geoscience Australia will provide a significant 'in kind' contribution to the project by hosting and maintaining the project web site. The addition of web-site content however, requires research by knowledgeable persons (possibly students under supervision) that must be funded.

**Support funding for international conferences and symposia**.....US\$10,000

The project will only offer the provision of "seed" funds to allow conference organisers to invite keynote and international speakers and postgraduate students attend their symposia and conferences. This usually only amounts to about 10-25% of travel funds required. The bulk of any travel assistance funding will normally be sought elsewhere, usually from a researcher's parent institution, a national research funding institution, or as a personal contribution. Only in special cases, such as candidates/students from disadvantaged situations/countries, will a larger travel assistance grant be made in return for a significant contribution to the IGCP project.

#### 8.10 Curriculum Vitae of proposer(s)

See **attached documents** for Working Group individuals.

#### 9. Attach letter of endorsement of IGCP/IUGS National Committee

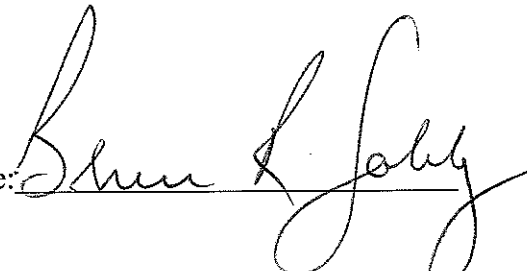
It is understood that the project leader will be responsible for the submission of annual progress reports, financial statement(s) on the use of IGCP funds, as well as bibliographic

data of all publications dealing with the results or activities of the project, all announcements of international public activities which may be connected with the project, such as conferences, field trips, workshops and courses, and a detailed final report when the project has been finished.

It is further understood that the results of the project will be published, preferably in international peer-reviewed publications. One copy of each publication or circulated document will be supplied to the IGCP Secretariat.

It is further understood that each publication resulting from the project has to carry, at a prominent place, a statement that it is a contribution to the International Geoscience Programme, specifying the number of the project.

In books resulting from the project, the title page and, when technically possible, the cover should also carry the official logo of the IGCP.

Date: 28-September-2007 Signature: 

**Dr. Bruce R. Goleby** (Chairman of Working Group)

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*australian unesco committee for the  
international geological programme*

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Dr Robert Missotten  
IGCP Secretary  
UNESCO  
1, rue Miollis  
75732 Paris Cedex 15,  
FRANCE

Dear Dr Missotten

The Australian National Committee for the IGCP is pleased to support the project proposed by Bruce Goleby on Crustal Architecture and Images – Tectonic controls on landscapes, resources and hazards. This is a successor to the successful IGCP project 474 on Images of the Earth's Crust.

The proposed project is truly global in scope, as it aims to understand the processes that operate within the Earth's crust, and the structures that these processes generate. The crust is the only part of our planet that we see and interact with, and it controls many aspects of geology that directly affect mankind. One of the innovative outputs from this project and its predecessor is putting images of the crust on the web, to enable geologists throughout the world to see data and interpretations that may be applicable to local situations.

The proposal clearly addresses the broad scientific objectives of the IGCP, concerning basic and applied science with increased understanding of geological processes and development of new geological concepts to meet future human needs; increasing our understanding of the factors controlling the global environment; and education and capacity building for the next generation.

The Australian IGCP Committee strongly supports this proposal, and I hope that it will receive favourable consideration from the Scientific Board.

Yours sincerely,

Cec Murray  
Chair  
Australian IGCP Committee  
10/9/2007



Australian Government

Geoscience Australia

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Dr. Bruce Goleby  
Chairman, IGCP Project 474 – Images of the Earth's Crust  
c/- Geoscience Australia  
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Canberra, ACT, 2601

**Geoscience Australia web site support for proposed IGCP project**

I have read with interest the proposal for a successor project for IGCP Project 474 – Images of the Earth's Crust. Geoscience Australia has hosted the web site of IGCP Project 474 over the last five years and has been pleased to see that it has expanded and prospered, the number of web site "hits" for instance being over 13,000 from 135 countries during 2006. Geoscience Australia has been pleased to support this contribution to the international geoscience community and public information.

The proposed new IGCP project for the next five years is a worthy successor to IGCP Project 474 and Geoscience Australia will continue to host and support the web site <http://www.earthscrust.org> for the lifetime of the project. Geoscience Australia, as the Australian national geological survey, takes an active part in networking with the international geoscience community and sees the IGCP/UNESCO organization as performing a very valuable role in the wider international community. Geoscience Australia is, of course, very much involved with the International Union of Geological Sciences in the hosting of the International Geological Congress in Brisbane during 2012.

I have noted with pleasure that the Working Group for the proposed IGCP project contains members from a very wide range of countries. Deep seismic profiling is truly a world-wide tool for investigating the fundamentals of geological processes, a tool that is widely applied across Australia. I wish you well in pursuing the goals of the new IGCP project and recommend it to the IGCP Scientific Board for support over the next five years.

Yours sincerely

Dr James Johnson  
Chief  
Onshore Energy & Minerals Division  
Geoscience Australia

28 September 2007



International Association of Seismology  
and Physics of the Earth's Interior



**INTERNATIONAL ASSOCIATION OF SEISMOLOGY AND PHYSICS OF  
THE EARTH'S INTERIOR**

**Working Group of Seismic Imaging of the Lithosphere**

**To: Doug Finlayson, IGCP Project 474 Business Manager**

**From: Walter D. Mooney, Chair, IASPEI Working Group on Seismic Imaging  
(Formerly the Commission on Controlled Source Seismology, CCSS).**

**Date: July 31, 3007**

**Re: Support for IGCP 474 and its Successor Program**

I am writing to you on behalf of the IASPEI Working Group on Seismic Imaging to register our strong support for the IGCP 474 and its successor program. Our Working Group, formerly the CCSS, is very interested in the efforts of the IGCP 474 to consolidate information on the Earth's crust in a rapid, widespread, and thorough manner. We hope that such a collection of knowledge will be regularly maintained and are confident that it will contribute much to the research of geophysicists worldwide.

IGCP 474 has maintained a valuable and effective website with the results from many important field investigations from around the world, including information about such efforts as:

- DEKORP 1's cooperation with the BELCORP group of the Belgian Geological survey in their deep seismic investigation of the western part of the Rhenish Massif, Rhenohercynian.
- INDEPTH's project to incorporate and organize seismic images of the crust and upper mantle beneath Tibet.
- The brief description of crustal images from the Donbas Foldbelt in Southeastern Ukraine, concisely yet effectively describing its structure and significance.
- Hosting the International Symposium on Deep Seismic Reflection Probing of the Continents and their Margins and its abstracts over the years
- Establishing a standard set of descriptions describing images of the Earth's interior
- The USGS and Virginia Tech collaboration involving the Virginia Seismic transect I-64

These projects comprise just a small handful of the multitude of research projects made plainly available to the public through your web site. The IGCP 474 has been highly successful in providing researchers with access to a large database of seismic images and geophysical information. The website is simple use, and such availability of information has

facilitated discoveries concerning the Earth's crust and encouraged collaboration between scientists around the world.

No scientific theory can expand without data, and this project serves to make geophysical data available to the world. The IGCP 474 has succeeded in promoting new theories and observations concerning the evolution of the crust. You and your team are to be commended for your noble, selfless efforts that promote scientific inquiry and discovery. We encourage the group to continue with their efforts, and the IASPEI Working Group wholeheartedly extends its support and cooperation with the next incarnation of the IGCP 474.

Pending information regarding our budget allocation from IASPEI, I further pledge to seek annual financial support for your ongoing efforts.



Natural Resources  
Canada

Ressources naturelles  
Canada

Earth Sciences Sector

Secteur des sciences de la Terre

July 31, 2007

Doug Finlayson  
IGCP Project 474 Business Manager

Re: Support for IGCP 474 and its Successor Program

I am writing to you on behalf of the Geological Survey of Canada (GSC), Earth Science Sector, Natural Resources Canada to register support for the IGCP 474 successor program. The GSC maintains the LITHOPROBE archive and incorporates appropriate new surveys as they become available; as such we were very interested in the efforts of the IGCP 474 to consolidate information on the Earth's crust in a rapid, widespread, and thorough manner. In this way, the IGCP website acts as metadata and a portal for interested users to find the GSC archived surveys. We therefore hope that such an internationally recognised portal of knowledge will continue to be regularly maintained and are confident that it will contribute much to the research of geophysicists worldwide.

IGCP 474 has maintained a valuable and effective catalogue of results from many important field investigations from around the world. Within Canada, recent and ongoing seismic projects that would be relevant to IGCP 474 include:

- Multi-channel seismic reflection survey off Nova Scotia, from the shelf edge to deep water, as part of the Canadian government's efforts to establish a case for discussions on the UN Convention on the Law of the Sea (UNCLOS). The survey, which took place in June 2007, covers an area about 1000 km x 500 km, involves about 20+ lines and cost ~C\$5.2 million.
- A related seismic refraction survey (LORITA) occurred in April, 2006, in conjunction with the Geological Survey of Greenland. Explosive charges on Arctic Sea ice produced data on the continental nature of the seafloor within the Lomonosov Ridge for another UNCLOS case. In 2008, a similar survey will study the Alpha Ridge, further west in the Arctic Ocean.
- A deep seismic reflection survey in the Nechako Basin of interior B.C. is intended to further exploration interest in the basin, Vibroseis data will extend to 12 or 14 s TWTT so crustal data will be acquired. Explosive-source data will be simultaneously recorded over a wide aperture in order to undershoot surface lava flows.
- Upper crustal and mine-scale seismic data is being acquired in the Flin-Flon area of Manitoba. This includes a 2-D grid and proper 3-D survey.

These projects comprise just a small sampling of projects that would further benefit by being made known to the public through your ongoing website. To date, the IGCP 474 has been highly successful in providing researchers with access to a large database of seismic images and geophysical information. The website is simple to

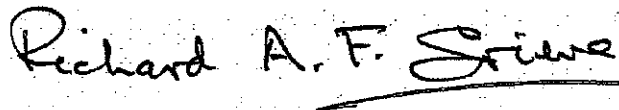
**Canada**

Geomatics Canada • Géomatique Canada  
Geological Survey of Canada • Commission géologique du Canada  
Polar Continental Shelf Project • Étude du plateau continental polaire

use, and such availability of information has facilitated discoveries and encouraged collaboration between scientists around the world. Scientific research and technology cannot advance without data, and this project serves to make geophysical data and associated new methodology available to the world. You and your team are to be commended for your past efforts that promote scientific inquiry and discovery. We encourage the group to continue with their efforts, and the Geological Survey of Canada extends its support and cooperation to the successor of the current IGCP 474 project.

David Snyder will serve as the main point of contact within the GSC for both IGCP474 related issues as well as information about the LITHOPROBE and NRCan ESS seismic data archive.

Yours truly,

A handwritten signature in cursive script that reads "Richard A. F. Grieve". The signature is written in black ink and is underlined with a single horizontal line.

R.A.F. Grieve  
Chief Scientist, Earth Sciences Sector  
Natural Resources Canada

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rgrieve@nrcan.gc.ca



## 同济大学海洋与地球科学学院

School of Ocean and Earth Science, Tongji University

**Dr Hongbo Zheng**

Professor, Head of School  
School of Ocean and Earth Science  
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China  
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August 10, 2007

Dr. Douglas M. Finlayson  
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**Dear Dr. Finlayson**

Thank you for the invitation to participate as a Working Group member for your new IGCP proposal, "Crustal Architecture and Landscape Evolution." On behalf the School of Ocean and Earth Sciences at Tongji University, I want to express my wholehearted support for the proposal and I am happy to see the active involvement of Dr. Chun-Feng Li as a Working Group member of the new project. This project is significant to our School because it builds upon our existing research and interdisciplinary strengths in the field of Geodynamics and Tectonophysics, which is one of the strategic planning priorities identified by the School of Ocean and Earth Sciences at Tongji University.

Your proposal addresses key international issues and will enable us to broaden our scope in research subjects and student educations. We are committed to supporting your proposal, and will support for research assistants/students to compile related website material, etc.. I am also pleased to be able to support the faculty involved in this project. We have traditionally strong research programs in seismic exploration and continental margin tectonics. Many of our faculty members here take active roles in national and international research programs.

Thank you for the opportunity to be involved with such important work. Good luck with this proposal.

Sincerely,

Hongbo Zheng  
Professor

National Institute of Polar Research, Tokyo, Japan



**NATIONAL INSTITUTE OF POLAR RESEARCH**

29 August 2007

To: **Dr. Douglas M. Finlayson**  
IGCP-474 Project Manager  
6 Neilson Street  
Garran ACT 2605  
AUSTRALIA

Dear Dr. Finlayson,

I was informed from Dr. Masaki Kanao of the National Institute of Polar Research that he was asked to become one of the working group member of the International Geological Correlation Program (IGCP) Project 474 - Images of the Earth's Crust - for next 5 years.

Dr. Kanao is much appreciated to become one of the members to make contribution by offering the adequate information about the lithospheric data compiled in the Gondwana region, particular in Antarctica.

In recent years, several multidisciplinary programs involving the International Polar Year 2007-2008 are carrying on to clarify the global dynamics in any kind of science branch. From these projects, fruitful results could be achieved including crust-mantle structure, dynamics and tectonics associated with Earth history, together with recent global changes.

It is also expected for the IGCP-474 project to create an archive of knowledge on crustal architecture for the long-term benefit, including a wider objective to foster the spread and application of geoscience knowledge to issues related to the pursuit of international social, economic and cultural goals and sustainable development.

I would sincerely express the willingness to have a cooperative works to contribute to the IGCP / UNESCO project, on the basis of participation from NIPR.

Yours sincerely,

Yoshiyuku Fujii  
Director-General

National Institute of Polar Research  
1-9-10 Kaga, Itabashi-ku,  
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## CV – Bruce Goleby

**Name:** Bruce Ronald GOLEBY

**Contact details:**

**Dr. Bruce R. Goleby**

Geoscience Australia

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Email: [bruce.goleby@ga.gov.au](mailto:bruce.goleby@ga.gov.au)

**Qualifications:** PhD, Research School of Earth Sciences, Australian National University.

**Current Employment:** Currently a Principal Research Scientist within the Geophysics Group, Onshore Energy and Minerals Division, Geoscience Australia.

**Duties:** Lead and manage Geoscience Australia's Onshore Energy and Minerals Division Seismic Group in the planning and execution of the seismic and magnetotelluric geophysical programs required to underpin the delivery of pre-competitive geoscience data and predictive products to lower exploration risk and attract mineral exploration investment in Australia.

**Recent Awards and Prizes:** Awarded a short term fellowship by the Japanese Society for Promotion of Science, 2006

**Societies:** Currently member of the Geological Society of Australia (GSA) and GSA's Specialist Group on Solid-Earth Geophysics, the Australian Society of Exploration Geophysicists, the European Association of Exploration Geophysicists and the American Geophysical Union.

**Professional Involvements** include Current chairman of IGCP Project 474, 'Images of the Earth's Crust', member of the Deep Seismic Symposium Organisation Committee, member of the AuScope Steering Committee and its Earth Imaging Capability, both part of the Australian National Collaborative Research Infrastructure Capability, Deputy Director of ANSIR, the Australian National Research Facility for Earth Sounding and member of the Australian National Geotransects Committee.

**Selected Papers:**

Goleby, B.R., Lyons, P., Huston, D., Vandenberg, L., Bagas, L., Jones, L.E.A., Newmont Exploration and Tanami Gold, 2007. The Tanami deep seismic reflection experiment: an insight into Proterozoic collision in northern Australia. *Tectonophysics* (in press)

Goleby, B.R., Barton, T., Jones, L., Fomin, T., Johnstone, D.W. and Crawford, A. 2006. Insights into the structure of the Australian Crust, results from ANSIR's Seismic Reflection Profiling Program. AESC'2006 Extended Conference Abstracts, Australian Earth Sciences Convention, Melbourne.

Drummond, B.J, Lyons, P., Goleby, B.R. and Jones, L.E.A., 2006. Constraining models of the tectonic setting of the giant Olympic Dam iron oxide-copper-gold deposit, South Australia, using deep seismic reflection data. *Tectonophysics*.

Goleby, B.R., Lyons, P., Drummond, B.J., Schwarz, M., Shearer, A.J., Fairclough, M.C., Korsch R.J. and Skirrow, R.G., 2005, General Basement Interpretation (18s Data), in, P. Lyons & B.R. Goleby (Compilers), The 2003 Gawler Craton Seismic Survey: Seismic Workshop, Geoscience Australia, Record 2005/19, 48-57.

Goleby, B.R., Blewett, R.S., Korsch, R.J., Champion, D.C., Cassidy, K.F., Jones, L.E.A., Groenewald, P.B., Henson, P., 2004. Deep seismic reflection profiling in the Archaean northeastern Yilgarn Craton, Western Australia: implications for crustal architecture and mineral potential. *Tectonophysics* 388, 119–133.

Goleby, B.R., Korsch, R.J., Fomin, T., Bell, B., Nicoll, M.G., Drummond, B.J. and Owen, A.J., 2002. A preliminary 3D geological model of the Kalgoorlie region, Yilgarn Craton, Western Australia based on deep seismic reflection and potential field data. *Australian Journal of Earth Sciences*, 49, 917-933.

<b>CV - David B. Snyder</b>
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Geological Survey of Canada  
615 Booth Street, Room 204  
Ottawa, Ontario K1A 0E9.  
(613) 992 9240  
dsnyder@NRCan.gc.ca

Residence:  
9 Leaver Avenue  
Nepean, Ontario K2E 5P5  
(613) 226 8630

**Career Experience**

- Aug, 98–present Research Scientist (level 3) at the Geological Survey of Canada; Head of the Seismology and Electromagnetism section since 2005. Roles have included: co-principal investigator in LITHOPROBE's SNORCLE transect across the Canadian Cordillera, Science Director of a down-hole seismic imaging consortium, and coordinator of a government-university-diamond exploration industry consortium mapping Canada's mantle using teleseismic studies (includes the POLARIS project).
- Feb, 88 – May, 98 Senior Associate in Research at University of Cambridge for the British Institutions Reflection Profiling Syndicate (BIRPS), Cambridge, U.K.
- Aug, 83 – June, 88 Graduate research assistant in Dept. of Geological Sciences, Cornell University, Ithaca, NY for Prof. R. Allmendinger.
- Aug, 79 – Feb, 86 U. S. Geological Survey geophysicist, Geophysics Branch, Menlo Park, CA.
- Sept, 78 – Jul, 79 NASA-sponsored Research assistant, Dept. of Geology, Arizona State University, Tempe, AZ.

**Education**

- |   |  |
|---|--|
| Cornell University<br>Ph.D., 1988                             | structural geology, geophysics, space science<br>"Foreland crustal geometries in the Andes of Argentina and the Zagros of Iran from seismic reflection and gravity data" |
| Stanford University<br>M. S., 1978<br><br>B. S. Physics, 1978 | physics & geophysics<br>"Lithospheric thickness of Mars from satellite gravity observations"   |

**Additional Information**

- Secretary, Commission on Controlled Source Seismology, Int'l Association for Seismology & Physics of the Earth's Interior, since 1993.
- Associate Editor, *Journal of Geophysical Research*, 1998-2003.
- Geophysics subject editor for the *Journal of the Geological Society of London*, 1994–98; Advisory Editor, 2000-present.

Member, Society of Exploration Geophysicists, American Geophysical Union, Canadian Geophysical Union, & Geological Society of London  
Member, Faculty Board of Earth Sciences & Geography, University of Cambridge, 1994–97

### Principal Recent Publications

Snyder, David & Richard Hobbs, 1999, The BIRPS Atlas II: a second decade of deep seismic reflection profiling, Geological Society Publishing House, 273pp. On 3 CD-ROMs.

Snyder, D. B., 2002, Lithospheric growth at margins of cratons, *Tectonophysics*, 355, 7–22.

Snyder, D., G. Perron, K. Pflug, & K. Stevens, 2002, New insights into the structure of the Sudbury Igneous Complex from downhole seismic studies, *Canadian Journal of Earth Sciences*, 39, 943–951.

Snyder, D., R. M. Clowes, F. A. Cook, P. Erdmer, C. A. Evenchick, A. J. Van der Velden, & K. Hall, 2002, Proterozoic prism arrests suspect terranes: insights into the ancient Cordilleran margin from seismic reflection data, *GSA Today*, 12, 4–10.

Snyder, D., M. Bostock, & G. Lockhart, 2003, Two anisotropic layers in the Slave craton, *Lithos*, 71, 529–539.

Cook, F. A., Clowes, R. M., Snyder, D., Van der Velden, A. J., Hall, K., Erdmer, P. & Evenchick, C. A., 2004, Precambrian crust and lithosphere beneath the Mesozoic Northern Canadian Cordillera discovered by LITHOPROBE seismic reflection profiling, *Tectonics*, 23(2), TC2010, doi:10.1029/2002TC001412.

Bellefleur, G., Müller, C., Snyder, D., and Matthews, L., 2004. Downhole seismic imaging of a massive sulfide ore body with mode-converted waves, Halfmile Lake, New Brunswick, Canada. *Geophysics*, 69, 2, 318–329.

Snyder, D., Rondenay, S., Bostock, M. & G. Lockhart, 2004, Mapping the mantle lithosphere for diamond potential using teleseismic methods, *Lithos*, 77, 859–872.

Snyder, D.B., & G. Lockhart, 2005, Kimberlite trends in NW Canada, *Journal Geological Society London*, 162, 737–740.

Snyder, D. B., Roberts, B. & Gordey, S. P., 2005, Contrasting seismic characteristics of three major faults in northwestern Canada, *Canadian Journal of Earth Science*, 42, 1223–1237.

Snyder, D.B., Bleeker, W., Roberts, B. J., & Salisbury, M. D., 2006, Structure and crustal architecture of the Yellowknife greenstone belt from SNORCLE geophysical survey data. In: Anglin, C.D., Falck, H., Wright, D.F., and Ambrose, E. J., *Gold in the Yellowknife greenstone belt, NW Territories: Results of the Extech III multidisciplinary research project*, Geological Association of Canada, Mineral Deposits Division, Special Publication 3, 116–125.

Snyder, D. B. & Bruneton, M., 2007, Seismic anisotropy of the Slave craton, NW Canada, from joint interpretation of SKS and Rayleigh waves, *Geophysical Journal International*, 169, 170–188.

Snyder, D. B. & Roberts, B. J., 2007, Seismic tomographic cross sections of the Bowser Basin in NW British Columbia, Canada, *Bulletin of Canadian Petroleum Geologists*, in press.

Snyder, D. B., Bleeker, W., Reed, L.E., Ayer, J.A., Houle, M.G., & Bateman, R., 2007, Tectonic and metallogenic implications of the Discover Abitibi regional seismic reflection profiles in the Timmins mining camp, *Economic Geology*, in press.

Snyder, D. B., Carey, P., & Salisbury, M., 2008, Processing of 2D-3C reflection seismic data along the Shillington high-resolution profile near Timmins, Ontario, *Tectonophysics*, submitted.

### **Goscience research in the field of crustal-scale seismic investigations 2000-2010**

1999-2000 LITHOPROBE SNoRCLE transect lines 2 & 3: 1900 km

2004 acquisition of 3-component Vibroseis data for the Discover Abitibi project (Ontario, Canada): 150 km of crustal-scale and 50 km of high resolution profiles

2006 LORITA UN Law of the Sea (UNCLOS) study of the Lomonosov Ridge, Arctic Ocean; refraction survey on sea ice

2007 UNCLOS survey of the Sohm Abyssal Plain off Nova Scotia.

2007-08 Acquisition of 350 km of Vibroseis and 50-100 km of explosive source data in the Nechako intermontane basin of the Canadian Rockies

2000-2008 POLARIS teleseismic array studies of the Slave craton (includes crustal refraction survey and Moho depth estimates)

2005-2010 POLARIS teleseismic array studies of the Rae craton and Hudson Bay region (includes crustal refraction survey and Moho depth estimates)

## CV Michael V.Mints

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(GIN RAS – Director of the Institute: Prof. Mikail G.Leonov)

PhD (Candidate in Geology-Mineralogy) – 1972, Geological Faculty of the Moscow State University  
DSc (Geology-Mineralogy) – 1993, Geological Institute of the Russian Academy of Sciences

### ***Fields of Occupation:***

Deep crustal structure and paleogeodynamics of the Early Precambrian crust, tectonics, regional geology of the eastern Fennoscandian Shield and East-European Craton as a whole

### ***Geoscience research in the field of crustal-scale seismic investigations within last 5 years:***

Geological interpretation of the reflection seismic data from 1-EU Geotraverse that crossed the East European craton from the Kola Peninsula via Central Russia to the Caspian Sea, c. 3700 km long.

### ***Projects:***

Russian Foundation for Basic Research (RFBR), Project 05-05-65012 (2005-2007) “Model of creation, deep crustal structure and the Palaeoproterozoic evolution of the Early Precambrian Cratons using East-European Craton as a basic example” – Leader  
IGCP 474 Project “Images of the Earth's Crust & Upper Mantle” – participant

### ***Key recent publications***

- Mints, M.V., Berzin, R.G., Suleimanov, A.K., Zamozhnyaya, N.G., Stupak, V.M., Konilov, A.N., Zlobin, V.L. and Kaulina, T.V., 2004 The deep structure of the Early Precambrian crust of the Karelian craton, southeastern Fennoscandian Shield: results of investigation along CMP profile 4B // *Geotectonics*, 38, 2, 87-102.
- Mints, M.V., Berzin, R.G., Andryushchtnko, Yu.N., Zamozhnyaya, N.G., Zlobin, V.L., Konilov, A.N., Stupak, V.M. and Suleimanov, A.K., 2004 The deep structure of the Karelian craton along Geotraverse 1-EB // *Geotectonics*, 38, 5, 329-342.
- Mints, M.V. and Konilov, A.N. Geodynamic crustal evolution and long-lived supercontinents during the Palaeoproterozoic: evidences from granulite-gneiss belts, collisional and accretionary orogens // “The Precambrian Earth: Tempos and events”. Series “Developments in Precambrian Geology, 12” (Eds. – P.G.Eriksson, W.Altermann, D.R.Nelson, W.U.Mueller and O.Catuneanu, Series Ed. – K.C.Condie). Amsterdam-Boston and other, Elsevier, 2004. P.223-239.
- Mints M.V., Suleimanov A.K., Babayants P.S., Berzin R.G., Blokh Yu.I., Philippova I.B., Trusov A.A., Zamozhniaya N.G. East European craton as all-embracing Palaeoproterpzoic accretionary-collision orogen: a synthesis of reflection siesmics along

- the 1-EU geotranssect, regional geological and geophysics data. **32<sup>nd</sup> International Geological Congress. Abstracts. Florence, Italy, 2004.** CD-ROM.
- Michael Mints, Arsen Suleimanov, Robert Berzin, Nadezhda Zamozhniaya, Vladimir Stupak, Pavel Babayants, Yury Blokh, Alexey Trusov, Irina Philippova, 2005. Crustal structure of the East-European craton: imaging Early Precambrian accretionary and collisional orogens. // **Supercontinents and Earth Evolution, Program and Abstracts, Fremantle, Australia**, P. 167.
- Mints, M.V., Suleimanov, A.K., Philippova, I.B., Zamozhniaya, N.G., Babayants, P.S., Blokh, Yu.I., Trusov, A.A. Midrussia segment of the Palaeoproterozoic Lapland-Midrussia-Southbaltia intercontinental collision orogen, East-European craton: integration of regional potential fields and CDP data along the 1-EU Geotraverse // **12<sup>th</sup> International Symposium on Deep Seismic Profiling of Continents and their Margins. Program and Abstracts. Hayama, Japan, 2006.** P.65.
- Mints, M., Suleimanov, A., Zamozhniaya, N. and Stupak, V. A 3-D model of the Early Precambrian crust under the southeastern Fennoscandian Shield: Karelia Craton and Belomorian tectonic province // *Tectonophysics* (submitted).
- Michael V.Mints, Irina B.Philippova, Pavel S.Babayants, Yury I.Blokh, Alexey A.Trusov. 3-D model of the deep crustal structure of the Volga-Uralia craton: the Tatseis reflection profile // **International Earth Imaging Symposium "Models of the Earth's Crust and Upper Mantle". Proceedings. S.-Petersburg. 2007. In press)**

29.08.2007

## CV - Songlin Li

### **Personal Data**

Date of birth: November 29, 1946.

### **Professional position:**

Research Professor of Geophysics and  
Director of Deep Seismic Sounding (DSS) Research Section at Research Center of  
Exploration Geophysics (RCEG), China Seismological Bureau (CSB)

### **Mail address:**

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E-mail: [slli@public.zz.ha.cn](mailto:slli@public.zz.ha.cn)

### **Education and Theoretical Training**

Oct., 1990 - Oct., 1993: Visiting scholar in U. S. Geological Survey (Menlo Park).

Sept., 1979 - March, 1982: M.Sc., Institute of Geophysics (Beijing), CSB.

Sept., 1964 - March, 1970: B.Sc, Department of Geophysics, Peking (Beijing) University

### **Academic Activities**

Since graduation from Peking University in 1970, have been working on seismology for 32 years.

Since 1982, focus on deep seismic sounding and seismic tomography.

1982-2002, Research Centre for Exploration Geophysics, China Seismological Bureau

1970-1982, Institute of Geodesy and Geophysics, Chinese Scientific Academy; Institute of Tectonics; and Henan Seismological Bureau.

### **Recent Publications**

Songlin Li and Walter D. Mooney, Crustal structure of China from deep seismic sounding profiles.

Tectonophysics, 1998, 288, 105-113.

Songlin Li et al., Three-dimensional crustal structure of the Capital Area obtained by a joint inversion of

DSS data from multiple profiles, Chinese J. Geophys. (English Edition), 2001, 44, 3, 357-365.

Songlin Li et al., Structures and earthquake-generating faults in the Jiashi Region, NW China: preliminary

results. Chinese J. Geophys. (English Edition), 2002, 45, 1, 72-77.

Songlin Li et al., A preliminary study on crustal velocity structures of Maqin-Lanzhou-Jingbian deep

seismic sounding profile. Chinese J. Geophys. (English Edition), 2002, 45, 2, 209-216.

Songlin Li et al., Simultaneous inversion of velocity distribution and interface positions, ACTA

Seismologica Sinica (English Edition), 1997, 10, 477-487.

Songlin Li et al., A study on Q value and its relationship with frequency of Luanxian region, China, ACTA

Seismologica Sinica (English Edition), 1991, 4, 509-519.



## CV Masaki Kanao, Japan

**This short CV includes statement of substantive position, details of institution (including name(s) of Departmental Head/CEO/Director), geoscience research in the field of crustal-scale seismic investigations in the last 5 years, key recent publications, contact information, mailing addresses.**

### **Dr. Masaki Kanao**

Research Associate of Geophysics, PhD.  
Polar Data Center (PDC) & Group of Earth Science,  
National Institute of Polar Research (NIPR),  
Research Organization of Information and System (ROIS)  
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### **Research Target:**

*Masaki Kanao* is chiefly interested in Earth's evolution from geophysical data, particularly by seismological studies. Polar regions, both in Arctic and Antarctic, have been investigated by several available seismological methods such as passive & active sources. He also interested in present solid structure, dynamics and past tectonics of the continental lithosphere, derived from field surveys and computer sciences. Antarctic continent, once as a member of Gondwana super-continent, is a main target field to reveal the lithospheric evolution.

He has been managing the seismological observations of the Japanese Antarctic permanent station, i.e., Syowa Station of East Antarctica, and surrounding continental margin area of Western Enderby Land - Eastern Dronning Maud Land. In order to maintain continuous monitoring observations of the broadband & short period seismometers, he has been obliged in advancing the data acquisition & transmission system by satellite communication for more than fifteen years.

In recent years, he started international cooperative studies in the Siberian region, Arctic Eurasia continent, by making use of broadband seismic observations with the member of Russian Academy of Science. These activities in the polar region give rise to significant contribution to the development of global Earth sciences, Federation of Digital Seismological Network (FDSN) and International Lithospheric Program (ILP), IASPEI.

### **Activities in the last 5 years:**

Lithospheric studies by active and passive seismic sources have been carried out in Gondwana super-continent, particularly Antarctica, by cooperation of the National Institute of Polar Research (NIPR) and related governmental institutes and universities. These science activities tightly involve both IGCP-474 and -440. The activities are also supported / collaborated by CC-8A / ILP: Lithospheric Evolution of Gondwana East from interdisciplinary Deep Surveys (LEGENDS) (<http://polaris.nipr.ac.jp/~pseis/legends/>).

*Masaki Kanao* has been managing the multidisciplinary project of SEAL (Structure and Evolution of East Antarctic Lithosphere; <http://polaris.nipr.ac.jp/~pseis/seal/>); which target for the lithospheric imaging in Dronning Maud Land - Enderby Land. DSS were conducted in the austral summer in 2000 and 2002, which give rise to prominent results regarding crust-mantle structure and tectonics associated with Gondwana formation. Broadband seismic deployment along the coastal area has also been carrying on to clarify the local/regional seismicity, structure around the Antarctic Plate, together with deep interior of the Earth.

On March 2007, a geoscience workshop & general symposium involving the International Polar Year (IPY 2007-2008) were held at NIPR and Science Council of Japan (SCJ), Tokyo. The major projects associated with solid earth science are presented along with the other global environmental researches.

**Related publication:**

- Kanao, M. and Tsuboi, S., 2007, Antarctic Arrays Deployments in East Antarctica: Japanese Contribution at IPY 2007-2008, Proc. Inter. Symp. –Asian Collaboration in IPY 2007-2008-, March 1, Tokyo, Japan, 145-147.
- Kanao, M., Usui, Y., Inoue, T., Yamada, A. and Kaminuma, K., 2007, Broadband seismic array deployments around the Lutzow-Holm Bay Region, East Antarctica; IPY 2007-2008 contribution, The 14th KOPRI International Symposium on Polar Sciences, May 15-17, Incheon, Korea, Proceedings, 36-40.
- Usui, Y., M. Kanao, A. Kubo, Y. Hiramatsu, and H. Negishi, 2007, Upper mantle anisotropy from teleseismic SKS splitting beneath Lützow-Holm Bay region, East Antarctica, U. S. Geological Survey and The National Academies; USGS OF-2007-1047, Short Research Paper 013; doi:10.3133/of2007-1047.srp013.
- Nawa, K., Suda, N., Satake, K., Sato, T., Doi, K., Kanao, M. and Shibuya, K., 2007, Loading and gravitational effects of the 2004 Indian Ocean tsunami at Syowa Station, Antarctica, Bull. Seis. Soc. Am., 97, S271-278, doi:10.1785/0120050625.
- Kanao, M., Nogi, Y. and Tsuboi, S., 2006, Spacial distribution and time variation In seismicity around Antarctic Plate - Indian Ocean region, Polar Geosci., 19, 202-223.
- Yamashita, M., H. Miyamachi, M. Kanao, T. Matsushima, S. Toda, M. Takada and A. Watanabe, 2005, Deep Reflection Imaging beneath the Mizuho Plateau, East Antarctica, by SEAL-2002 Seismic Experiment, Futterer D.K., Damaske D., Kleinschmidt G., Miller H., Tessensohn F. (eds) Antarctica: Contributions to global earth sciences, Springer-Verlag, Berlin Heidelberg New York, 147-154.
- Kanao, M., M. Ishikawa, M. Yamashita, K. Kaminuma and L. D. Brown, 2004, Structure and Evolution of the East Antarctic Lithosphere: Tectonic Implications for the Development and Dispersal of Gondwana, Gondwana Research, 7,31-41.
- Kanao, M. and M. Ishikawa, 2004, Origins of the Lower Crustal Reflectivity in the Lützow-Holm Complex, Enderby Land, East Antarctica, Earth Planets Space, 56, 151-162.
- Yoshii, K., K. Ito, H. Miyamachi and M. Kanao, 2004, Crustal structure derived from refractions and wide-angle reflections in the Mizuho Plateau, East Antarctica, Polar Geosci., 17, 112-138.
- Yamada, A., M. Kanao and M. Yamashita, 2004, Features of seismic waves recorded by seismic exploration in 2002: Responses from valley structure of the bedrock beneath Mizuho Plateau, Polar Geosci., 17, 139-155.
- Brown, L. D., A. Kroner, C. Powell, B. Windley and M. Kanao, 2001, Deep Seismic Exploration of East Gondwana: the LEGENDS Initiative, Gondwana Research, 4, 846-850.
- 

**1. Summary of planned seismic programs expected to be involved in over the next 5 years**

Masaki Kanao promotes the deep seismic geo-transects (SGT) by passive and active sources along the onshore traverses on continental ice sheet in Antarctica. This is planned in closer cooperation with LEGENDS, IGCP-474, -440 as a whole, together with WG on Solid Earth Geophysics of the Scientific Committee on Antarctic Research (SCAR).

During the IPY 2007-2008, in particular, a large scale of broadband deployment which crossing the East Antarctic inland are planning by international collaboration in order to delineate the structure and evolution of the frontier continent (Antarctica's GAmfurtsev Province / GAmfurtsev Mountain SEISmic experiment; AGAP / GAMSEIS), POLer observation NETwork; POLNET).

The data obtained during the IPY and succeeding future is initially stored and available from data library server of NIPR (POLARIS system). Then it will immediately be offered to world data centers, such as Incorporated Research Institute of Seismology / Data Management System (IRIS/DMS), FDSN/ GSN, PACIFIC21. These data servers are available in general and connected to the Joint Committee on Antarctic Data Management / Antarctic Master Directory (JCADM/AMD) .

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*(for reference)*

**ILP / CC-8: Committee on Interdisciplinary Lithospheric Surveys (COILS), Chairperson: L. D. Brown (USA)**  
**CC-8A: Lithospheric Evolution of Gondwana East from iNterdisciplinary Deep Surveys (LEGENDS), Chairperson: A. Kroner (Germany)**

Activity:

2004:

**CC-8A:** LEGENDS Workshop Hyderabad (with Field SGT Field Trip)

**CC-8:** DSC Mont Tremblant, Canada: Phase II Global Atlas

**CC-8:** Global Atlas Website established (<http://www.earthscrust.org> )

**CC-8A:** LEGENDS Session at AOGS, Singapore

**CC-8A:** NGRI deep seismic survey of SGT begins

2005:

**CC-8A:** Deep seismic survey of SGT completed

**CC-8:** ELLIPSE website available (<http://www.geoellipse.info>)

**CC-8A:** LEGENDS page in NIPR website available (<http://polaris.nipr.ac.jp/~pseis/legends/>)

2006:

**CC-8A:** Survey in S. India underway (NGRI)

**CC-8A:** Proposals for Sri Lanka

**CC-8A:** Workshops for Africa (Madagascar)

**CC-8:** Seismix-2006 (Hayama, Japan)

2007:

**CC-8A:** Survey in S. India underway (NGRI)

**CC-8A:** Workshops for Antarctica, March (NIPR, SCJ)

**CC-8:** Seismix-2007, September (St. Peterburg, Russia)

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**Masaki Kanao** (*additional information*)

HP;

<http://polaris.nipr.ac.jp/~kanao/>

Biography;

<http://polaris.nipr.ac.jp/~kanao/biography.htm>

Directory Database of Research and Development Activities (ReaD); (M.Kanao)

[http://read.jst.go.jp/public/cs\\_ksh\\_007EventAction.do?action4=event&lang\\_act4=E&judge\\_act4=2&knkysh\\_name\\_code=5000041985](http://read.jst.go.jp/public/cs_ksh_007EventAction.do?action4=event&lang_act4=E&judge_act4=2&knkysh_name_code=5000041985)

## CV – Douglas M. Finlayson

**Name:** Douglas McKnight Finlayson  
**Address:** 6 Neilson Street  
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Australia  
**Phone:** +61 (0)2 6281 5810  
**Email:** [doug.finlayson@netspeed.com.au](mailto:doug.finlayson@netspeed.com.au)

**Date of Birth:** 19 June 1938

### **Tertiary Education:**

BSc (Honours Physics), University of Edinburgh, Scotland, U.K. 1960.

MSc (Geophysics) - University of Edinburgh, 1966.

D.Sc. - University of Edinburgh, 1984.

### **Positions held:**

Engineering physicist – British Aircraft Corp, 1960-61

Geophysicist – British Antarctic Survey, 1961-65

Geophysicist/Principal Research Scientist – Geoscience Australia, 1965-2001

Consultant geophysicist – 2001-present

### **Recent Projects:**

- National Geoscience Mapping Accord project in the Otway Basin, southeast Australia (Aust. Federal-State initiative); seismic imaging of the crustal structure; **Geoscience Australia; Project Leader and Principal Research Scientist** (1990-95)
- Australia-PNG Volcanological Services Support (VSS) Project; seismic imaging of the Rabaul caldera and magma reservoir; **Geoscience Australia Project Leader and Principal Research Scientist** (1995-2001); in cooperation with Australian National University, University of Hokkaido, and the University of Wisconsin.
- Australian Geodynamics Cooperative Research Centre (AGCRC): Eastern Lachlan Orogen Project (1997-2001); seismic imaging of crustal structure in major gold/copper mineral province in eastern Australia; **Geoscience Australia Project Leader and Principal Research Scientist**; in cooperation with CSIRO, NSW Geological Survey and IRIS/US Geological Survey..
- Turkey: Marmara Earthquake Emergency Reconstruction (MEER) Project (World Bank) (2000-2001); **Geoscience Australia Project Leader**, international projects for geohazard assessment and management.
- Australia-Indonesia Government Sector Linkages Program (GSLP) (AusAID); **Geoscience Australia Project Leader**, International Projects (2000-2001); project development with Volcanological Survey of Indonesia, the Geological Research and Development Centre (GRDC) and the Badan Meteorologi dan Geofisika (BMG); earthquake and tsunami risk assessment.
- Earthquake and Volcano Monitoring Improvement Program, Republic of the Philippines (1998-2001); **Geoscience Australia Project Leader**; A Japanese Government funded project to design, build and install a new network of 34 seismic stations throughout the Philippines for the Philippines Institute of Volcanology and Seismology (PHIVOLCS).
- IGCP Project 474 – 2002-2007 - **Business Manager** – Establishment and management of International Geological Programme (IGCP) 474 – Images of the Earth's Crust – a project that seeks to establish and maintain international links in the field of deep seismic profiling and the development of seismic data and information resources for public information and education via the world-wide-net.
- Geoscience Australia – 2003 - consultant **Project Developer** – seismic exploration tape library re-mastering project. Development of proposals for the re-mastering of archival seismic tapes held by Geoscience Australia as part of the requirements in legislation for the archiving of material generated

from exploration leases around Australia's offshore waters.

- Geoscience Australia – 2004-2006 – consultant **Project Developer** – Australian Tsunami Warning System – develop proposals for the establishment of a network of broadband seismic stations across Australia and the Australian region to detect tsunamigenic earthquakes in cooperation with other international seismic monitoring agencies.

**Societies:**

Geological Society of Australia  
Australian Society of Exploration Geophysicists  
American Geophysical Union

**Selected Recent Publications:**

- Petkovic, P., Collins, C. D. N., & Finlayson, D. M., 2000. A crustal transect between Precambrian Australia and the Timor Trough across the Vulcan Sub-basin. **In: Deep Seismic Profiling of the Continents and their Margins (Editors – R. Carbonell, J Gallart, and M Torne), Tectonophysics, 329, 23-38.**
- Finlayson, D. M., Korsch, R. J., Glen, R. A., Leven, J. H. & Johnstone, D. W., 2002. Seismic imaging and crustal architecture across the Lachlan Transverse Zone, a possible early cross-cutting feature of eastern Australia. **Australian Journal of Earth Sciences, 49, 311-321.**
- Finlayson, D. M., Gudmundsson, O., Itikarai, I., Nishimura, Y., & Shimamura, H., in press 2002. Rabaul Volcano, Papua New Guinea: island arc crustal architecture and seismic tomographic imaging of an active volcano. **Journal of Volcanology and Geothermal Research, in press.**
- Finlayson, D. M., Gudmundsson, O., Itikarai, I., Nishimura, Y., AND Shimamura, H., 2003. Rabaul Volcano, Papua New Guinea: seismic tomographic imaging of an active volcano. **Journal of Volcanology and Geothermal Research, 124, 153-171.**
- Finlayson, D. M. and Geoscience Australia repository staff, 2003. Geoscience Australia project to remaster archival seismic data and associated petroleum exploration documents, 2003-2007: Business plan. **Report to Geoscience Australia, July 2003.**
- Gudmundsson, O., Finlayson, D. M., Itikarai, I., Nishimura, Y. and Johnson, W. R., 2004. Seismic attenuation at Rabaul volcano, Papua New Guinea. . **Journal of Volcanology and Geothermal Research, 130, 77-92.**
- Finlayson, D. M., 2003. IGCP Project No. 474; Images of the Earth's crust - "inner" space, the continents and their margins. **The Australian Geologist, 128, 32-33.**
- Finlayson, D. M., Murray, C. G., Johnstone, D. W., Chudyk, E. C., Korsch, R. J., Barton, T. J. and Drummond, B. J., 2004. The Earth's crust across Phanerozoic Australia – a classic continental accretion and evolution model along the 1100 km deep seismic transect in southern Queensland. **The 11<sup>th</sup> International Symposium on Deep Seismic Profiling of the Continents and their Margins, Canadian Geophysical Union and Geological Survey of Canada abstracts, 36-38.**
- Finlayson, D. M. and Cummins, P. R., 2005. Discussion paper: - A tsunami warning system for southwest Pacific island nations using international seismic and sealevel monitoring networks. **Report to Geoscience Australia, May, 2005.**
- Finlayson, D. M. and Cummins, P. R., 2005. Equipment for monitoring the seismic activity of volcanoes prone to ash cloud emissions under international airline routes north of Australia ("The Flores Project"). **Report to Geoscience Australia, May, 2005.**
- Finlayson, D. M., 2005. Australian Tsunami Warning System: equipment and infrastructure for the establishment of new seismic monitoring stations and upgrading of existing stations – business and procurement plan. **Report to Geoscience Australia, October, 2005.**
- Finlayson, D. M., 2005. Australian Tsunami Warning System: equipment and infrastructure for the establishment of new seismic monitoring stations and upgrading of existing stations – statement of technical requirements. **Report to Geoscience Australia, October, 2005.**
- Goleby, B.R., Stephenson, R., and Fomin, T., 2007 - IGCP Project 474 – Images of the Earth's Crust and Upper Mantle. **Proceedings of the International Earth Imaging Symposium, "Models of the Earth's Crust and Upper Mantle" 18-20 September, 2007, Saint-Petersburg, Russia.**

## CV – Ramon Carbonell

### **Prof: Ramon Carbonell**

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### **Education**

- B.S. Univ. Barcelona, Physics 1985
- M.S. Univ. Barcelona, Physics 1986
- PhD. Univ. Wyoming, Geophysics 1991 (Advisor: Prof. Scott Smithson)

### **Research Topics**

- Seismic imaging.
- Multi-component seismic reflection (normal incidence and wide-angle) data acquisition, processing, interpretation, and modelling.
- Seismic wave propagation through complex media.
- Resolution of the inverse problem in seismics.
- High resolution seismic techniques applied to problems related to the shallow subsurface structure, groundwater and enviromental assesment.
- Reflection seismology applied to understanding the structure, nature, genesis and growth, (i.e evolution) of the earth's continental crust. Composition and physical properties of the crust and upper mantle.
- Seismic imaging of the water column

### **Selected Papers**

Brown, D., Carbonell, R. Kukkonen, I., Ayala, C., and Golovnova, I. Composition of the Uralida crust from Vp, Vs, heat flow, gravity and magnetic data. *Earth and Planet. Science Letters*, 210, 333-349, 2003.

Carbonell, R., On the nature of mantle heterogeneities and discontinuities: evidence from a very dense wide-angle shot record, *Tectonophysics*, Volume 388, Issues 1-4, 13 September 2004, Pages 103-117.

Carbonell, R., V. Sallares, J. Pous, J. J. Dañobeitia, P. Queralt, J. J. Ledo and V. García Dueñas, A multidisciplinary geophysical study in the Betic chain (southern Iberia Peninsula), *Tectonophysics*, Volume 288, Issues 1-4, 30 March 1998, Pages 137-152.

Carbonell, R., and Scott B. Smithson, The bright Moho reflection in the 1986 Nevada PASSCAL seismic experiment, *Tectonophysics*, Volume 243, Issues 3-4, 30 March 1995, Pages 255-276.

Clement, W.P., R. Carbonell and S. B. Smithson, Shear-wave splitting in the lower crust beneath the Archean crust of southwest Greenland, *Tectonophysics*, Volume 232, Issues 1-4, 20 April 1994, Pages 195-210.

Carbonell, R., W. P. Clement and Scott B. Smithson, Joint P- and S-wave velocity determination from

- reflected PP, SS and converted PS/SP phases from large aperture seismic reflection measurements, *Tectonophysics*, Volume 232, Issues 1-4, 20 April 1994, Pages 379-389.
- Carbonell, R., J. Gallart, A. Pérez-Estaún, J. Diaz, S. Kashubin, J. Mechie, F. Wenzel, J. Knapp, Seismic wide-angle constraints on the crust of the southern Urals, *J. Geophys. Res.*, 105(B6), 13755-13778,
- Carbonell, R., D. Lecerf, M. Itzin, J. Gallart, D. Brown, Mapping the Moho beneath the southern Urals with wide-angle reflections, *Geophys. Res. Lett.*, 25(22),
- Carbonell R., F. Simancas, C. Juhlin, J. Pous, A. Pérez-Estaún, F. Gonzalez-Lodeiro, G. Muñoz, W. Heise, P. Ayarza (2004), Geophysical evidence of a mantle derived intrusion in SW Iberia, *Geophys. Res. Lett.*, 31, L11601,
- Carbonell, R., Gallart, J., Pérez-Estaún, A., Modeling and imaging the Moho transition: The case of the southern Urals *Geophysical Journal International* 149, 134-148, 2002.
- Escuder Viruete, J., R., Carbonell, D. Martí, M. J. Jurado and A. Pérez-Estaún, Architecture of fault zones determined from outcrop, cores, 3-D seismic tomography and geostatistical modeling: example from the Albalá Granitic Pluton, SW Iberian Variscan Massif, *Tectonophysics*, Volume 361, Issues 1-2, 9 2003, Pages 97-120.
- Escuder Viruete, J., R. Carbonell, D. Martí and A. Pérez-Estaún, 3-D stochastic modeling and simulation of fault zones in the Albalá granitic pluton, SW Iberian Variscan Massif, *Journal of Structural Geology*, Volume 25, Issue 9, 2003, Pages 1487-1506.
- Escuder Viruete, J., R. Carbonell, M. J. Jurado, D. Martí and A. Pérez-Estaún, Two-dimensional geostatistical modeling and prediction of the fracture system in the Albalá Granitic Pluton, SW Iberian Massif, Spain, *Journal of Structural Geology*, Volume 23, Issue 12, 2002, Pages 2011-2023.
- Flecha, D. Martí R. Carbonell, J. Escuder-Viruete and A. Pérez-Estaún, Imaging low-velocity anomalies with the aid of seismic tomography, *Tectonophysics*, Volume 388, Issues 1-4, 13 2004, Pages 225-238. doi:10.1016/j.tecto.2004.04.031
- Flecha, I., Carbonell, R., Zeyen, H., Martí, D., Palomeras, I., Simancas, F., Pérez-Estaún, A., Imaging granitic plutons along the IBERSEIS profile. *Tectonophysics*, Volume 420, Issues 1-2, 26 2006, Pages 37-47
- Holliger, K., A., Levander, R. Carbonell and R., Hobbs, Some attributes of wavefields scattered from Ivrea-type lower crust, *Tectonophysics*, Volume 232, Issues 1-4, 20 April 1994, Pages 267-279.
- Martí, D., Carbonell, R., Tryggvason, A., Escuder, J. and Pérez-Estaún, A. Mapping Brittle Fractures Zones in 3 Dimensions: High Resolution Travel Time Seismic Tomography in a Granitic Pluton. *Geophysical Journal International* 149, 95-105, 2002.
- Martí D., R. Carbonell, A. Tryggvason, J. Escuder, A. Pérez-Estaún, Calibrating 3D tomograms of a granitic pluton, *Geophys. Res. Lett.*, 29 (17), 1834,
- Michaud, F., J.J. Dañoibeitia, R. Carbonell, R. Bartolomé, D. Córdoba, L. Delgado, F. Nuñez-Cornu and T. Monfret, New insights into the subducting oceanic crust in the Middle American Trench off western Mexico (17-19°N), *Tectonophysics*, Volume 318, Issues 1-4, 10 March 2000, Pages 187-200.
- Suetnova, E., R. Carbonell, S. B. Smithson, Magma in layering at the Moho of the basin and range of Nevada, *Geophys. Res. Lett.*, 20(24), 2945-2948,
- Simancas, F., Carbonell, R. Gonzalez-Lodeiro, F., Pérez-Estaún, A., Juhlin, C., Ayarza, P., Kashubin, A., Azor, A., Martínez-Poyatos, D., Almodovar, G.R., Pascual, E., Sáez, R., Expósito, I. Crustal Structure of the Transpresional Variscan Orogen of SW Iberia: The IBERSEIS Deep Seismic Reflection Profile. *Tectonics*, 22, 6, 1062, doi:10.1029/2002TC001479, 2003.
- Schmelzbach, C., Juhlin, C., Simancas, J.F., (2007) Prestack and Poststack migration of crooked-line seismic reflection data: A case study from the South Portuguese Zone fold belt, southwestern Iberia., *Geophysics*, Vol., 72, 2 B9, 10.1190/1.2407267

**Appointments**

1990-92	Post-Doctoral Research Associate	Univ. of Wyoming
1992-93	Research Scientist (Strake Fellow)	Houston Advanced Research Center/Rice Univ.
1993	Research Scientist	CSIC-Inst. Earth Sciences
1999-2000	Depart. Head	CSIC-Inst. Earth Sciences
2005	Research Professor Geophysics	CSIC-Inst. Earth Sciences

**Professional Memberships:** American Geophysical Union, Society of Exploration Geophysics, European Union of Geosciences (President of the seismology Section)

**Advisees**

Eduard Rubio, (GeoMedia Inc.),  
Teresa Teixidor, (Univ. Granada)  
David Martí (Queens Univ., Canada)



## CV -Frederick A.Cook

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### **Education:**

1981 Ph. D. in Geophysics, Cornell University.  
1975 M. Sc. in Geophysics, University of Wyoming.  
1973 B. Sc. in Geology, University of Wyoming.

### **Employment:**

1989 Professor, Department of Geology and Geophysics, University of Calgary  
1987 - Director, LITHOPROBE Seismic Processing Facility at the University of Calgary  
1986 - 1989 Associate Professor, University of Calgary  
1982 - 1986 Assistant Professor, University of Calgary  
1981 - 1982 Post-Doctoral Associate, Cornell University  
1975 - 1977 Geophysicist for Continental Oil Co., Oklahoma City, Oklahoma.

### **Awards:**

1991 Outstanding Researcher, University of Calgary Faculty of Science

### **Professional Affiliations:**

Society of Exploration Geophysicists  
American Geophysical Union  
Geological Society of America  
Association of Professional Engineers, Geologists, and Geophysicists of Alberta  
(Registered as both a Geologist and a Geophysicist)

### **Selected Relevant Publications:**

Cook, F., D. Albaugh, L. Brown, S. Kaufman, J. Oliver, and R. Hatcher, Jr., 1979, Thin-skinned tectonics in the crystalline southern Appalachians: COCORP seismic reflection profiling of the Blue Ridge and Piedmont: *Geology*, v. 7, p. 653-657.  
Cook, F., 1988, Proterozoic thin-skinned thrust and fold belt beneath the Interior Platform in northwest Canada: *Geol. Soc. Amer. Bull.*, v. 100, p. 877-890.  
Cook, F., 1988, Middle Proterozoic compressional orogen in northwestern Canada: *Jour. Geophys. Res.*, v. 93, p. 8985-9005.  
Cook, F., and Varsek, J., 1994, Orogen-scale decollements, *Rev. of Geophysics*, v. 32, 37-60.  
Cook, F., 1995, Lithospheric processes and products in the southern Canadian Cordillera: A LITHOPROBE perspective, *Can. J. Earth Sci.*, v. 32, 1803-1824  
Cook, F., A. van der Velden, K. Hall, and B. Roberts, 1998, Tectonic delamination and subcrustal imbrication of the Precambrian lithosphere in northwestern Canada mapped by LITHOPROBE, *Geology*, v. 26, 839-842.  
Cook, F., A. van der Velden, K. Hall, and B. Roberts, 1999, Frozen subduction in Canada's Northwest Territories: LITHOPROBE deep lithospheric reflection profiling of the western Canadian Shield, *Tectonics*, v. 18, 1-24.  
Cook, F., 2002, Fine structure of the continental reflection Moho, *Geol. Soc. America Bulletin*, v.114, 64-79.

### **Additional Selected Publications:**

Cook, F., L. Brown, and J. Oliver, 1980, The southern Appalachians and the growth of continents: *Scientific American*, v. 234, p. 126-139.  
Cook, F., and D. Turcotte, 1981, Parameterized convection and thermal evolution of the earth: *Tectonophysics*,

v. 75, p.1-17.

- Cook, F., and Jones, A., 1995, Seismic reflections and electrical conductivity: a case of Holmes' curious dog?, *Geology*, v. 23, 141-144.
- Cook, F., and Van der Velden, A., 1995, Three dimensional crustal structure of the Purcell anticlinorium in the Cordillera of southwestern Canada, *Geol. Soc. America Bulletin*, v. 107, 642-644.
- Van der Velden, A. and F. Cook, 1996, Structure and tectonic development of the southern Rocky Mountain trench, *Tectonics*, v. 15, 517-544.
- Cook, F., and Vasudevan, K., 1997, Georadar anisotropy in the Gotthard Gneiss, Switzerland, *Geophys. Res. Letters*, v. 24, 197-200.
- Cook, F., Li, Q., and Vasudevan, K., 1997, Identification and interpretation of azimuthally varying crustal reflectivity with an example from the Southern Canadian Cordillera, *J. Geophys. Res.*, v. 102, 8447-8465.
- Li, Q., Cook, F., and Vasudevan, K., 1997, Seismic skeletonization: A new approach to interpretation of seismic reflection data, *J. Geophys. Res.*, v. 102, 8427-8445.
- Patterson, J., and Cook, F., 2002 Successful application of Ground Penetrating Radar in the exploration of gem tourmaline pegmatites of southern California, *Geophysical Prospecting*, v. 50, 107-117.

#### **Editorships:**

- 1991-1994     Bulletin of Canadian Petroleum Geology (Associate Editor)
- 1992-1994     Journal of Geophysical Research (Associate Editor)
- 1995            Canadian Journal of Earth Sciences (Guest Editor for Issue on LITHOPROBE S. Cordillera Transect)
- 1999-present   Canadian Journal of Earth Sciences (Associate Editor)

#### **Committee Memberships:**

- 1990-1993     Member, Solid Earth Sciences Grant Selection Committee, Chairman, 1992-93; 1997-1998  
                  Chairman, NSERC Earth Sciences Reallocations Committee,
- 1987- present   Director, LITHOPROBE Seismic Processing Facility
- 1985- 1995     Transect Leader, Southern Canadian Cordillera transect
- 1987- present   Member (ex-officio), LITHOPROBE Scientific Committee
- 1987- present   LITHOPROBE Seismic and LSPF subcommittee
- 1993- present   Co-Transect Leader (with P. Erdmer), LITHOPROBE SNORCLE transect
- 1998- present   Member, Pan-LITHOPROBE Synthesis subcommittee

#### **Theses Supervised:**

- Gremell, P., 1986, A gravity study of the Purcell anticlinorium in the Toby Creek area of British Columbia, M. Sc., Univ. of Calgary, 122 pp.
- Dufresne, D., 1987, Design and applications of a diversity stack computer program, M. Sc., Univ. of Calgary, 85 pp.
- Lortie, J., 1988, Attenuation of the effect of harmonic distortion on synthetic Vibroseis data using an "exact" wave-shaping filtering method, M. Sc., Univ. of Calgary, 169 pp.
- Eaton, D., 1988, An integrated geophysical study of Valhalla gneiss complex, southern British Columbia, M. Sc., Univ. of Calgary, 130 pp.
- Geis, W., 1989, Seismic reflection imaging of the Chapeau Block, Kapuskasing Structural Zone, Ontario, M. Sc., Univ. of Calgary, 127 pp.
- Coflin, K. C., 1990, Crustal structure of the southeast margin of the Canada basin based upon crustal reflection seismic profiles, Ph. D., Univ. of Calgary, 134 pp.
- Varsek, J. L., 1992, Cordilleran crustal structure, southern Canada and northwestern United States, Ph. D., Univ. of Calgary, 188 pp.
- Clark, E. A., 1992, Proterozoic deformation in the Anderson Plains region, District of Mackenzie, NWT, Canada, Ph. D., Univ. of Calgary, 168 pp.
- Dredge, M., 1993, A geophysical deep crustal study of the Fort Norman area, NWT, Canada, M. Sc., Univ. of Calgary, 131 pp.
- Van der Velden, A., 1995, Surface geometry and tectonic controls on the development of the Rocky Mountain

- trench in southeastern British Columbia, Canada, M.Sc., Univ. of Calgary, 91 pp.
- Hall, K., 1997, Geophysical transect of the Eagle Plains foldbelt and Richardson Mountains anticlinorium, northern Yukon and western Northwest Territories, Canada, Univ. of Calgary, M. Sc., 67 pp.
- Lemieux, S., 2000, Tectonic evolution of the Precambrian basement and structural analysis of the Western Canada sedimentary basin in Southern Alberta, from seismic reflection and potential-field studies, Univ. of Calgary, M. Sc., 109 pp.
- Geiger, H., 2002, Relative amplitude preserving prestack time migration by the equivalent offset method, Univ. of Calgary, Ph.D., 396 pp.

**Presently Supervising:**

- Patterson, J., (Ph. D.) Geophysical characterization and mechanical emplacement of gem-bearing sheeted pegmatite dikes
- Siegel, S., (M. Sc) Seismic stratigraphic and structural analysis of the Proterozoic Fort Simpson Basin, NW Canada
- Travis, S., (M. Sc.) Reinterpretation of geophysical data from southern British Columbia
- Cook, N., (M. Sc.) Analysis of geophysical data near the southern terminus of the Fort Simpson trend in northeastern British Columbia.

## CV - Randell Stephenson

### **Dr. Randell Stephenson**

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Netherlands

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### ***Education***

Randell Stephenson received his Ph.D. at Dalhousie University, Canada, in 1981 (“Continental Topography and Gravity” supervised by C. Beaumont) after M.Sc. and B.Sc.(hon.) degrees at Carleton University, Canada (“Stresses Developed at an Aseismic Continental Margin” and “A Geological Interpretation of Bouguer Anomalies in the Vicinity of Nain, Labrador” both supervised by G. Ranalli).

### ***Post-Ph.D. employment***

Randell Stephenson has been *Universitair Hoofddocent* (University Senior Lecturer) in the Structural Geology/Tectonics Department at the Vrije Universiteit, Amsterdam, since 2004, prior to which he was *Universitair Docent* (University Lecturer) from 1989. He was Research Scientist and Head (from 1986) of the Geophysics Section, Petroleum Geology Subdivision, Institute of Sedimentary and Petroleum Geology, Geological Survey of Canada, Calgary in the years 1983-1989, prior to which he was Postdoctoral Fellow in Earth Physics at the Research School of Earth Sciences, The Australian National University, Canberra, Australia.

### ***Present research activities***

The main focus of Randell Stephenson’s research is the integration of and realistic geological interpretation of geophysical observations of crustal and lithospheric structure associated with sedimentary basins; characterisation and quantitative modelling of the origin and evolution of diverse sedimentary basins in different kinds of tectonic settings of sedimentary basins, including the relationship of lithosphere processes with sedimentation in basins and erosion. Active projects include the following:

- Basement and deep crustal structure of the Vrancea Zone, Romanian Carpathians; controls on seismicity and neotectonic foreland basin development (ongoing Ph.D. project, ISES sponsorship), with the University of Bucharest, Romania;
- Paleotectonic reconstruction of the accreted belts of the southern margin of the East-European Craton; paleomagnetism of Late Palaeozoic-Jurassic units around the Black Sea (ongoing Ph.D. project, NWO sponsorship), with Utrecht University and the Institute of Geophysics, Kyiv, Ukraine;
- Sedimentary basin and crustal architecture, including the dynamic evolution of the intraplate Eureka Orogen, Arctic Canada; earlier ISES sponsorship in collaboration with the Geological Survey of Canada, with the Geological Survey of Canada, Halifax and Calgary;
- Tectonic events controlling the evolution of the Black Sea and its northern margin: offshore subsurface and modelling studies synthesised with onshore geology (as leader of MEBE Consortium Working Group, MEBE sponsorship), with the University of Paris and various institutions in countries bordering the Black Sea;
- Comparative studies of the Black Sea paleo-back-arc basin with modern analogues on the margins of the Pacific plate (ad hoc funding), with the Australian National University, Canberra;

- Deep structure of the Crimean “Orogen” and the northern margin of the Black Sea from new deep seismic reflection profiling (Ukrainian and EU-equipment pool funding), in collaboration with Ukrainian institutions;
- Deep structure of the Donbas Foldbelt, Ukraine; analysis and kinematic modelling of deep near-vertical and wide-angle seismic data; controls and mechanisms of rifting and basin inversion; timing of basin inversion (sponsorship provided by Shell), with Ukrainian institutions and Utrecht University; and
- Thermal evolution of the Donbas Foldbelt, Ukraine, with application to deep, thick sedimentary basins, based on seismically-constrained numerical modelling (funding from Aarhus University, Denmark), with Aarhus University

### ***Current/recent functions***

Randell Stephenson is/has recently been:

- Editor-in-Chief, *Journal of Geodynamics*;
- Co-convenor of two symposia at the Asia Oceania Geosciences Society 4th Annual Meeting (Bangkok, July-August 2007): SE05-14 “Marginal Basins: Back-Arc Basins and Ophiolites” and SE30 “Geodynamics, Active Tectonics of Asia and Himalaya”;
- Co-editor with D.G. Gee (University of Uppsala), European Lithosphere Dynamics, 600 page comprehensive review of the geology and tectonic evolution of the European lithosphere, published in November 2006 (Geological Society of London, Memoir);
- Member of the Board and Vice-President, Middle East Basins Evolution Programme (MEBE), tectonic and stratigraphic evolution of the basins of the Arabian and Caucasus-Caspian domains since the Mesozoic (2001-present); Leader of the MEBE “Black Sea” Working Group;
- Member of the International Editorial Council, *Geophysical Journal*, published in Kyiv (1994-present);
- Member of the Editorial Advisory Board, *Kwartalnik Geologiczny/Geological Quarterly*, published in Warszawa (1999-present);
- Transect Co-ordinator, TRANSMED VIII (“[www.unibas.it/transmed/index2.htm](http://www.unibas.it/transmed/index2.htm)”), lithosphere transect across the eastern Mediterranean Sea from Ukraine to Red Sea (2001-2004);
- Member of the Scientific Steering Committee of the ESF EUROPROBE Programme and leader of the “Intraplate Tectonics and Basin Dynamics” main theme (1992-2001); leader of the EUROPROBE GeoRift Project (1994-2001); and
- Project Co-ordinator, INTAS Project “Relationship between pre-Jurassic intra-cratonic rifting and back-arc extension on the southern margin of the East-European Craton” (1998-2002)

### ***Selected Publications***

Randell Stephenson is author or co-author of about 120 papers. Ten papers selected from about 30 published in the last 5 years include:

- Nielsen, S.B., STEPHENSON, R.A., and Thomsen, E., in press. Dynamics of North Atlantic and African plate boundaries linked by European Palaeocene intra-plate deformations. *Nature*.
- V. Pease, J.S. Daly, S.-Å. Elming, R. Kumpulainen, M. Moczydlowska, V. Puchkov, D. Roberts, A. Saintot, and R. STEPHENSON, in press. Baltica in the Cryogenian, 850-630 Ma, in S. Bogdanova and S. Pisarevsky (Eds.), *Testing the Rodinia Hypothesis: Records in its Building Blocks, Precambrian Research, Special Issue*.
- O. Khriachtchevskaia, S.M. Stovba, and R. STEPHENSON, 2007. 1-D modelling of tectonic subsidence of the Azov Sea and the north-western shelf of the Black Sea during Cretaceous-Neogene times. *Geophysical Journal* 29(5): 3-24 and (in modified form) the Geological Society of London, Special Publication.

- R.A. STEPHENSON, T. Yegorova, M-F. Brunet, S. Stovba, M. Wilson, V. Starostenko, A. Saintot, and N. Kuszniir, 2006. Late Palaeozoic intra- and pericratonic basins on the East European Craton and its margins, in: D.G. Gee and R.A. Stephenson (Eds.), *European Lithosphere Dynamics*, Geological Society of London, Memoir 32: 463-479.
- Saintot, R.A. STEPHENSON, S. Stovba, M-F. Brunet, T. Yegorova, and V. Starostenko, 2006. The evolution of the southern margin of Eastern Europe (Eastern European and Scythian platforms) from the latest Precambrian–Early Palaeozoic to the Early Cretaceous, in: D.G. Gee and R.A. Stephenson (Eds.), *European Lithosphere Dynamics*, Geological Society of London, Memoir 32: 481-505.
- I. Panea, R. STEPHENSON, C. Knapp, V. Mocanu, G. Drijkoningen, L. Matenco, J. Knapp, K. Prodehl, 2005. Near-vertical seismic reflection image using a novel acquisition technique across the Vrancea Zone and Foscani Basin, south-eastern Carpathians (Romania). *Tectonophysics*, 410: 293-309.
- A. Bocin, R. STEPHENSON, A. Tryggvason, I. Panea, V. Mocanu, F. Hauser, and L. Matenco, 2005. 2.5D seismic velocity modelling in the south-eastern Romanian Carpathians Orogen and its foreland. *Tectonophysics*, 410: 273-291.
- R.A. STEPHENSON, Y. Mart, A. Okay, A. Robertson, A. Saintot, S. Stovba and O. Khriachtchevskaia, 2004. TRANSMED Transect VIII: Eastern European Craton to Arabian Craton (Red Star to Red Sea). In: Cavazza, W., et al. (eds). *The TRANSMED Atlas – The Mediterranean region from crust to mantle*. Springer Verlag, Berlin Heidelberg.
- T.P. Yegorova, R.A. STEPHENSON, S.L. Kostyuchenko, E.P. Baranova, V.I. Starostenko, and K.E. Popolitov, 2004. Structure of the lithosphere below the southern margin of the East European Craton (Ukraine and Russia) from gravity and seismic data. *Tectonophysics*, 381: 81-100.
- Yu. Maystrenko, S. Stovba, R. STEPHENSON, U. Bayer, E. Menyoli, D. Gajewski, Ch. Hübscher, W. Rabbel, A. Saintot, V. Starostenko, H. Thybo, and A. Tolkunov, 2003. Crustal-scale pop-up structure in cratonic lithosphere: DOBRE deep seismic reflection study of the Donbas Foldbelt, Ukraine. *Geology*, 31(8): 733-736.

## CV - Larry D. Brown

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### Professional Preparation:

1976 Ph.D., Geological Sciences, Cornell University, Ithaca, NY  
1973 B.S., Physics, Georgia Institute of Technology, Atlanta, Georgia

### Appointments:

2001- Professor, Archaeology Program Cornell University  
1992-present Director of Graduate Studies, Field of Geological Sciences, Cornell University  
1991 Guest Professor, Chiba University, Japan  
1989-present Professor, Cornell University  
1988 Visiting Scientist, BMR (now AGSO), Canberra, Australia  
1987 Visiting Scientist, University of Lausanne, Switzerland  
1983-1989 Associate Professor, Cornell University  
1983 Guest Professor, Kiel University, Germany  
1977-1983 Assistant Professor, Cornell University  
1976 Postdoctoral Research Associate, Cornell University

### Awards:

1981 ARCO Outstanding Junior Faculty Award  
Geological Society of America Fellow

### Professional Organizations

Geological Society of America  
American Geophysical Union  
Society of Exploration Geophysicists  
Environmental and Engineering Geophysics Society  
European Geophysical Society

### Selected Relevant Publications:

Steer, D. N., **L.D. Brown**, J.H. Knapp, and D.J. Baird, 1995, Comparison of explosive and vibroseis source energy penetration in the Williston Basin, Montana and North Dakota, *Geophysics*, 61, 211-221.  
Knapp, J.H., D. N. Steer, **L. D. Brown**, R. Berzin, A. Suleimanov, M. Stiller, E. Lüschen, D. L. Brown, R. Bulgakov, S. N. Kashubin, and A. V. Rybalka, 1996, A lithosphere-scale seismic image of the Southern Urals from explosion-source reflection profiling, *Science*, 274, 226.  
**Brown, L.D.**, W. Zhao, K.D. Nelson, M. Hauck, D. Alsdorf, A. Ross, M. Cogan, M. Clark, X. Liu, and J. Che. 1996, Bright spots, structure and magmatism in southern Tibet from INDEPTH seismic reflection profiling, *Science*, 274, 1688-1690.  
Diaconescu, C.C., J.H. Knapp, **L.D. Brown**, D.N. Steer, and M. Stiller, 1998, Precambrian Moho offset and tectonic stability of the East European platform from the URSEIS deep seismic profile, *Geology*, 26, 211-214.

Steer, D. N.; Knapp, J. H. ; **Brown, L. D.** , 1998, Super-deep reflection profiling, *Tectonophysics*, 286, 111-121.

Additional Selected Publications:

**Brown, L.**, M. Barazangi, J. Oliver and S. Kaufman, 1986, The first decade of COCORP: 1974-1984, in *Reflection Seismology and the Continental Crust: A Global Perspective*, edited by M. Barazangi and L. D. Brown, Amer. Geophys. Union Geodynamic Series v. 13, pp. 107-120.

Mayer, J.R., and **L.D. Brown**, 1986, Signal penetration: Basin and Range to Colorado Plateau, *Geophysics*, 51, 1050-1054.

**Brown, L.D.**, 1987, Lower continental crust: variations mapped by COCORP deep seismic profiling, *Annales Geophysicae*, 5B, 325-330.

Alsdorf, D., **L. Brown**, K.D. Nelson, Y. Makovsky, S. Klemperer, and W. Zhao, 1998, Crustal deformation of the Lhasa terrane, Tibet plateau from Project INDEPTH deep seismic reflection profiles, *Tectonics*, 17, 501-519.

Zhao, W., Mechie, J., **L.D. Brown**, J. Guo, S. Haines, T. Hearn, S.L. Klemperer, Y.S. Ma, R. Meissner, K.D. Nelson, P. Pananont, R. Rapine, A. Ross, and J. Saul, 2001, Crustal structure of central Tibet as derived from Project INDEPTH wide-angle seismic data, *Geophysical Journal*, 145, 486-496.

Synergistic Activities:

1998- Co-Chairman, International Lithosphere Program Committee on International Lithospheric Surveys (COILS)

2001- Co-Chairman: International Lithosphere Program, Subcommittee on Lithospheric Evolution of Gondwana East from iNternational Deep Surveys (LEGENDS)

2001 Multidisciplinary Assessment Committee, Canada Foundation for Innovation (2001)

2001 Steering Committee, *Gondwana Research*

Collaborators & Other Affiliations:

Collaborators: Doug Nelson, James Knapp, Simon Klemperer, Martyn Unsworth, James Mechie, Ranier Kind, James Ni, Tom Hearn, Kate Miller, David Okaya, Francis Wu, Kirk Macintosh, Tosio Nakamura, Bill Kidd, Lothar Ratschbacher, Ramon Carbonell, Josep Gallart, Alfred Hirn, Alan Jones, Onno Oncken, Barry Drummond, Alfred Kroener, Brian Windley, Masaki Kanao, Hiroshi Sato, Naoshi Hirata, Takaya Iwasaki, Tom Pratt, Bob Stern, Zhao Wenjin, Zhao Xun, Richard England, Peter Maguire,.

Graduate and Post-doctoral Advisors:

Jack E. Oliver, Sidney Kaufman, Jack Bird, Joseph Burns.

Thesis Committee Member:

Dave Steer, Tomas Zapata, Anibal Fernandez, Dogan Seeber, Michael Hauck, Doug Alsdorf, Andy Ross, Tim Piwowar, Christine Orgren, Graham Brew, Alex Calvert, Monica Bader, John McBride, Simon Klemperer, Dave Steiner.



## CV - STEPHEN BANNISTER

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### Current substantive position :

Senior Research Scientist and Objective leader, North Island subduction objective, in the PGSF "Impacts of Global Plate Tectonics" research programme, at GNS Science ([www.gns.cri.nz](http://www.gns.cri.nz)), Lower Hutt, New Zealand, undertaking crustal-scale seismic investigations in New Zealand and Antarctica. The Resources Group Manager (departmental head) is Mike Isaac ([m.isaac@gns.cri.nz](mailto:m.isaac@gns.cri.nz))

### Professional Preparation:

BSc.(Hons, Geophysics), Victoria University of Wellington, New Zealand, 1982

PhD in Geophysics, Victoria University of Wellington, New Zealand, 1986

### Appointments:

2003-present, Senior Research Scientist and Objective leader, GNS Science

1993-2003, Scientist, Institute of Geological & Nuclear Sciences, New Zealand

1990-1993, Scientist, DSIR Geology and Geophysics, Wellington, New Zealand

1988-1989, NTNF Post-doctoral fellow, Oslo University, Norway

1986-1987, Post-doctoral fellow, Macquarie University, Australia

### Honors:

2001- Honorary Research Associate in School of Earth Sciences, Victoria University of Wellington

1996, New Zealand Geophysics Prize, Royal Society of New Zealand, with Jim Ansell, for PEPI paper on the morphology of the Hikurangi subduction zone

1992, NZ-USA Cooperative Science Award, USGS Woods Hole

### Selected Publications:

Ansell, J.H.; Bannister, S. 1996. Shallow morphology of the subducted Pacific Plate along the Hikurangi margin, New Zealand. *Physics of the earth and planetary interiors*, 93: 3-20

Bannister, S., M.Reyners, G.Stuart and M.Savage, 2007. Imaging the Hikurangi subduction zone using teleseismic receiver functions; crustal fluids above the forearc mantle wedge. *Geophys.J.Int.*, 169, 602-616, doi:10.1111/j.1365-246X.2007.03345.x, 2007.

Bannister, S.; C.Thurber, and J.Louie, 2006. Detailed fault structure highlighted by finely relocated aftershocks, Arthur's Pass, New Zealand. *Geophys.Res.Lett.*, 33, L18315, doi:10.1029/2006GL027462.

Bannister, S.; Bryan, C.J.; Bibby, H.M, 2004. Shear wave velocity variation across the Taupo Volcanic Zone, New Zealand, from receiver function inversion. *Geophysical journal Int.*, 159(1): 291-310

Bannister, S.; Yu, J.; Leitner, B.; Kennett, B.L.N., 2003. Variations in crustal structure across the transition from west to east Antarctica, Southern Victoria Land. *Geophys. journal Int.*, 155(3): 870-884

Bannister, S.; Kennett, B.L.N., 2002. Seismic activity in the Transantarctic Mountains : results from a broadband array deployment. *Terra Antartica*, 9(1): 41-46

Bannister, S.; Snieder, R.K.; Passier, M.L., 2000. Shear-wave velocities under the Transantarctic Mountains and Terror Rift from surface wave inversion. *Geophysical research letters*, 27(2): 281-284

Bannister, S.; Ruud, B.O.; Husebye, E.S., 1991. Tomographic estimates of sub-Moho seismic velocities in Fennoscandia and structural implications. *Tectonophysics*, 189(1/4): 37-53

- Bannister, S.; Husebye, E.S.; Ruud, B.O., 1990. Teleseismic P coda analysed by three-component and array techniques : deterministic location of topographic P-to-Rg scattering near the NORESS array. *Bulletin of the Seismological Society of America*, 80(6B): pp. 1969-1986
- Bannister, S.; Perin, B.J.; Webb, T.H., 1989. Normal faulting through subducted oceanic crust : the 19 July 1985 earthquake of Hawke's Bay, New Zealand. *Tectonophysics*, 162(3/4): 303-313
- Bannister, S., 1988. Microseismicity and velocity structure in the Hawkes Bay region, New Zealand : fine structure of the subducting Pacific Plate. *Geophysical journal*, 95: 45-62
- Danesi, S., Bannister, S., and Morelli, A., 2007. Repeating earthquakes from rupture of an asperity under an Antarctic outlet glacier. *Earth and Planetary Science Letters* (2006). doi:10.1016/j.epsl.2006.10.023.
- Eberhart-Phillips, D.; Bannister, S.C. 2002. Three-dimensional crustal structure in the Southern Alps region of New Zealand from inversion of local earthquake and active source data. *Journal of geophysical research. Solid earth*, 107(B10): doi:10.1029/2001JB000567, 2002.
- Heise, W., Bibby, H.M., Caldwell, T.G., Bannister, S., Ogawa, Y., Takakura, S., and T. Uchida, 2007. Melt distribution beneath a young continental rift: The Taupo Volcanic Zone, New Zealand. *Geophysical Research Letters*, 34, L14313, doi:10.1029/2007GL029629.
- Henrys, S., M. Reyners, I. Pecher, S. Bannister, Y. Nishimura, and G. Maslen., 2006. Shallow plate kinking beneath the Central North Island of New Zealand: a Subduction Escalator. *Geology*, 34, 777-780. doi:10.1130/G22594.1, 2006.
- Horspool, N.A., M.K. Savage and S. Bannister, 2006. Implications for intraplate volcanism and back-arc deformation in northwestern New Zealand, from joint inversion of receiver functions and surface waves. *Geophys.J.Int.*, 166, 1466-1483(18). doi:10.1111/j.1365-246X.2006.03016.x., 2006.
- Lin, Fan-Chi, Ritzwoller, M.H., Townend, J., Bannister, S., Savage, M., 2007, Ambient noise Rayleigh wave tomography of New Zealand. *Geophys.J.Int.*, doi:10.1111/j.1365-246X.2007.03414.x, 2007.
- Louie, J.N.; Chavez-Perez, S.; Henrys, S.A.; Bannister, S. 2002. Multimode migration of scattered and converted waves for the structure of the Hikurangi slab interface, New Zealand. *Tectonophysics*, 355: 227-246
- Reyners, M., and S. Bannister, 2007. Earthquakes triggered by slow slip at the plate interface in the Hikurangi subduction zone, New Zealand, 2007. *Geophysical Research Letters*, 34, L14305, 2007.
- Stern, T., Benson, A., Bannister, S., and Stratford, W., 2005. Rocks beneath New Zealand's central North Island: mantle or crust? *Eos*, 86, 538, 543.

### **Synergistic Activities:**

- New Zealand representative on SEG Global Affairs committee (2005-present), and member of SEG Foundation Projects Review Committee (2006, 2007)
- Royal Society of New Zealand (past Secretary and Treasurer geophysics section, Wellington-branch) (1992-1994)
- Served on organising committees, Seismix2003 Deep Seismic Profiling Symposium (2003); 8<sup>th</sup> International Symposium on Antarctic Earth Sciences (1998).

### **Research in crustal-scale seismic investigations – in the last 5 years**

Co-PI of a joint NZ-Italian passive seismic array deployment, Antarctica (2003), targeting the nature of seismicity and deep crustal structure near David Glacier, northern Victoria Land.

PI of 2004-2005 broadband seismic experiment 'RF2004' across the central Taupo Volcanic Zone, targeting seismic properties of the mid- and lower crust, central New Zealand.

GNS associate investigator of the high-resolution seismic reflection experiment "MORC – Mantle or Crust" across the Taupo Volcanic Zone (2005), (see Stern et al, 2005 publication above).

Objective leader of GNS Science research on the Hikurangi subduction zone, including the MED-EC005 seismic programme (2005), involving marine seismic reflection acquisition and 3D offshore-onshore recording, seismically imaging the subduction decollement of the subducting Pacific plate.

## CV - Chun-Feng Li

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### Principal Research Interests

Tectonophysics and Geodynamics, Marine Geology and Geophysics, Seismology, Geophysical Data Processing and Interpretation, Nonlinear Processes in Geosciences

### Working Experience

Visiting Professor, Université des Sciences et Technologies de Lille, France, 2005, 6-7.  
Associate Professor, School of Ocean and Earth Sciences, Tongji University, China, 2005-present.  
Assistant Professor, School of Ocean and Earth Sciences, Tongji University, China, 2003-2005.  
Teaching Assistant, Department of Geosciences, University of Tulsa, USA, 1999 -2002.  
Geophysicist, Carrizo Oil & Gas, Inc. Houston, TX., USA 1998 -1999.  
Teaching & Research Assistant, Department of Geosciences, University of Houston, USA, 1996 -1997.  
Research Assistant, Institute of Crustal Dynamics, Chinese Seismological Bureau, Beijing, China, 1993 -1996.

### Education

PhD in Geophysics, University of Tulsa, Tulsa, OK., USA, 2002.  
MS in Geophysics, University of Houston, Houston, TX., USA, 1999.  
MS in Geology, Graduate School, Chinese Seismological Bureau and Chinese Academy of Sciences, Beijing, China, 1995.  
BS in Geology, China University of Geosciences, Wuhan, China, 1992.

### Major Research Projects

2007, Onboard scientific participant, Integrated Ocean Drilling Program Expedition 316: NanTroSEIZE Stage 1: NanTroSEIZE Shallow Megaspill and Frontal Thrusts.  
2007, National Basin Research Program of China: Tectonics and Hydrocarbon Potential of the South China Sea Continental Margins.  
2006, Chinese Natural Science Foundation Project: Wavelet-based singularity analyses on 3D seismic data.  
2005, CNOOC sponsored project: Study of tectonic inversion and hydrocarbon accumulation in the Xihu Depression of the East China Sea Basin.  
2004, China Startup Foundation Project: Singularity analyses of seismic data and acoustic impedance reconstruction.  
2003, Chinese national key research program: Interactions between the Earth Spheres: Deep-Sea Processes and Records.  
2003, Chinese national key research program: Formation and evolution of Chinese marginal seas and their related resources.  
1998, Worked on 3D seismic data acquisition in Southern Texas, USA.  
1997, Studied crustal seismic velocity and density structure of Southern California, USA.  
1994, Studied tectonics along the Kunlun active fault on the Tibetan Plateau with a China-France cooperative research program. Participated in field investigation.  
1993, Digitized, processed and analyzed aeromagnetic data along the Xianshuihe active fault zone, China.

### Journal Publications

- Chun-Feng Li, Z. Zhou, J. Li, H. Chen, J. Geng, H. Li, 2007, Precollisional tectonics and terrain amalgamation offshore southern Taiwan: Characterizations from reflection seismic and potential field data. *Science in China, Series D: Earth Sciences*, 50(6), 897-908.

- Chun-Feng Li, Z. Zhou, J. Li, H. Hao, J. Geng, 2007, Structures of the northeasternmost South China Sea continental margin and ocean basin: geophysical constraints and tectonic implications. *Marine Geophysical Researches*, 28, 59-79.
- Chun-Feng Li, Zhou Z., Ge H, Mao Y, 2007, Correlations between erosions and relative uplifts from the central inversion zone of the Xihu Depression, East China Sea Basin. *Terrestrial, Atmospheric and Oceanic Sciences*. In press.
- Li, Chun-Feng, 2003. Rescaled-range and power spectrum analyses on well-logging data. *Geophysical Journal International*, 153, 201-212.
- Li, Chun-Feng, 2004, Information passage from acoustic impedance to seismogram: Perspectives from wavelet-based multiscale analysis. *Journal of Geophysical Research*, 109, B07301, doi:10.1029/2003JB002883.
- Liner, C. L. and C.-F. Li, 2004, Application of the continuous wavelet transform to broadband wavefield data. *Annals of the European Academy of Sciences*.
- J. Smythe, A. Gersztenkorn, B. Radovich, C.-F. Li, C. Liner, 2004, Gulf of Mexico shelf framework interpretation using a bed-form attribute from spectral imaging, *The Leading Edge*, 23(9), 921-926.
- Chun-Feng Li, Q. He, G. Zhao, 2005, Paleo-earthquake studies on the eastern section of the Kunlun fault. *Acta Seismologica Sinica*, 18(1), 64-71.
- Chun-Feng Li, C. L. Liner, 2005, Singularity exponent from wavelet-based multiscale analysis: A new seismic attribute. *Chinese Journal of Geophysics*, 48(4), 953-959.
- Chun-Feng Li, 2004, Comparative geological study between the western Pacific marginal seas and the paleo-Tethyan marginal seas. In: J. Li and S. Gao (eds), *Basin Evolution and Resources of the Chinese Marginal Seas*, (Volume 3, Serial studies of the formation and evolution of the Chinese marginal seas). Beijing: Ocean Press, 46-53, color plate III, IV. (In Chinese)
- Chun-Feng Li, Q. He, G. Zhao, 2004, The Holocene slip rate along the eastern segment of the Kunlun fault. *Seismology and Geology*, 26(4), 676-687. (In Chinese)
- Chun-Feng Li, 2005, Some remarks on application of fractal analyses in well logging data. *Well Logging Technology*, 29(1), 15-20. (In Chinese)
- Chun-Feng Li, X. Zhang, X. Cai, 2005, Analyses of petrology and sedimentary environment on late-Cambrian carbonate rocks of the Xiyangshan Formation in NW Jiangxi, China. *Acta Sedimentologica Sinica*, 23(1), 41-48. (In Chinese)
- Chun-Feng Li, 2005, Methods of mapping the depth to the Curie isotherm. *Progress in Geophysics*, 20(2), 550-557.
- Chun-Feng Li, 2005, Assessing deconvolution models in view of multiscale reflectivity. *Progress in Exploration Geophysics*, 28(4), 250-257. (In Chinese)
- Chun-Feng Li, 2005, Fractal media and fractal stratigraphy. *Journal of Stratigraphy*, 29(4), 348-354. (In Chinese)
- Zhang, J., S. Wang, D. Liu, C.-F. Li, 1995, The study of structural environment of Xianshuihe active fault zone and neighboring region using aeromagnetic data. *Seismology and Geology*, 17(3), 259-264. (In Chinese)

#### **Patent**

US Patent 6745129 B1. Inventor: Li Chun-Feng, Liner C. University of Tulsa.

Patent title: Wavelet-based analysis of singularities in seismic data. Int. Cl7: G01V 1/28. U.S. Cl: 702/17. June 01, 2004.

#### **Conference Proceedings**

- Chun-Feng Li, Zhou Z, Ge H, Mao Y, 2006, Tectonic subsidence and crustal structure of the Xihu Depression, East China Sea Basin. 12th International Symposium on Deep Seismic Profiling. Hayama, Japan.
- Liner, C. L., Chun-Feng Li, A. Gersztenkorn, J. Smythe, 2004, SPICE: A new general seismic attribute. Paper presented at the 74th Annual Meeting of Society of Exploration Geophysicists, Denver, Colorado, USA. 433-436.

- Chun-Feng Li, Zhou Z, Hao H., Chen H., Wang J., Chen B., 2007, Geophysical constraints on Late Mesozoic tectonics along the present-day northeastern South China Sea continental margin. *J. China Univ. Geosci.*, 18, Special Issue, p. 484, 489.
- Chun-Feng Li, Liner, C., 2007, Properties of high resolution 3D seismic singularity attribute. *J. China Univ. Geosci.*, 18, Special Issue, p. 530-531.

#### **Professional Service**

Panel member, Site Survey Panel of the Integrated Ocean Drilling Program (IODP). (since 07/2007).

#### **Teaching at Tongji University**

Specialized English in Geology and Geophysics (undergraduate)  
 Numerical Computing (undergraduate)  
 Seismic Stratigraphy (undergraduate)  
 Physics of the Earth's Interior and Geodynamics (undergraduate)  
 Nonlinear Processes in Geosciences (graduate)  
 Geodynamics (graduate)  
 Marine Geology – tectonics and geophysics session (graduate)

#### **Skills**

Programming: C, Fortran, Mathematica, MATLAB, HTML, BASIC  
 Computing Systems: IRIX/Solaris/Linux, Windows, MS-DOS, MacOS  
 Software: GeoQuest-GeoFrame, Landmark-Openworks, Kingdom Suite, GeoGraphix, ArcView, ArcGIS,  
 Seismic Unix, Generic Mapping Tools (GMT)  
 Speaking Language: Bilingual, fluent in Chinese and English

#### **Details of the School of Ocean and Earth Sciences**

The history of the School of Ocean and Earth Science goes back to the times when marine geology was first set up in Tongji University as a department. The traditional strength of the department since its foundation has been in research on resources and environments, with foci on paleoceanography and integrated geophysical exploration. The development over the past 30 years has made the school a leading institution in marine geology and geophysics in China.

Research activities in the school are mainly hosted in the State Key Laboratory of Marine Geology. Equipped with state-of-the-art instruments, the school is currently carrying out a whole range of projects, which fall into the following areas:

Paleoceanography and global changes  
 Earth surface processes  
 Tectonics and basin analysis  
 Geodynamics and tectonophysics  
 Marine geology and geophysics  
 Seismic exploration  
 Earthquake seismology

The School offers Undergraduate degrees in three discipline areas: Marine Geology, Geophysics, and Geoscience information and Technology, as well as Masters (Science) and Doctoral (Science) degrees in Marine Geology and Geophysics. The school has approximately 45 faculty members and 400 students.

Dean: Dr. Hongbo Zheng

Date: Aug. 31, 2007

## CV - Ilmo Tapio Kukkonen

### 1. Full names

*Surname:* Kukkonen *First names:* Ilmo Tapio

### 2. Date and place of birth

April 6, 1956, Helsinki

### 3. Contact information:

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### 4. Current position

- Research Professor in Applied Geophysics, Southern Finland Office, Geological Survey of Finland, from August 2006

### 5. Previous professional appointments

- Division manager, Geophysics, Southern Finland Office, Geological Survey of Finland; January 2005 – July 2006
- Acting head of section Geophysics, Espoo Unit, Geological Survey of Finland, September 2003 – December 2004
- Senior Scientist at the Geological Survey of Finland, Espoo; Jan. 1991- Sept. 2003; Geothermics, reflection seismics and lithospheric geophysics
- Environmental studies and co-ordination of environmental investigations of the Geological Survey; Jan. 1989 - Dec. 1990
- Scientist at the Geological Survey of Finland, Nuclear Waste Disposal Research Group; Geophysical studies for investigations of radioactive waste in the Finnish bedrock; Mar. 1984 - Dec. 1988 and Sept. 1982
- Geophysicist at the Geological Survey of Finland, Espoo, Department of Exploration; Graphite deposit exploration in Finland: June 1982 - Aug. 1982 and Oct. 1982 - Feb. 1984
- Assistant in Economic Geology at the Helsinki University of Technology, Laboratory of Economic Geology, Nov. 1980 - June 1981 and Feb. 1982 - May 1982
- Military Service; June 1981 - Feb. 1982

### 6. Degrees

- Docent in Solid Earth Geophysics, Helsinki University of Technology; Feb. 1996
- Docent in Geothermal Geophysics, University of Helsinki; Mar. 1995
- Doctor of Technology (Major in Applied Geophysics), Helsinki University of Technology, Aug. 1989; Doctoral thesis title: 'Terrestrial heat flow density in Finland, the central Fennoscandian Shield' (thesis accepted with honors)
- Licentiate of Technology (Major in Economic Geology), Helsinki University of Technology; Dec. 1986; Licentiate thesis title: 'The effect of past climatic changes on bedrock temperatures and temperature gradients in Finland' (in Finnish)
- Master of Technology (Diploma Engineer in Economic Geology), Helsinki University of Technology; Dec. 1980. Diploma thesis title: 'The accuracy of ore reserve estimation in sub-level stoping at the Otanmäki mine' (in Finnish)

### 7. Nature and scope of publications

- Over 100 scientific publications (of which 48 in international peer-reviewed journals) on topics such as geothermics of the lithosphere, thermal evolution of the lithosphere, mantle xenoliths, thermal

properties of rocks, geothermal resources, seismic structure and lithological composition of the crust, groundwater flow in crystalline rock, geochemistry of deep groundwaters, palaeoclimate, nuclear waste disposal, environmental and archaeological applications of geophysics, impact craters and meteorites.

## **8. Memberships in boards and committees of scientific organizations**

### **International:**

- International Association of Seismology and Interiors of the Earth, IASPEI, Executive Committee 2007-2011, member
- International Continental Scientific Drilling Program, ICDP, Executive Committee, Finnish representative for the Academy of Finland (from 2005)
- International Association of the Seismology and the Physics of the Earth's Interior (IASPEI), International - Heat Flow Commission, member 1991-95, vice-chairman 1995-99, chairman 1999-2003, past chairman 2003-2007.
- Continental Deep Drilling program (KTB), Germany, member of the Geothermal Task Group, 1991-94
- EUROPROBE/Svekalapko, principal investigator of the geothermal subproject, 1995-2000
- EUROPROBE/Uralides, western co-ordinator of the geothermal subproject, 1995-1996
- IGCP-408 >Rocks and Minerals at Great Depth and on the Surface, subproject leader on >The distribution, mineralogy, and mobility of heat producing elements in the SG-3 section=, 1999-2002

### **Domestic:**

- ICDP (International Continental Scientific Drilling Program), member of the national committee (from 2006)
- The national IUGG (International Union of Geodesy and Geophysics) committee, member (from 2006)
- The Finnish Geodetic Institute, member of the international scientific advisory group (from 2005)
- International Union of Geodesy and Geophysics (IUGG)/International Lithosphere Programme (ILP), member of the national ILP committee, from 1992, vice-chairman from 2002
- International Geological Correlation Programme, IGCP, national committee, member (from 2004)
- Geophysical Society (Finland): Vice Chairman 1991, Chairman 1992, Member of the Board 1993
- Vuorimiesyhdistys r.y. (Finnish Association of Mining and Metallurgical Engineers), member of the Geological Committee 1994-95, chairman 1996-1999
- Geophysica, research journal of the Geophysical Society of Finland, Editorial Board, member, from 2006

## **9. Excerpts of scientific merits, main results and activities in research**

- I have carried out geothermal research (from the late 1980's) of the present and past thermal structure of the lithosphere, particularly in Finland, but also in the Russian Karelia, the Kola Peninsula, the Urals, Estonia and other areas. I participated and organized geothermal international expeditions in the 1990's to the Kola Peninsula, Russian Karelia and Estonia, which resulted in significant new heat flow data sets and interpretations. I have published numerous papers on heat flow, lithospheric temperatures, radiogenic heat production, mantle xenoliths, thermal modeling results and modeling methods, as well as effects of palaeoclimate on present geothermal gradient. The xenolith-calibrated geotherm constructed by myself and co-workers (e.g., papers 1.30 and 1.42 in the publication list) formed the basis of interpreting the kimberlite-derived xenocryst data from eastern Finland in terms of upper mantle layering. This has turned out to be highly relevant for diamond exploration in Finland. I have made important observations of systematic vertical variation in heat flow and geothermal gradient in Fennoscandia, the East European Platform and the Urals and shown the relation of such vertical systematics to climate changes during the past 100,000 years (e.g., papers 1.20, 1.21 and 1.41). My present geothermal research foci are in the thermal evolution of the lithosphere and physical modeling of PTt-paths of rocks in the Svecofennian orogen, as well as thermal modelling of permafrost.
- I was the project manager and principal investigator of project FIRE (Finnish Reflection Experiment 2001-2005), a major reflection seismic survey in Finland, which produced over 2100 km of crustal

scale reflection data in Finland. FIRE was one of the Finnish-Russian debt-conversion projects. The results (published as a Special Paper of GTK, publication [6.6] in the list) have significantly improved our understanding of the crustal architecture and evolution of the Fennoscandian Shield. I had a significant role in negotiating the project and co-ordinating the work of the Russian contractor, national consortium partners, and several GTK departments into a smoothly operating project organization of about 80 people. The total project budget was about 17 Million Eur in 2001-2005.

- I am the initiator, science co-ordinator and present project manager of the GTK project Outokumpu Deep Drilling Project (2004-). In the project, a 2,516 m deep research hole was drilled in Outokumpu, eastern Finland, in a classical Cu-Co-Zn sulphide ore province. The hole, together with relevant FIRE results, has opened a completely new view on the extensively debated deep structure of the Outokumpu ore province, and has shown the high potential of reflection seismic methods in ore exploration. The deep hole is utilized in an international framework for multi-disciplinary research projects for studying the geological and geophysical properties of deep crystalline bedrock, evolution of the bedrock of the area, composition and origin of saline fluids, possible existence of deep biosphere in the area, stress field in bedrock and development of exploration and investigation methods and technologies, such as high resolution borehole and surface seismic methods. Currently research teams from seven countries participate in the project. The drilling part of the Outokumpu project was one of the Finnish-Russian debt-conversion projects. The funding received from debt conversion for the drilling was 8.2 Million USD, and the GTK budget of the Outokumpu Deep Drilling project in 2005-2006 is about 590,000 Eur.
- I am the project manager of a new reflection seismic project, the project HIRE 2007-2010. The project HIRE (High Resolution Reflection Seismics in Ore Exploration) produces and interprets reflection seismic surveys on 6-8 potential exploration and mining targets in Finland. The aim is to apply high resolution reflection seismic 2D and 3D surveys, a technique previously unused for exploration in Finland, demonstrate its applicability and produce useful structural and lithological information on the known and potential massive sulphide and gold mineralizations in the target areas. Extensive collaboration with exploration companies is an essential component of the project. The seismic acquisition is funded from the Finnish-Russian debt-conversion agreement for 2006-2008, with a value of 5 Million USD, and the GTK budget for 2007-2010 is 3.3 Million USD.

## 10. Publications

### 10.1. Papers in international journals and monographs:

- [1.1] Nurmi, P. and Kukkonen, I., 1986. A new technique for sampling water and gas from deep drill holes. *Canadian Journal of Earth Sciences*, 23, pp. 1450-1454.
- [1.2] Kukkonen, I., 1987. Vertical variation of apparent and palaeoclimatically corrected heat flow densities in the central Baltic Shield. *Journal of Geodynamics*, 8, pp. 33-53.
- [1.3] Kukkonen, I., 1988. Terrestrial heat flow and groundwater circulation in the bedrock in the central Baltic Shield. *Tectonophysics*, 156, pp. 59-74.
- [1.4] Nurmi, P., Kukkonen, I., and Lahermo, P., 1988. Geochemistry and origin of saline groundwaters in the Fennoscandian Shield. *Applied Geochemistry*, 3, pp. 185-203.
- [1.5] Kukkonen, I., 1989. Terrestrial heat flow and radiogenic heat production in Finland, the central Baltic Shield. In: V. Cermak, L. Rybach and E.R. Decker (Editors), *Heat Flow and Lithosphere Structure*. *Tectonophysics*, 164, 219-230.
- [1.6] Vanhala, H., Soininen, H. and Kukkonen, I., 1992. Detecting organic chemical contaminants by spectral-induced polarization method in glacial till environment. *Geophysics*, 57, 1014 - 1017.
- [1.7] Kukkonen, I., Kivekäs, L. and Paananen, M., 1992. Physical properties of karnäite and related rocks in the Lappajärvi meteorite crater, Finland. In: L.J. Pesonen and H. Henkel (Editors), *Fennoscandian Impact Craters*. *Tectonophysics*, 216, 111-122.
- [1.8] Kukkonen, I.T. and Järvinmäki, P., 1992. Finland. In: E. Hurtig, V. Cermak, R. Haenel and V. Zui (Editors), *Geothermal Atlas of Europe*. Hermann Haack, Gotha, p. 29.
- [1.9] Cermak, V., Balling, N., Kukkonen, I. and Zui, V.I., 1993. Heat flow in the Baltic Shield - results of the lithospheric geothermal modelling. *Precambrian Research*, 64, 53-65.



- [1.10] Cermak, V., Kukkonen, I.T. and Safanda, J., 1993. Temperature logs in deep wells - a useful tool for past climatic reconstruction. *Terra Nova*, 5, 134-143.
- [1.11] Kukkonen, I.T., Cermak, V. and Hurtig, E., 1993. Vertical variation of heat flow density in the continental crust. *Terra Nova*, 5, 389-398.
- [1.12] Kukkonen, I.T., 1993. Heat flow map of northern and central parts of the Fennoscandian Shield based on geochemical surveys of heat producing elements. *Tectonophysics*, 225, 3-13.
- [1.13] Terho, M., Pesonen, L.J., Kukkonen, I.T. and Bukovanská, M., 1993. The petrophysical classification of meteorites. *Studia Geophysica et Geodaetica*, 37, 65-82.
- [1.14] Pesonen, L.J., Terho, M. and Kukkonen, I.T., 1993. Physical properties of 368 meteorites: Implications for meteorite magnetism and planetary geophysics. *Proc. NIPR Symp. Antarct. Meteorites*, 6, 401-416.
- [1.15] Kukkonen, I.T. and Clauser, C., 1994. Simulation of heat transfer at the Kola deep-hole site - implications for advection, heat refraction and paleoclimatic effects. *Geophysical Journal International*, 116, 409-420.
- [1.16] Kukkonen, I.T., Cermak, V. and Safanda, J., 1993. Subsurface temperature-depth profiles, anomalies due to climatic ground surface temperature changes or groundwater flow effects. *Global and Planetary Change*, 9, 221-232.
- [1.17] Kukkonen, I. T., 1995. Thermal aspects of groundwater circulation in bedrock and its effect on crustal geothermal modelling in Finland, the central Fennoscandian Shield. In: N. Balling and E.R. Decker (Editors), *Heat Flow and Thermal Regimes of Continental Lithosphere*, *Tectonophysics*, 244, 119-136.
- [1.18] Kukkonen, I.T. and Jöeleht, A., 1996. Geothermal modelling of the lithosphere in the central Baltic Shield and its southern slope. *Tectonophysics*, 255, 25-45.
- [1.19] Terho, M., Pesonen, L.J. and Kukkonen, I.T., 1996. Magnetic properties of asteroids from meteorite data - implications for magnetic anomaly detections. *Earth, Moon and Planets*, 72, 225-231.
- [1.20] Kukkonen, I.T. and Šafanda, J., 1996. Palaeoclimate and structure: the most important factors controlling subsurface temperatures in crystalline rocks. A case history from Outokumpu, eastern Finland. *Geophysical Journal International*, 126, 101-112.
- [1.21] Kukkonen, I.T., Golovanova, I.V., Khachay, Yu.V., Druzhinin, V.S., Kosarev, A.M. and Schapov, V.A., 1997. Low geothermal heat flow of the Urals fold belt - implication of low heat production, fluid circulation or palaeoclimate? *Tectonophysics*, 276, 63-85.
- [1.22] Huenges, E., Kukkonen, I.T. and Urai, J. (Editors), 1998. Relationships between various physical properties in sedimentary and crystalline rocks. *Physics and Chemistry of the Earth*, special issue, 23, no 3.
- [1.23] Kukkonen, I.T., 1998. Temperature and heat flow density in a thick cratonic lithosphere: the SVEKA transect, central Fennoscandian Shield. *Journal of Geodynamics*, 26, 111-136.
- [1.24] Jöeleht, A. and Kukkonen, I.T., 1998. Thermal properties of granulite facies rocks in the Precambrian basement of Estonia and Finland. *Tectonophysics*, 291, 195-203.
- [1.25] Kukkonen, I.T. and Peltoniemi, S., 1998. Relationships between thermal and other petrophysical properties of rocks in Finland. *Physics and Chemistry of the Earth*, 23, 341-349.
- [1.26] Kukkonen, I.T., Gosnold, W.D. and Šafanda, J., 1998. Anomalously low heat flow density in eastern Karelia, Baltic Shield: a possible palaeoclimatic signature. *Tectonophysics*, 291, 235-249.
- [1.27] Verdoya, M., Pasquale, V., Chiozzi, P. and Kukkonen, I.T., 1998. Radiogenic heat production in the Variscan crust: new determinations and distribution models in Corsica (northwestern Mediterranean). *Tectonophysics*, 291, 63-75.
- [1.28] Jokinen, J. and Kukkonen, I.T., 1999. Random modelling of the lithospheric thermal regime: forward simulations applied in uncertainty analysis. *Tectonophysics*, 306, 277-292.
- [1.29] Jokinen, J. and Kukkonen, I.T., 1999. Inverse simulation of the lithospheric thermal regime using the Monte Carlo method. *Tectonophysics*, 306, 293-310.
- [1.30] Kukkonen, I.T. and Peltonen, P., 1999. Xenolith-controlled geotherm for the central Fennoscandian Shield: implications for lithosphere-asthenosphere relations. *Tectonophysics*, 304, 301-315.
- [1.31] Kukkonen, I.T., Jokinen, J. and Seipold, U., 1999. Temperature and pressure dependencies of thermal transport properties of rocks: Implications for uncertainties in thermal lithosphere models and new laboratory measurements of high-grade rocks in the central Fennoscandian Shield. *Surveys in Geophysics*, 20, 33-59.

- [1.32] Jokinen, J. and Kukkonen, I.T., 2000. Inverse Monte Carlo simulation of the lithospheric thermal regime in the Fennoscandian Shield using xenolith-derived mantle temperatures. *Journal of Geodynamics*, 29, 71-85.
- [1.33] Korsman, K., Korja T., Pajunen, M., Virransalo, P. and the GGT/SVEKA Working Group (IK as a member of the WG), 1999. The GGT/SVEKA Transect - Structure and evolution of the continental crust in the Paleoproterozoic Svecofennian orogen in Finland. *International Geology Review*, 41, 287-333.
- [1.34] Kukkonen, I.T. and Safanda, J., 2001. Numerical modelling of permafrost in bedrock in northern Fennoscandia during the Holocene. *Global and Planetary Change*, 29, 259-273.
- [1.35] Bodri, L., Cermak, V. and Kukkonen, I.T., 2001. Climate change of the last 2000 years inferred from borehole temperatures: data from Finland. *Global and Planetary Change*, 29, 189-200.
- [1.36] Kukkonen, I.T., Suppala I., Sulkanen, A., Lindberg A., Hautojärvi, A., Raiko, H. ja Johansson, E., 2001. Investigations on thermal properties of rocks at test sites for final disposal of spent nuclear fuel in Finland. In: P. Särkkä and P. Eloranta (editors), *Rock mechanics - A Challenge for Society*, Proc. of the ISRM Regional Symposium EUROCK 2001, Espoo, Finland, June 4-7, 2001, A.A. Balkema, Svets & Zeitlinger B.V., Lisse, the Netherlands, pp. 757-762.
- [1.37] Kukkonen, I.T. and Lahtinen, R., 2001. Variation of radiogenic heat production rate in 2.8 - 1.8 Ga old rocks in the central Fennoscandian Shield. *Physics of the Earth and Planetary Interiors*, 126, 279-294.
- [1.38] Joeleht, A. and Kukkonen, I.T., 2002. Physical properties of Vendian to Devonian sedimentary rocks in Estonia. *GFF*, vol. 124, 65-72.
- [1.39] Kukkonen, I., 2002. Finland. In: S. Hurter and R. Haenel (editors), *European Commission, Atlas of Geothermal Resources in Europe*, pp. 29-30 + plates 18-19 with maps, European Commission, Luxembourg.
- [1.40] Jõelet, A., Kirsimäe, K., Shogenova, A., Šliaupa, S., Kukkonen, I.T., Rastenie, V. and Zabele, A., 2002. Thermal conductivity of Cambrian siliciclastic rocks from the Baltic Basin. *Proc. Estonian Acad. Sci. Geol.*, 51, 5-15.
- [1.41] Kukkonen, I.T. and Jõelet, 2003. Weichselian temperatures from geothermal heat flow data. *Journal of Geophysical Research*, 108 (B3), ETG-9, 11 p.
- [1.42] Kukkonen, I.T., Kinnunen, K. and Peltonen, P., 2003. Mantle xenoliths and thick lithosphere in the Fennoscandian Shield. *Phys. Chem. Earth*, 28, 349-360.
- [1.43] Brown, D., Carbonell, R., Kukkonen, I., Ayala, C and Golovanova, I., 2003. Composition of the Uralide crust from seismic velocity ( $V_p$ ,  $V_s$ ), heat flow, gravity and magnetic data. *Earth and Planetary Science Letters*, 210, 333-349.
- [1.44] M. Bruneton, H. A. Pedersen, P. Vacher, I. T. Kukkonen, N. T. Arndt, S. Funke, W. Friederich, V. Farra & the SVEKALAPKO Seismic Tomography Working Group, (2004). Layered lithospheric mantle in the central Baltic Shield from surface waves and xenoliths analysis. *Earth Planet. Sci. Lett.*, 226, 41-52
- [1.45] V.N. Glaznev, I.T. Kukkonen, A.B. Raevsky and J. Jokinen, 2004. Novye dannye o teplovom potoke v zentralnoy chasty Kolskogo Polyostrova. *Dokl. Acad. Nauk*, 396, 102-104 (in Russian).
- [1.46] Bruneton, M., Pedersen, H.A., Vacher, P., Kukkonen, I.T., Arndt, N.T., Funke, S., Friederich, W. and Farra, V., 2004. Layered lithospheric mantle in the central Baltic Shield from surface waves and xenolith analysis. *Earth and Planetary Science Letters*, 226, 41-52.
- [1.47] Mottaghy, D., Schellschmidt, R., Popov, Yu.A., Clauser, C., Kukkonen, I.T., Nover, G., Milanovsky, S., Romushkevich, R.A., 2005. New heat flow data from the immediate vicinity of the Kola super-deep borehole: Vertical variation in heat flow confirmed and attributed to advection. *Tectonophysics*, vol. 401, 119-142.
- [1.48] Kuusisto, M., Kukkonen, I.T., Heikkinen, P., Pesonen, L.J., 2006. Lithological interpretation of crustal composition in the Fennoscandian Shield with seismic velocity data. *Tectonophysics* 420, 283-299.

## 10.2 Papers (selected) in domestic publication series:

- [2.12] Kukkonen, I., Heikkinen, P., Ekdahl, E., Korja A., Hjelt, S.-E., Yliniemi, J., Berzin, R. and FIRE Working Group, 2002. Project FIRE: Deep Seismic Reflection Sounding in Finland 2001-2005. In: Lahtinen, A., Korja, A., Arhe, K., Eklund, O., Hjelt, S.-E. and Pesonen, L.J. (Eds), *Lithosphere 2002, A symposium on the Structure, Composition and Evolution of the Lithosphere in Finland*, Institute of Seismology, University of Helsinki, Rep. S-42, pp. 67-70.

- [2.13] Kukkonen, I.T., Heikkinen, P., Ekdahl, E., Hjelt, S.-E., Yliniemi, J., Jalkanen, E. and FIRE Working Group, 2006. Acquisition and geophysical characteristics of reflection seismic data on FIRE transects, Fennoscandian Shield. In: Kukkonen, I.T. and Lahtinen, R. (editors), Finnish Reflection Experiment 2001-2005. Geological Survey of Finland, Special Paper 43, pp. 13-43 +11 appendices.
- [2.14] Korja, A., Lahtinen, R., Heikkinen, P., Kukkonen, I.T. and FIRE Working Group, 2006. A geological interpretation of the upper crust along FIRE 1. In: Kukkonen, I.T. and Lahtinen, R. (editors), Finnish Reflection Experiment 2001-2005. Geological Survey of Finland, Special Paper 43, pp. 45-76 + 1 appendix.

### 10.3 Edited publications (selected)

- [6.2] Huenges, E., Kukkonen, I.T. and Urai, J. (Editors), 1998. Special issue on "Relationships between various physical properties in sedimentary and crystalline rocks". *Physics and Chemistry of the Earth*, vol. 23, No. 3.
- [6.3] Kukkonen, I.T. Cermak, V. and Kennett, B. (Editors), 2001. Special issue on "Thermal structure of the Earth's structure and Geodynamics". *Physics of the Earth and Planetary Interiors*, vol. 126, Nos 3-4.
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## CV - JOHN A. HOLE

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### Appointments

2002 – present Associate Professor, Department of Geosciences, Virginia Technical University  
1996 - 2002 Assistant Professor, Department of Geological Sciences, Virginia Technical University

### Professional Preparation

Stanford University Geophysics Postdoc 1993-1996  
U.S. Geological Survey, Menlo Park Geophysics Postdoc 1996-1996  
University of British Columbia Geophysics Ph.D. 1993  
Carleton University Honours Geology and Physics B.Sc. 1986

### Selected Publications

- Bleibinhaus, F., Lester, W. R., and **Hole**, J. A. (2007) Applying full waveform inversion to wideangle seismic surveys, *Tectonophysics*, submitted.
- Wu, J., **Hole**, J. A., Snoke, J. A., and Imhof, M. G., (2007) Depth extent of the fault zone wave guide: effects of increasing velocity with depth, *Geophys. J. Int.*, submitted, under revision.
- Bleibinhaus, F., **Hole**, J. A., Ryberg, T., and Fuis, G. S., 2007. Structure of the California Coast Ranges and San Andreas Fault at SAFOD from seismic waveform inversion and reflection imaging, *J. Geophys. Res.*, **112**, B06315, doi:10.1029/2006JB004611.
- Hole**, J. A., Ryberg, T., Fuis, G. S., Bleibinhaus, F., and Sharma, A. K., 2006. Structure of the San Andreas fault zone at SAFOD from a seismic refraction survey. *Geophys. Res. Lett.*, **33**, L07312, doi:10.1029/2005GL025194.
- Gettemy, G. L., Tobin, H. J., **Hole**, J. A., and Sayed, A. Y., 2004. Multi-scale compressional wave velocity structure of the San Gregorio Fault zone. *Geophys. Res. Lett.*, **31**, L06601, doi:10.1029/2003GL018826.
- Anderson, K. B., Spotila, J. A., and **Hole**, J. A., 2003. Application of geomorphic analysis and ground penetrating radar to characterization of paleoseismic sites in dynamic alluvial environments: An example from southern California. *Tectonophysics*, **368**, 25-32.
- Hole**, J. A., Catchings, R. D., St. Clair, K. C., Rymer, M. J., Okaya, D. A., and Carney, B. J., 2001. Steep-dip seismic imaging of the shallow San Andreas Fault near Parkfield. *Science*, **294**, 1513-1515.
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- Henstock, T. J., A. Levander, and J. A. **Hole**, 1997. Deformation in the lower crust of the San Andreas Fault system in northern California. *Science*, 278, 650-653.
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- Hole**, J. A., H. Thybo, and S. L. Klemperer, 1996. Seismic reflections from the near-vertical San Andreas Fault. *Geophys. Res. Lett.*, **23**, 237-240.
- Benz, H. M., B. A. Chouet, P. B. Dawson, J. C. Lahr, R. A. Page, and J. A. **Hole**, 1996. Three-dimensional P and S wave velocity structure of Redoubt volcano, Alaska. *J. Geophys. Res.*, **101**, 8111-8128.
- Hole**, J. A., and B. C. Zelt, 1995. 3-D finite-difference reflection traveltimes. *Geophys. J. Int.*, **121**, 427-434.
- Brocher, T. M., J. McCarthy, P. E. Hart, W. S. Holbrook, K. P. Furlong, T. V. McEvilly, J. A. **Hole**, and S. L. Klemperer, 1994. Seismic evidence for a lower-crustal detachment beneath San Francisco Bay, California. *Science*, **265**, 1436-1439.
- Hole**, J. A., R. M. Clowes, and R. M. Ellis, 1993. Interpretation of three-dimensional seismic refraction data from western Hecate Strait, British Columbia: Structure of the Queen Charlotte Basin. *Can. J. Earth Sci.*, **30**, 1427-1439.
- Hole**, J. A., 1992. Nonlinear high-resolution three-dimensional seismic travel time tomography. *J. Geophys. Res.*, **97**, 6553-6562.
- Hole**, J. A., R. M. Clowes, and R. M. Ellis, 1992. Interface inversion using broadside seismic refraction data and three-dimensional travel time calculations. *J. Geophys. Res.*, **97**, 3417-3429.

### **Synergistic Activities**

- Computer software for the analysis and inversion of three-dimensional seismic travel time data has been requested by and distributed to scientists at *132 institutions* (university, government and industry) in *30 countries*.
- 2003-2006 Member IRIS-PASSCAL Steering Committee
- 2006-present Member of IRIS Data Management System Steering Committee, IRIS: Incorporated Research Institutions for Seismology – national academic consortium
- 2003: Co-Host: 12th International Workshop on Deep Seismic Methods sponsored by U.S. National Science Foundation and the IUGG Commission on Controlled-Source Seismology (now the Working Group on Seismic Imaging of the Lithosphere)
- 3-day workshop on techniques for analysis of deep seismic data; >30 participants from around the world
- Fellow, Geological Society of America

### **Recent/Pending Field Efforts (past 5 years)**

- 2008 Coast Mountains batholith of British Columbia, Canada; crustal refraction
- 2004 Kimballton Mine, Appalachians of Virginia, USA; upper-crustal reflection
- 2004 Chesapeake Bay impact crater, Virginia, USA; upper-crustal refraction and reflection
- 2003 San Andreas Fault, California, USA; crustal refraction and reflection.

## CV - Gary S. Fuis

### **Dr. Gary S. Fuis**

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**BORN:** February 29, 1944, at Oak Ridge, Tennessee, USA

### **EDUCATION:**

B.A. (Geology), Cornell University, 1966  
Ph.D. (Geology and Geophysics), California Institute of Technology, 1974

### **POSITIONS HELD:**

Geologist, U.S. Geological Survey, Pasadena CA and Flagstaff AZ, 1966-1974  
Geophysicist (Scientist-In-Charge, Southern California Seismic Network), U.S. Geological Survey, Pasadena CA, 1974-1978  
Geophysicist, U.S. Geological Survey, Menlo Park CA, 1978-present

### **GEOLOGICAL/GEOPHYSICAL CONTRIBUTIONS:**

- (1) Geological map and mathematical model of deformation for Fort Rock dome, Yavapai County AZ (Ph.D. thesis)
- (2) Expansion and development of Southern California Seismic Network, in cooperation with the California Institute of Technology (~70 stations added)
- (3) Seismic imaging, using refraction and reflection techniques, and geologic/tectonic interpretation of a number of continental transects, including (a) one in the Imperial Valley region, California, (b) one in northeastern California, (c) the Trans Alaska Crustal Transect (TACT), (d) the Pacific-Arizona Crustal Experiment (PACE), and (e) the Los Angeles Region Seismic Experiment (LARSE)

### **SELECTED PUBLICATIONS:**

- Fuis, G. S., Mooney, W. D., Healy, J. H., McMechan, G. A., and Lutter, W. J. (1982). Crustal structure of Imperial Valley region, *in* The Imperial Valley Earthquake of October 15, 1979, U.S. Geological Survey Professional Paper 1254, 25-49.
- Fuis, G. S., Mooney, W. D., Healy, J. H., McMechan, G. A., and Lutter, W. J. (1984). A seismic refraction survey of the Imperial Valley region, California, *Journal of Geophysical Research*, 89, 1165-1189.
- Fuis, G. S., Zucca, J. J., Mooney, W. D., and Milkereit, B. (1987). A geologic interpretation of seismic-refraction results in northeastern California, *Geological Society of America Bulletin*, 98, 53-65.
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- McCarthy, J., Larkin, S. P., Fuis, G.S., Simpson, R. W., and Howard, K.A. (1991). Anatomy of a metamorphic core complex: seismic refraction/wide-angle reflection profiling in southeastern California and western Arizona, *Journal of Geophysical Research*, 96, 12,259-12,292.
- Fuis, G. S., and Clowes, R. M. (1993). Comparison of deep structure along three transects of the western North American continental margin, *Tectonics*, 12, 1420-1435.
- Fuis, G.S., Levander, A.R., Lutter, W.J., Wissinger, E.S., Moore, T.E., and Christensen, N.I. (1995). Seismic images of the Brooks Range, Arctic Alaska, reveal crustal-scale duplexing, *Geology*, 23, 65-68.
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- Fuis, G.S., Murphy, J.M., Lutter, W.J., Moore, T.E., Bird, K.J., and Christensen, N.I. (1996). Deep seismic structure and tectonics of northern Alaska: crustal-scale duplexing with deformation extending into the upper mantle, *Journal of Geophysical Research*, 102, 20,873-20,896.
- Fuis, G.S. (1998). West margin of North America--a synthesis of recent seismic transects, *Tectonophysics*, 288, 265-292.
- Fuis, G.S., Ryberg, T., Godfrey, N.J., Okaya, D.A., and Murphy, J.M., Crustal structure and tectonics from the Los Angeles basin to the Mojave Desert, southern California, *Geology* (in press).