

Draft Proposal for a new ILP Task Force

Lithosphere structure and mineral resources

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Objectives and scientific rationale

Geological, geodynamic and tectonic processes that define and control the lithosphere structure and evolution are closely related to deposition of minerals, many of which occur only in specific lithospheric settings. Recent technological shifts and the depletion of mineral resources put pressure on the mineral exploration industry which is experiencing a boom in activity over the past decade. This boom is also associated with breakthroughs in mineral exploration which build on new fundamental results in geophysics, geochemistry, and geodynamics.

Significant efforts are being put forward internationally and nationally, e.g. at the scales of national geological surveys, to bridge mineral exploration and the academic community. However, the results of the academic research are not used at full by the mining industry. On the other side, a significant part of the fundamental research does not target practical application of the results by the mineral exploration community and the step between the academic result and its possible application is often missing.

The objective of the proposed ILP Task Force is to provide a new framework for mineral exploration targeting. This requires detailed knowledge on the lithosphere-scale structure, including detailed knowledge of the crust, together with the improved and enhanced understanding of the impact of various plate tectonics and mantle dynamics processes on the lithosphere composition and architecture.

The scientific goals of the proposed ILP Task Force are to recognize:

- the links between deep processes and shallow structures, including the structure of the lithospheric mantle and the crust;
- the links between the lithosphere evolution, ore-forming processes and the origin of different mineral deposits;
- the links between deep mantle processes, including LIPs, lithosphere modification, and mineral deposits;
- the links between lithosphere modification by plate tectonic processes and mineral deposits;
- the effects of large-scale impacts on the lithosphere structure and formation of unique mineral deposits;
- the links between the unique mineral deposits, crustal and mantle processes and geodynamics;
- the role of secular cooling of the Earth's interior on formation of unique mineral deposits.

The goal of the proposed TF fits the mission of the ILP in:

- addressing the connections between the deep Earth ore-forming processes, lithosphere structure and mineral deposits at the near-surface;
- building on interdisciplinary research which includes collaboration between geology, geophysics and geochemistry;
- building on the integration of geophysical imaging of the crustal and upper mantle structure with tectonic reconstruction of processes that form and modify the lithosphere and with geodynamic modeling of these processes.

The proposed TF also addresses the ILP challenges in:

- strengthening the impact of the lithosphere research by focusing on the hot topic of the societal needs – the depletion in known mineral resources and the growing societal needs in exploration of new mineral resources, especially REEs;
- promoting training of young researchers in the field which in high demand by the society.

Work groups

The proposed ILP Task Force will focus primarily on magmatic ore deposits on continents, which are mostly associated with large igneous provinces, continental collisional orogens, Precambrian cratons, and paleo-subduction systems. Other tectonic settings, such as the Arctic shelf, may also be included as a sub-task of the new Task Force. Therefore, it is logical to structure the Task Force by different tectonic settings and the associated ore-forming processes.

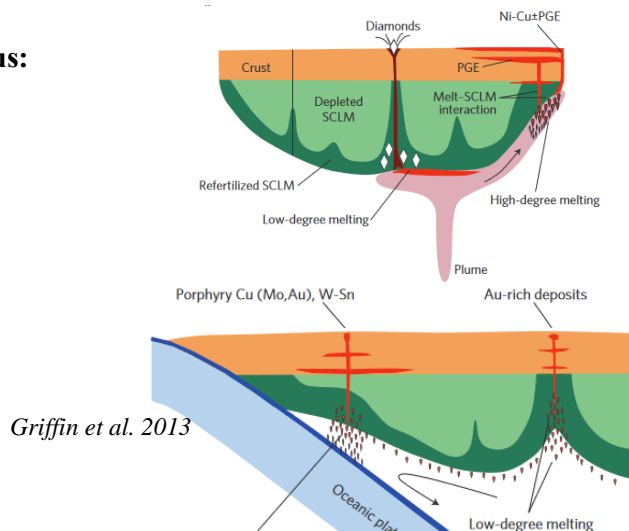
We anticipate that the following work groups may be formed around the target tectonic settings:

- magmatic ore deposits on the cratons;
- mineral deposits of the Central Asia orogenic belt and the Tethysides;
- magmatic ore deposits associated with large igneous provinces;
- mineral deposits associated with subduction systems;
- mineral deposits of the Arctic region.

These groups will work in close interaction and collaboration to keep the integrity of the Task Force and to benefit from expertise and knowledge of all team members.

Major types of ore deposits to be in focus:

- Chromite deposits
- Platinum Group Metals
- Cu-Fe-Ni sulfides
- Fe-Ti oxides
- Diamonds in kimberlites
- REEs in carbonatites
- Gold and uranium deposits



Methodology

Understanding of lithosphere structure and evolution since its formation in Achaean to modern active tectonic processes requires a detailed knowledge on its properties. Geological data are available only for the uppermost parts of the lithosphere, exposed at the near-surface, and are largely unavailable for many remote regions, especially of the southern hemisphere, due to various climatic and political reasons. This necessitates the use of geological information together with remote geophysical surveys, geochemical and petrological studies to constrain high-resolution models of the structure and physical properties of the crust and lithospheric mantle. The latter are reflected in lateral and vertical variations of different physical parameters, which (among other factors) strongly depend on pressure, temperature, composition, and physical state of the matter. It necessitates a joint interpretation of the entire set of data which is provided by different techniques used in Earth sciences.

Research will include the continuation of regular academic activities by the Task Force participants, which will be adjusted and channeled to target questions of joint interest within the overall objective of the Task Force.

Magmatic ore deposits are formed during crystallization of a magma. They are linked to magmatic processes associated with either plate tectonic settings (collisional orogens and subduction systems), or with mantle hotspots and plumes (large igneous provinces); some may also be associated with large-scale impacts that cause intensive lithosphere heating and melting. All these processes create and modify the structure and composition of the crust and the lithosphere mantle, and therefore can be recognized by high-resolution geophysical models. Geological data combined with geochemical studies provides constraints on geodynamic processes responsible for formation and deposition of ore deposits. These processes can be tested by numerical modeling which provides important constraints on the details of magmatic processes and their impact on the lithosphere structure and composition.

Methods include (but not limited to):

- Regional geology and tectonics;
- Seismic surveys for the crustal and upper mantle structure;
- Potential field modeling (gravity and magnetics);
- Heat flow and thermal modeling;
- Petrological and geochemical studies;
- Paleo-tectonics;
- Laboratory measurements of rock properties;
- Numerical modelling.

External collaboration

The proposed ILP Task Force will foster collaboration between the academia and the mining industry.

- Many of the proposed participants have a long-term expertise in close collaboration with the exploration industry. This also includes all 3 proponents of the TF. Their expertise will be used to foster and broaden this collaboration to include all TF participants.
- The proposed participants include 2 persons employed in the exploration industry. This will facilitate the interaction with the industry partners, especially at the start of the TF.
- We anticipate close collaboration with national geological surveys, especially in China and Russia, to benefit from their expertise in linking the academic knowledge and exploration targets.
- We also anticipate close collaboration with other international projects, such as IGCP 662 (2018-2023) “Orogenic Architecture and Crustal Growth from Accretion to Collision”

Collaboration within ILP

Several presently active ILP Task Forces focus on problems directly related to formation of mineral resources, and collaboration with them will be mutually beneficial.

- TF II has focus directly related to the formation of magmatic ore deposits by magma migration through the lithosphere;
- TF IV with focus on the fate of subducted continental lithosphere is only marginally related to the focus of the proposed new TF, however collaboration with this TF may be useful for understanding mineralization in subduction, especially paleo-subduction settings;
- TF IX has focus closer linked to formation of magmatic ore deposits at the subduction settings and collaboration with this TF will be useful;
- TF VI targets sedimentary basins, some of them may be formed by plume-lithosphere interaction and therefore may have magmatic ore deposits buried under the sedimentary cover; collaboration with this TF may be useful;
- TF VIII may provide useful information on numerical modeling of mantle and plate tectonics processes which may lead to ore formation.

We therefore anticipate close collaboration with several active Task Forces.

Task Force activities

We plan to organize the activities around different types of meetings.

1. Annual workshops limited to 50-80 participants with the main objectives:

- to foster the development of interdisciplinary and international collaborations,
- to facilitate cross-disciplinary discussions at all levels;
- to facilitate the integration of young researchers into high-level scientific collaborations.

The first workshop will focus on state-of-the art developments in our understanding of the links between the deep mantle and lithosphere processes, impacts and mineral deposits.

Through a series of keynote presentations from senior and junior researchers on geophysics, geochemistry, and geology, and through discussion forums we aim to

- (1) identify the hot topics,
- (2) promote multi-disciplinary collaborations,
- (3) expose young scientists and industry specialists to the wider research.

2. Meetings of workgroups (limited to 10-15 participants).

These workgroups will be a natural outcome from the workshops.

The goal of these meetings is to discuss collaboration on specific hot topics.

3. Small workshops with potential industry partners.

These workgroups will be a natural outcome from the projects and we will target to have several of them annually.

4. Thematic symposia associated with large meetings, like AGU, EGU, GSA, CGU with the aim to present the project results to a larger audience in the Earth Sciences community.

5. Thematic symposia at industry-targeted meetings, like:

- International Mineral Processing Congress (IMPC);
- World Mining Congress (WMC);
- European Mineral Processing and Recycling Congress (EMPRC),
- China Mining Congress(CMC)

with the aim to present the project results to a broad audience in mineral exploration.

6. Field trips to typical mines, unique deposits, and orogenic belts during the workshops and the meetings. The aim of this activity is to focus on relations of mineral deposit and special geological process and to establish and promote collaboration between different participants and between the academic research and the industry.

7. Joint workshops with other ILP Task Forces.

Several presently active ILP Task Forces focus on problems directly related to formation of mineral resources, and collaboration with them will be mutually beneficial.

Potential key collaborators

(organized by the area of expertise)

Name	Country	Affiliation	email	Expertise
Prof. Victoria Pease	Sweden	Stockholm univ.	vicky.pease@geo.su.se	Arctic geology
Prof. Changqian Ma	China	CUG, Wuhan	cqma@cug.edu.cn	Geochemistry
Prof. Yigang Xu	China	Guangzhou Institute of Geochemistry	yigangxu@gig.ac	Geochemistry
Prof. Bill Griffin	Australia	Macquarie University	griffin@mq.edu.au	Geochemistry, magmatic ore deposits
Prof. Suzanne O'Reilly	Australia	Macquarie University	oreilly@mq.edu.au	Geochemistry, magmatic ore deposits
Prof. Rais Latypov	South Africa	Uni. of Witwatersrand	Rais.Latypov@wits.ac.za	Geochemistry, magmatic ore deposits
Prof. Maya Kopylova	Canada	Univ. British Columbia	mkopylov@nexus.eos.ubc.ca	Geochemistry, diamond exploration
Prof. Nick Arndt	France	Université Grenoble Alpes	arndt@ujf-grenoble.fr	Geochemistry, magmatic ore deposits
Dr. Joao Duarte	Portugal	Univ. Lisbon	jdduarte@ciencias.ulisboa.pt	Geodynamics
Dr. Dmitriy Alexeiev	Russia	Geological Inst., Moscow	@ginras.ru, dvalexiev@yandex.ru	Geology, Central Asia orogenic belt
Dr. Inna Safonova	Russia	Novosibirsk State Univ.	inna03-64@mail.ru	Geology, Central Asia orogenic belt
Prof. Carol Stein	USA	Univ. Chicago	c-stein@northwestern.edu	Geology, geophysics
Prof. Tao Wang	China	Inst. Geology, CAGS	taowang@cags.net.cn	Geology, granitoids of Central Asia
Prof. Zengqiang Hou	China	Inst. Geology, CAGS, Beijing	Houzengqian@126.com	Geology, granitoids of Central Asia
Prof. Morten Smerlor	Norway	NGU, Trondheim	morten.smelror@ngu.no	Geology, Mineral exploration
Prof. Oleg Petrov	Russia	VSEGEI, St. Petersburg	vsegei@vsegei.ru	Geology, Mineral exploration
Prof. Peter Cawood	Australia	Monash University	peter.cawood@monash.edu	Geology, orogenies
Prof. Celal Sengör	Turkey	ITU, Istanbul	sengor@itu.edu.tr	Geology, tectonics
Prof. Boris Natal'in	Turkey	ITU, Istanbul	natalin@itu.edu.tr	Geology, tectonics
Prof. Anatoly Nikishin	Russia	Moscow State Univ.	amnikishin@gmail.com	Geology, tectonics
Dr. G. Skridlaite	Lithuania	IGG, Vilnius	grazina@geologin.lt	Geology, tectonics
Dr. Bing Xia	China	IGG, Beijing	bingxia0127@gmail.com	Geophysics, geology
Prof. Sergey Kashubin	Russia	VSEGEI, St. Petersburg	Sergey_Kashubin@vsegei.ru	Geophysics, geology
Prof. Simon Klempner	USA	Stanford univ.	sklemp@stanford.edu	Geophysics/seismology
Prof. Abdolreza Ghods	Iran	IASBS, Zanjan	aghods@iasbs.ac.ir	Gravity and magnetic modeling
Prof. Sue Webb	South Africa	Uni. of Witwatersrand	Susan.Webb@wits.ac.za	Gravity modeling
Dr. Mikhail Kaban	Germany	GFZ	kaban@gfz-potsdam.de	Gravity modeling

Prof. Carla Braitenberg	Italy	Univ. Trieste	berg@units.it	Gravity modeling
Prof. Qin Wang	China	Nanjing Univ.	w_wang123@126.com	High P-T metamorphism
Prof. Hemin Koyi	Sweden	Uppsala Univ.	Hemin.Koyi@geo.uu.se	Lab. measurements of rock properties
Prof. Shun Karato	USA	Yale Univ.	shun-ichiro.karato@yale.edu	Lab. measurements of rock properties, Rheology
Dr. Graham Begg	Australia	Minerals Targeting International	graham@mineralstargeting.com	Mineral exploration
Dr. Yulia Cherepanova	U.K.	Wardell Armstrong International	yulia.v.cherepanova@gmail.com	Mineral exploration
Dr. Sergei Medvedev	Norway	Univ. Oslo	sergei.medvedev@fys.uio.no	Numerical modeling
Haibin Yang	Australia	Monash University	yanghaibin3589@gmail.com	Numerical modeling
Prof. Franco Pirajno	Australia	Univ. Western Australia, Perth	pirajno@uwa.edu.au, franco.pirajno39@gmail.com	Ore Deposits
Prof. Lewis Ashwal	South Africa	Uni. of Witwatersrand	Lewis.Ashwal@wits.ac.za	Precambrian geology
Prof. Tim Kusky	China	CUG, Wuhan	tkusky@gmail.com	Precambrian geology
Prof. Sergei Lebedev	Ireland	DIAS, Dublin	sergei@cp.dias.ie	Seismology
Dr. Andrew Schaeffer	Canada	Geological Survey of Canada	andrew.schaeffer@canada.ca	Seismology
Prof. Ivan Koulakov	Russia	IGGP, Novosibirsk	ivan.science@gmail.com	Seismology
Dr. Alexey Shulgin	Norway	Univ. Oslo	alexey.shulgin@geo.uio.no	Seismology, gravity
Prof. Vitaly Starostenko	Ukraine	Institute of Geophysics, Kiev	vstar@igph.kiev.ua	Seismology, gravity
Prof. Seth Stein	USA	Northwestern Univ.	seth@earth.northwestern.edu	Stress, deformation
Prof. Yener Eyuboglu	Turkey	KTU, Trabzon	yenereyuboglu@gmail.com	Structural geology

Potential partner organizations

Various mining companies;
International Minerals Processing Council (IMPC);
Chinese Academy of Geological Sciences (CAGS);
National geological surveys (e.g. VSEGEI)

References

- Arndt N., Ganino C., 2011. Magmatic Ore Deposits. In: Metals and Society, 43-72, vol 2. Springer,
Griffin, W.L., Begg, G.C. and O'Reilly, S.Y. 2013. Continental-root control on the genesis of
magmatic ore deposits. Nature Geoscience, 6, 905-910.
Jingwen M, C Yanbo, C Maohong, F Pirajno, 2013. Major types and time–space distribution of Mesozoic
ore deposits in South China and their geodynamic settings. Miner Deposita 48: 267–294
Ridley J., 2013. Ore Deposit Geology. Cambridge: Cambridge University Press.

Present position:

Professor of Geophysics
 Department of Geosciences and Natural Resources Management (IGN)
 University of Copenhagen, Denmark
 Phone: +45-3532 2473; +45-5088 2438
 E-mail: irina@ign.ku.dk; iartemieva@gmail.com

**Education:**

2007 Habilitation (dr. scient.), University of Copenhagen, Denmark
 1987 PhD in Geophysics; Inst. Physics of the Earth, Moscow, USSR
 1984 BS & MS in Physics, Physics Department, M.V. Lomonosov Moscow State University, Moscow

Employment:

Since 2005 Professor, before that Associate Professor, IGG/IGN, University of Copenhagen, Denmark
 2003-2004 Senior Researcher, U.S. Geological Survey, Menlo Park, CA, USA;
 2002 Ass. Research Professor, EOST, l'Universite Strasbourg, France;
 1999-2001 Associate Research Professor, Uppsala University, Sweden;
 1997-1999 Leading Research Scientist, Inst. of Physics of the Earth (IPE), Russian Acad. Sciences, Moscow;
 1987-1997 Junior, then Senior Research Scientist, IPE, USSR Academy of Sciences, Moscow

Professional long-term visits:

1995-2002 Visiting researcher, U.S. Geological Survey, Menlo Park, CA, USA (the total exceeds 3 years);
 1998 Visiting researcher, Institut de Physique du Globe, Paris, France;
 1998 Visiting researcher, University of Quebec at Montreal, Canada;
 1993 Visiting researcher, Technical University, Clausthal-Zellerfeld, Germany;

Honors and Professional recognitions:

2018 International Eurasian Academy of Sciences (elected Member)
 2016 AcademiaNet of Outstanding Female Academics (nominated by Danish Research Council)
 2014 Royal Danish Academy of Science and Letters (elected Member)
 2013 Life-Time Member, European Geosciences Union
 2012 Fellow, Geological Society of America
 2007 European Academy of Sciences "Academia Europaea" (elected Member)
 2000 Fellow, Royal Astronomical Society, London

International professional advisory boards and councils:

2018 Evaluation Panel, 7 Research Institutions in Earth, Atmospheric Sciences and Climate Change, FCT, Portugal
 2018 Chair, Re-accreditation Panel, Faculty of Mining, Geology and Petroleum Engineering, Zagreb University, Croatia
 2018 Chair, Re-accreditation Panel, Faculty of Geotechnical Engineering, Zagreb University
 2018 Member, Re-accreditation Panel, Faculty of Geodesy, Zagreb University, Croatia
 2018- I International Science Council (former ICSU), Denmark, Executive Committee Member
 2017- Arthur Holmes Medal Committee Member, European Geosciences Union
 2016- President, Danish National Committee for Lithosphere Research
 2013-2017 Council member, European Geosciences Union (ca. 15,000 participants)
 2013-2017 Programme Committee member, European Geosciences Union
 2013-2017 President Geodynamics, European Geosciences Union
 Since 2010 Official nominator for the Japan Prize
 2008-2017 EU "European Plate Observing System" (EPOS), Danish co-representative
 1999-2001 Science Coordinator, European Science Foundation program EUROPROBE

International professional panels of national funding agencies:

2108- Portuguese National Foundation for Science and Technology (FCT), Panel in Geosciences
 2013-2015 l'Institut Universitaire de France (IUF), France, Assessment committee;
 2014 l'Institut Universitaire de France (IUF), France, Chairperson, Humanities and Sciences Assessment Committees for Young (<45 y.) Professors;
 2012-2015 Portuguese National Foundation for Science and Technology (FCT), Portugal, Panel member in Geosciences

- 2006-2011 Swedish National Research Council (VR), Sweden, Vice-chairperson (2007-2009), Panel member in Geosciences
- 2002-2003 Irish National Basic Research Council, Ireland, Panel member in Earth Sciences

International professional evaluations:

- Crafoord Prize (Nobel Prize equivalent in geosciences), Royal Swedish Academy of Sciences
- National Science Foundation of the Netherlands
- National Science Foundation of Czech Republic
- Polish Academy of Sciences
- Deutsche Forschungsgemeinschaft (DFG), Germany
- The Knut and Alice Wallenberg Foundation, Sweden
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Russian Foundation for Basic Research (RFFI)
- Russian Ministry of Science, Mega-grants
- NSF and EarthScope (USA), external evaluator in Geophysics and Continental Dynamics
- INTAS International Program Research Grant Assessment

Professor and PhD Assessment committees:

USA, Rutgers Univ., Assessment of Full Professor in Geophysics
 Canada Research Chairs Program, Assessment of Full and Associate Professor Chairs in Geophysics
 Swedish National Research Council, Selection for Professor Position in Geophysics
 PhD defense committees (Denmark, Sweden, Italy)

Editorial activities:

2016- Editor-in-Chief, *Journal of Geodynamics (Elsevier)*
 2016- Editorial Advisory Committee, *Journal of Indian Geophysical Union*
 2014- Associate editor, *Nature Scientific Reports (Nature Publishing Group)*
 2014- Associate editor, *J. Geophysical Research (RAS)*
 2010-2017 Associate editor, *Solid Earth (European Geosciences Union)*
 2006- Associate editor, *Tectonophysics (Elsevier)*
 1999-2009 Associate editor, *Journal of Geodynamics (Elsevier)*
 Guest editor of 4 special issues of *Tectonophysics* (2002, 2011, 2013, 2014)
 Reviewer for ca. 15 leading international peer-reviewed journals including *Nature Geosciences*.

Professional activities (organizational):

2006-2008 Science program coordinator in Solid Earth Geophysics, 33 Intern. Geological Congress, Oslo.
 1999-2001 Organizer and Science program coordinator of ca. 20 ESF-ILP EUROPROBE workshops (each with 80-250 participants) and scientific steering meetings;
 1994-present Convener and co-convener of >50 symposia at the leading international conferences, including EGU, EGS, GSA, AGU, IGC, IASPEI, etc.

EXTERNAL FUNDING:

2016-2017 Co-PI, Nordic-Russian Cooperation Programme in Education and Research NCM-RU-2016/10057 "IAS-Integrated Arctic Studies Network"
 2014-2016 PI, PhD study grants, University of Copenhagen (1.6 mln. dkk)
 2014-2018 PI, research grant, Danish Research Council, Denmark (~8.6 mln. dkk); success rate 10%
 2011-2013 PI, research grant, Danish Research Council, Denmark (~6.2 mln. kr.); success rate 10%
 2010-2011 PI, personal 2-year research Freia grant, University of Copenhagen (~1.9 mln. kr.) (1 of 6 funded in all Natural Sciences);
 2010-2018 PI and co-PI, International PhD-Elite courses, University of Copenhagen (total ~0.7 mln dkk);
 2007-2009 PI, personal 3-year research grant, Carlsbergfondet, Denmark (~1.7 mln. kr.); success <10%
 2005-2006 PI, personal 2-year research grant, Carlsbergfondet, Denmark (~1.1 mln. kr.); success <10%
 Since 1997 PI, several personal large-scale research grants from the world-leading companies in the diamond-exploration industry
 1991-1996 Co-PI, several research grants from the oil-exploration companies (Shell, Schlumberger)

Participation in international research programs:

- 2015-2020 UNESCO IGCP-648 “Supercontinent Cycles and Global Geodynamics”
 2016-2017 Nordic-Russian Cooperation Programme in Education and Research
 2014- International Continental Drilling Programme (ICDP), “A Bushveld Scientific Drilling Project” (South Africa) Working Group
 2012- Scan-Array seismic network of the Nordic Countries, UK and Germany
 2012- NSF (USA)-CIDER Programme “Collaborative Institute for Deep Earth Research”
 2011- NSF (USA) -GeoPRISMS Programme “Geodynamic Processes at Rifting and Subducting Margins”, www.geoprisms.org
 2009-2014 ESF-EuroCORES programme “Topo-Scandes”
 2008-2017 European Plate Observing System (EPOS), Danish co-representative, <http://www.epos-eu.org/>
 2008-2010 NSF (USA)-Margins Programme “Evolution of continental margins”, <http://www.nsf-margins.org/>

Invited lectures:

ca. 50 at international symposia, including invited talks at AGU (4), GSA, EGU (3), IGC, IUGG
 ca. 50 in the leading research centers in USA, Canada, Germany, Sweden, Switzerland, Austria, China, Japan

Supervision since 2011:

>30 BS (incl. the best BS thesis at KU in 2018), 15 MS, 8 PhDs*, 7 postdocs*, 2 adjuncks*
 *(Co)Funded from my grants

Teaching since 2011:

Developed (and teach) several new courses in geophysics in University of Copenhagen, including:

- “Lithosphere structure from geophysical data” (MS level);
- “Solid Earth geophysics” (MS level);
- “Unresolved problems in Solid Earth geophysics” (MS level);
- “Global tectonics” (BS level);
- “Introduction to Solid Earth geophysics” (BS level)

Co-organized 10 International PhD Elite courses in Geophysics with the world-leading invited lecturers.

Publications metrics (01/2019):

<https://scholar.google.com/citations?user=ToY84sUAAAAAJ&hl=en>

Number of citations: >3000 since 2001; >1600 since 2014

Average citation per item (WoS) – 45;

Most publications are first-authored;

Selected publications:**Books:**

1. Artemieva I.M., 2011. “The lithosphere: An interdisciplinary approach”. *Cambridge University Press Monograph*, 794 pp., ISBN 9780521843966.
2. Thybo H., Artemieva I.M., Kennett B. (Eds.), 2013. *Moho: 100 years after Andrija Mohorovičić*. Elsevier, 743 pp.

Highly cited journal articles:

3. Artemieva I.M. and Mooney W.D., 2001. Thermal structure and evolution of Precambrian lithosphere: A global study. *J. Geophys. Res.*, 106, 16387-16414 (700 citations)
4. Artemieva I.M., 2006. Global 1°x1° thermal model TC1 for the continental lithosphere: implications for lithosphere secular evolution. *Tectonophys.*, 416, 245-277. (330 citations)
5. Artemieva I.M., 2009. The continental lithosphere: Reconciling thermal, seismic, and petrologic data. *Lithos*, 109, 23-46 (200 citations)
6. Artemieva I.M., Thybo H., and Kaban M.K., 2006. Deep Europe today: Geophysical synthesis of the upper mantle structure and lithospheric processes. In: D. Gee and R. Stephenson (Eds.), *European Lithosphere Dynamics. Geol. Soc. London. Mem. v. 32*, 11-41 (130 citations)
7. Artemieva I.M. and Thybo H., 2013. EUNaseis: a seismic model for Moho and crustal structure in Europe, Greenland, and the North Atlantic region. *Tectonophys.*, 609, 97-153 (80 citations)
8. Thybo H. and Artemieva I.M., 2013. Moho and magmatic underplating in continental lithosphere. *Tectonophys.*, 609, 605-619 (150 citations)

CV, Professor Dr. SHUWEN DONG

Current positions:

Professor, Nanjing University, China
PI, Sinoprobe Center of Chinese Academy of Geological Sciences (CAGS)

Education:

1981: Chinese Academy of Geological Sciences, Geology and Geomechanics, M.S.
1988: Chinese Academy of Geological Sciences, Tectonics, PhD.
1989: Visting Scholar in Bruchwarge Tech. University, Germany.

Current and most recent positions held:

1999-2016: Professor, Chinese Academy of Geological Science
1998-1999: Professor and Director-General, Institute of Geomechanics, CAGS
1995-1997: Deputy Director, Nanjing Institute of Geology and Mineral Resources, CAGS
1989-1994: Senior Geologist, Institute of Geology, Anhui Province

Academic awards and honours (selected):

2010: Award of National Field Investigation
2011: Academician of the Erfut Academy of Germany
2012: First Class Award of Scientific and Technology on Land and Resources of China
2013: Honorary Fellow of Geological Society of America
2016: The Russian Federation, Friendship Award
2016: Second Class Award of national Scientific and Technology of China
Vice President, Chinese Academy of Geological Science

Management experience

PI (2008-present), SINOPROBE - Chinese National Programme in Geosciences (funding ca 40 bln. yuan);
PI of numerous geophysical and geological programs in China

International relations

Treasurer, International Union of Geological Sciences (2012-2016)
Member of Scientific Board of International Geosciences Program (IGCP) of UNESCO/IUGS (2004-2010)
Secretary General of China National Committee for IGCP (since 1999)
Foreign Affiliate of the Incorporated Research Institutions for Seismology (IRIS, since 2005)

Scientific focus areas

Geology, tectonics, seismology

Supervision of students (PhD students and postdocs): numerous

Publication metrics: publications listed on Web of Science (WoS): 118; total number >200;
Citations (WoS): ca. 3000 citations; h-index = 24;
2 papers in the *Nature* Group journals

CV, Dr. RICHARD ERNST

Current positions:

Adjunct Professor, Dept. Earth Sciences, Carleton University, Ottawa, Canada
Professor, Founder and Leader of Geochemical LA-ICPMS Lab
Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia
Consultant, Ernst Geosciences, Ottawa, Canada

Education:

PhD in Earth Sciences, Carleton University (1989);
MSc in Geology, University of Toronto (1981);
BA hon. in Earth Sciences, Wesleyan University (1978)

Most recent positions held:

2014-present Part-time prof. at Tomsk State University, Tomsk, Siberia.
2009-present Leader of Industry Consortium Project (www.supercontinent.org).
2005-2008 Contract with BHP Billiton, to produce Large Igneous Province database.
2005-present Ernst Geosciences (consultant).
2004-present Adjunct Professor, Department of Earth Sciences, Carleton University.

Management experience:

2003 - Co-leader of the Large Igneous Provinces (LIPs) Commission of IAVCEI
(International Association of Volcanology and Chemistry of the Earth's Interior).
2009 - Launch of a consortium of industry sponsors contributing 1.5 million dollars toward
using the LIP's (Large Igneous Provinces) record to reconstruct supercontinents back
through time.

Most Relevant Research Funding as Lead Applicant (PI):

4.3 mln. USD since 2009, from:

Russian Ministry of Science and Education, 2017 (1.9 mln. USD),
NSERC Discovery Grant, 2014 (Research council of Canada) (145K USD),
NSERC CRD (Research council of Canada) (687K USD and 78K USD),
Industry Consortium (1.5 mln. USD),
Geological Survey of Canada.

International relationships:

Leader of the LIPs Commission of IAVCEI www.largeigneousprovinces.org, 2003-present).
Associate Editor "Geological Society of America Bulletin" (2007-present).
Associate Editor "Russian Geology and Geophysics" (2015-present).
Associate Editor "Geodynamics & Tectonics" (2013- present).

Scientific focus areas: Geology, magmatism, continental evolution, mineral exploration

Supervision of students: 13 PhD students, 14 MS students, 14 BS students.

Publication metrics: A total of 149 peer reviewed publications; 143 industry report; Research
Monograph with Cambridge University Press, 'Large Igneous Provinces', 653 pp, 2014.
Citations (Google Scholar): >9,500 in total, h-index =45, i10 index =114.