

CURRICULUM VITAE

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PRESENT POSITIONS

- Senior Research Fellow, Geophysikalisches Institut, Universität Karlsruhe, GERMANY (since 2003)
- Professor (part time), Institut de Physique du Globe de Paris, FRANCE (since 2005)
- Chief Scientist (since 2008), Head of Section “Computational Geodynamics” (since 2004), and Research Professor (since 1998), International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences, Moscow, RUSSIA
- Co-Leader of Research Group “Numerical Methods in Geophysics”, Institute of Mathematics and Mechanics, Russian Academy of Sciences, Ekaterinburg, RUSSIA (since 1999)
- Visiting Lecturer and Senior Scientist, Abdus Salam International Centre for Theoretical Physics, Trieste, ITALY (since 1994)

PERSONAL DATA

Born: 28 September 1961; Baku, Azerbaijan, married, one son.

Languages: Azeri, English, German, Russian (fluent); French, Italian, Turkish (minor)

Secondary education:

Mathematical high school for gifted children (1978, Gold Medal for Excellence in Education);

Music high school for gifted children (piano; 1976, cum laud).

PROFESSIONAL EDUCATION

1982, B.Sc., magna c.l., Mathematics, Baku State University, Azerbaijan

1983, M.Sc., magna c.l., Mathematical Physics, M. Lomonosov Moscow State University, Russia

1990, Ph.D., Geophysics, c.l., Russian Academy of Sciences, Moscow, Russia

1997, D.Sc. (Habilitation), Geophysics, Russian Academy of Sciences, Moscow, Russia

PROFESSIONAL EXPERIENCE / PREVIOUS APPOINTMENTS

- Invited Professor, University of Tokyo, Earthquake Research Institute, JAPAN (2005-08)
- Foreign Associate, Earth Simulator Center, Yokohama, JAPAN (2005-07)
- Invited Professor, University of California at Los Angeles, Department of Earth & Space Sciences, USA (2003)
- Senior Researcher, Heidelberg Academy of Sciences, WSM Project, GERMANY (2002-03)
- A.von Humboldt Research Fellow, University of Karlsruhe, Geophysical Institute, GERMANY (2001-02)
- Royal Society Visiting Scholar, University of Cambridge, Institute of Theoretical Geophysics, UK (2000)
- Invited Professor, University of Roma “La Sapienza”, Department of Physics, ITALY (1999)
- Invited Professor, Hebrew University of Jerusalem, Institute of Earth Sciences, ISRAEL (1999)
- Associate Professor, M. Gubkin Russian State University of Oil and Gas, Moscow, RUSSIA (1998-2000)
- Executive Director, Italian-Russian Institute for Advanced Geophysical Studies, Moscow, RUSSIA (1998-2000)
- Research Fellow, Visiting Scientist, Uppsala University, Department of Earth Sciences, SWEDEN (1998-2000)
- Research Fellow, Visiting Scientist, Royal Institute of Technology, Center for Parallel Computers, Stockholm, SWEDEN (1996-99)
- Visiting Scientist, Universität Mainz, Institut für Geowissenschaften, GERMANY (1996)

- Postdoc, University of Trieste, Division of Applied Geophysics, Department of Naval Architecture, Ocean and Environmental Engineering, ITALY (1995-96)
- Visiting Scientist, Vrije Universiteit, Faculty of Earth Science, Amsterdam, NETHERLANDS (1995)
- Researcher, Senior Research Fellow, Russian Academy of Sciences, IIEPT, Moscow, RUSSIA (1990-98)
- Full-time post-graduate student, USSR Academy of Sciences, Institute of Physics of the Earth, Moscow, RUSSIA (1987-90)
- Junior Researcher, Azerbaijan Academy of Sciences, Institute of Geology, Baku, AZERBAIJAN (1983-1986)

ACADEMIC DISTINCTIONS AND AWARDS

- International Award, American Geophysical Union (2009)
- Most Cited Paper 2004-2007 Award, Elsevier (2007)
- Alexander von Humboldt Research Fellowship (2001)
- Royal Society of London Research Fellowship (2000)
- Russian President Research Fellowship (1999)
- Swedish Institute Research Scholarship (1996, 1997)
- Italian Ministry of Education Research Scholarship (1995)
- Academia Europaea Award and Medal (1995)
- International Science Foundation Award, New York (1993)
- Conference Travel Awards by IUGG, EGS, and AGU (1991 to 1995)

PROFESSIONAL SOCIETY ACTIVITIES AND PANELS OF EXPERTS

- Chair, Focus Group on Natural Hazards, American Geophysical Union (AGU) (2008-2010).
- Secretary-General, International Union of Geodesy and Geophysics (IUGG), elected (2007-2015).
- Member, Board of Directors, International Year of Planet Earth (IYPE) Corporation (2007-2010).
- Member, International Council for Science (ICSU) GeoUnions Board (since 2007).
- Council member (2007-2009), ICSU Federation of Astronomical and Geophysical Data Services.
- Member, Panel on Natural Hazards, American Geophysical Union (2007-2008).
- Immediate Past President (2007-2011), President (2004-2007), Vice-President (2000-2004), Commission on Geophysical Risk and Sustainability, International Union of Geodesy and Geophysics.
- Member, Science Working Group, UNESCO-IGOS - Geohazards (2005-2007).
- Executive Director, Russian Outreach Center of the American Geophysical Union (since 2001).
- Member, Committee on International Participation, American Geophysical Union (2000-2006).
- Governing Board Member, EUROSCIENCE – European Association for the Promotion of Science and Technology (1997-2002)
- Chair, EuroScience Working Group “Science and Urgent Problems of Society” (since 1998)
- Member, EUROPROBE Task Group “GeoRift: Geodynamics of Intracratonic Rifting” (1993-1995)
- Co-Chair, EuroScience Working Group “Integration and Collaboration in Europe” (1996 -)

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

- Associate Member, American Association of Petroleum Geologists (since 2004)
- Member, European Geosciences Union (since 2003)
- Member, European Geophysical Society (1996 – 2002)
- Founder Member, EuroScience (since 1996)
- Life Member, American Geophysical Union (since 1993)

RECENT INVITED CONFERENCE TALKS

- Joint Assembly of American Geophysical Union, Toronto, Canada, 2009
- International Workshop on Statistical Seismology, Lake Tahoe, California, USA, 2009
- International Geological Congress, Oslo, Norway, 2008
- Euroscience Open Forum, Barcelona, Spain, 2008
- RisiKa International Congress, Karlsruhe, Germany, 2008
- International conference on Extreme Events: Causes and Consequences, ENS, Paris, France, 2008
- International Workshop on Advanced Numerical Modeling of Mantle Convection and Lithospheric Dynamics, UC Davis, USA, 2008
- Fall Meeting, American Geophysical Union, San Francisco, USA, 2007, 2005

- Conference on Natural Disasters and Risks in the Modern World, Suzdal, Russia, 2007
- European Geophysical Union, Vienna, Austria, 2007, 2005
- International Conference on Global Change, Islamabad, Pakistan, 2006
- General Assembly of the Asian Seismological Commission, Bangkok, Thailand, 2006
- OECD Global Science Forum Workshop "Earthquake Science and its Contribution to Society", Potsdam, Germany, 2006
- International Conference on Adaptive Modelling and Simulation, Barcelona, Spain, 2005
- IGOS-Geohazards Workshop, BRGM, Orleans, France, 2005
- Chevron Energy Technology Company, Houston, USA, 2005

ORGANIZATION OF RECENT INTERNATIONAL MEETINGS

- ICSU CODATA symposium on geophysical data (Kiev, Ukraine, 5-8 October 2008)
- Conference "Earth Science for Society" (Karlsruhe, Germany, 4 August 2008)
- ISCU Workshop on Natural and Human-Induced Hazards and Disasters in Africa (Kampala, Uganda, 21-23 July 2007)
- Union Symposium "High-Performance Computations in Geosciences", IUGG XXIV General Assembly (Perugia, Italy, 2-13 July 2007)
- EuroScience Symposium "Riding the Storm: Can Science Keep us in the Saddle?" at the 2nd European Science Open Forum (Munich, Germany, July 2006)
- Science Advisory Committee member and organizer of the Special Session "Mathematical Aspects of Geohazard Research", the 26th IUGG Conference on Mathematical Geophysics (Israel, June, 2006)
- UNESCO-IUGG-AGU Workshop "Recent Geodynamics, Georisk and Sustainability in the Black Sea to Caspian region" (Baku, Azerbaijan, July 2005)
- Symposia on Computational Fluid and Solid Geodynamics at M.I.T. (Cambridge, USA, 2003, 2005)
- IUGG-EuroScience-NATO workshop "Risk Science, Society and Sustainability" at the European Science Open Forum (Stockholm, Sweden, August 2004)
- IUGG-EuroScience-NATO Workshop on risk and sustainability (Budapest, Hungary, 2002)

BRIEF DESCRIPTION OF SCIENTIFIC WORK

Studies of dynamics of the crust, lithosphere, and mantle and their surface manifestations (including sedimentary basin evolution, salt tectonics, seismicity, seismic hazard, and orogeny) through multidisciplinary synthesis, theoretical analysis, and numerical experiments.

Ongoing research: computational geodynamics; data assimilation (inverse problems) in models of crustal and mantle dynamics; development of quantitative methods for geodynamics; geothermal evolution of sedimentary basins; salt diapirism; modelling of seismicity; block-and-fault dynamics of the lithosphere; evolution of descending lithosphere; mantle plume evolution.

Previously also: gravitational, thermal, and buckling instabilities of rheologically stratified (geo)structures; propagation of slow tectonic waves in the lithosphere; migration of seismic activity; subsidence analysis of sedimentary basins and mechanisms of basin evolution.

MAJOR SCIENTIFIC RESULTS

Crust and mantle evolution

Introduction of data assimilation in problems of crust and mantle dynamics. Numerical methodology for solving the direct and inverse problems of thermal convection with infinite Prandtl number (development of backward advection, variational/adjoint, and quasi-reversibility methods).

Crust and lithosphere instability

Theoretical results in problems of gravitational (Rayleigh-Taylor), thermal (Rayleigh-Bernard) and buckling (Kelvin-Helmholtz) instabilities of the (geo)structures including analysis of Newtonian, Maxwell, non-Newtonian power law, and perfectly plastic rheologies.

Salt diapirism

Quantitative models of geothermal evolution of the Astrakhan Arch of the Pricaspian Basin and recognition of the regions of possible hydrocarbon generation.

Quantitative models of salt structure evolution in the Pricaspian Basin and in the Gulf of Mexico.

Introduction of quantitative dynamic structural restoration of salt diapirs and their overburden.

Quantitative understanding of the processes of salt extrusion and gravity current.

Sedimentary basins

Introduction of eclogitization-induced mantle flow mechanism for sedimentary basin evolution.

Quantitative models of the evolution of intracratonic sedimentary basins in the North American (Michigan, Illinois, Williston), East European (Timan-Pechora, Dnepr-Donets, Moscow, and Pre-Uralian), and Siberian (Tunguska and Vilyui) platforms.

Seismicity and seismic hazard

Introduction of mantle dynamics into analysis of lithospheric lithospheric rigid block-and-fault systems and earthquake studies.

Quantitative models of a fault network interaction in the Tibet-Himalayan region to explain seismicity and slip rates at major regional faults.

Seismic hazards and earthquake loss estimation for Baku (Azerbaijan) and seismic hazard conditions at the Vrancea region (Romania).

Tectonic stress

Understanding of stress accumulation and its change in the lithospheric slab in terms of style of the slab subduction.

Explanation of coexisting shortening - extension and seismic activity in the Central Apennines by the lithosphere buoyancy.

Numerical methodology in general

New numerical methods and algorithms of an enhanced accuracy for studying problems of Earth's dynamics.

TEACHING EXPERIENCE

- 2007-2009, block lecture course "Data Assimilation in Computational Geodynamics" for graduate students and young scientists, Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy.
- 2005-2006 (winter semester), lecture course "Introduction to Tectonic Stress Analysis and Modeling" for advanced students of the Geophysical Institute, Karlsruhe University, Germany.
- 2005, block lecture course "Numerical Modeling of Nonlinear Dynamics of the Lithosphere" for graduate students and young scientists, Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy.
- 2004-2005 (winter semester), curriculum "Physics of the Earth" for undergraduate students (together with Prof. Dr. F. Wenzel) and lecture course "Computational Fluid Dynamics of the Earth" for advanced students of the Geophysical Institute, Karlsruhe University, Germany.
- 2001, 2003, block lecture course at international workshops on Nonlinear Dynamics of the Lithosphere and Earthquake Predictions organized by the Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy. The lectures for graduated students and young researchers on numerical modeling of lithospheric dynamics and geohazards research.
- 1998-2000 (summer semesters), lecture courses "Foundations of Geophysics and Geodynamics" and "Computational Geodynamics" for students of the M. Gubkin Russian State University of Oil and Gas in Moscow, Russia.
- 1997-2001, chair of colloquium "Mathematical and Numerical Problems in Geodynamics" for graduate students and young researchers in the Russian Academy of Sciences, Moscow, Russia.

Recent Ph.D. students

- D. Krupsky, thesis title: "Numerical Modeling of Thermal Evolution of Layered Geological Structures", received PhD in 2007. He is a postdoc in the Russian Academy of Sciences, Moscow.
- E. Bushueva, thesis title: "Thermal Regimes of Sedimentary Basins", received PhD from in 2006. She works now for oil industry in Russia.

PUBLICATIONS

Author and co-author of some 110 papers (the principal author in some 70 papers) discussing geophysics, geodynamics, geohazards, fluid mechanics, applied mathematics, and science policy in general.

LIST OF SELECTED RECENT PUBLICATIONS (2009-2004)

Articles in International Journals

1. Ismail-Zadeh, A., Aoudia, A., and Panza, G., Three-dimensional numerical modeling of contemporary mantle flow and tectonic stress beneath the Central Mediterranean, *Tectonophysics*, accepted, 2009.
2. Ismail-Zadeh, A., Wilhelm, H., Volozh, Y., and Tinakin, O., The Astrakhan Arch of the Pricaspian Basin: Geothermal analysis and modelling, *Basin Research*, accepted, 2009.
3. Ismail-Zadeh, A., Korotkii, A., Schubert, G., and Tsepelev, I., Numerical techniques for solving the inverse retrospective problem of thermal evolution of the Earth interior, *Computers & Structures*, 87, 802-811, 2009.
4. Ismail-Zadeh, A., Schubert, G., Tsepelev, I., and Korotkii, A., Thermal evolution and geometry of the descending lithosphere beneath the SE-Carpathians: An insight from the past, *Earth Planet. Sci. Lett.*, 273, 68-79, 2008.
5. Ismail-Zadeh, A., Korotkii, A., Schubert, G., and Tsepelev, I., Quasi-reversibility method for data assimilation in models of mantle dynamics, *Geophys. J. Int.*, 170, 1381-1398, 2007.
6. Ismail-Zadeh, A., Le Mouél, J.-L., Soloviev, A., Tapponnier, P., and Vorovieva, I., Numerical modeling of crustal block-and-fault dynamics, earthquakes and slip rates in the Tibet-Himalayan region, *Earth Planet. Sci. Lett.*, 258, 465-485, 2007.
7. Ismail-Zadeh, A., Sokolov, V., and Bonier, K., Geodynamics, seismicity and seismic hazard of the south-eastern Carpathians, *Natural Hazards*, 42, 493-514, 2007.
8. Ismail-Zadeh, A. and Takeuchi, K., Preventive disaster management of extreme natural events, *Natural Hazards*, 42, 459-467, 2007.
9. Ismail-Zadeh, A., Wilhelm, H., Volozh, Yu, Geothermal evolution of the Astrakhan arch region of the Pricaspian Basin, *Int. J. Earth Sci.*, DOI 10.1007/s00531-007-0258-z, 2007.
10. Ismail-Zadeh, A., Schubert, G., Tsepelev, I., and Korotkii, A., Three-dimensional forward and backward numerical modeling of mantle plume evolution: Effects of thermal diffusion, *J. Geophys. Res.*, 111, B06401, doi:10.1029/2005JB003782, 2006.
11. Ismail-Zadeh, A., Mueller, B., and Schubert, G., Three-dimensional modeling of present-day tectonic stress beneath the earthquake-prone southeastern Carpathians based on integrated analysis of seismic, heat flow, and gravity observations, *Phys. Earth Planet. Inter.*, 149, 81-98, 2005.
12. Ismail-Zadeh, A.T., and Huppert, H.E., Effect of power law rheology of surroundings on the gravitational instability of a viscous layer, *Comput. Seism. Geodyn.*, 7, 216-223, 2005.
13. Ismail-Zadeh, A., Schubert, G., Tsepelev, I., and Korotkii, A., Inverse problem of thermal convection: Numerical approach and application to mantle plume restoration, *Phys. Earth Planet. Inter.*, 145, 99-114, 2004.
14. Ismail-Zadeh, A.T., Tsepelev, I.A., Talbot, C.J., and Korotkii, A.I., Three-dimensional forward and backward modelling of diapirism: Numerical approach and its applicability to the evolution of salt structures in the Pricaspian basin, *Tectonophysics*, 387, 81-103, 2004.
15. Ismail-Zadeh, A.T., Tsepelev, I.A., Talbot, C., and Oster, P., Three-dimensional modeling of salt diapirism: A numerical approach and algorithm of parallel calculations, *Comput. Seism. Geodyn.*, 6, 33-41, 2004.

Books and book chapters

1. Ismail-Zadeh, A., Tackley, P., *Computational Methods for Geodynamics*, Cambridge University Press, to be published in 2010.
2. Ismail-Zadeh, A., Computational geodynamics as a component of comprehensive seismic hazards analysis, in *Natural Hazards: Minimizing Risk and Maximizing Awareness*, T. Beer (Ed.), Springer, Berlin, 2009.
3. Ismail-Zadeh, A., Beer, T. (Eds.), *Georisk: Interactions Between Science and Society*, Springer, Heidelberg, 2007.
4. Ismail-Zadeh, A. (Ed.) *Recent Geodynamics, Georisk and Sustainable Development in the Black Sea to Caspian Sea Region*, American Institute of Physics Conf. Proc., v. 825, Melville, New York, 2006. 162 p.

Full list of publications can be found at web-page: <http://www.mitp.ru/~aismail/lpub.htm>