

Dr. Nikita Mironov

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Curriculum Vitae

PERSONAL:



Name: Nikita Mironov Leonardovich
Born: September 23, 1977 in Moscow, Russia
Nationality: Russian
Family: Married, 2 children (son, 2005 and daughter, 2011)

EDUCATION AND SCIENTIFIC DEGREES:

1984-1994 Elementary and intermediate schools, Moscow
1994-1999 Diploma (MSc eq.) in geochemistry (with honours), Moscow State University
2001-2009 Cand. Sci (PhD eq.) in geochemistry, Vernadsky Institute, Moscow, Russia.
Dissertation "The origin and evolution of Kliuchevskoi volcano magmas from study of melt inclusions in olivine", supervisor M.V. Portnyagin

PROFESSIONAL POSITIONS:

1999-2002 Post graduated student at M.V. Lomonosov Moscow State University, Geological Department, Chair of Petrology, Teaching experience in petrography
2001-2008 Junior Researcher at the V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry of Russian Academy of Science (GEOKHI RAS) in Moscow (Russia)
2008-2011 Research Assistant at GEOKHI RAS
2002-2013 Several one-two months' research visits at GEOMAR, Kiel and at the Institute of Mineralogy, Hannover, Germany
Since 2011 Senior Researcher at the V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry (GEOKHI) in Moscow (Russia)

SCIENTIFIC RESPONSIBILITIES:

- Reviews for publications and English scientific editing of Geochemistry International

ADMINISTRATIVE RESPONSIBILITIES:

- Vice-chairman of young scientists' council of Vernadsky Institute of Geochemistry and Analytical Chemistry

SCIENTIFIC INTERESTS:

1. Origin and evolution of magmas at active continental margins, island arcs and ocean islands
2. Hunting for melt inclusions and variability of parental magmas
3. A revealing of initial volatiles content (H₂O, CO₂, S, Cl, F) in primitive subduction zone and oceanic islands magmas
4. Estimation of chalcophile ore elements content in primary arc magmas and their behavior during magma degassing and crystallization
5. Dynamics of crystallization and magma transport beneath volcanic centers
6. Methodology of melt inclusions studies and their implication to topics above

SKILLS OR EXPERIENCE:

1. Optical microscopy: petrography of rocks, identification of minerals, identification and documentation of magmatic (melt, crystal and fluid) inclusions in minerals.
2. Experimental work: conducting high-T, 1-atm P heating homogenization experiments of individual olivine and clinopyroxene grains containing recrystallized melt inclusions under optical control using Sobolev-Slutskiy ("Vernadsky") heating stage.
3. Melt inclusions sample preparation: different kinds of samples to fit analytical methods and to make melt inclusion the best
4. Analytical methods: Electron Micro Probe Analyses (EMPA) (Cameca SX-50, Cameca SX-100, Jeol JXA-8200), Secondary Ion Mass Spectrometry (SIMS) (Cameca ims-4f), Fourier Transform InfraRed (FTIR) spectroscopy (Bruker IFS88 spectrometer and IR Scope II microscope)
5. Modelling natural processes: using existing models developed by the experts (e.g. mantle melting in open systems – Portnyagin et al, EPSL, 2007 and suppl.; fractional and equilibrium crystallization of basaltic magmas with/without volatiles - Petrolog 3 - Danyushevsky, Plechov, 2011; Comagmat - Ariskin, 1999; methods for estimation physico-chemical conditions of crystallization based on minerals and mineral(s)-melt equilibria – e.g. Minerals, Inclusions and Volcanic Processes, 2008).

AWARDS:

1998: George Soros' graduate student fellowship

2000: George Soros' post graduate (Ph.D.) student fellowship

2006: Best publication award from MAIK/Interperiodika

2008: Best poster presentation at the International Conference on Fluid Inclusion Research (Moscow)

CURRENT PROJECTS:

- Petrology, eruptive history and fluid regime of magmas within Tolbachik regional zone of cinder cones, Kamchatka (principal investigator) – funded by Russian Foundation for Basic Research (RFBR, 2012-2014)
- Sources, initial content and evolution of chalcophile ore elements in island-arc magmas based on studies of melt inclusions in minerals (principal investigator) - funded by Russian Foundation for Basic Research (RFBR, 2012-2013)
- Determination of CO₂ concentrations in mantle-derived magmas: a combination of new experimental and analytical approaches to study glass inclusions in olivine (responsible investigator) – funded by German Science Foundation (DFG, 2013)

SOME FORMER PROJECTS:

- Origin and evolution of active volcanoes magmas of Klyuchevskaya group, Kamchatka (principal investigator) - funded by Russian Foundation for Basic Research (2003-2005)
- Geochemical systematics of halogens in magmas of island-arcs and continental margins (participant) – funded by Russian Foundation for Basic Research (2006-2008)
- Volatiles and Fluids in Subduction Zones (SFB 574) (participant in melt inclusions studies of Central America Volcanic Arc) – funded by German Research Foundation (2006-2012)
- Variations in primary magmas composition of Eastern volcanic belt of Kamchatka - petrologic interpretation (principal investigator) – funded by Russian Foundation for Basic Research (2007-2009)
- Kurile-Kamchatka and Aleutian Marginal Sea-Island Arc Systems: Geodynamic and Climate Interaction in Space and Time (a joint German-Russian project - KALMAR) (participant) – funded by German Federal Ministry of Education and Research and Russian Ministry of Education and Science (2007-2011)
- The scale and dynamics of volatile fluxes from Kamchatkan volcanoes during the Holocene (participant) – funded by Russian Foundation for Basic Research (2009-2011)

- Petrology, geochemistry and geodynamics of formation and evolution processes of lithosphere and convecting mantle (participant; leader scientist – A.V. Sobolev) - funded by Russian President to support leading Russian scientific schools (2006-2013)

INTERNATIONAL COLLABORATION:

- GEOMAR (Helmholtz centre for ocean research Kiel), Germany - Dr. Maxim Portnyagin, Prof. Kaj Hoernle;
- Institute of Mineralogy, Leibniz University of Hannover, Germany – Dr. R. Botcharnikov, Prof. F. Holtz, Dr. R. Almeev;
- Max Planck Institute for Chemistry, Mainz, Germany and Institut des Sciences de la Terre (ISTerre), Grenoble, France – Prof. Alexander Sobolev, Dr. Dmitry Kuzmin;
- Geological Sciences, University of Oregon, USA – Prof. Ilya Bindeman
- Centre de Recherches Petrographiques et Geochimiques, Nancy, France – Dr. Andrey Gurenko

RESEARCH GUEST VISITS:

GEOMAR: 02-03/2002, 10-11/2003, 11-12/2006, 11-12/2007, 06/2009, 11-12/2009, 05/2010, 07/2013; Institute of Mineralogy at Leibniz University Hannover: 04-06/2013

EXPEDITIONS:

- July-September 1997: Dikii Greben', Kambal'ny, Kosheleva, Kuril lake, Tolmachov dol volcanoes, Southern Kamchatka (student practice, together with Vera Ponomareva)
- August 1996, 2000: West Siberia region – soil studies, ecology, oil deposits and spills (student and scientist practice, together with Sergey Trofimov)
- July 2000: South Urals, Miass national park (assistant, field petrology practice for students)
- July 2001: Shiveluch and New Tolbachik volcanoes, Kamchatka (scientist, together with Maxim Portnyagin and Sergey Khubunaya)
- August 2001: 1st KOMEX-2 (joint german-russian project) expedition in Kamchatka. Zhupanova River area; Southern Kamchatka across-arc transect from Mutnovsky to Bolshaya Ipelka volcanoes; Nachikinsky volcano in the Northern Kamchatka (scientist, together with Kaj Hoernle and Maxim Portnyagin)
- August 2002: 2nd KOMEX-2 expedition in Kamchatka. Eastern Volcanic Front, from Kambalny volcano in the south to Kikhpinich volcano in the north; Zarechny and Kharchinsky volcanoes in the Central Kamchatka Depression; Sedanka volcanic field in Sredinny Range; Shisheisky Complex of high-magnesian andesites (scientist, together with Maxim Portnyagin)
- July 2006: Ophiolites of Polar Ural mountains (Voykar massif), (scientist, together with Alexander Sobolev and Valentina Batanova)
- August 2006: Zheltovsky and Ilyinsky volcanoes, Kuril Lake deposits in the Southern Kamchatka (scientist, together with Maxim Portnyagin)
- August 2007: 1st KALMAR expedition. Kliuchevskoi and Tolbachik volcanoes, area near Zimina and Udina volcanoes, Azhabach Complex, monogenetic volcanoes in the Southern Kamchatka (scientist, together with Maxim Portnyagin)
- July-August 2009: Expedition to Kliuchevskaya volcanic group (Bezmyanny, Kliuchevskoi, Tolbachik volcanoes) (leader scientist, together with Vera Ponomareva)
- September-October 2009: R/V SONNE SO201-2 KALMAR expedition in NW Pacific and Bering Sea (scientist)

Field excursions:

Costa Rica volcanoes, june 2007

Iceland neovolcanic zone, august 2008

German Eifel, may 2011

PUBLICATIONS:

Co-author and author of 11 peer-reviewed scientific publications since 2000 (75 citations)
Full list: <http://intranet.geokhi.ru/Lab12/Mironov.aspx> and also see below:

Peer reviewed publications (all):

1. Portnyagin M.V., Hoernle K., Storm S., Mironov N.L., van den Bogaard C., Botcharnikov R. (2012) H₂O-rich melt inclusions in fayalitic olivine from Hekla volcano: Implications for phase relationships in silicic systems and driving forces of explosive volcanism on Iceland. *Earth and Planetary Science Letters*, 357-358, p. 337-346. <http://dx.doi.org/10.1016/j.epsl.2012.09.047>
2. Portnyagin M.V., Hoernle K., Mironov N.L. (2012) Contrasting compositional trends of rocks and olivine-hosted melt inclusions from Cerro Negro volcano (Central America): Implications for decompression-driven fractionation of hydrous magmas. *International Journal of Earth Sciences*, special SFB 574 volume "Volatiles and fluids in subduction zones", *International Journal of Earth Sciences (Geologische Rundschau)*, August 2012. <http://dx.doi.org/10.1007/s00531-012-0810-3>
3. Mironov N.L., Portnyagin M.V. (2011) H₂O and CO₂ in parental magmas of Kliuchevskoi volcano inferred from study of melt and fluid inclusions in olivine. *Russian Geology and Geophysics (special issue Melts and fluids in natural mineral and ore formation processes: modern studies of fluid and melt inclusions in minerals)* v. 52, p. 1353-1367. <http://dx.doi.org/10.1016/j.rgg.2011.10.007>
4. Portnyagin M.V., Naumov V.B., Mironov N.L., Belousov I.A., Kononkova N.N. (2011) Composition and Evolution of the Melts Erupted in 1996 at Karymskoe Lake, Eastern Kamchatka: Evidence from Inclusions in Minerals. *Geochemistry International*, v. 49, n. 11, p. 1085-1110. <http://dx.doi.org/10.1134/S0016702911110085>
5. Chertkova N.V., Tsai A.E., Mironov N.L., Shcherbakov V.D. (2010) Thermodynamic Settings of Melting and Melt Ascent from Magmatic Chambers Using the Example of Klyuchevskoi Volcano. *Moscow University Geology Bulletin*, vol. 65, n. 1, pp. 39–48. <http://dx.doi.org/10.3103/S0145875210010047>
6. Churikova T., Woerner G., Mironov N., Kronz A. (2007) Volatile (S, Cl and F) and fluid mobile trace element compositions in melt inclusions: implications for variable fluid sources across the Kamchatka arc. *Contributions to Mineralogy and Petrology*, v.154(2), p.217-239. <http://dx.doi.org/10.1007/s00410-007-0190-z>
7. Portnyagin M.V., Hoernle K., Plechov P.Y., Mironov N.L., Khubunaya S.A. (2007) Constraints on mantle melting and composition and nature of slab components in volcanic arcs from volatiles (H₂O, S, Cl, F) and trace elements in melt inclusions from the Kamchatka Arc. *Earth and Planetary Science Letters* 255(1-2):53-69. <http://dx.doi.org/10.1016/j.epsl.2006.12.005>
8. Portnyagin M.V., Mironov N.L., Matveev S.V., Plechov P.Y. (2005) Petrology of Avachites, High-Magnesian Basalts of Avachinsky Volcano, Kamchatka: II. Melt inclusions in olivine. *Petrology* 13(4):322-351
9. Portnyagin M.V., Plechov P.Y., Matveev S.V., Osipenko A.B., Mironov N.L. (2005) Petrology of Avachites, High-Magnesian Basalts of Avachinsky Volcano, Kamchatka: I. General Characteristics and Composition of Rocks and Minerals. *Petrology* 13(2):99-121
10. Mironov N.L., Portnyagin M.V., Plechov P.Y., Khubunaya S.A. (2001) Final Stages of Magma Evolution in Klyuchevskoy Volcano, Kamchatka: Evidence from Melt Inclusions in Minerals of High-Alumina Basalts. *Petrology* 9(1):46-62
11. Plechov P.Yu., Mironov N.L., Plechova A.A., Khubunaya S.A. (2000) Compositional peculiarities and genesis of melt inclusions in plagioclase from the Apakhonchich lava flow, Klyuchevskoi volcano, Kamchatka. *Geochemistry International*, v.38, n.1, p. 34-41

In preparation:

12. Mironov N.L., Portnyagin M.V. High initial content of chalcophile ore elements in primitive island arc magmas based on LA-ICPMS study of OI-hosted melt inclusions from Great Tolbachik fissure eruption of 1975-76 in Kamchatka.
13. Mironov N.L., Portnyagin M.V., Botcharnikov R., Holtz F., Gurenko A. New experimental approach to study primitive melt inclusions in olivine reveals high CO₂ concentration in island-arc mantle-derived magmas

PhD thesis:

14. Mironov N.L. (2009) The origin and evolution of Kliuchevskoi volcano magmas from study of melt inclusions in olivine. Candidate's Dissertation (PhD Thesis Equivalent) in Geology and Mineralogy, 325 p., GEOKHI RAS, Moscow. Supervisor M.V. Portnyagin. Abstract of dissertation (in russian), 31 p, <http://geo.web.ru/db/msg.html?mid=1182249>.

Some of Thesis (since 2007):

15. Mironov N.L., Portnyagin M.V. (2012) Sources, initial content and evolution of chalcophile ore elements in island-arc magmas based on studies of melt inclusions in minerals. Second young scientist conference "New in knowledge on ore formation processes", 11-13 of December 2012, IGEM RAS, Moscow
16. Basilevsky A.T., Shalygin E.V., Titov D.V., Markiewicz W.J., Scholten F., Roatsch Th., Kreslavsky M.A., Moroz L.V., Ignatiev N.I., Fiethe B., Osterloh B., Michalchik H., Mironov N.L., Head J.W. (2012) Possible felsic summit of Tuulikki Mons, Venus: Evidence from 1-micron surface emissivity and Magellan-viewed morphology. 43rd Lunar and Planetary Science Conference, March 19-23, 2012, The Woodlands, Texas.
17. Portnyagin, M., Mironov, N., Ponomareva, V., Bindeman, I., Hauff, F., Sobolev, A., Kayzar, T., Garbe-Schönberg, D., and Hoernle, K. (2011) Arc Magmas from Slab to Eruption: The Case of Kliuchevskoy Volcano: Mineralogical Magazine, v. 75, p. 1661 (Goldschmidt Conference, Prague, August 14-19, 2011, Keynote).
18. Mironov, N., and Portnyagin, M. (2011) Volatiles (H₂O, CO₂, S, Cl, F) in Primary Magmas of Kliuchevskoy Volcano (Kamchatka): Mineralogical Magazine, v. 75, p. 1478 (Goldschmidt Conference, Prague, August 14-19, 2011; Poster).
19. Portnyagin, M., Sobolev A., Mironov N., Gorbach N., Kuzmin D., Hoernle, K. (2011) The origin of primary magmas at the Kamchatka-Aleutian arc junction by melting of mixed pyroxenite and peridotite mantle sources: KALMAR – 2nd Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems, May 16 – 20, 2011, Trier, Germany, p. 103-104 (Oral)
20. Mironov N., Portnyagin, M. (2011) Deep roots of Klyuchevskoy volcano, Kamchatka: KALMAR – 2nd Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems, May 16 – 20, 2011, Trier, Germany, p. 85-86 (Poster)
21. Mironov N., Portnyagin, M. (2011) Volatile flux from Klyuchevskoy volcano, Kamchatka: KALMAR – 2nd Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems, May 16 – 20, 2011, Trier, Germany, p. 87-88 (Poster)
22. Mironov NL, Hoernle K, Portnyagin MV (2010) Preliminary data on volatiles (H₂O, S, Cl, F) in primitive magmas of Azores islands, Northern Atlantic - «wet or not wet» is Azores hotspot? International conference Geochemistry of magmatic rocks, school "Alkaline magmatism of the Earth", 12-16 September 2010, Crimea, Ukraine, Moscow-Koktebel, (Talk). On-line version: <http://alkaline.web.ru/2010/Abstracts.htm>
23. Portnyagin MV, Hoernle K, Storm S, Mironov N, Van den Boogaard C (2010) Water-rich melt inclusions in olivine from silicic Icelandic rocks. III Biennial Conference Asian Current Research on Fluid Inclusions (ACROFI III) and XIV International Conference on Thermobarogeochemistry (TBG XIV), Novosibirsk, 15-20 September 2010 (Invited talk)
24. Mironov N, Portnyagin M (2009) Klyuchevskoy volcano: from source to surface. In: First Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian

- Marginal Sea-Island Arc Systems, April 27 – May 1, 2009, Petropavlovsk-Kamchatsky, Russia, Terra Nostra, v. 2009/1, p. 50-51, (Talk).
25. Plechova AA, Mironov NL, Portnyagin MV (2009) Volatiles (H₂O, S, Cl, F) in primitive magmas of Kamchatka and their long-term fluxes to the exosphere. In: First Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems, April 27 – May 1, 2009, Petropavlovsk-Kamchatsky, Russia, Terra Nostra, v. 2009/1, p. 58-59, (Poster).
 26. Portnyagin M, Ponomareva V, Bindeman I, Hauff F, Krasheninnikov S, Kuvikas O, Mironov N, Pletchova A, van den Bogaard C, Hoernle K (2009) Millennial Variations of Major and Trace Element and Isotope Compositions of Klyuchevskoy Magmas, Kamchatka. In: First Bilateral Workshop on Russian-German Cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems, April 27 – May 1, 2009, Petropavlovsk-Kamchatsky, Russia, Terra Nostra, v. 2009/1, p. 64-65 (Poster).
 27. Portnyagin MV, Sobolev AV, Mironov NL, Hoernle K (2009) Pyroxenite melts involved in magma genesis in Kamchatka. *Geochimica et Cosmochimica Acta* 73(13, Supp. 1):A1044, doi:10.1016/j.gca.2009.1005.1012 (Talk)
 28. Mironov N, Portnyagin MV (2008) Dynamics of crystallization and magma transport beneath Klyuchevskoy volcano (Kamchatka). XIII All-Russian conference on thermobarogeochemistry in conjunction with APIFIS-IV symposium, 22-25.09.2008, Moscow, Russia, <http://www.minsoc.ru/2008-1-26-0> (Poster)
 29. Mironov NL, Portnyagin MV (2008) Dynamics of magma crystallization and transport at the Klyuchevskoy volcano (Kamchatka) revealed from melt inclusions study. In: IAVCEI General Assembly - Reykjavík 18 - 25 August, 2008 (Talk)
 30. Plechova A, Portnyagin M, Mironov N, Ponomareva V, Bazanova L (2008) Degassing and redox state of magmas in Kamchatka. IAVCEI General Assembly - Reykjavík 18 - 25 August, 2008 (Poster)
 31. Portnyagin M, Almeev R, Matveev S, Mironov N, Holtz F (2008) Experimental and Natural Evidence for Rapid Water Exchange Between Melt Inclusions in Olivine and Host Magma. AGU Fall Meeting, San Fransisco, USA, December 14-19, Eos Trans. AGU, 89(52), Fall Meet. Suppl., V13F-05 (Invited Talk).
 32. Portnyagin M, Mironov N, Ponomareva V, Hoernle K (2008) Millennial Variations of Magma and Volatile Fluxes Inferred From Time-Series Study of Klyuchevskoy Volcano, Kamchatka. AGU Fall Meeting, San Fransisco, USA, December 14-19, Eos Trans. AGU, 89(52), Fall Meet. Suppl., U52A-07 (Talk).
 33. Mironov, N., Portnyagin, M., and Hoernle, K. (2007) Crystallization, degassing and mixing processes in the magma origin of Irazu volcano as revealed from melt inclusion study, Workshop to Integrate Subduction Factory and Seismogenic Zone Studies in Central America: June 18-22, 2007, Heredia, Costa Rica (poster).
 34. Portnyagin, M.V., Mironov, N., Sadofsky, S., Hoernle, K., and van den Bogaard, P. (2007) Melt inclusions, volatiles and their fluxes in Central America (key-note talk), Workshop to Integrate Subduction Factory and Seismogenic Zone Studies in Central America: June 18-22, 2007, Heredia, Costa Rica.