

**Personal data:**

Last, first and middle names: Mironov Nikita Leonardovich
Date and place of birth: September, 23, 1977, Moscow, Russia
Age: 34
Marital status: Married
Wife: Mironova Alexandra (19/05/1977)
Children: Ilya (07/2005) and Maria (04/2011)
Citizenship: Russia

Professional biography:

- Since 06/2011: Senior Researcher at the V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry (GEOKHI) in Moscow (Russia)
- 05/2009: Ph.D dissertation “The origin and evolution of Kliuchevskoi volcano magmas from study of melt inclusions in olivine”, V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry (GEOKHI), Moscow, Russia. Scientific advisor Dr. Maxim Portnyagin
- Since 10/2008: Research assistant at GEOKHI
- Since 04/2001: Junior Researcher at the V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry of Russian Academy of Science (GEOKHI RAS) in Moscow (Russia).
- 1999-2002: Post graduated student at M.V. Lomonosov Moscow State University, Geological Department, Chair of Petrology
- 06/1999: Diploma in Geochemistry (with honours)
- 1994-1999: Student at M.V. Lomonosov Moscow State University, Geological Department

Awards:

- 2008: Best poster presentation at the International Conference on Fluid Inclusion Research (Moscow)
- 2006: Best publication award from MAIK/Interperiodika
- 2000: George Soros’ post graduate (Ph.D.) student fellowship
- 1998: George Soros’ graduate student fellowship

Scientific interests, current and prospective:

- Origin and evolution of magmas at active continental margins and island arcs
- Hunting for melt inclusions and variability of parental magmas
- A revealing of initial CO₂ and other volatiles (H₂O, S, Cl, F, Br) in primitive subduction zone magmas
- Dynamics of crystallization and magma transport beneath volcanic centers
- Estimation of chalcophile ore elements content in primary magmas of Kamchatka arc volcanoes and their behavior during magma degassing and crystallization
- Methodology of melt inclusions studies and their implication to topics above

Favorite place: volcanic Kamchatka

Skills and experience:

- Optical microscopy: petrography of rocks, identification of minerals, identification and documentation of magmatic (melt, crystal and fluid) inclusions in minerals.
- Experimental work: conducting heating homogenization experiments of individual olivine and clinopyroxene grains containing recrystallized melt inclusions under optical

control using Sobolev-Slutskii (“Vernadsky”) heating stage. Introduced with cryometric experimental study of fluid inclusions.

- Melt inclusions sample preparation: different kinds of samples to fit analytical methods and to make melt inclusion the best
- Analytical methods: in our works we try and effectively use many of modern analytical techniques, especially those which concern local analyses of melt inclusions glasses and minerals. Working methods (and operating machines) are: 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). Introduced method: Lazer Ablation-Ion Coupled Plasma Mass Spectrometry (LA-ICP MS) (Excimer lazer COMPexProTM combined with optical Olympus microscope and quadrapole spectrometer ICP Agilent 7500c)
- Modelling natural processes: I use existing models developed by the experts. Main modeling processes are: mantle melting in open systems (software, reference – Portnyagin et al, EPSL, 2007 and suppl.); fractional and equilibrium crystallization of basaltic magmas with/without volatiles (e.g. Petrolog 3 – Danyushevsky, Plechov, 2011; Comagmat – Ariskin, 1999); diffusive re-equilibration processes of olivine-hosted melt inclusions (e.g. Danyushevsky et al., 2002). I also use mass-balance calculations (Mathcad, Excel) and different methods for estimation physico-chemical conditions of crystallization and melting (P-T-fO₂-H₂O) based on minerals and mineral(s)-melt equilibriums (e.g. Sobolev et al., 1993; Minerals, Inclusions and Volcanic Processes, 2008, in Reviews in Mineralogy and Geochemistry).

Current personal projects:

- Petrology, eruptive history and fluid regime of magmas within Tolbachik regional zone of cinder cones (Kamchatka) – funded by Russian Foundation for Basic Research (RFBR, 2012-2014)

Some former projects:

- The scale and dynamics of volatile fluxes from Kamchatkan volcanoes during the Holocene (participant) – funded by Russian Foundation for Basic Research (2009-2011)
- 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)
- Variations in primary magmas composition of Eastern volcanic belt of Kamchatka - petrologic interpretation (executive participant) – funded by Russian Foundation for Basic Research (2007-2009)
- 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)
- Geochemical systematics of halogens in magmas of island-arcs and continental margins (participant) – funded by Russian Foundation for Basic Research (2006-2008)
- Origin and evolution of active volcanoes magmas of Klyuchevskaya group, Kamchatka (executive participant) - funded by Russian Foundation for Basic Research (2003-2005)

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

Working guest visits:

GEOMAR: 05/2010, 11-12/2009 (also at Institute of Mineralogy, Hannover), 06/2009, 11-12/2007, 11-12/2006, 10-11/2003, 02-03/2002

Recent Expeditions:

- September-October 2009: R/V SONNE SO201-2 KALMAR expedition in NW Pacific and Bering Sea
- July-August 2009: Expedition to Kliuchevskaya volcanic group (Bezmyanny, Kliuchevskoi, Tolbachik volcanoes) (together with Vera Ponomareva)
- August 2007: 1st KALMAR expedition. Kliuchevskoi and Tolbachik volcanoes, area near Zimina and Udina volcanoes, Azhabach Complex, monogenetic volcanoes in the Southern Kamchatka (together with Maxim Portnyagin).
- August 2006: Zheltovsky and Ilyinsky volcanoes, Kuril Lake deposits in the Southern Kamchatka (together with Maxim Portnyagin).
- July 2006: Ophiolites of Polar Ural mountains (Voykar massif), (together with Alexander Sobolev and Valentina Batanova)
- 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 (together with Maxim Portnyagin).
- 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 (together with Kaj Hoernle and Maxim Portnyagin).
- July 2001: Shiveluch and New Tolbachik volcanoes, Kamchatka (together with Maxim Portnyagin and Sergey Khubunaya).

Field excursions:

German Eifel, may 2011

Iceland neovolcanic zone, august 2008

Costa Rica volcanoes, june 2007

Publications:

Per reviewed (all):

- Portnyagin M.V., Hoernle K., Storm S., Mironov N.L., van den Bogaard C., Botcharnikov R. 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*, submitted.
- 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”, in press
- 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>
- 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>
 - 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
 - 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
 - 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
 - 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
 - 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
 - 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
 - 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:

- Mironov N.L., Portnyagin M.V., Hoernle K. Three contrasting types of magmas involved in genesis of basalt-andesitic scoria of 1963-65 year eruption of Irazu volcano, Costa-Rica, as revealed from olivine hosted naturally quenched melt inclusions. In preparation for *Contributions to Mineralogy and Petrology*
- Mironov N.L., Portnyagin M.V. The content of chalcophile ore elements in primitive island arc magmas based on La-ICP MS study of Ol-hosted melt inclusions from Great Tolbachik fissure eruption of 1975-76 in Kamchatka. In preparation for *Chemical Geology*
- Mironov N.L., Portnyagin M.V. Dynamics of crystallization and magma transport beneath Kliuchevskoi volcano, Kamchatka – petrological constraints from study of olivine hosted melt and fluid inclusions. In preparation for *Geology or Journal of Petrology*

Ph.D. dissertation:

- 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. Abstract of dissertation (in russian), 31 p, <http://geo.web.ru/db/msg.html?mid=1182249>

Some of Thesis (since 2007):

- 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.
- 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).
- 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).
- 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)
- 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)
- 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)
- 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>
- 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)
- 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).
- 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).
- 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).

- 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)
- 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)
- 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)
- 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)
- 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 Francisco, USA, December 14-19, *Eos Trans. AGU*, 89(52), Fall Meet. Suppl., V13F-05 (Invited Talk).
- 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 Francisco, USA, December 14-19, *Eos Trans. AGU*, 89(52), Fall Meet. Suppl., U52A-07 (Talk).
- 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).
- 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.

Reviewing and English scientific editing: Geochemistry International