

# Maxim Gavrilenko, PhD

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## BRIEF SUMMARY

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My research interests lie in the field of igneous petrology with applications in geochemistry, volcanology, as well as the origin of crustal materials through high-temperature melting and crystallization processes. I am particularly interested in chemical evolution of igneous systems in different tectonic settings, and the role of subsurface magmatic processes driving and controlling volcanic eruptions.

## EDUCATION

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2016 Ph.D. (Petrology, Geochemistry) Rutgers, the State University of New Jersey, United States  
1997 M.Sc. (Geology, Geochemistry) Moscow State University, Russia

## PROFESSIONAL EXPERIENCE

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2020- Postdoctoral Researcher, Institut des Sciences de la Terre (ISTerre), Université Grenoble Alpes-CNRS  
2019-20 Senior Research Scientist, Center for Hydrocarbon Recovery, Skolkovo Institute of Science and Technology  
2018-19 Postdoctoral Researcher, Dept. of Earth and Planetary Sciences, Washington University in St. Louis  
2017-18 Postdoctoral Researcher, Dept. of Geological Sciences and Engineering, University of Nevada, Reno  
2016-17 Postdoctoral Researcher, Dept. of Earth and Planetary Sciences, Washington University in St. Louis  
2011-14 Fulbright Fellow, Department of Earth and Planetary Sciences, Rutgers University  
2011-16 Research and Teaching Assistant, Department of Earth and Planetary Sciences, Rutgers University  
2010 Intern, ARC Centre of Excellence in Ore Deposits, University of Tasmania, Australia (three months)  
2008 Intern, Geophysical Institute, University of Alaska Fairbanks (three months)  
2006 Intern, Geophysical Institute, University of Alaska Fairbanks (three months)  
2005-16 Research Assistant, Institute of Volcanology and Seismology, Kamchatka, Russia  
2004 Geologist, Avers-1 Ltd., Russia  
2001-03 IT lead expert, CNET Networks, Inc.

## ANALYTICAL INSTRUMENTATION EXPERIENCE

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- ◆ 10+ years of electron microprobe experience (both JEOL and Cameca)
- ◆ Laser ablation ICP-MS (Agilent 7500ce + UP-213) and solution ICP-MS (Agilent 7700)
- ◆ Ion microprobe (Cameca ims 7f, volatiles in nominally-anhydrous minerals and melt inclusions)
- ◆ Bulk sample compositional analyses by XRF, ICP-MS, LA-ICP-MS
- ◆ Experimental petrology facilities experience: piston cylinder apparatus, 1-atm furnaces
- ◆ Spectrophotometry (Agilent Technology – Cary 5000 UV-Vis-NIR spectrophotometer)

## NUMERICAL SIMULATION EXPERIENCE

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- ◆ Petrological Modeling: MELTS, PETROLOG, Arc Basalt Simulator, PRIMELT, COMAGMAT
- ◆ EPMA simulation: PENEPMA, CalcZAF
- ◆ Basic, Fortran, Matlab, Python programming

## TEACHING EXPERIENCE

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- ◆ Graduate Teaching Fellow (2015-2016). Rutgers University.  
Mineralogy (Fall 2015) – laboratory and field instructor  
Introduction to Geophysics (Spring 2016) – field and data analysis instructor

- ◆ Undergraduate Mentor (2013). Jennifer Geoghegan, (faculty mentor: Michael J. Carr) Undergraduate Senior Thesis Research, Rutgers University.

## FIELD EXPERIENCE

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- ◆ Cascades: Mt. Shasta (one week, 2018).
- ◆ Kamchatka, Russia: Shiveluch and Klyuchevskoy volcanoes (two weeks, 2017)
- ◆ Kamchatka, Russia: Shiveluch volcano (two weeks, 2016)
- ◆ Sicily, Italy: Mt. Etna (one week, 2010)
- ◆ Kamchatka, Russia: Gorely and Mutnovsky volcanoes (six weeks, 2008-2010)
- ◆ Kamchatka, Russia: Bezymyanny, Gorely, and Mutnovsky volcanoes (three weeks, 2007)
- ◆ Cascades: Mt. St. Helens (one week, 2006).
- ◆ Kamchatka, Russia: Bezymyanny volcano (two weeks, 2006)
- ◆ Kamchatka, Russia: Bezymyanny and Tolbachik volcanoes (two weeks, 2005)
- ◆ Eastern Siberia, Russia (two months, 2005).
- ◆ Kamchatka, Russia: Klyuchevskoy volcano (two weeks, 2003)
- ◆ Kamchatka, Russia: Bezymyanny, Gorely, and Mutnovsky volcanoes (five weeks, 2000)
- ◆ Kamchatka, Russia: Klyuchevskoy, Karymsky, Gorely, and Mutnovsky volcanoes (twelve weeks, 1998-99)
- ◆ Kamchatka, Russia: Bezymyanny and Klyuchevskoy volcanoes (three weeks, 1996)
- ◆ Kamchatka, Russia: Gorely and Mutnovsky volcanoes (two weeks, 1995)

## ACADEMIC AWARDS, SCHOLASHIPS, AND FELLOWSHIPS

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- ◆ 2015: Richard K. Olsson Award – for Ph.D.-student of the year; RUTGERS University (Dept. Earth & Planetary Sciences)
- ◆ 2014: Excellence Fellowship for dissertation work (2014-2015); RUTGERS University (School of Arts and Sciences)
- ◆ 2010: FULBRIGHT Program – The International Fulbright Science & Technology Award; 3-year fellowship (2011-2014)

## FUNDED RESEARCH PROJECTS

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- ◆ Far Eastern Branch of Russian Academy of Sciences – research grants (2015, 2012-2009, 2007, 2006).
- ◆ Russian Foundation for Basic Research – “Research Support Program for Young Scientists” (2001, 2002); conference travel grants (2008, 2009).

## ACADEMIC ADVISORS

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- P. Ruprecht (University of Nevada, Reno, *Post-doc advisor*)
- M. Krawczynski (Washington University in St. Louis, *Post-doc advisor*)
- C. Herzberg (Rutgers University, *Ph.D. advisor*)
- M. Carr (Rutgers University, *Ph.D. committee member*)
- V. Levin (Rutgers University, *research mentor*)
- A. Ozerov (Institute of Volcanology and Seismology, Russia, *research mentor*)

## COMMUNITY SERVICES

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- ◆ Reviewer for such peer-reviewed scientific journals as Earth and Planetary Science Letters, Bulletin of Volcanology, Chemical Geology, Lithos, Geochimica et Cosmochimica Acta, Journal of Petrology, American Mineralogist, Contributions to Mineralogy and Petrology.
- ◆ Proposal reviewer for the U.S. National Science Foundation (Petrology & Geochemistry).
- ◆ Proposal reviewer for the Fulbright Scholarship program (Geology).
- ◆ Session convener “The role of volatiles in volcanic systems of the Earth's lithosphere”, IAVCEI Scientific Assembly, 2017.

## LANGUGES

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Russian (native speaker); English (fluent); French (basic in speaking and reading).

## PROFESSIONAL AFFILIATIONS

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The American Geophysical Union (AGU)

The Mineralogical Society of America (MSA)

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

## PUBLICATIONS (PUBLISHED OR IN PEER-REVIEW PROCESS)

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- 8) **Gavrilenko, M.G.**, Batanova, V., Llovet, X., Krashennnikov, S., Koshlyakova, A., Sobolev A. (**in press**) Secondary fluorescence effect quantification of EPMA analyses of olivine grains embedded in basaltic glass. *In press in Chemical Geology*. DOI: 10.1016/j.chemgeo.2023.121328
- 7) Zelenski, M., Luca Rizzo, A., Taran, N., Nekrylov, N., Chaplygin, I., **Gavrilenko, M.**, Farhadian Babadi, M., Mehrabi, B., Shakeri, A., Delavari, M., Sherbakov, V. (**in review**) Slab fluid induced magmatism under a large intraplate volcano? The case of Damavand, the northern Iran. *In review in Journal of Volcanology and Geothermal Research*
- 6) Goltz, A., Krawczynski, M., **Gavrilenko, M.G.**, Gorbach, N., Ruprecht, P. (2020) Evidence for superhydrous primitive arc magmas from mafic enclaves at Shiveluch volcano, Kamchatka. *Contributions to Mineralogy and Petrology*, 175(12):115. DOI: 10.1007/s00410-020-01746-5 (**16**)
- 5) **Gavrilenko, M.G.**, Krawczynski, M., Ruprecht, P., Li, W., Catalano, J.G. (2019) The quench control of water estimates in convergent margin magmas. *American Mineralogist*, v. 104, no. 7, p. 936-948. DOI: 10.2138/am-2019-6735 (**25**)
- 4) **Gavrilenko, M.G.**, Herzberg, C.T., Vidito, C., Carr, M.J., Tenner, T., Ozerov A.Yu. (2016) A Calcium-in-Olivine Geohygrometer and its Application to Subduction Zone Magmatism. *Journal of Petrology*, v.57, no. 9, p. 1811-1832. DOI: 10.1093/petrology/egw062 (**103**)
- 3) **Gavrilenko, M.G.**, Ozerov, A.Yu., Kyle, P., Carr, M.J., Nikulin A., Vidito, C., Danyushevsky, L. (2016) Abrupt transition from fractional crystallization to magma mixing at Gorely volcano (Kamchatka) after caldera collapse. *Bulletin of Volcanology*, v. 78, no. 7, p. 1-28. DOI: 10.1007/s00445-016-1038-z (**37**)
- 2) Levin, V., Droznina, S., **Gavrilenko, M.G.**, Carr, M.J., Senyukov, S.L. (2014) Seismically active subcrustal magma source of the Klyuchevskoy volcano in Kamchatka, Russia. *Geology*, v. 42, no. 11, p. 983-986. DOI: 10.1130/g35972.1 (**23**)
- 1) Tolstykh, M.L., Naumov, V.B., **Gavrilenko, M.G.**, Ozerov, A.Yu., Kononkova, N.N. (2012) Chemical composition, volatile components, and trace elements in the melts of the Gorely volcanic center, southern Kamchatka: Evidence from inclusions in minerals. *Geochemistry International*, vol. 50, No 6, p. 522-550. DOI: 10.1134/S0016702912060079 (**21**)

(ITALICS = CITATIONS BASED ON GOOGLE SCHOLAR)

## PUBLICATIONS (IN PREPARATION)

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- 1) Llovet, X., **Gavrilenko, M.G.**, Sobolev, A.V. Element depletion due to boundary fluorescence in electron probe microanalysis. *To be submitted to Microscopy and Microanalysis*.
- 2) **Gavrilenko, M.G.**, Ruprecht, P., Krawczynski, M., Portnyagin, M., Mironov, N. The magmatic H<sub>2</sub>O pathway at a subduction zone through the lens of non-traditional hygrometry: advantages, complications, and perspectives. *To be submitted to Contributions to Mineralogy and Petrology*.

## CONFERENCE PRESENTATIONS

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### **Abstracts presented:** (\*=presenter)

\***Gavrilenko, M.**, Batanova, V., Llovet, X., Krasheninnikov, S., Koshlyakova, A., Sobolev A. (2022) Secondary fluorescence effect quantification of EPMA analyses of olivine grains embedded in basaltic glass. *Goldschmidt Conference 2022 (Honolulu, USA)*.

\***Gavrilenko, M.**, Batanova, V., Krasheninnikov, S., Sobolev A. (2021) EPMA analyses of olivine near the boundary with a basaltic glass – the secondary fluorescence effect quantification. *Goldschmidt Conference 2021 (Lyon, FRANCE)*. DOI: 10.7185/gold2021.5335

\***Gavrilenko, M.**, Ruprecht, P., Krawczynski, M., Catalano, J. (2019) The Limits of Glassy Melt Inclusion as Magmatic H<sub>2</sub>O Recorders for Super-Hydrous Mafic Melts. *AGU Fall Meeting (San Francisco, USA)*, Abstract V11A-02.

\*Ruprecht, P., Reyes, P., Winslow, H., Walowski, K., **Gavrilenko, M.**, Krawczynski, M., Plank, T. (2019) Crystal exit interviews – the role of olivine in recording magma assembly and magmatic processes. *AGU Fall Meeting (San Francisco, USA)*, Abstract V43A-05.

\*Krawczynski, M., Goltz, A., **Gavrilenko, M.** (2019) Evidence for eruption of a superhydrous magma from Shiveluch volcano, Kanchatka. *GSA Annual Meeting (Phoenix, USA)*. DOI: 10.1130/abs/2019AM-340579

\***Gavrilenko, M.**, Ruprecht, P., Krawczynski, M. (2018) Magmatic H<sub>2</sub>O variations in primitive magmas of Klyuchevskoy volcano through the lens of the Ca-in-olivine. *Goldschmidt Conference 2018 (Boston, USA)*.

\*Goltz A., Krawczynski, M., **Gavrilenko, M.**, Gorbach, N., Ruprecht, P. (2018) Petrology and Geochemistry of Mafic Enclaves from Shiveluch Volcano, Kamchatka. *Goldschmidt Conference 2018 (Boston, USA)*.

\***Gavrilenko, M.**, Krawczynski, M., Ruprecht, P., Li, W. (2017) Are melt inclusions a robust tool for understanding H<sub>2</sub>O content of deep hydrous arc magmas? *IAVCEI Scientific Assembly (Portland, USA)*.

\*Krawczynski, M., **Gavrilenko, M.**, Ruprecht, P. (2017) Possible existence of deep super-hydrous arc magmas: implications from high-Mg amphibole. *IAVCEI Scientific Assembly (Portland, USA)*.

\*Herzberg, C., **Gavrilenko, M.**, Vidito, C. (2015) Provenance of Olivine in Volcanic Rocks. *Goldschmidt Conference 2015 (Prague, Czech Republic)*.

\*Ponomareva, V., Portnyagin, M., Kuvikas, O., Pevzner, M., Bazanova, L., Bigg, G., **Gavrilenko, M.**, Kyle, P., Christel van den Bogaard (2009) Tephrochronological Research in the KALMAR Project and its Implications to the Temporal and Compositional Evolution of Volcanism in Kamchatka. *First Bilateral workshop on Russian-German cooperation on Kurile-Kamchatka and the Aleutian Marginal Sea-Island Arc Systems*.

\***Gavrilenko M.**, Ozerov A., Kyle P., Eichelberger J. (2008) Gorely volcano (Southern Kamchatka) – petrochemical characteristics of magmatic evolutionary series. *IAVCEI General Assembly (Reykjavik, Iceland)*.

### **Poster presented:**

\***Gavrilenko, M.**, Ruprecht P., Krawczynski, M., (2018) Tracking pre-eruptive magmatic H<sub>2</sub>O evolution from the mantle to the surface at Klyuchevskoy volcano (Kamchatka arc). *AGU Fall Meet. Suppl., Abstract T31H-0396*.

\***Gavrilenko, M.**, Krawczynski, M., Ruprecht P. (2017) The quench control of water estimates in convergent margin magmas. *AGU Fall Meet. Suppl., Abstract V33G-0590*.

- \***Gavrilenko, M.**, Herzberg, C., Vidito, C., Carr, M., Tenner, T., Ozerov A. (2016) A Calcium in Olivine Geothermometer and its Application to Subduction Zone Magmatism. *AGU Fall Meet. Suppl., Abstract V31A-3060*.
- \***Gavrilenko, M.**, Ozerov A., Kyle P., Carr M.J., Nikulin A. (2015) Magma mixing and degassing processes in the magma chamber of Gorely volcano (Kamchatka): evidence from whole-rock and olivine chemistry. *AGU Fall Meet. Suppl., Abstract V43B-3120*.
- \***Gavrilenko, M.**, Ozerov, A., Kyle, P., Carr, M.J. (2015) The roles of fractional crystallization and mixing on magma evolution at Gorely volcano (Kamchatka). *GeoPRISMS/TEI SCD Meeting (Los Angeles)*.
- \***Gavrilenko, M.**, Ozerov, A. (2014) The Sub-Crustal Magma Chamber Existence and Magma Ascent Rate for Klyuchevskoy Volcano (Kamchatka): Constrains from Ni Zonation in Olivine Phenocrysts. *AGU Fall Meet. Suppl., Abstract V51A-4726*.
- \***Gavrilenko, M.** (2014) Volcanoes – a window to the Earth interior: Identification of Source Lithology. *Fulbright International Science & Technology Capstone (Washington, DC)*.
- \***Gavrilenko, M.**, Carr, M., Herzberg, C., Ozerov, A. (2013) Pyroxenite is a possible cause of enriched magmas in island arc settings: Gorely volcano (Kamchatka). *AGU Fall Meet. Suppl., Abstract V31A-2666*.
- \*Dunham, B., Levin, V., Droznina, S., **Gavrilenko, M.** (2013) Impact of subduction geometry on high-productivity arc volcanism of the Klyuchevskoy volcanic group (Kamchatka, Russia). *AGU Fall Meet. Suppl., Abstract V21C-2748*.
- \***Gavrilenko, M.**, Herzberg, C., Portnyagin, M., Ozerov, A. (2012) Identification of Source Lithology at South Segment of Kamchatka Subduction Zone. *AGU Fall Meet. Suppl., Abstract V31A-2761*.
- \***Gavrilenko, M.**, Ozerov, A. (2011) Mineralogical and Geochemical Characteristics of High-Magnesian Basalts of Gorely volcano (Southern Kamchatka): Implication for Mantle Source. *AGU Fall Meet. Suppl., Abstract V43C-2584*.
- \*Shipman, J., Izbekov, P., **Gavrilenko, M.** (2011) Petrologic Insights into Magma System Response to Edifice Collapse. *AGU Fall Meet. Suppl., Abstract V21E-2540*.
- \***Gavrilenko, M.G.**, Ozerov, A.Yu. (2010) Geochemical similarities between the Pre-caldera and Modern evolutionary series of eruptive products from Gorely volcano. *AGU Fall Meet. Suppl., Abstract V21B-2333*.
- \*Shipman, J.S., Turner, S.J., **Gavrilenko, M.**, Izbekov, P.E. (2010) Rapid Modal Analysis and Whole-Rock Geochemistry of the 1956-Present Eruptive Products of Bezymianny Volcano, Kamchatka, Russia. *AGU Fall Meet. Suppl., Abstract V21B-2332*.
- \***Gavrilenko, M.G.**, Ozerov, A.Yu. (2010) The chemical composition of the accessory minerals inclusions in the olivine and pyroxene phenocrysts, as an indicator of the calc-alkaline magmas evolution conditions at the Gorely volcano (Kamchatka). *GSA Annual Meeting (Portland)*.
- \***Gavrilenko, M.**, Ozerov, A. (2009) High-Magnesian Basalts – Source of Calc-Alkaline Series of Gorely Volcano (Kamchatka). *6th Biennial Workshop on Japan-Kamchatka-Alaska Subduction Processes (Fairbanks)*.