

Charles Le Losq, Ph.D.

Maître de Conférences at the Institut de physique du globe de Paris

University Paris Cité

Institut Universitaire de France

1 rue Jussieu, 75005 Paris, France

<http://charlesll.github.io> · GitHub: github.com/charlesll

SCOPUS: 5522597650 · ORCID: 0000-0001-8941-9411

March 3, 2025

EDUCATION

Institut de physique du globe de Paris – University Paris VII

Paris, France

Ph.D. in Geophysics, obtained with congratulations of the jury

Oct. 2009 – Dec. 2012

Title: Role of alkali elements and water on the properties and structure of aluminosilicate melts and glasses: with volcanological implications.

Ph.D. defended the 13 December 2012 and obtained with the mention ‘very honorable with congratulations of jury’, in front of a jury composed of Claude Jaupart (Professor at the IPGP - Paris VII, president of the jury), Dominique Massiot (Director of the CEMHTI-CNRS Orléans, reviewer), Mike Toplis (Research director, Observatory Midi-Pyrénées of Toulouse, reviewer), Bernard Hehlens (Professor, University Montpellier 2), Roberto Moretti (Professor, University Federico II of Napoli, Italia) and Daniel R. Neuville (Research director, CNRS - IPGP, Ph.D. supervisor).

Institut de physique du globe de Paris

Paris, France

Master in Geology and Natural Hazards, Mention ‘Good’

Sept. 2007 – June 2009

University of Poitiers

Poitiers, France

Licence (Bachelor equivalent) in Geosciences, Mention ‘Good’

Sept. 2004 – June 2007

RESEARCH EXPERIENCE

Institut Universitaire de France

Paris, France

Junior Member

Oct. 2025 - Oct. 2029

Institut de physique du globe de Paris - Paris City University

Paris, France

Maître de Conférences (Assistant Professor)

Sept. 2019 - current

- Build rheological models of magmas and use them to study volcanic eruptions and magma oceans.
- Develop machine learning as a tool in geochemistry.
- Teach during the Licence and Master courses.

Australian National University - Research School of Earth Sciences

Canberra, Australia

Research Fellow

Oct. 2015 - Sept. 2019

- Develop knowledge about, and build models of the links between properties, structure and chemistry of silicate materials.
- Study the water solution mechanisms in nominally anhydrous minerals.

- Explore geochemical datasets via unsupervised machine learning classification models.
- Develop Bayesian and machine learning modelling of spectroscopic data.

Carnegie Institution for Science*Washington DC, U.S.A.**Postdoctoral Fellow*

Oct 2013 - Oct 2015

- Performed hydrothermal diamond cells and piston-cylinder experiments to develop our understanding of water solution mechanisms in magmas and glasses.
- Studied the behaviour of stable isotopes of light elements in glasses and melts for understanding e.g. water budget on Earth.

Institut de physique du globe de Paris*Paris, France**Research and Teaching Assistant*

Oct 2012 - August 2013

- Pursued research on the properties of alkali aluminosilicate glasses and melts.
- Studied the rheology of magmas from the Toba (Indonesia) and Erebus (Antartica) volcanoes.

Institut de physique du globe de Paris - University Paris 7 – Denis Diderot*Paris, France.**Ph.D. student and teaching assistant*

2009 -2012

- Research on the properties of alkali aluminosilicate glasses and melts.
- Developed a new method to measure glass water contents.
- Built ad-hoc models to predict the rheology of the magmas from the Vesuvius (Italy), Erebus (Antartica) and Mont Dore (France) volcanoes.

Master intern

2007, 2008

- Studied the rheology of silica-rich alkali aluminosilicate glasses and melts.
- Experimented a novel method to measure glass water content from their Raman spectra.
- Studied the properties of volcanic pumices from the Mont Dore volcano in France.

TEACHING EXPERIENCE**Field courses***Geology 1 fieldtrip*

2021 - present

- 6 days/yr, 1st year Master 1, Geology cursus, Institut de Physique du Globe de Paris.

Master field course

2019- present

- 6 days/yr, 1st year Master (all cursus), Institut de Physique du Globe de Paris.

Initiation to field work

2017

- 2 days, undergraduate course, Blue Planet course, Research School of Earth Sciences.

Geological Mapping

2009 - 2013

- 10 days/yr, 3rd year Licence STEP (Bachelor equivalent), Institut de Physique du Globe de Paris, University Paris VII – Denis Diderot.

Lectures*Volcanic Systems*

2019 - present

- 8 hours. Course Manager. 1st year of Master STEP, Institut de physique du globe de Paris, University of Paris.

Modeling in Geochemistry

2019 - present

- 8 hours. 2nd year of Master STEP, Institut de physique du globe de Paris, University of Paris.

Characterization of materials

2019 - 2022

- 8 hours. 1st year of Master STEP, Institut de physique du globe de Paris, University of Paris.

From atoms to materials

2022 - present

- 8 hours. 1st year of Master STEP, Institut de physique du globe de Paris, University of Paris.

Analytical Tools in Geochemistry

2013

- 4 hours. 2nd year of Master STEP, Institut de physique du globe de Paris, University Paris VII – Denis Diderot.

Practicals*Physics for Geosciences 2: practicals*

2019 - 2024

- 64 hours. Course Manager. 3rd year of Licence STEP, Institut de physique du globe de Paris, University Paris VII – Denis Diderot.

EMSC8023 Data Analysis 2019

- Master degree, Research School of Earth Sciences.

EMSC8014 Computational Geoscience 2018, 2019

- 24 hours. Master degree, Research School of Earth Sciences.

Data Science Python courses 2018

- 8 hours. Ph.D. level, Research School of Earth Sciences.

Volcanology 2011, 2012

- 12 hours/yr. 1st year of Master STEP, Institut de physique du globe de Paris, University Paris VII – Denis Diderot.

Tutorials

Tutored Project in Geoscience 2021, 2024

- 8 hours/yr. Master degree, IPGP.

EMSC8701 Research Orientation 2018, 2019

- 3 hours/yr. Master degree, Research School of Earth Sciences.

Round tables and seminars 2013

- 16 hours. 3rd year of License Sciences of the Living, University Paris VII – Denis Diderot. Tutorials in Earth and Environmental sciences.

Supervision

Engineers

- Salomé Pannefieu. 2025. Supervisor.
- Clément Ferraina. 2023 → 2024. Supervisor.

Ph. D. candidates

- Matthieu Nougaret. 2022 → present. Co-director.
- Salomé Pannefieu. 2020 → 2024. Co-director.
- Nicholas Farmer. 2016 → 2019. Advisor.

Master students

- Lauréna Mourand. 2025 (5 months internship). Supervisor, 2nd year internship.
- Lauréna Mourand. 2024 (2 months internship). Supervisor, 1st year internship.
- Matthieu Nougaret. 2022 (5 months internship). Supervisor, 2nd year internship.
- Barbara Baldoni. 2021 (6 months internship). Supervisor, 1st year internship.
- Julia Cozzolino. 2021 (5 months internship). Co-supervisor, 2nd year internship.
- Julia Cozzolino. 2020 (2 months internship). Supervisor, 1st year internship.
- Floriane Lebas. 2020 (2 months internship). Supervisor, 1st year internship.

Undergraduate students

- Robin Duprat. 2022 (3 months internship). Supervisor, 3rd year professional undergraduate internship.
- François Decossin. 2020 (2 months internship). Supervisor, 3rd year undergraduate internship.
- Aurélien Bablet. 2013 (1 month internship). Supervisor, undergraduate laboratory internship.

Professional master students

- 2019 - 2024. Tutor of three professional master students during their 2 year internship in industry.

Evaluation of undergraduate internships

- 2013, 8 hours. 3rd year of Licence STEP (Bachelor equivalent), Institut de physique du globe de Paris, University Paris VII – Denis Diderot. Evaluation of students' final reports and presentations.

PROFESSIONAL TRAINING

Maître de Conférences initial pedagogical training 2019 - 2020

- 32 hours. University of Paris, France. Various courses on the different aspects of teaching and mentoring students during their university journey.

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| <i>Ionizing Radiation Machines</i> | 2016 |
| <ul style="list-style-type: none"> • 1/2 day. Australian National University, Canberra, Australia. | |
| <i>CNRS formation on nucleation and crystallization phenomena</i> | 2013 |
| <ul style="list-style-type: none"> • 5 days, France. Review of the recent theories on the nucleation and crystallization processes and of the analytical tools for studying them (SEM and HRTEM microscopy, X-Ray diffusion and diffraction, Raman spectroscopy, small-angle neutron scattering, XAFS spectroscopy). | |
| <i>First aid and rescue worker formation</i> | 2013 |
| <ul style="list-style-type: none"> • 2 days, IPGP, Paris, France. | |
| <i>CNRS formation on molecular dynamic simulation of silicate melts</i> | 2011 |
| <ul style="list-style-type: none"> • 5 days, France. Use of the Abinit code, ab initio and classical models, Reverse Monte-Carlo models. | |
| <i>Agent of implementation of hygiene and safety rules</i> | 2011 |
| <ul style="list-style-type: none"> • 6 days (42 hours), IPGP – University Paris-Est – University Paris Descartes, Paris, France. | |
| <i>Prevention and Civic Assistance formation level 1 (first aid and rescue)</i> | 2011 |
| <ul style="list-style-type: none"> • 12 hours, University Paris VII – Denis Diderot, Paris, France. | |

UNIVERSITY SERVICES

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| Institut de physique du globe de Paris | <i>Paris, France</i> |
| <i>ED STEP'UP Doctoral school advisor for the Doctoral Congress</i> | 2025 - present |
| <i>REVOSIMA committee</i> | 2020 - 2023 |
| <ul style="list-style-type: none"> • Petrology and geochemistry referee. | |
| <i>Safety Prevention Assistant</i> | Nov 2019 - Oct 2022 |
| <ul style="list-style-type: none"> • Risk documentation and safety issues management of the Geomaterial laboratory at IPGP. | |
| Research School of Earth Sciences, Australian National University | <i>Canberra, Australia</i> |
| <i>Deputy Associate Director / Engagement Portfolio</i> | 2018 - 2019 |
| <ul style="list-style-type: none"> • Lead, manage and develop the engagement activities of ANU-RSES toward its stakeholders. | |
| <i>Experimental Petrology Representative / Engagement Portfolio</i> | 2017 - 2019 |
| <ul style="list-style-type: none"> • Represent the Experimental Petrology group in the Engagement Portfolio. | |
| <i>Infrared Laboratory Manager</i> | 2017 - 2019 |
| <ul style="list-style-type: none"> • Manage 16 users, ensure formation of new users, as well as maintenance and good working conditions of the infrared spectrometer. | |
| <i>Leading Member of the Data Science Research Theme</i> | 2016 - 2019 |
| <ul style="list-style-type: none"> • Co-organizer of the Data Science Research Forums, the Data Science Lunch, and Data Science Python courses, and interventions in the Data Surgery sessions. • Created and maintain the RSES Data Science website and Github repository. | |
| <i>Geochemistry cluster representative</i> | 2016 - 2017 |
| <ul style="list-style-type: none"> • Represented the Geochemistry group for engagement activities during the meeting of the RSES Marketing committee as well as of the Marketing team of the ANU College of Science. | |
| Carnegie Institution for Science | <i>Washington DC, U.S.A.</i> |
| <i>BBR Poster Gathering co-creator and co-organizer</i> | 2015 |
| <ul style="list-style-type: none"> • Created and organised the BBR poster sessions in 2015 where scientists from the Geophysical laboratory and the Department of Terrestrial Magnetism present to each other their work. The goal is to foster the development of a collegial and collaborative environment for enhancing collaborations and generating new ideas. | |
| Institut de physique du globe de Paris | <i>Paris, France</i> |
| <i>Safety Prevention Assistant</i> | Oct 2012 - August 2013 |
| <ul style="list-style-type: none"> • Worked on improving risk documentation and safety issues management of the Geochemistry laboratory at IPGP. | |
| <i>Co-organisator of the Ph. D. conference</i> | 2010 |

- Organised this week-long conference where Ph.D. students of IPGP present their work as posters or oral presentations, and where they also meet with industrial partners.

COMMUNITY SERVICE

CNRS RT NuTS

2022 - current

Member of the programming panel of the thematic network NuTS, numerical science in solid earth

- Participate in developing and organising the program for the meetings

Program Review Committee 6 SOLEIL synchrotron

2020 - current

Member of the review pannel

- Participate in reviewing proposals and assigning shifts at the SOLEIL synchrotron.

International Mineralogical Association meeting

2022

Co-convener of the session OL34

AGU Fall meeting

2021

Primary convener of sessions V23A and V25A

CLEEDI workshop, Foix, France

2021

Co-organizer of the CLEEDI workshop

Raman Open Database

2018 -

Advisory board member

- Participate in the ROD development and promotion.
- Develop a Python wrapper for formatting Raman data in the ROD format.

Reviewer

Peer-reviewed journals: Geology, Earth and Planetary Science Letters, American Mineralogist, Chemical Geology, Geochimica et Cosmochimica Acta, Applied Spectroscopy, Journal of Petrology, Physics and Chemistry of Glasses: European Journal of Glass Science and Technology Part B, Journal of Geophysical Research: Machine Learning and Computation, Journal of Non-Crystalline Solids, Ceramics International, European Journal of Mineralogy, Journal of Raman Spectroscopy, Journal Volcanica, Physical Chemistry Chemical Physics, Scientific Reports, Nature Communications, Comptes Rendus Geosciences

Grants: French ANR and INSU projects, German DFG projects.

Affiliations and Memberships

Japan Geoscience Union, American Geophysical Union

OUTREACH ACTIVITIES

Institut de physique du globe de Paris

Paris, France

Intervenues during high school student interships

2024, 2025

- Animate sessions presenting high pressure research activities.
- Visit of the high pressure laboratory, team CAGE.

Research School of Earth Sciences

Canberra, Australia

ANU Open Day

2018

- Participated to the organisation of ANU Open Day.

Sciences in ACTION

2018

- Animator at the ANU-RSES booth at this outreach event.

National Youth Science Forum summer school

2017, 2018

- Organised the venue of the students and the visits/activities at RSES.

Summer School of Indigenous Students

2016

- Coordinated this event, where 14 students from high-school visited RSES for a summer school.

ANU Open Day

2016

- Animator at the Lab Coat Party, where experiments and samples were shown to the public.

DISTINCTIONS

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|-----------------------------------------|-----------|
| <i>Institut Universitaire de France</i> | 2024-2029 |
| • Chaire Fondamentale Junior | |
| <i>University Paris Cité</i> | 2019-2023 |
| • Chaire d'Excellence | |

GRANTS

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|---------------------------------------------------------------------------|-----------|
| <i>Institut Universitaire de France</i> | 2024-2029 |
| • Grant Value: 75,000 € | |
| <i>Labex UnivEarth, University Paris Cité</i> | 2023-2025 |
| • Grant Value: 260,000 € | |
| <i>Data Intelligence Institute of Paris</i> | 2021 |
| • Grant Value: 3,600 € | |
| <i>University of Paris Chaire d'Excellence</i> | 2019 |
| • Grant Value: 200,000 € | |
| <i>Australian National University Early Career Scientist Travel Grant</i> | 2017 |
| • Grant Value: \$3000 AUD. | |

NUMERICAL PROJECTS

For a full list of the projects I maintain or I am involved in, please see my Github page.

- **gpvisc**: An open source project for modeling the viscosity of magmatic liquids, sensus latto. Creator and administrator.
- **i-Melt**: An open source project for machine learning modeling of material properties. Creator and administrator.
- **Rampy**: An open source library for helping treating spectroscopic data (Raman, Infrared, XAS and NMR...) written with the Python language. Creator and administrator.
- **Spectra.jl**: An open source library for helping treating spectroscopic data (Raman, Infrared, XAS and NMR...) written with the Julia language. Creator and administrator.
- **gcvspline**: A Python wrapper for the FORTRAN gcvspline library, offering easy access to generalized cross-validated spline functions. Creator and co-administrator.
- **gcvspl**: Julia wrapper of the GCV spline FORTRAN program. Creator and co-administrator.
- **sulfur-magma**: FORTRAN code for prediction of sulfur redox state in magmatic liquids. Maintainer.
- **iron-magma**: FORTRAN code for prediction of iron redox state in magmatic liquids. Maintainer.
- **water-speciation-magma**: FORTRAN code for prediction of water speciation in magmatic liquids. Maintainer.
- **PyMCR**: Multivariate Curve Resolution for Python. Contributor.

SELECTED PUBLICATIONS

- Le Losq, C., Ferraina, C., Sossi, P.A., and Boukaré, C.-É. (2025) A general machine learning model of aluminosilicate melt viscosity and its application to the surface properties of dry lava planets. *Earth and Planetary Science Letters*, 656, 119287. <https://doi.org/10.1016/j.epsl.2025.119287>
- Le Losq, C., and Baldoni, B. (2023) Machine learning modeling of the atomic structure and physical properties of alkali and alkaline-earth aluminosilicate glasses and melts. *Journal of Non-Crystalline Solids*, 617, 122481. <https://doi.org/10.1016/j.jnoncrysol.2023.122481>
- Le Losq, C., and Sossi, P.A. (2023) Atomic structure and physical properties of peridotite glasses at 1 bar. *Frontiers in Earth Science*, 11. <https://doi.org/10.3389/feart.2023.1040750>

- Le Losq, C., Neuville, D.R., Chen, W., Florian, P., Massiot, D., Zhou, Z., Greaves, G.N. (2017) Percolation channels: a universal idea to describe the atomic structure and dynamics of glasses and melts. *Scientific Reports* 7, 16490. <https://doi.org/10.1038/s41598-017-16741-3>
- Le Losq C., Neuville D. R., Florian P., Henderson G. S. and Massiot D. (2014) The role of Al³⁺ on rheology and structural changes in sodium silicate and aluminosilicate glasses and melts. *Geochimica et Cosmochimica Acta* 126, 495-517. <https://doi.org/10.1016/j.gca.2013.11.010>

SELECTION OF MEDIA RELEASE

- Australian Academy of Science, 2017. Shatterproof mobiles are coming.
- ABC news, 2017. Cracked phone screens could soon be a thing of the past – thanks to science.
- The Canberra Times, 2017. New glass technology could lead to end of smashed mobile phone screens.
- ZDnet] 2017. ANU moves closer to fracture-proof phone screens.
- The Indian Express, 2017. Improved glass structure behind shatter-proof smartphone screens: Study
- ScienceDaily, 2017. Shatter-proof mobile phone screens a step closer.