Charles Le Losq, Ph.D.

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

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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 – June2007

Research Experience

Institut de physique du globe de Paris - University of Paris *Paris, France*
Maître de Conférences (Assistant Professor) Sept. 2019 - current

- Build rheological models of magmas and use them to study the link between volcanic explosivity and magma rheology.
- 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, 1rd year Master 1, Geology cursus, Institut de Physique du Globe de Paris.

Master field course 2019- present

- 6 days/yr, 1rd 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 - present

- 6 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 - present

- 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 the Geoscience 2022

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

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.

Student Supervision

Ph. D. supervision

- Salomé Pannefieu. 2020 → present. Advisor.
- Nicholas Farmer. 2016 → 2019. Advisor.

Master student supervision

- Matthieu Nougaret. 2022 (5 months intership). Supervisor, 2^{nd} year internship.
- Barbara Baldoni. 2021 (6 months intership). Supervisor, 1^{st} year internship.
- Julia Cozzolino. 2021 (5 months intership). Co-supervisor, 2^{nd} year internship.
- Julia Cozzolino. 2020 (3 months intership). Supervisor, 1^{st} year internship.
- Floriane Lebas. 2020 (3 months intership). Supervisor, 1^{st} year internship.

Undergraduate student supervision

- François Decossin. 2020 (2 months intership). Supervisor, 3^{rd} year undergraduate internship.
- Aurélien Bablet. 2013 (1 month intership). Supervisor, undergraduate laboratory internship.

Professional master student supervision

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

Evaluation of undergraduate interships

- 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.

Ionizing Radiation Machines 2016

- 1/2 day. Australian National University, Canberra, Australia.

CNRS formation on nucleation and crystallization phenomena 2013

- 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).

First aid and rescue worker formation 2013

- 2 days, IPGP, Paris, France.

CNRS formation on molecular dynamic simulation of silicate melts 2011

- 5 days, France. Use of the Abinit code, ab initio and classical models, Reverse Monte-Carlo models.

Agent of implementation of hygiene and safety rules 2011

- 6 days (42 hours), IPGP – University Paris-Est – University Paris Descartes, Paris, France.

Prevention and Civic Assistance formation level 1 (first aid and rescue) 2011

- 12 hours, University Paris VII – Denis Diderot, Paris,France.

University Services

Institut de physique du globe de Paris, University of Paris *Paris, France*

REVOSIMA committee Jan 2020 - current

- Petrology and geochemistry referee.

Safety Prevention Assistant Nov 2019 - current

- Risk documentation and safety issues management of the Geomaterial laboratory at IPGP.

Research School of Earth Sciences, Australian National University *Canberra, Australia*

Deputy Associate Director | Engagement Portfolio 2018 - 2019

- Lead, manage and develop the engagement activities of ANU-RSES toward its stackholders.

Experimental Petrology Representative | Engagement Portfolio 2017 - 2019

- Represent the Experimental Petrology group in the Engagement Portfolio.

Infrared Laboratory Manager 2017 - 2019

- Manage 16 users, ensure formation of new users, as well as maintenance and good working conditions of the infrared spectrometer.

Leading Member of the Data Science Research Theme 2016 - 2019

- 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.

Geochemistry cluster representative 2016 - 2017

- 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 *Washington DC, U.S.A.*

BBR Poster Gathering co-creator and co-organizer 2015

- 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 *Paris, France*

Safety Prevention Assistant Oct 2012 - August 2013

- Worked on improving risk documentation and safety issues management of the Geochemistry laboratory at IPGP.

Co-organisator of the Ph. D. conference 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

Program Review Committee 6 SOLEIL synchrotron *2020 - current*

member

- Participate in reviewing proposals and assigning shifts at the SOLEIL synchrotron.
- Develop a Python wrapper for formating Raman data in the ROD format.

AGU 2022 *2021*

Primary convener of sessions V23A and V25A

CLEEDI workshop, Foix, France *2021*

Co-organizer of the CLEEDI workshop

Raman Open Database *2018 - current*

Advisory board member

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

Reviewer

Reviewer for journals (Earth and Planetary Science Letters, American Mineralogist, Chemical Geology, Geochimica et Cosmochimica Acta, Applied Spectroscopy, Journal of Non-Crystalline Solids, Journal Volcanica, Physical Chemistry Chemical Physics, Scientific Reports, Nature Communications, Comptes Rendus Geosciences...) and grants (French ANR and German DFG).

Affiliations and Memberships

Geochemical Society, Japan Geoscience Union, American Geophysical Union, Union pour la Science et la Technologie Verrières

Outreach Activities

Research School of Earth Sciences, Australian National University. *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 Indigeneous 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.

Selected Publications

- Le Losq, C., Valentine, A.P., Mysen, B.O., and Neuville, D.R. (2021) Structure and properties of alkali aluminosilicate glasses and melts: Insights from deep learning. Geochimica et Cosmochimica Acta, 314, 27–54. https://doi.org/10.1016/j.gca.2021.08.023
- 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

Publication Metrics

ORCID ID	0000-0001-8941-9411
SCOPUS ID	55225976500
40	articles in peer-reviewed international journals
4	book chapter
11 invited and 1 keynote	oral communications in peer-reviewed international conferences
Total citation number	Google Scholar 915 / SCOPUS 699
H index	Google Scholar 17 / SCOPUS 15
I10 index	Google Scholar 23

Table 1: Publication metrics.

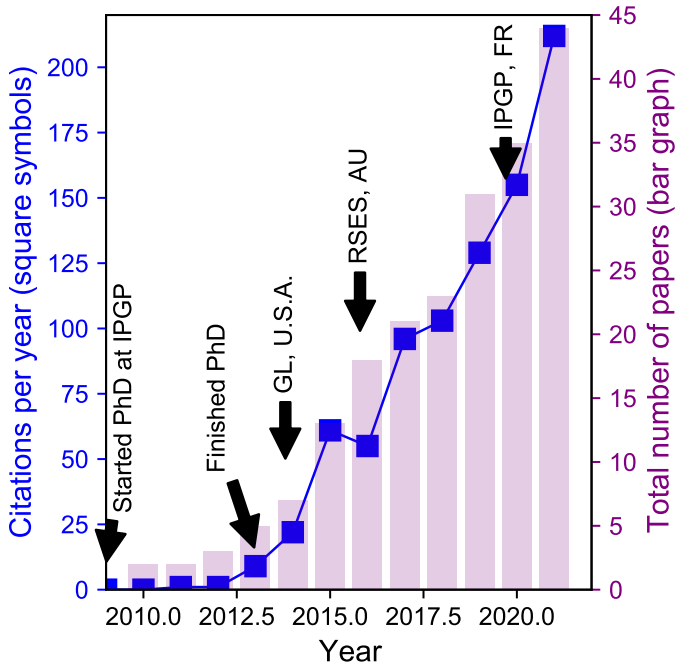

Figure 1: Number of citations per year (blue squares) and of papers (purple bars). Arrows indicate relocation events; IPGP: Institut de Physique du Globe de Paris; RSES: Research School of Earth Sciences; GL: Geophysical Laboratory; see also Positions section. Source: Google Scholar.

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.

Grants

Data Intelligence Institute of Paris 2021
- Grant Value: 3,600 euros.

University of Paris Chaire d'Excellence 2019
- Grant Value: 200,000 euros.

Australian National University Early Career Scientist Travel Grant 2017
- Funding for presenting my work at the Goldschmidt 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.
- **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.

Referees

- **Prof. Daniel R. Neuville**
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- **Prof. Andrew Berry**
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