

## CURRICULUM VITAE

### VERONIQUE LE ROUX, Ph.D.

Associate Scientist

Woods Hole Oceanographic Institution, G&G Dept.

Born 01/15/1983; Married, 2 children

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### Appointments

<b>2017 – Present</b>	<b>Associate Scientist</b> , Woods Hole Oceanographic Institution (USA)
<b>2013 – Present</b>	<b>Joint Program Faculty</b> , Massachusetts Institute of Technology/Woods Hole Oceanographic Institution (USA)
<b>2013 – 2017</b>	<b>Assistant Scientist</b> , Woods Hole Oceanographic Institution (USA)
<b>2012 – 2013</b>	<b>Post-doctoral Investigator</b> , Woods Hole Oceanographic Institution (USA)
<b>2011 – 2012</b>	<b>Post-doctoral Scholar</b> , Woods Hole Oceanographic Institution (USA). Sponsors: G. Gaetani, N. Shimizu
<b>2011 – 2012</b>	<b>Complementary Research Investigator</b> , Rice University (USA)
<b>2009 – 2011</b>	<b>Post-doctoral Fellow</b> , Rice University (USA). Advisor: C.-T. Lee
<b>2005 – 2008</b>	<b>Teaching Assistant</b> , University of Montpellier (France)

### Academic Preparation

<b>2009</b>	Ph.D. Macquarie University (AU) Advisors: J.-L. Bodinier, A. Vauchez. and S. Y. O'Reilly.
<b>2008</b>	Ph.D. Montpellier University (FR) Advisors: J.-L. Bodinier, A. Vauchez. and S. Y. O'Reilly.
<b>2005</b>	Master degree (II) Earth Sciences, Montpellier University (FR) Advisor: J.-L. Bodinier.
<b>2004</b>	Master degree (I), Earth & Planetary Sciences, University of Nantes (FR) Advisor: C. Sotin.
<b>2003</b>	Bachelor degree, Earth & Planetary Sciences, University of Nantes (FR)

### Research Interests

Fluids and volatiles in mantle rocks, eclogites, lower crust; Melt-rock reactions in Earth's mantle; High P-T experiments - mantle melting, slab melting, mélange melting; Melting processes at oceanic ridges; Material transport in subduction zones, arc magmatism; Novel developments in Earth Sciences by micro-CT

### Peer-reviewed publications

Total citations **1262**; h-index **12**

\*Equal 1<sup>st</sup> author; \$Undergraduate advisee; #Graduate advisee; ##Postdoctoral advisee

23. Jones M. R., Soule A., Liao Y., Brodsky H., **Le Roux V.**, Klein F. Quantitative vesicle analyses and total CO<sub>2</sub> reconstruction in mid-ocean ridge basalts. Journal of Volcanology and Geothermal Research. *Submitted*.

22. \*Klein F., \***Le Roux V.** (2020), Quantifying the Volume Increase and Chemical Exchange During Serpentinization. Geology. doi.org/10.1130/G47289.1

21. #Urann. B.M., **Le Roux V.**, John T., Beaudoin G.M., Barnes J.D. (2020), The distribution and abundance of halogens in eclogites: an in situ SIMS perspective of the Raspas Complex (Ecuador). American Mineralogist 105 (3): 307–318, doi 10.2138/am-2020-6994. *Invited contribution*.
20. Shinevar W.J., Mark H.F., Clerc F., Codillo E.A., Gong J., Olive J.-A., Brown S.M., Smalls P.T., Liao Y., **Le Roux V.**, Behn M.D. (2019), Causes of oceanic crustal thickness oscillations along a 74-Myr Mid-Atlantic Ridge flow line. Geochemistry Geophysics Geosystems (G<sup>3</sup>). doi.org/10.1029/2019GC008711
19. **Le Roux V.**, Liang Y. (2019), Ophiolitic pyroxenites record boninite percolation in subduction zone mantle. Minerals 9, 565; doi:10.3390/min9090565.
18. Miller W.G.R., MacLennan J., Shorttle O., Gaetani G.A., **Le Roux V.**, Klein F. (2019), Estimating the carbon content of the deep mantle with Icelandic melt inclusions. Earth and Planetary Science Letters 523, 115699
17. Jones M. R., Wanless V. D., Soule S. A., Kurz M. D., Mittelstaedt E., Fornari D. J., Curtice J., Klein F., **Le Roux V.**, Brodsky H., Péron S., Schwartz D.M. (2019), New constraints on mantle carbon from Mid-Atlantic Ridge popping rocks. Earth and Planetary Science Letters 511, 67-75
16. \*\$Codillo E., \***Le Roux V.**, Marschall H., (2018) Arc-like magmas generated by mélange-peridotite interaction in the mantle wedge. Nature Communications 9, 2864
15. Nielsen S. G., Horner T. J., Pryer H. V., Blusztajn J., Shu Y., Kurz M. D. and **Le Roux V.**, (2018) Barium isotope evidence for pervasive sediment recycling in the upper mantle. Science Advances, 4, no. 7, doi: 10.1126/sciadv.aas8675
14. Jones M., Soule S.A., Gonnermann H., **Le Roux V.**, Clague D. (2018) Degassing-based constraints on ascent and emplacement dynamics during the 2011 eruption of Axial Seamount. Earth and Planetary Science Letters, doi.org/10.1016/j.epsl.2018.04.044
13. ##Cruz-Urbe A., Marschall H., Gaetani G., **Le Roux V.** (2018) Generation of alkaline magmas in subduction zones by melting of mélange diapirs. Geology 46 (4): 343-346
12. #Urann B.M., **Le Roux V.**, \$Hammond K., Marschall H., Lee C.-T., Monteleone B. (2017) Fluorine and chlorine in mantle minerals and the halogen budget of the Earth's mantle. Contributions to Mineralogy and Petrology doi 10.1007/s00410-017-1368-7
11. **Le Roux V.**, Nielsen S.G., ##Sun C., Yao L. (2016) Dating layered websterite formation in the lithospheric mantle. Earth and Planetary Science Letters 454 pp. 103–112
10. Miller K.J., Zhu W., Montesi L., Gaetani G., **Le Roux V.**, Xiao X., (2016) Experimental evidence for melt partitioning between olivine and orthopyroxene in partially molten harzburgite. JGR Solid Earth 121 doi:10.1002/2016JB013122
9. **Le Roux V.**, Dasgupta R., Lee C.-T.A. (2015) Recommended mineral-melt partition coefficients for FRTEs (Cu), Ga and Ge during mantle melting. American Mineralogist 100 pp. 2533–2544
8. **Le Roux V.**, Dick H, Shimizu N. (2014) Tracking flux melting and melt percolation in supra-subduction peridotites (Josephine Ophiolite, USA). Contributions to Mineralogy and Petrology 168 pp. 1–22
7. Lee C.-T. A., Luffi P., Chin E. J., Bouchet R., Dasgupta R., Morton D.M., **Le Roux V.**, Yin Q.-Z., Jin D. (2012) Copper systematics in arc magmas and implications for crust-mantle differentiation Science 336 pp. 64–68
6. **Le Roux V.**, Dasgupta R., Lee C.-T. A. (2011) Mineralogical heterogeneities in the Earth's mantle: constraints from Mn, Co, Ni and Zn partitioning during partial melting. Earth and Planetary Science Letters 307 pp. 395–408
5. Lee, C.-T. A., Luffi, P., **Le Roux, V.**, Dasgupta, R., Albarède F., Leeman W.P. (2010) The redox state of arc mantle using Zn/Fe systematics. Nature 468 pp. 681–685
4. **Le Roux V.**, Lee C.-T. A., Turner S.J. (2010) Zn/Fe systematics in mafic and ultramafic systems: implications for detecting major element heterogeneities in the Earth's mantle Geochimica et Cosmochimica Acta 74 pp. 2776–2796
3. **Le Roux V.**, Bodinier J.-L., Alard O., O'Reilly S.Y., Griffin W.L. (2009) Isotopic decoupling during porous melt flow: A case-study in the Lherz peridotite. Earth and Planetary Science Letters 279 pp. 76–85
2. **Le Roux V.**, Tommasi A., Vauchez A. (2008) Feedback between melt percolation and deformation in an exhumed lithosphere-asthenosphere boundary. Earth and Planetary Science Letters 274 pp. 401–413

**1. Le Roux V.,** Bodinier J.-L., Tommasi A., Alard O., Dautria J.-M., Vauchez A., Riches A.J.V. (2007) The Lherz spinel lherzolite: refertilized rather than pristine mantle, Earth and Planetary Science Letters 259 pp. 599–612

## Research Grants

\$ Principal Investigator

**\$2019-2022:** National Science Foundation, Geophysics program/Petrology and Geochemistry program, *Collaborative Research: Voyage to the bottom of Arcs: interplay between water, deformation, and lower crustal stability* (Le Roux, Chin & Behn), \$790,939

**\$2019-2022:** National Science Foundation, Geoprisms program, *Collaborative Research: Melange-peridotite Interactions in the Source of Arc Magmas* (Le Roux & Behn), \$546,403

**\$2019-2021:** National Science Foundation, Petrology and Geochemistry Program, *Halogen budget of subducted eclogites: the in-situ perspective* (Le Roux), \$363,064

**\$2018-2020:** The Andrew W. Mellon Foundation Award for Innovative Research, *Magma Pulses in the Abyss* (Le Roux), \$64,078

**2017-2019:** National Science Foundation, Antarctic Earth Sciences, *Collaborative Research: Determining Magma Storage Depths and Ascent Rates for the Erebus Volcanic Province, Antarctica Using Diffusive Water Loss from Olivine-hosted Melt Inclusion* (Gaetani, Le Roux, Sims, Wallace), \$499,907

**\$2016-2019:** Ocean Exploration Institute, *What is the transport mechanism of sediments in subduction zones?* (Le Roux), \$74,984

**\$2016-2019:** National Science Foundation, Petrology and Geochemistry Program, *Quantifying the Volume Changes During Serpentinization of Peridotite using Hydrothermal Laboratory Experiments and X-ray Microtomography* (Klein & Le Roux), \$350,000

**2016-2018:** National Science Foundation, Marine Geology and Geophysics Program. *Collaborative Research: Does Calcification By Paleoceanographically Relevant Benthic Foraminifera Provide A Record Of Localized Methane Seepage?* (Bernhard, Martin & Le Roux), \$218,355

**2016-2019:** National Science Foundation, Geobiology and Low-Temperature Geochemistry Program. *Collaborative Research: Alteration of microbially-produced carbonate rock by unicellular predators to better understand early Earth's dominant ecosystem* (Visscher, Bernhard, & Le Roux), \$255,000

**\$2017:** Independent Research And Development Awards Developing in-situ trace element analysis capabilities in silicates at WHOI, \$74,758

**\$2015-2017:** National Science Foundation, Petrology and Geochemistry Program, *F and Cl in peridotite minerals: analytical development and applications to fluid cycling in the Earth's mantle* (Le Roux, Monteleone, & Shimizu), \$298,072

**2015-2017:** Ocean Exploration Institute, *A chronometer for magmatic processes at mid-ocean ridges* (Gaetani & Le Roux), \$59,032

**\$2015:** Independent Research And Development Awards *Micro-tomography at WHOI: Test Scans and 3-D Data Processing of Geological and Biological Samples* (Le Roux) \$58,297

**\$2014-2016:** Andrew W. Mellon Foundation Award for Innovative Research, *Connecting Mineral physics and Geochemistry* (Le Roux), \$59,744

**\$2013-2015:** Deep Ocean Exploration Institute, *Innovative tracers of hydrous melting in the Earth's mantle* (Le Roux & Shimizu), \$71,433

**\$2012-2014:** National Science Foundation, Petrology and Geochemistry Program, *Widespread pyroxenite layering in the mantle*, (Le Roux & Tivey), \$259,097

**\$2011-2013:** Deep Ocean Exploration Institute, *A new experimental approach to constraining H<sub>2</sub>O cycling in subduction zones*, (Le Roux & Gaetani), \$67,590

**\$2011-2012:** Deep Ocean Exploration Institute Scholarship (Le Roux), WHOI, \$62,000

**\$2007-2009:** International Macquarie University Research excellence Scholarship (MQRES), Macquarie University, AUD \$19,231/year

**\$2006-2008:** ‘Aide à la mobilité internationale’ (Research funds for international collaborations), Ministère délégué à l’enseignement supérieur et à la recherche, 5100 €

## **Formal presentations**

### *Invited presentations*

2019. European Institute for Marine Studies, Geosciences Ocean, Brest, France  
2019. Laboratoire Magmas et Volcans, Clermont-Ferrand, France  
2019. Geosciences Environnement Toulouse, France  
2019. Geosciences Montpellier, France  
2019. Water in the mantle workshop, Lamont Doherty Earth Observatory, USA  
2018. Boston College, USA  
2018. Aarhus University, Denmark  
2018. California Institute of Technology, USA  
2015. American Geophysical Union (AGU), Fall Meeting, San Francisco, USA  
2015. Massachusetts Institute of Technology, USA  
2015. Goldschmidt Conference, Prague, Czech Republic  
2014. Ecole Normale Supérieure de Lyon, France  
2013. Bayerisches Geoinstitut, Germany  
2012. Unité Mixte de Recherche Domaines Océaniques, Brest, France  
2010. University of New Mexico, USA  
2010. Wood Hole Oceanographic Institution, USA  
2010. Goldschmidt Conference, Knoxville, USA  
2010. Geosciences Montpellier, France  
2010. Ecole Normale Supérieure de Lyon, France  
2009. American Geophysical Union, Fall Meeting, San Francisco, USA

*79 contributed presentations at international conferences and institution seminars since 2005; 37 as lead presenter.*

## **Supervision and mentoring**

### *Postdoctoral advisees*

**2017 – 2019:** Emily Cooperdock (sponsored by WHOI scholarship; now Assistant professor at USC)  
**2016 – 2019:** Ayla Pamukcu (sponsored by NSF grant since 2017; now Assistant professor at Stanford)  
**2015 – 2016:** Chenguang Sun (sponsored by WHOI scholarship; now postdoctoral fellow at Rice University)  
**2015** Alicia Cruz-Urbe (sponsored by H. Marschall and G. Gaetani; now Assistant professor at University of Maine)

### *PhD student advisees*

**2017 – Present:** Emmanuel Codillo (MIT/WHOI Joint Program)  
**2015 – Present:** Benjamin Urann (MIT/WHOI Joint Program)  
**2013.** Ning Zhao (MIT/WHOI Joint Program) – Geodynamics Class project, Spring

### *Undergraduate/Master student advisees*

**2020:** Hugo Lestrelin — Ecole Normale Supérieure Paris (France) — Guest Student Fellow (1 mo)  
**2019:** Alexandra Nordyke — Bennington College (USA) — Summer Student Fellow (3 mo; co-advisor)  
**2017 – 2018:** Taylor Hough — Brown U. (USA) — Summer Student Fellow and Master’s thesis  
**2016:** Nadine Doiron — UMass Amherst — NENIMF summer student (3 mo; co-advisor)  
**2015 – 2016:** Emmanuel Codillo — U. of Philippines — Guest student (9 mo)

**2015.** Emma Soucy — Northeastern U. (USA) — Co-op internship program (6 mo)  
**2015.** Keiji Hammond — Northeastern U. (USA) — Co-op internship program (6 mo)  
**2015.** Marienel Basiga — San Jose State U. (USA) — Summer Student Fellow Program student (3 mo)  
**2014.** Marienel Basiga — San Jose State U. (USA) — Partnership Education Program student (minority program; 3 mo)  
**2013.** Jeremy Slaugenwhite — U. of Houston (USA) — Guest student (1 month; co-adviser)

*Other Guest or Short-term students*

**2019:** Collaboration with PhD student Olivia Anderson (UCSB, USA); **Feb. 2018:** Guest Ph.D. students Stamatis Flemetakis and Dominik Lorocho (U. of Muenster, Germany); **Dec. 2017:** Guest undergraduate student Megan Reilly (Northeastern U.); **May 2017:** Guest Ph.D. student Manon Bickert (IPGP, France)

## Synergistic Activities

Journal Reviewer:

American Mineralogist; American Journal of Science; Chemical Geology; Contributions to Mineralogy and Petrology; Earth and Planetary Science Letters; Earth Science Reviews; Geochimica et Cosmochimica Acta; Geochemical Perspectives Letters; Geochemical Society of America Special Papers; Geochemistry Geophysics Geosystems (G<sup>3</sup>); Geology; Journal of Geophysics Research-Solid Earth; Journal of Petrology; Lithos; Mineralogy and Petrology; Nature Communications; Nature Scientific Reports; Science Advances; Tectonophysics

Proposal Reviewer:

<b>2010 – Present</b>	National Science Foundation: Petrology and Geochemistry, Frontier Research in Earth Sciences (FRES), Collaborative studies of the Earth Interior (CSEDI); Tectonics; Polar Programs
<b>2018 – Present</b>	Deutsche Forschungsgemeinschaft (German Research Foundation)
<b>2014</b>	Panel member, CSEDI, National Science Foundation
<b>2013</b>	ETH Zurich Research Commission

Institution and departmental service (WHOI):

<b>2016 – Present</b>	MIT/WHOI Joint committee for Marine Geology & Geophysics (PhD program)
<b>2016 – Present</b>	NENIMF ion microprobe steering committee
<b>2018</b>	WHOI Inter-disciplinary award proposal review committee
<b>2017</b>	WHOI search committee for Vice-President of Academic Program and Dean
<b>2017</b>	WHOI search committee for Geochemistry/Petrology position
<b>2016</b>	Geology and Geophysics Department Chair transition committee
<b>2016</b>	WHOI search committee for Geophysics position
<b>2016 – 2017</b>	WHOI women's committee
<b>2016</b>	WHOI Catalyst program, proposal review panel
<b>2016</b>	Visioning committee for Vice-President of academic programs and Dean
<b>2015 – 2016</b>	Department representative, Summer Student Fellowship committee

Thesis committees:

<b>2019 – Present</b>	Thesis committee, MIT student Cassandra Seltzer
<b>2019</b>	Thesis proposal committee, MIT/WHOI PhD student Fiona Clerc
<b>2017 – 2019</b>	Thesis committee, MIT/WHOI PhD student Meghan Jones
<b>2019</b>	Chair of General examination committee, MIT/WHOI PhD student Fiona Clerc
<b>2017</b>	General examination committee, MIT/WHOI PhD student Gabriela Serrato
<b>2017</b>	General examination committee, MIT/WHOI PhD student William Shinevar
<b>2017</b>	General examination committee, MIT/WHOI PhD student Meghan Jones

**2017**

Chair of PhD defense, MIT/WHOI PhD student Emily Sarafian

Service to Field:

- 2018** Goldschmidt session co-convener (Igneous Processes throughout the Arc Crustal Column and Oceanic Mantle)
- 2015** Goldschmidt session co-convener (How chalcophile are the chalcophile elements?)
- 2015.** AGU session co-convener (Endogenous mantle melting: petrology and geophysics)
- 2015** AGU session co-convener (The Ophiolite-Subduction Connection: Using peridotites as analogs for subduction zone mantle)
- 2015** AGU session co-convener (Melt and Liquids in Earth and Planetary Interiors)
- 2013** Geodynamics program co-organizer (WHOI). Theme: ‘Simulating the Earth in the lab’  
<http://www.whoi.edu/main/2013-geodynamics-program>
- 2013** AGU session co-convener (Deformation Processes: Microstructure, Rheology, and the Effects of Fluids)
- 2009–2011** Reading group organizer: Petrology/Geochemistry (Rice University; 2009–2010); Subduction Zones (WHOI; 2011)
- 2010** Goldschmidt session co-convener (New and Old Paradigms on the Origin and Evolution of Continental Lithosphere)

**Analytical and technical skills**

EPMA: CAMECA SX 100. CAMECA SX 50, JEOL JXA-733 Superprobe

SIMS: Cameca IMS 1280 and 3f

HIGH P-T EXPERIMENTS: Piston cylinder, 1-atm furnace

ICPMS and LA-ICPMS: VG Plasmaquad II Turbo, Agilent 7500 ICPMS, ThermoFinnigan Element II Sector ICP-MS

X-RAY MICROTOMOGRAPHY: Skyscan 1272 micro-CT; Synchrotron; 3D Microtomography modeling: Avizo software; Skyscan reconstruction, analysis and visualization software (CtAn; CtVox; CTVol; NRecon; Dataviewer).

**Field experience**

**At sea.** 2017. SCARF Research Cruise AR23-02. *R/V Neil Armstrong* (Ponta Delgada-WH)

**On land.** Introduction to field mapping in sedimentary terrains (France)

Volcanism and Metamorphism (Central Massif, France)

Alpine Ophiolite (Corse, France)

Peridotite Massifs of the Pyrenees (France)

Regular field trips over 3 years; Regular field trips with undergraduate students (5–6 times/year) — Volcanism in South of France

Conference field trip: Volcanism of Mount Shasta and Shear zones in Josephine Peridotite (USA)

Mantle xenoliths in cinder cones (Colorado Plateau, USA)

Volcanism in the Azores (Portugal)

Peridotites and pyroxenites in the Josephine Ophiolite (USA)

Pyroxenites in the Pyrenean Massifs (France)

**Teaching**

**2018–2019:** reading seminar Geochemistry/Petrology

**2017.** Summer Student Fellow Program Lecturer (undergraduate) – *Travel inside the deep Earth*

**2016.** 12.703 MIT/WHOI Presenting Scientific Research (graduate)

**2015.** 12.703 MIT/WHOI Presenting Scientific Research (graduate)

**2015.** Summer Student Fellow program Lecturer (undergraduate) – *Geology going 3-D: new prospects for Earth Sciences*

**2014.** Summer Student Fellow program Lecturer (undergraduate) – *Travel inside the deep Earth*

**2013.** 12.753 MIT/WHOI Geodynamics Class (graduate) – *Experiments: simulating the Earth in the Lab*

**2009–2010:** L lectures at Rice University – geochemistry and thermodynamics (graduate)

**2005–2008:** Regular Teaching Assistant at Montpellier University (64 hours of teaching/2 classes/ per year/ 3 years; igneous, metamorphic and sedimentary petrology).

## Outreach

*Host for volunteer High school students*

**2015.** Maria Barrera – Falmouth Academy (USA), volunteer internship (2 months)

**2015.** Natasha Garland– Falmouth Academy (USA), volunteer internship (2 months)

**2014.** Chris Connolly – Falmouth High School (USA) — School-to-Careers internship program (3 months)

*School outreach*

**2018.** 3-D models hands-on activities for visually impaired-students (7<sup>th</sup> to 12<sup>th</sup> grade), WHOI, MA

**2018.** ‘Inside the Earth’ presentation and hands-on activities — pre-K class, Woods Hole Daycare Co-op, MA

**2018.** ‘Forams’ hands-on activities for visually impaired-students (7<sup>th</sup> to 12<sup>th</sup> grade) — “The Very Big and the Very Small” Perkins School for the Blind, MA

**2016.** ‘Inside the Earth’ presentation and hands-on activities — pre-K class, VNA child care center, MA

*General public outreach*

**2018:** Interview for ‘Who is WHOI’ short documentary about WHOI. <https://vimeo.com/292046329>

**2015–2018:** Member of the *Partnership program* between WHOI scientists and Trustees, which encourages dialogue that enhances the understanding of Trustees and Members about WHOI science and culture

## Awards

**2011** Deep Ocean Exploration Institute Scholarship, WHOI

**2007** Bourse Lavoisier Cotutelle (Salary funds, European scholarship for international collaborations)

**2007** International Macquarie University Research excellence Scholarship (MQRES), Macquarie University

**2004** Master degree French scholarship for highly ranked students

## Languages

French (Native proficiency)

English (Full professional proficiency in reading, writing, speaking)

Danish (Basic proficiency in reading, writing, speaking)

Spanish (Basic proficiency in reading)