

Vincent Milesi

Geochemist, PhD

Specialist of water-rock interactions with extensive skills in numerical modelling applied to understand the behavior and fate of chemical compounds in surface and sub-surface

CONTACT

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MAIN SKILLS

Numerical modeling:
equilibrium chemistry (SUPCRT, CHNOSZ), reaction path modeling (EQ3/6), kinetic reactions (Phreeqc), 1D-transport (CrunchFlow)

Computing:
Python, R, Jupyter Notebook

Fieldwork:
remote-controlled seafloor exploration (2 missions of 2 weeks); sediment coring, gas and water sampling (4 missions of 2 weeks)

Laboratory experiment:
High pressure/temperature experiments, aqueous mineral synthesis

Analysis:
X-ray diffraction, transmission and scanning electron microscopes, RockEval, gas chromatography, electronic emission (noble gases) and inductively coupled plasma mass spectrometry

LANGUAGES

- **English:** Full professional proficiency
- **French:** Native proficiency
- **Portuguese:** Intermediate proficiency

EXPERIENCE

Self-Employed: Design of numerical tools to model the speciation of abiotic and biologic organic compounds

funded by CIFAR (Canada), Aug 2020 – present

- Modeling of abiotic organic matter at Kidd Creek mine (Canada) and protein metastability in Old City vent field vents (southwest Indian ridge)

Collaborators: B. Menez (IPGP), B. Sherwood Lollar (University of Toronto)

Postdoctoral Scholar: Forward geochemical modelling as guiding tool during exploration of seafloor hydrothermal systems (Hawaii & Gorda Ridge)

Arizona State Univ. (Phoenix, USA), funded by NASA, Jan 18 – Jul 20

- Coupling programming language with geochemical software
- Statistical data analyses. Bioenergetic calculation.
- Result-informed decision-making during exploration

Collaborators: E. Shock (ASU), C. German and J. Huber (WHOI), D. Lin (NASA)

Postdoctoral Scholar: Early diagenesis of lacustrine carbonates in volcanic settings: the role of magmatic CO₂ (lake Dziani Dzaha, Mayotte Island)

IPGP (Paris), funded by TOTAL (French Oil Company), Dec 15 – Oct 17

- Sampling and analyses of sediments (coring), gases and pore waters
- Characterization of mineral sequence, chemical and isotopic composition of associated fluids
- Reactive transport modelling of the sediment diagenesis

Collaborators: M. Ader (IPGP), C. Steefel (Berkley), E. Gaucher (TOTAL)

PhD thesis: Generation of hydrocarbon gases in the Solimões sedimentary basin: the role of siderite (FeCO₃)-water interactions

IPGP (Paris), UERJ (Rio de Janeiro), funded by HRT Oil&Gas, Oct 11 – Jul 15

- Analysis of gases, waters and rocks (cuttings) from exploratory drilling wells
- Laboratory experiments of hydrothermal decomposition of siderite
- Thermodynamic modeling of organic compounds formation

Collaborators: F. Guyot (MNHN), F. Brunet (ISTerre), A. Prinzhofer, L. Richard

EDUCATION

- **PhD in Earth Sciences (2011-2015)**, specialty Geochemistry, IPGP, Paris
- **Dual degree:** UERJ, Rio de Janeiro
- **Master in Earth Sciences (2009-2011)**, specialty Geochemistry, IPGP, Paris
- **Bachelor in Earth Sciences (2006-2009)**, Univ. Saint Etienne, France

TEACHING AND MENTORING

Designing computing tools (Jupyter Notebook) to increase accessibility to geochemical modelling

- Evolution of fluid composition along hydrothermal circulation
- Calculation of dissolved carbon speciation as function of pressure, temperature and redox conditions

Mentoring of undergraduate and graduate students

- Fall 2019, undergraduate research project: Chemical disequilibria in the Yellowstone National Park hydrothermal fluids
- Spring-Fall 2017, graduate research project: H₂ generation from NH₃-rich fluid/Fe-oxides interactions under hydrothermal conditions

Invited lecturer, Seafloor hydrothermal systems and microbial life's habitats, Arizona State Univ, Fall 2018

Teaching assistant at IGP/Univ. Paris Diderot (P7), Session 2014-2015

- Organic geochemistry, 2nd year BSc, 36h
- Physics and chemistry for geosciences: chemistry, 1st year BSc, 30h
- Physics and chemistry for geosciences: physics (thermodynamics), 2nd year BSc, 30h

PUBLICATIONS

- **Milesi V.**, Shock E., Ely T., Lubetkin M., Sylva S. P., Huber J. A., Smith A.R., Kobs Nawotniak S., German C.R. and Lim D. S. (2021) Forward geochemical modeling as a guiding tool during exploration of Sea Cliff hydrothermal field, Gorda Ridge. *Planetary and Space Science*, 197, 105151.
- Cadeau P., Jézéquel D., Leboulanger C., Fouilland É., Le Floc'h E., Chaduteau C., **Milesi V.**, Guélard J., Sarazin G., Katz A., d'Amore S., Bernard C. and Ader M. (2020). Carbon isotope evidence for large methane emissions to the Proterozoic atmosphere. *Scientific reports*, 10(1), 1-13.
- **Milesi V.**, Debure M., Marty N., Capano M., Jézéquel D., Steefel C., Rouchon V., Albéric P., Bard E., Sarazin G., Guyot F., Virgone A., Gaucher E.C. and Ader M. (2020) Early diagenesis of lacustrine carbonates in volcanic settings: characterization and modeling unravelling the role of magmatic gases (Lake Dziani Dzaha, Mayotte Island, Indian Ocean). *ACS Earth Space Chem.* 4 (3), 363-378
- **Milesi V.**, Jézéquel D., Debure M., Cadeau P., Guyot F., Sarazin G., Claret F., Vennin E., Chaduteau C., Virgone A., Gaucher E.C. and Ader M. (2019) Formation of magnesium-smectite during lacustrine carbonates early diagenesis: Study case of the volcanic crater lake Dziani Dzaha (Mayotte – Indian Ocean). *Sedimentology*, 66: 983-1001
- Gérard E., De Goeyse S., Hugoni M., Agogué H., Richard L., **Milesi V.**, Guyot F., Lecourt L., Borensztajn S., Joseph M.B., Leclerc T., Sarazin G., Jézéquel D., Leboulanger C., Ader M. (2018) Key Role of Alphaproteobacteria and Cyanobacteria in the Formation of Stromatolites of Lake Dziani Dzaha (Mayotte, Western Indian Ocean). *Front. Microbiol.* 9, 796
- **Milesi V.**, McCollom T. and Guyot F. (2016) Thermodynamic constraints on the formation of condensed carbon from serpentinization fluids. *Geochim. Cosmochim. Ac.* 189, 391-403
- **Milesi V.**, Prinzhofer A., Guyot F., Benedetti M. and Rodrigues R. (2016) Contribution of siderite–water interaction for the unconventional generation of hydrocarbon gases in the Solimões basin, north-west Brazil. *Mar. Petrol. Geol.* 71, 168-182
- **Milesi V.**, Guyot F., Brunet F., Richard L., Recham N., Benedetti M. and Prinzhofer A. (2015) Formation of CO₂, H₂ and condensed carbon from siderite dissolution in the 200–300°C range and at 50MPa. *Geochim. Cosmochim. Ac.* 154, 201-211