

Cédric Millot

PhD in Planetary Sciences

Updated June 12, 2026



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Google Scholar: [Cédric Millot](https://scholar.google.com/citations?user=Cédric%20Millot)

Research interests

Mars, surface processes, remote sensing, topography, machine learning

Research experience

Postdoctoral Researcher January 2023 - Present day

LGL-TPE, Université Claude Bernard Lyon 1, Lyon, France

I am working on high resolution orbital data in the making of morphometric equations for small Martian craters, focusing on their link to erosion processes. First results have been published to *JGR: Planets*. I am also focusing on building paleo-surfaces with GIS tools. An article is currently in preparation to be submitted.

Education

Ph.D. in planetary sciences September 2018 – September 2021

LGL-TPE, Université Claude Bernard Lyon 1, Lyon, France

Subject: *Topography and Thermal Properties of Martian Slopes with Seasonal Flows*.

I worked on surface processes called *Recurring Slope Lineae*. I combined high resolution observations with thermal models to constrain the activity of the processes with surface temperatures. I also focused on quantifying slope uncertainties related to Digital Elevation Models. Two articles have been published in *Icarus*.

Supervisors: C. Quantin-Nataf and C. Leyrat.

Master's degree, "Earth and Planets" September 2015 – June 2017

Université Claude Bernard Lyon 1 – ENS Lyon Lyon, France

Research Internship: *Thermal Properties of Recurring Slope Lineae in Coprates Chasma, Mars*.

Supervisors: C. Quantin-Nataf and C. Leyrat.

Received at the entrance examination of the Ecole Normale Supérieure of Lyon.

Bachelor in Geosciences September 2012 – June 2015
University Claude Bernard Lyon 1 – ENS Lyon Lyon, France

Internships

Long research internship September 2017 – August 2018
Université Claude Bernard Lyon 1 – ENS Lyon Lyon, France
Subject: *Thermal Properties of Recurring Slope Lineae on Mars*.
Supervisors: C. Quantin-Nataf and C. Leyrat.

Research internship January 2017 – June 2017
Université Claude Bernard Lyon 1 – ENS Lyon Lyon, France
Subject: *Thermal Properties of Recurring Slope Lineae in Coprates Chasma, Mars*.
Supervisors: C. Quantin-Nataf and C. Leyrat.

Research internship April 2016 – July 2016
Université Claude Bernard Lyon 1 – ENS Lyon Lyon, France
Subject: *Bayesian Inversion of Surface Seismic Waves*.
Supervisors: E. Debayle, T. Bodin and Benoît Tauzin.

Research internship January 2015
Université Claude Bernard Lyon 1 – ENS Lyon Lyon, France
Subject: *Morphologies of Clays in Coprates Chasma, Mars*.
Supervisors: D. Loizeau and C. Quantin-Nataf.

Computing skills

Programming

Proficient in: Matlab (8 years), Fortran (5 years), Python (3 years).

Familiar with: IDL (3 years), Linux-based systems (5 years).

Knowledge of SPICE/NAIF toolkits used on Matlab and IDL.

Knowledge on Machine Learning and Deep Learning libraries in Python (scikit tools, Pytorch), GIS libraries (GDAL), Geophysics libraries (SHtools).

Common use of a linux-based calculation server (MarsSI).

Scientific softwares

ArcGIS, Quantum GIS.

Others

LaTeX, Inkscape, Filezilla, Shotcut (video editing software), OBS Studio (streaming software), Cubase (music editing software), Office suite (Word, Excel, Powerpoint).

Publications

Depth to Diameter Relationships for < 50 m Diameter Martian Craters

Millot, C., Quantin-Nataf, C., Dehouck, E., Torres, I. and Volat M.

JGR: Planets, 2025.

Assessing Slope Uncertainties of Martian Digital Elevation Models from Numerical Propagation of Errors on Synthetic Geological Surfaces

Millot, C., Quantin-Nataf, C., Leyrat, C., Lherm, V. and Volat, M.

Icarus, 2023.

Oxia Planum: The Landing Site for the ExoMars “Rosalind Franklin” Rover Mission: Geological Context and Prelanding Interpretation

Quantin-Nataf, C., Carter, J., Mandon, L., Thollot, P., Balme, M., Volat, M., Pan, L., Loizeau, D., **Millot, C.**, Breton, S., Dehouck, E., Fawdon, P., Gupta, S., Davis, J., Grindrod, P. M., Pacifici, A., Bultel, B., Allemand, P., Ody, A., Lozac’h, L. and Broyer, J.

Astrobiology, 2021.

Local Topography Effects on the Surface Temperatures on Mars - Application to the Case of Recurring Slope Lineae (RSL)

Millot, C., Quantin-Nataf, C. and Leyrat, C.

Icarus, 2021.

Variability of Spider Spatial Configuration at the Martian South Pole

Hao J., Michael, G. G., Adeli, S., Jaumann, R., Portyankina, G., Hauber, E., **Millot C.** and Zuschneid, W.

Planetary and Space Science, 2020.

Refining the Age, Emplacement and Alteration Scenarios of the Olivine-Rich Unit in the Nili Fossae Region, Mars

Mandon, L., Quantin-Nataf, C., Thollot, P., Mangold, N., Lozac’h, L., Dromart, G., Beck, P., Dehouck, E., Breton, S., **Millot, C.** and Volat, M.

Icarus, 2020.

Quantifying Widespread Aqueous Surface Weathering on Mars: the Plateaus South of Coprates Chasma

Loizeau, D., Quantin-Nataf, C., Carter, J., Flahaut, J., Thollot, P., Lozac’h, L. and **Millot, C.**

Icarus, 2018.

Conference papers

Reconstructing the Noachian Paleo-surface of Mars

Millot C., Quantin-Nataf C., Salles T. and Arnould M.
EuroPlanet Science Congress, EPSC2026, September 2026

Rebuilding the Noachian Paleo-surface of Mars

Millot C., Quantin-Nataf C. and Salles T.
European Geosciences Union General Assembly, EGU2026, May 2026

HiRISE Image Colorization with a U-net Deep Neural Network

Volat M., Quantin-Nataf C. and **Millot C.**
EuroPlanet Science Congress, EPSC-DPS2025-969, September 2025

Supervised Deep Learning for Mapping Small Craters on Mars

Millot C., Quantin-Nataf C. and Volat M.
EuroPlanet Science Congress, EPSC-DPS2025-1547, September 2025

Morphometric Laws for Small Martian Craters ($D < 50$ m): a Case Study on Landslide Deposits

Millot C., Quantin-Nataf, C., Dehouck, E., Volat, M. and Torres I.
EuroPlanet Science Congress, EPSC2024-844, September 2024

MarsSI: Martian Surface Data Processing Service

Volat, M., Quantin-Nataf C., Mandon, L., Torres, I. and **Millot C.**
EuroPlanet Science Congress, EPSC2024-49, September 2024

Extent and Nature of Clay-rich Deposits, from Oxia Planum to Marwth Vallis

Torres, I., Carter, J., Quantin-Nataf, C., Volat, M., **Millot, C.** and Dehouck E.
EuroPlanet Science Congress, EPSC2024-609, September 2024

Morphometric Laws for Small Martian Craters ($D < 50$ m): a Case Study within Valles Marineris

Millot C., Quantin-Nataf, C., Dehouck, E., Volat, M. and Torres I.
10th International Conference on Mars, July 2024

Assessing slope precision from numerical propagation of DEM (Digital Elevation Model) vertical errors

Millot, C., Quantin-Nataf, C. and Leyrat C.
EuroPlanet Science Congress, EPSC2020-881. September 2020.

High Resolution Digital Elevation Model Errors Propagation on Computed Slopes

Millot, C., Quantin-Nataf, C., Leyrat, C. and Volat, M.
51st Lunar and Planetary Science Conference, March 2020.

Thermal Behaviour of Recurring Slope Lineae Areas in Palikir Crater

Millot C., Quantin, C., Leyrat, C. and Volat, M.

EPSC-DPS Joint Meeting 2019, EPSC-DPS2019-1945, September 2019.

Thermal Behaviour of Recurring Slope Lineae in Palikir Crater

Millot C., Quantin-Nataf, C., Leyrat, C. and Volat, M.

9th International Conference on Mars, July 2019.

Variability of araneiform spatial patterns at the Martian south pole

Hao, J., Michael, G., Adeli, S., Hauber, E., Portyankina, G., Jaumann, R. and **Millot, C.**

50th Lunar and Planetary Science Conference, March 2019.

A Post-Impact Volcanism Scenario for the Formation of the Olivine-Rich Unit in the Region of Nili Fossae, Mars

Mandon, L., Quantin, C., Thollot, P., Lozac'h, L., Mangold, N., Dromart, G., Beck, P., Dehouck, E., Breton, S. and **Millot, C.**

49th Lunar and Planetary Science Conference, March 2018.

Thermal Properties of Recurring Slope Lineae (RSL) in Coprates Chasma

Millot, C., Quantin-Nataf, C., Leyrat, C., Lozac'h, L. and Millet, F.

49th Lunar and Planetary Science Conference, March 2018.

Widespread Aqueous Surface Weathering South of Coprates Chasma, Mars.

Loizeau, D., Carter, J., **Millot, C.**, Flahaut, J., Quantin, C., Thollot, P. and Lozac'h, L.

47th Lunar and Planetary Science Conference, March 2016.

Teaching experience

Teaching assistant, Department of Biology (University of Lyon)

BIO2396M

2018 – 2025

Cumulated hours: 173.5

Geographical Information Systems (GIS) and Spatial Data

Advanced practical works on ArcGIS 10 software for 2nd year's Master students.

Teaching assistant, Department of Biology (University of Lyon)

BIO1321M

Spring 2019, 2020, Winter 2025

Cumulated hours: 66

Transversal Skills: Quality Management and Project Management

Practical works on ArcGIS 10 software for 1st and 2nd year's Master students. The course is an overview of widely used GIS tools. Students have to complete a project in risk management using GIS software.

Teaching assistant, Department of Geosciences (University of Lyon)

STU1001L

Spring - Fall 2019

Cumulated hours: 67.5

Geosciences

Tutorial rooms of main topics in geosciences (sedimentology, petrology, tectonic, seismology, planetary sciences, geophysics, geochemistry).

Internship supervisor

Supervisor for a 2nd year bachelor student's internship Summer 2026

Subject: "Detection and Characterization of Layers at the Martian Paleoshorelines"

Duration: 2 months

Supervision rate: 100%

Supervisor for a 1st year master student's internship Spring 2024

Subject: "Detecting layers on Mars using Artificial Intelligence"

Duration: 3 months

Supervision rate: 100%

Supervisor for a 3rd year student's internship Winter 2024

Subject: "Geomorphologic study of small craters ($D < 50$ m) on Mars"

Duration: 4 weeks

Supervision rate: 100%

Supervisor for a 3rd year student's internship January 2019

Subject: "Activité saisonnière et variations morphologiques des RSL dans l'hémisphère nord de Mars"

Duration: 4 weeks

Supervision rate: 100%

Public conferences

Public conference for the Open University of Lyon (in french).

Subject: "Mars as seen by cinema from 1900's to the present day, an updated version."

January 2026.

Public conference for the Open University of Lyon (in french).

Subject: "Mars as seen by cinema from 1900's to the present day."

January 2025.

Public conference for the Open University of Lyon (in french).

Subject: "Using Artificial Intelligence to study the planetary surfaces."

February 2023.

Public conference for the Open University of Lyon (in french).

Subject: "Martian climates: past and present."

24 February 2021, in remote.

Live for the Twitch channel "ConScience".

The goal of this live is to compare the model of Mars in the video game Minecraft with what we know about real Mars.

18 February 2021, in remote.

Public conference for the city of Vaulx-en-Velin in Planétarium de Vaulx-en-Velin (in french).

Subject: "What is the weather on Mars?"

24 January 2019.

Public conference for the Open University of Lyon (in french).

Subject: "What is the weather on Mars?"

6 November 2017.

Languages

French (native), English (advanced), Spanish (basics).

Language Skills Certification

Higher Education Language Skills Certification (CLES 2 = B2)

Service and outreach

Representative for PhD students at ED 52 PHAST

March 2019 – September 2021

Other interests

Music (guitarist for 26 years), member of a choir as a guitarist for 13 years and bands for several years, sports (powerlifting, handball), cinema and video games.