Gerard Rocher-Ros

Postdoc researcher, Swedish University of Agricultural Sciences
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Catchment ecologist interested in landscape patterns of ecosystem function,
with a background in complex systems and statistical modelling.

EDUCATION

Umeå University, Sweden, Ph.D. in Physical geography   2014-2019
Climate Impacts Research Centre. Department of Ecology and Environmental Science.
Thesis: *Biophysical controls of CO_2 evasion in inland waters*. Advisor: Reiner Giesler.

Autonomous University of Barcelona, Spain, M.S. Statistical Modelling   2013-2014
Department of Mathematics. Specialty in Statistical Modelling and Complex Systems.
Thesis: *"Multifractal patterns in ecosystems: implications for the response of forest fires to environmental conditions"*. Advisor: Salvador Pueyo

University of Barcelona, Spain, B.S. Environmental Sciences   2008-2013

PROFESSIONAL APPOINTMENTS

- Postdoctoral mobility grant from the Swedish Research Council. Host institution: **Blanes Centre of Advanced Studies (Spanish National Research Council)**. Local institution: **Swedish University of Agricultural Sciences**   2022 - 2025
  Project: *Closing the Carbon Cycle in River Networks across Climate and Terrestrial Productivity Gradients*. Collaborators: Susana Bernal, Hjalmar Laudon.

- Postdoctoral researcher at **Umeå University, Sweden**. Climate Impacts Research Centre. Department of Ecology and Environmental Science.   2020 - 2022
  Project: *Top-down controls from Arctic terrestrial herbivores on aquatic biogeochemistry*. Advisors: Johan Olofsson, Ryan Sponseller.

- Parental leave (12 months):
    - October – November 2019 (100%)
    - September 2020 – April 2021 (80%)
    - December 2022 – March 2023 (80%)

SUPERVISORY ACTIVITIES

- Co-advisor of *Fredrik Sundberg*, PhD student in Arctic aquatic biogeochemistry at **Umeå University (Sweden)**. Main Advisor is Prof. Jan Karlsson. 2022 - present.

- Member of the PhD advisory committee (USA system) of *Keridwen Whitmore*, PhD student in tropical biogeochemistry at **University of North Carolina at Chapel Hill (USA)**. Main advisor is Prof. Diego Riveros-Iregui. 2022 - present.

SCIENTIFIC PUBLICATIONS

- 16. Saunois M, Martinez A, Poulter B, Zhang Z, Raymond P, Regnier P, Canadell JG, Patra PK, Bousquet P, Jackson RB, Ciais P, Dlugokencky EJ, Lan X, Allen GH, Bastviken D, Beerling DJ, Belikov DA, Blake DR, Castaldi S, Crippa M, Deemer BR, Dennison F, Etiope G, Gedney N, Höglund-Isaksson L, Holgerson MA, Hopcroft PO, Hugelius G, Ito A, Jain AK, Janardanan R, Johnson MS, Kleinen T, Krummel P, Lauerwald R, Li T, Liu X, Maksyutov S, McDonald KC, Melton JR, Mühle J, Müller J, Murguia-Flores F, Niwa Y, Noce S, Pan S, Parker RJ, Peng C, Ramonet M, Riley WJ, **Rocher-Ros**

G, Rosentreter JA, Sasakawa M, Segers A, Smith SJ, Stanley EH, Thanwerdas J, Tian H, Tsuruta A, Tubiello FN, Weber TS, van der Werf G, Worthy DE, Xi Y, Yoshida Y, Zhang W, Zheng B, Zhu Q and Zhuang Q. *Global Methane Budget 2000-2020*. Earth Science System Data Discussions (2024)

- 15. Woodrow R, White S, Conrad S, Wadnerkar P, **Rocher-Ros G**, Sanders C, Holloway C, Santos I. *Enhanced stream greenhouse gas emissions at night and during flood events*. *Limnology and Oceanography Letters*

- 14. **Rocher-Ros G**, Stanley EH, Loken L, Casson N, Raymond PA, Liu S, Amatulli G, Sponseller R. (2023) *Global methane emissions from rivers and streams.* *Nature*

- 13. Stanley EH, Loken L, Casson NJ, Wallin M, Oliver S, Zhang L, Sponseller R, **Rocher-Ros G**. (2023) *GRiMeDB: the Global River Methane database.* *Earth System Science Data*

- 12. Olid C, Rodellas V, **Rocher-Ros G**, Garcia-Orellana J, Diego-Feliu M, Alorda-Kleinglass A, Bastviken D, Karlsson J. (2022) *Groundwater discharge as a driver of methane emissions from Arctic lakes* *Nature Communications*

- 11. Aho KS, Fair JH, Hosen JD, Kyzivat ED, Logozzo L, **Rocher-Ros G**, Weber LC, Yoon B, Raymond PA. (2021) *Distinct concentration-discharge dynamics in temperate streams and rivers: CO_2 exhibits chemostasis while CH_4 exhibits source limitation due to temperature control. Limnology and Oceanography*

- 10. Gomez-Gener L* & **Rocher-Ros G***, Battin TJ, Cohen MJ, Dalmagro HJ, Dinsmore KJ, Drake TW, Duvert C, Enrich-Prast A, Horgby Å, Johnson M, Kirk L, Machado-Silva F, Marzolf N, McDowell MJ, McDowell WH, Miettinen H, Ojala AK, Peter HM, Pumpanen J, Ran L, Riveros-Iregui D, Santos IR, Six J, Stanley EH, Wallin M, White SA, Sponseller RA. (2021) *Global carbon dioxide efflux from rivers enhanced by high nocturnal emissions* (*Shared first authorship). *Nature Geoscience*

- 9. Karlsson J, Serikova S, Vorobyev S, **Rocher-Ros G**, Denfeld B, Pokrovsky OS. (2021) *Carbon emission from Western Siberian Inland Waters. Nature Communications*

- 8. Myrstener M, Gomez-Gener L, **Rocher-Ros G**, Giesler R, Sponseller RA (2021). *Nutrient availability shapes metabolic seasonal regimes in Arctic streams. Limnology and Oceanography*

- 7. **Rocher-Ros G**, Harms TK, Sponseller RA, Väisänen M, Mörth C-M, Giesler R (2021). *Metabolism overrides photo-oxidation in CO_2 dynamics of Arctic permafrost streams. Limnology and Oceanography*

- 6. Harms TK, **Rocher-Ros G**, Godsey SE. (2020) *Emission of greenhouse gases from water tracks draining arctic hillslopes. Journal of Geophysical Research-Biogeosciences*

- 5. **Rocher-Ros G**, Sponseller RA, Bergström A-K, Myrstener M, Giesler R. (2020). *Stream metabolism controls diel patterns and evasion of CO_2 in Arctic streams. Global Change Biology*

- 4. **Rocher-Ros G**, Sponseller RA, Lidberg W, Mörth C-M, Giesler R. (2019) *Landscape process domains drive patterns of CO_2 evasion from river networks. Limnology and Oceanography: Letters*

- 3. Lyon SW, Ploum SW, van der Velde Y, **Rocher-Ros G**, Mörth C-M, Giesler R. (2018) *Lessons learned from monitoring the stable water isotopic variability in precipitation and streamflow across a snow-dominated sub-arctic catchment. Arctic, Antarctic and Alpine Research*

- 2. Myrstener M, **Rocher-Ros G**, Burrows RM, Bergström AK, Giesler R, Sponseller RA. (2018) *Persistent nitrogen limitation of stream biofilm communities along climate gradients in the arctic. Global Change Biology*

- 1. **Rocher-Ros G**, Giesler R, Lundin E, Salimi S, Jonsson A, Karlsson J. (2017) *Large lakes dominate CO_2 evasion from lakes in an Arctic catchment. Geophysical Research Letters*

ORAL COMMUNICATIONS

- Bernal S, Peñarroya X, Jativa C, Casamayor, EO, Lupon A, Ledesma, JL, **Rocher-Ros G**, Catalán N, Martí E. *Living on the edge: Mediterranean streams as natural laboratories for understanding the impact of*

extreme hydrological events on biogeochemical transport and cycling (Presented at BIOGEOMON meeting in Puerto Rico, 2024. Selected for an invited article in the journal Biogeochemistry)

- **Rocher-Ros G**, Olofsson J, Nilsson K, Siewert M, Sponseller R. *Arctic terrestrial herbivores control the export of nutrients and carbon to aquatic ecosystems.* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Bernal S, Lupon A, **Rocher-Ros G**, Jativa C, Penarroya X, Lannergård E, Soler M, Martí E, Ledesma J. *Hydrological conditions control CO2 sources and concentration patterns in an intermittent Mediterranean stream* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Woodrow R, White S, Conrad S, Wadnerkar P, **Rocher-Ros G**, Sanders C, Holloway C, Santos I. *Enhanced nocturnal CO2, CH4, and N2O emissions in headwaters revealed by high temporal resolution measurements.* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Olid C, Verheijen H, **Rocher-Ros G**. *The role of groundwater inputs on biogeochemical processes of ice-covered lakes.* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Sponseller R, **Rocher-Ros G**, Myrstener M, Hintz C, Buffam I, Giesler R. *Integrating stream metabolism and biogeochemical fluxes across scales in an Arctic catchment.* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Casson N, Loken L, **Rocher-Ros G**, Sponseller R, Stanley E. *The role of hydrology and temperature in predicting methane in streams and rivers.* (Presented at ASLO meeting in Mallorca (Spain), 2023)

- Sponseller RA, **Rocher-Ros G**, Casson NJ, Loken LC, Oliver SK, Stanley EH. *Global patterns in the methane to carbon dioxide ratio of running waters* (Presented at SIL meeting in Berlin (Germany), 2022)

- **Rocher-Ros G**, Raymond PA, Liu S, Rosentretter J, Amatulli G, Loken L, Casson N, Sponseller R, Stanley EH. *Global methane emissions from running waters.* (Presented at JASM meeting in Grand Rapids (USA), 2022)

- Stanley EH, **Rocher-Ros G**, Loken L, Casson NJ, Wallin M, Zhang L, Sponseller R. *Introducing GRiMeDB: The Global Rivers Methane database.* (Presented at JASM meeting in Grand Rapids (USA), 2022)

- Hintz C, **Rocher-Ros G**, Buffam I, Sponseller RA. *How is diel nitrate variation coupled to N limitation in Arctic streams?* (Presented at ASLO meeting 2021 (online))

- Myrstener M, **Rocher-Ros G**, Gomez-Gener L, Giesler R, Sponseller R. *Nutrient availability shapes seasonal metabolic regimes in Arctic streams* (Presented at ASLO meeting in Victoria (Canada), 2018)

- **Rocher-Ros G**, Sponseller RA, Mörth C-M, Myrstener M, Giesler R. *Aquatic metabolism is an important driver of CO_2 dynamics in Arctic streams of Sweden.* (Presented at SFS meeting in Detroit (USA), 2018, and in ASLO meeting in Victoria (Canada), 2018)

- Myrstener M, **Rocher-Ros G**, Gomez-Gener L, Giesler R, Sponseller RA. *Nutrient availability shapes seasonal metabolic regimes in Arctic streams.* (Presented in ASLO meeting in Victoria (Canada), 2018)

- **Rocher-Ros G**, Sponseller RA, Mörth C-M, Giesler R. *High resolution measurements of CO_2 fluxes in an Arctic stream network reveal high spatial variability.* (Presented at SEFS meeting in Olomouc (Czech Republic), 2017)

- **Rocher-Ros G**, Burrows R, Bergström A-K, Giesler R, Sponseller RA. *Resource limitation in arctic stream ecosystems: a comparative study in three ecoregions in northern Sweden.* (Presented at ASLO Meeting in Granada (Spain), 2015)

- Karlsson J, Giesler R, **Rocher-Ros G**, Salimi S, Lundin E. *The role of inland waters in the carbon cycle at high latitudes: Assessment from integrated terrestrial-aquatic carbon balances of subarctic catchments* (Presented at ASLO+SFS meeting in Portland (USA), 2014)

- Karlsson J, Klaus M, Lundin E, **Rocher-Ros G.** *Spatiotemporal variability in GHG fluxes and implications for accurately estimating GHG emissions from inland waters.* (Presented at AGU Meeting in San Francisco (USA), 2013)

- Vogel H, Wagner B, Rosén P, Meyer-Jacob C, Ritter B, Boxberg F, Gudasz C, **Rocher-Ros G**, Snowball I. *Lake floor morphology, sediment architecture, and patterns of sedimentation in Lake Torneträsk.* (Presented at EGU Meeting in Vienna (Austria), 2012).

TEACHING EXPERIENCE

Umeå University

- Teaching assistant in *Arctic Geoecology*.   2015-2018
  Field course taught in Abisko, Sweden. Coordinating field projects and one lecture. Course coordinator: Reiner Giesler.

- Teaching assistant in *Water quality and management*.   2015-2017
  Supervising lab classes about aquatic macroinvertebrates and its use for water quality assessment. Course coordinator: Ryan Sponseller.

- Teaching assistant in *Aquatic Biogeochemistry*.   2015-2017
  Leading a field project on greenhouse gas dynamics in experimental ponds. Course coordinator: Ann-Kristin Bergström.

- Teaching assistant in *Miljöresan*   2015-2017
  Field course taught in Abisko, Sweden. Coordinating field projects and leading one excursion. Course coordinator: Micael Jonsson.

- Teaching assistant in *Environmental disturbances in soil and water*   2015
  Teaching practical sessions on spatial statistics, applied to soil and water disturbances Course coordinator: Håkan Eriksson.

Other teaching occasions

- Invited lecturer in the PhD course: *Time series analysis in ecological sciences*, organized by the Iberian Society of Ecological Sciences.   2023-2024
  A lecture on spatial time-series analysis, using R software, followed by a one-day hands-on workshop.

- Invited lecturer in the PhD course: *Time series analysis in limnology*, organized by the Iberian Limnological Society.   2022
  In this course I do a lecture on time-series analysis and visualization using R software, followed by a hands-on workshop for a whole day.

- Guest teacher in the *International Field School in Watershed Sciences*.   2014
  A field course on field and laboratory techniques in watershed sciences for graduate students as part of the NSERC CREATE ABATE Program. I led a field excursion to show a catchment experimental setup in Abisko.

AWARDS AND GRANTS

Awards

- National champion of the Frontiers Planet Prize (for Sweden, 2024).

Grants as main researcher

- Scholarship from the King Carl XVI Gustaf Foundation's 50-year fund for science, technology and the environment (2024): 100.000 SEK + handshake of the king.

- Funding for an art-science exhibition in Umeå Kommun (2023). Art piece to display the effects of climate change in the global mountains, together with the artist Eva Marklund (300 000 SEK). *Summits of Snow*

- International postdoc mobility grant from the Swedish Research council (2021): 3 600 000 SEK (360 000 EUR) *Closing the Carbon Cycle in River Networks across Climate and Terrestrial Productivity Gradients*

- Early career project grant from the Climate Impacts Research Centre in Umeå (2020): 30 000 SEK (3000 EUR) *Consequences of the altered tundra carbon cycle by reindeers: Accounting for aquatic carbon losses*

- Pilot research grant from the Climate Impacts Research Centre in Umeå (2018): 40 000 SEK. *Shaking radionuclides in agitated waters: using Radon222 to measure CO_2 fluxes in Arctic streams.*

- Endowment award from the Society of Freshwater Science (2018): 1000 USD

Grants as collaborator
- Action group of the International Permafrost Association (2023): 5 000 EUR. Leader: Anna Virkkala. *ABCflux v2 - an Arctic-boreal carbon flux data compilation and synthesis effort.*
- National Research grant from the Spanish Research council (2022): 127.000 EUR. Main PI: Susana Bernal. *Influence of carbon and nitrogen lateral inputs on stream metabolism and CO_2 evasion in Mediterranean headwater streams (2022)*

PROFESSIONAL CONTRIBUTIONS AND AFFILIATIONS

- Manuscript reviewer (n=34) for: *Science Advances (1)*, *Nature Geoscience (1)*, *Proceedings of the National Academy of Sciences (PNAS) (2)*, *Nature Communications (1)*, *Global Biogeochemical Cycles (5)*, *Biogeochemistry (1)*, *Biogeosciences (2)*, *Limnology and oceanography Letters (3)*, *Water Resources Research (1)*, *Limnology and Oceanography (4)*, *Environmental Research Letters (1)*, *Ecosystems (1)*, *Biogeosciences (1)*, *Hydrological Processes (1)*, *Radiocarbon (1)*, *Journal of Geophysical Research-Biogeosciences (5)*, *Communications Earth and the Environment (1)*, *Aquatic Sciences (2)*.

- Oustanding reviewer in 2022 for Global Biogeochemical Cycles

- Member of the *Association for the Sciences of Limnology and Oceanography* (ASLO), the *Society for Freshwater Science* (SFS) and the *Asociación Ibérica de Limnología* (AIL).

RELEVANT SKILLS

Software skills
- Proficiency level programming with R.
    - Data processing and statistical analysis (*tidyverse*)
    - Graphical visualisation (*ggplot2*, *shiny*)
    - GIS analysis and hydrological modelling (*whitebox*, *sf*, *terra*)
    - Reproducible documentation (*Rmarkdown*)
- Intermediate level programming in C and Python.
- Intermediate GIS user. Knowledge of ArcGIS, QGIS, Google Earth Engine.
- User of git/github.
- User of illustration software (Inkscape, Adobe Photoshop/Illustrator)
- User of Linux, Windows OS and Mac OS.
- Modelling aquatic stream metabolism using inverse Bayesian model fitting.
- Machine learning models using random forests in R.
- Development of cellular automata models.
- Development of basic websites using Hugo in markdown.

Environmental science skills
- Coordinate and perform fieldwork campaigns in remote places.
- Perform hydrological measures in streams and rivers.
- Field and laboratory handling of a wide array of water, soil and biological samples.
- Maintain, calibrate and program environmental sensors (CO_2, O_2, temperature, pressure, conductivity . . .)
- Use of Campbell Scientific data loggers and Raspberry Pi.

Languages skills
- Native in: Catalan, Spanish, Occitan.
- Proficient in: English.
- Intermediate in: Swedish and French.

Community engagement
- Manager of social networks for the Swedish Ecological society (Oikos-Sweden).

- Member of the European-wide collaborative project "Urban Algae", on the societal perception of the ecological status of urban ponds.

- Vice-chairman (2015-2017) and Chairman (2017-2018) of the PhD branch of NTK (Student association of the Science and Technology faculty, Umeå University).