Caroline Muller

CONTACT

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RESEARCH TOPICS

Moist convection, hydrological cycle (mean and extreme precipitation), spatial organization of tropical clouds, tropical cyclones, ocean circulation, internal waves.

RESEARCH EXPERIENCE

2024 - present **Institute of Science and Technology Austria (ISTA)**
Professor

2021 - 2024 **Institute of Science and Technology Austria (ISTA)**
Assistant Professor

2015 - 2021 **CNRS, Laboratoire de Météorologie Dynamique (LMD), École Normale Supérieure (ENS) Paris**
CNRS researcher *Chargée de Recherche CNRS*
& joint appointment as ENS lecturer *Maître de Conférence attachée à l'ENS*

2012 - 2015 **CNRS, Laboratoire d'Hydrodynamique de l'X (LadHyX), École Polytechnique**
CNRS researcher *Chargée de Recherche CNRS*

2010 - 2012 **Princeton University/GFDL** Atmosphere Ocean Science Dept.
Associate Research Scholar, with Isaac Held

2008 - 2010 **Massachusetts Institute of Technology (MIT)** Earth, Atmospheric and Planetary Sciences Dept.
Postdoctoral Associate, with Paul O'Gorman

2003 - 2008 **New York University** Courant Institute of Mathematical Sciences
Ph.D. research, with Oliver Bühler

Summers of 2004, 2005 and 2006 **NASA** Goddard Institute for Space Studies
Summer internships, with Vittorio Canuto and Armando Howard

EDUCATION

Courant Institute of Mathematical Sciences, New York University (NYU)
Ph.D. in Applied Mathematics, May 2008
M.S. in Mathematics, May 2005
- Ph.D. title: Wave-induced mixing in the abyssal ocean
- Advisor: Oliver Bühler

Georgia Institute of Technology
M.S. in Aerospace Engineering, March 2003 - selective dual degree program with Supaéro
- Master's thesis topic: A wavelet method for solving optimal control problems
- Advisor: Panagiotis Tsiotras

Supaéro, École Nationale Supérieure de l'Aéronautique et de l'Espace, France
Engineering degree, March 2003
- Ranked first on the competitive entrance exam for Supaéro Mathematics major

Distinctions

2023	**Paper selected for front cover** *Physics Today*
2019–2025	**ERC Starting Grant** *European Research Council (ERC)*
2019	**Invited professor - Spring semester** *New York University - Abu Dhabi campus*
2012–2017	**Director of the graduate summer school** "Fluid Dynamics of Sustainability and the Environment" (FDSE): annual summer school co-organized by École Polytechnique & the University of Cambridge `fdse.org`
2016	**Invited professor - Spring semester** *New York University - Shanghai campus*
2015	**Joint appointment as ENS lecturer** *École Normale Supérieure, Paris*
2009	**Publication selected to be an "Editor's Highlight"** *Geophysical Research Letter*
2007	**"Sandra Bleistein" Prize** for notable achievement in applied math *Courant Institute of Mathematical Sciences*
2007	**Nominated for Outstanding Teaching Award** *New York University, College of Arts and Sciences*
2007	**Best poster presentation award** *AMS* 16^{th} *Conference on Atmospheric and Oceanic Fluid Dynamics*
2003–2008	**Henry MacCracken Fellowship** *New York University Graduate School of Arts and Sciences*
1999	**Ranked first** on the entrance exam for Supaéro, Math major *Supaéro, École Nationale Supérieure de l'Aéronautique et de l'Espace*

Supervisions

Postdocs Alejandro Casallas (2024-ongoing; Marie Curie Fellow); Jiawei Bao (2024-ongoing; Marie Curie Fellow); Bidyut Goswami (2022-ongoing); Lokahith Agasthya (2022-ongoing; Marie Curie Fellow); Yi-Ling Hwong (2022-2024; Marie Curie Fellow); Benjamin Fildier (2019-2022); Nicolas Da Silva (2019); Jean-Baptiste Courbot (2017-2018)

PhD students Andrea Polesello (2024-ongoing); Alex Charinti (2023-ongoing); Bowen Yang (2022-ongoing); Andrea Stollner (2022-ongoing); Sima Dogan (2022-ongoing); Julie Andre (2021-2024); Sophie Abramian (2020-2023); Sara Shamekh (2017-2020); Océane Richet (2014-2017)

Masters students/interns: More than 25 Masters research internships supervised

Awards and Distinctions of Group Members

- 2024 **Permanent Researcher Position** at IIASA, for Yi-Ling Hwong postdoctoral fellow
- 2024 **JSPS postdoctoral fellowhip**, for Julie Andre PhD student
- 2024-2026 **Marie-Curie IST-bridge fellowship**, for Alejandro Casallas postdoctoral fellow
- 2024 **PhD Prize** of Treilles Foundation, for Sophie Abramian PhD student
- 2023 **Winner "Exposure to Policy Making"** Marie Sklodowska-Curie Actions, Yi-Ling Hwong postdoctoral fellow
- 2023-2025 **Marie-Curie IST-bridge fellowship**, for Jiawei Bao postdoctoral fellow
- 2023 **CFMIP Early Career Scientist award**, for Yi-Ling Hwong postdoctoral fellow
- 2023 **CFMIP Early Research Career award**, for Sophie Abramian PhD student

- 2023 **ERC Starting Grant**, for Benjamin Fildier former postdoctoral researcher
- 2023 **Assistant Professor position** at New York University, for Sara Shamekh former PhD student
- 2023 **Researcher position at CNRS**, for Benjamin Fildier former postdoctoral researcher
- 2022-2024 **Marie-Curie IST-bridge fellowship**, for Lokahith Agasthya postdoctoral fellow
- 2022-2024 **Marie-Curie IST-bridge fellowship**, for Yi-Ling Hwong postdoctoral fellow
- 2022 **Jury congratulations at Pan GASS meeting**, for Sophie Abramian PhD student
- 2022 **Narasimha best research award**, for Bidyut Goswami postdoctoral researcher
- 2021 **CFMIP Early Career Scientist Award**, for Benjamin Fildier postdoctoral researcher

Outreach

2017–present **Public seminars** on tropical cyclones and on climate change
Les Houches City Hall; L'Institut des Hautes Études pour la Science et la Technologie (IHEST); La Direction Générale de l'Armement; Journées UPA - Union des Professeurs des classes préparatoires aux grandes écoles; "Pint of Science" events, Vienna Austria

2017–present **Appearances in the media** on hurricanes, on climate change, and on Mediterranean events
Television (France Info - France télévision; BFMTV; LCI television; M6 including the scientific TV show E=M6; France O; France 5); Radio (AFP; France culture; France Inter; Radio Canada); Written press (Newspaper 20 minutes; Wiener Zeitung; Der Standard; Der Spiegel)

2015–present **Scientific popularization** participation and scientific presentations at numerous events
Open-door events at ENS; Alumni visits at ENS; High-school students days; science for kids events

Administration

2025–ongoing **Scientific Council member, IMPT** *Institute of Mathematics for Planet Earth*

2024–ongoing **Chair of Recruiting Committee: Astro, Earth, Physics and Chemistry** *ISTA*

2024–ongoing **EGU session convener** *EGU conference, Vienna Austria*

2023–2024 **Grant panel member** *ANR (French funding agency)*

2021–2024 **Search Committee member** *ISTA*

2021–ongoing **Mission Advisory Group member** *ESA Harmony* satellite mission

2019–ongoing **Vice President of Research Group "GDR" on Turbulence**

2019–ongoing **Co-Editor of Atmospheric Dynamics volumes**, for Encyclopedia "Sciences and climate" *ISTE & Wiley Editors*

2018–2021 **Editor** for the journal *Current Climate Change Reports*

2020 **Member of Doctoral School board** *ED 129 Sorbonne Université*

2020 **Search Committee member** *Université Claude Bernard Lyon 1*

2016–2021 **Elected member of the laboratory committee** of *LMD*

2018 **Vice-president of the search committee** *ENS Paris*

2017 **Search Committee member** *Université de la Polynésie Française*

2012–2017 **Director of the FDSE graduate summer school**

2016–2017 Organizer of laboratory (LMD) seminars at *ENS*

2014–2015	Organizer of laboratory (LadHyX) seminars at *École Polytechnique*
2010–2012	Organizer of the climate dynamics seminar at *Princeton University*
2008–2010	**Created and ran** a journal club to discuss papers at *MIT*
2003–present	**Reviewer for several journals**, including *Nature, Proceedings of the National Academy of Sciences, Reviews of Geophysics, Geophysical Research Letters, J. of Advances in Modeling Earth Systems, ...*
2015–present	Member of over 25 **PhD committees**

Teaching Activities

2025	Lecturer	*Life on our planet* ISTA
2022	Lecturer	*Dry and Moist Atmospheric Convection* ISTA
2017-2021	Lecturer	*Clouds and Atmospheric Convection* ENS Paris
2015-2021	Lecturer	*Linear Algebra for Geosciences* ENS Paris
2015-2021	Lecturer	*Meteorology* ENS Paris
2014&16&18	Lecturer	*Clouds and Climate* FDSE graduate summer school, University of Cambridge UK
2013&15&17	Lecturer	*Numerical methods for fluid dynamics and applications* FDSE graduate summer school, Ecole Polytechnique
2016	Lecturer	*Calculus* NYU, Shanghai campus
2013-2015	Teaching Assistant	*Fluid Dynamics* ENSTA
2014	Teaching Assistant	*Turbulence* Ecole Polytechnique
2013	Lecturer	*Physical Oceanography* ENSTA
2005-2008	Lecturer	*PreCalculus, Calculus II and Calculus III* NYU
2003-2005	Teaching Assistant	*Business Calculus and Quantitative Reasoning* NYU

Main fundings & participation in national and international projects

2024–2025	**PI**, Interdisciplinary Project ICP, funded by ISTA: *Data-driven Investigation Of Storms (DIOS)*
2024–2025	**co-PI**, Interdisciplinary Project ICP, funded by ISTA: *Electrification of Hydrometeors*
2019–2025	**PI**, ERC Starting Grant, funded by ERC: *organisation of CLoUdS, and implications for Tropical cyclones and for the Energetics of the tropics, in current and in a waRming climate (CLUSTER)*
2021–2022	**co-PI**, ESA supported project, funded by ESA: *Science Data Utilisation and impact study for the ocean*
2018–2019	**PI**, PSL/NYU international collaborative project, funded by PSL (consortium of French universities and research institutions) and NYU (New York University): *New perspectives on tropical cyclone formation and intensification*
2018–2021	**PI**, LMD collaborative project, funded by LEFE (French national funding program from CNRS-INSU): *Robustness Of the Self-Aggregation of convection to Large-scale forcing, and implications for precipitation over tropical Islands*
2017–2018	**co-PI**, PI: B. Legras, PSL collaborative project, funded by PSL (consortium of French universities and research institutions): *Analyse de la croissance et morphologie des amas nuageux par méthodes variationnelles d'imagerie et de dynamique des fluides*
2017–2019	**co-PI**, PI: L.Oruba, collaborative project, funded by LEFE (French national funding program from CNRS-INSU): *Ocean-Atmosphere interactions: oceanic mesoscale eddies and tropical cyclones*
2016–2017	**PI**, ENS collaborative project, funded by ENS Actions Incitatives:

Role of small-scale Ocean dynamics in the large-scale Oceanic and atmospheric Circulation

2016–2017 **PI**, LadHyX collaborative project, funded by Chaire DDX-EDF (Chair for Sustainable Development) at Ecole Polytechnique:
Role of ocean Internal waves in the ocean Circulation

2016–2017 **PI**, France-Berkeley international collaborative project, funded by the France-Berkeley fund:
Impact of Self- Aggregation on Cyclogenesis

2015–2016 **PI**, LadHyX/LMD collaborative project, funded by Chaire DDX-EDF:
Modeled Aggregation of Convection And Cyclogenesis

2014–2015 **PI**, LadHyX/LMD collaborative project, funded by Chaire DDX-EDF:
Organization of Convection in the Tropical Atmosphere

2013–2017 **PI**, PhD funding, funded by Direction Générale de l'Armement (DGA):
Dissipation Of Tidal Energy in the Deep Ocean