GIULIA ROCCETTI

Exoplanet atmospheres - Earth Sciences

https://giulia-roccetti.github.io/
giulia.roccetti@esa.int
https://orcid.org/0000-0001-6227-7847
https://www.linkedin.com/in/giulia-roccetti/
ESAC, Villafranca del Castillo, Madrid, Spain

Employment

10/2025 – present — **Research Fellow**, European Space Agency (ESA)
European Space Astronomy Centre (ESAC) in Madrid (Spain)
Awarded project title: "*Clouds from Earth to exoplanets*".

09/2022 – 09/2025 — **Ph.D. student**, European Southern Observatory (ESO) (Germany)
International Max Planck Research School (IMPRS) in Astrophysics

03/2021 – 09/2022 — **Mini-job** as co-developer of the Pale Blue Dot project and co-lead of the international pilot projects, Ludwig-Maximilian University of Munich (LMU) (Germany).

07/2020 – 08/2020 — **Software developer** at Ageing Tech in Rome (Italy).

Education

09/2022 – 07/2025 — **Ph.D. Physics (summa cum laude)**, Ludwig-Maximilian University of Munich (LMU) (Germany)
Student in the International Max Planck Research School (IMPRS) in Astrophysics program
Thesis title: "*Modeling Earth as an exoplanet in reflected and polarized light*".

10/2020 – 08/2022 — **M.Sc. Physics** with specialization in Astrophysics, Ludwig-Maximilian University of Munich (LMU) (Germany)
Thesis title: "*Long-term presence of liquid water on the surface of exomoons orbiting freefloating planets*".

09/2017 – 09/2020 — **B.Sc. Physics**, Sapienza University of Rome (Italy)
Thesis title: "*Exoplanets: Study of the hypothesis of Fulton Gap with Machine Learning methods*".

First author publications

10/2025 — Giulia Roccetti, Claudia Emde, Michael Sterzik, Mihail Manev, Stefano Bagnulo and Julia V. Seidel, "**Planet Earth in reflected and polarised light III. Modeling and analysis of a decade-long catalog of Earthshine observations**"
Accepted on *Astronomy & Astrophysics*, arxiv preprint available at `https://arxiv.org/abs/2509.13415`

08/2025 — Giulia Roccetti, Michael Sterzik, Claudia Emde, Mihail Manev, Stefano Bagnulo and Julia V. Seidel, "**Planet Earth in reflected and polarised light II. Refining contrast estimates for rocky exoplanets with ELT and HWO**"
Astronomy & Astrophysics, 700, A62, August 2025, `https://doi.org/10.1051/0004-6361/202554831`

05/2025 — Giulia Roccetti, Claudia Emde, Michael Sterzik, Mihail Manev, Stefano Bagnulo and Julia V. Seidel, "**Planet Earth in reflected and polarised light I. Three-dimensional radiative transfer simulations of realistic surface-atmosphere systems**"
Astronomy & Astrophysics, 697, A170, May 2025, `https://doi.org/10.1051/0004-6361/202554167`

First author publications (continued)

10/2024 Giulia Roccetti, Luca Bugliaro, Felix Gödde, Claudia Emde, Ulrich Hamann, Mihail Manev, Michael Sterzik and Cedric Wehrum, "**HAMSTER: Hyperspectral Albedo Maps dataset with high Spatial and TEmporal Resolution**"
Atmospheric Measurement Techniques, 17, 6025–6046, October 2024, https://doi.org/10.5194/amt-17-6025-2024

08/2023 Giulia Roccetti, Tommaso Grassi, Barbara Ercolano, Karan Molaverdikhani, Aurélien Crida, Dieter Braun and Andrea Chiavassa, "**Presence of liquid water during the evolution of exomoons orbiting ejected free-floating planets**"
International Journal of Astrobiology, 22(4):317-346, August 2023, https://doi.org/10.1017/S1473550423000046

Co-author publications

submitted Surangkhana Rukdee, Manuel Güdel, Iva Vilović, et al., "**Is the high-energy environment of K2-18b special?**"
Astronomy and Astrophysics, October 2025, https://arxiv.org/abs/2510.06939
Contribution: interpretation of the results and link to habitability.

David Dahlbüdding, Tommaso Grassi, Karan Molaverdikhani, et al., "**Habitability of Tidally Heated H_2-Dominated Exomoons around Free-Floating Planets**"
International Journal of Astrobiology, June 2025
Contribution: exomoons tidal evolution and interpretation of the results.

07/2025 Svetlana Berdyugina, Lucas Patty, Jonathan Grone et al., "**Detecting alien living worlds and photosynthetic life using imaging polarimetry with the HWO coronagraph**"
arXiv, July 2025, https://arxiv.org/abs/2507.03819
Contribution: co-lead of the linear polarization science case.

03/2025 Julia V. Seidel, Bibiana Prinoth, Lorenzo Pino, et al., "**Vertical structure of an exoplanet's atmospheric jet stream**"
Nature, 639, 902–908, March 2025, https://doi:10.1038/s41586-025-08664-1
Contribution: interpretation of cloud formation and implications for the results.

06/2024 Jiri Zak, Henri Boffin, Elyar Sedaghati, et al., "**HD 110067 c has an aligned orbit**"
Astronomy and Astrophysics, 687, L2, June 2024, https://doi.org/10.1051/0004-6361/202450570
Contribution: part of the observing proposal and the analysis of the data.

Funding and Awards

Awards

01/2023 **Best Student Talk Prize** at 779. WE-Heraeus-Seminar, 200 EUR

Grants and Funding

10/2025 - current **ESA Internal Research Fellowship**
Three-year funded fellowship ~300 000 EUR

11/2024 **SETI**, Funding to attend the HWO spectral retrieval workshop at STScI, ~250 EUR

07/2023 **Origins 2023**, Funding to attend the conference, ~2 000 EUR

03/2023 **ESA ESTEC**, Funding to attend the Planet ESLAB 2023 conference, ~800 EUR

Funding and Awards (continued)

09/2022 - 09/2025 **ESO PhD grant**
Three-year funded PhD position ~90 000 EUR

Invited Talks and Seminars

09/2025 **Exo-coffee at University of Côte d'Azur** (Nice, France)
"Modeling Earthshine observations to prepare the characterization of rocky exoplanets"

05/2025 **Prof. Leonardo Testi's group meeting** (Bologna, Italy)
"Exploring Earth's reflected light through 3D radiative transfer simulations"

04/2025 **Talk at the Exoplanet Research Chair meeting (Prof. Kevin Heng)** (Munich, Germany)
"Three-Dimensional Radiative Transfer Modeling of Earth's Reflected Light"

11/2024 **Prof. Lisa Kaltenegger's group meetings** (Cornell University, USA)
"Exploring Earth's reflected light through 3D radiative transfer simulations"

NASA Goddard Exoplanets Seminar (NASA, USA)
"Exploring Earth's reflected light through 3D radiative transfer simulations"

Origins Seminar series (University of Arizona, USA)
"Modeling Earthshine observations for future exoplanet reflected light missions"

09/2024 **Planetary Camera and Spectrograph (PCS) R&D meeting** (ESO, Germany)
"Case for Polarimetry"

German Aerospace Center (DLR) (Oberpfaffenhofen, Germany)
"Earth as an exoplanet: the atmospheric physics' perspective"

ESA Science Hub, ESA ESRIN (Frascati, Italy)
"Probing cloud and surface properties in disk-integrated Earth's observations"

07/2024 **ESO Wine & Cheese seminar** (Garching, Germany)
"From Earthshine to the characterization of rocky exoplanets in reflected light"

04/2024 **Institute of Science and Technology Austria (ISTA)** (Vienna, Austria)
"Earth as an exoplanet: the atmospheric physics' perspective"

12/2023 **TMT ESO Chile** (Santiago de Chile, Chile)
"Earth as an exoplanet: detecting liquid water"

Contributed Talks at Conferences

10/2025 **ESA's MADRID-Area Exoplanet Science Meeting (MAESM) 2025** (Madrid, Spain)
"Earthshine observations as a benchmark for rocky exoplanet characterization"

07/2025 **Exoclimes VII** (Montreal, Canada)
"Exploring Earth's Reflected Light Through 3D Radiative Transfer Simulations"

03/2025 **Towards New Frontiers: The Astrochemical Journey from Young Stellar Nurseries to Exoplanets** (ESO, Germany)
"Characterizing Earth-like Exoplanets: Insights from Earthshine Observations"

07/2024 **Two HoRSES** (Berlin, Germany)
"Towards observing surface features of exoplanets in the ELT era: future applications of Earthshine"

06/2024 **Exoplanets 5** (Leiden, Netherlands)
"Long-term monitoring of the Earth as an exoplanet"

04/2024 **European Geosciences Union (EGU) - General Assembly 2024** (Vienna, Austria)
"Development of a spatio-temporal albedo dataset for Earth"

Contributed Talks at Conferences (continued)

07/2023 **Origins 2023** (Quito, Ecuador)
"Observing the Earth as an exoplanet: constraining cloud properties with spectropolarimetry of Earthshine"

05/2023 **Biennial European Astrobiology Conference (BEACON)** (La Palma, Spain)
"Constraining cloud properties on exoplanets with polarisation spectra and phase curves: the case of Earth"

03/2023 **Planet ESLAB 2023** (ESA-ESTEC, the Netherlands)
"Presence of Liquid Water during the evolution of exomoons orbiting ejected free-floating planets"

All-hands-on-deck Meeting 2023 - SPP 1992 (Munich, Germany)
"Long term presence of liquid water on the surface of exomoons orbiting ejected free-floating planets"

01/2023 **WE-Heraeus-Seminar 779** (Bad Hoffen, Germany)
"Long term presence of liquid water on the surface of exomoons orbiting ejected free-floating planets"

11/2022 **Disks and Planets across ESO facilities** (ESO Garching, Germany)
"Potential long term presence of liquid water on exomoons orbiting ejected free-floating planets"

Origins Excellence Cluster Science Week (Kloster Seeon, Germany)
"Long term presence of liquid water on the surface of exomoons orbiting ejected free-floating planets"

Posters

09/2024 **Cloud Academy III** (Les Houches, France)
"Clouds on Earth and beyond: what we learn from spectropolarimetry of Earthshine"

Schools and Specialised Training

07/2025 **ExoSLAM summer school** (Montreal, Canada)
Data reduction and analysis techniques for exoplanet atmosphere characterization.

06/2025 **FIT-FORUM school** (online, Italy)
Radiative transfer school for the preparation of the ESA's FIT-FORUM mission.

11/2024 **Habitable Worlds Observatory Exoplanet Spectral Retrieval Workshop 2024** (STScI, Baltimore, USA)
First tutorial workshop dedicated to the application of spectral retrieval techniques to exoplanet data sets obtained with the future Habitable Worlds Observatory.

09/2023 **ARES III School** (Biarritz, France)
Doctoral school on exoplanet atmospheric retrieval methods with JWST and Ariel, also using Machine Learning.

03/2023 **Cloud Academy III** (Les Houces, France)
Doctoral school on cloud formation and properties in extrasolar planets.

08/2021 **Atmospheres, Atmospheres! Do I look like I care about atmospheres?** (ESO, online)
Workshop on the characterization of exoplanet atmospheres by transmission and emission spectroscopy.

Supervising Experience

10/2025 - present — **Primary supervisor of a Master thesis** (co-supervised with Prof. Leonardo Testi).
Project title: "Analysis of high-resolution NIR Earthshine observations in polarization", student: Pietro Caccese (University of Bologna, Italy).

07/2024 - 08/2024 — **Co-supervisor of a Bachelor student**, ESO Summer Research Program 2024 (Germany)
Project title: "The needle in a haystack: hunting for exocomets", student: Catalina Sáez Carvajal (University of Valparaíso, Chile)

Community Work

09/2023 - 02/2025 — **Member of the Diversity, Equity and Inclusion (DE&I) Committee of ESO**
First student member, representing all ESO students in Garching and Chile

05/2023 - 02/2025 — **Student representative** in the Office for Science at ESO (Germany)

Outreach

04/2025 — **Role Model at the Girls' Day organised by the European Patent Office (EPO)**
I represented ESO and shared my experience as a woman in STEM (Munich, Germany)

01/2025 — **Speaker at the Kosmiches Kino Planetarium show** (ESO, Germany)
Show title: "*How Unique Is Earth? A Journey Through Exoplanet Discoveries*".

10/2024 — **Volunteer at the ESO Open House Day**
I contributed to the planning and organization of a planet formation exhibit, with a special emphasis on designing activities accessible to visually impaired individuals.

04/2024 — **Role Model at the Girls' Day organised by the European Patent Office (EPO)**
I represented ESO and shared my experience as a woman in STEM (Munich, Germany)

03/2024 — **Informal Discussion at ESO**
"Latest on Climate simulations: Atlantic Circulation might be on Tipping Course" (Munich, Germany)

06/2021 - 12/2022 — **Co-author and co-responsible** of the Pale Blue Dot project at LMU, providing educational material for primary school children on the topics of astronomy and climate change (`https://www.blaueperle-schule.com/`).

School visits

05/2023 — **Outreach activity in a primary school** (Scuola Elementare Quinqueremi) in Rome (Italy) on the topics of Astronomy, Space and Climate Change.

2022 — **I visited several schools** in Munich (Germany) as part of the Pale Blue Dot project, and I co-organised teacher trainings. I also lead pilot projects in Armenia, Ethiopia and South Africa.

Organization of Events and Hiring Processes

11/2025 — **LOC member** of "Planetary Formation and Exoplanets in the ELT era" (ESO, Germany)

Organization of Events and Hiring Processes (continued)

03/2025 — **LOC member** of "Towards New Frontiers: The Astrochemical Journey from Young Stellar Nurseries to Exoplanets" (ESO, Germany)

05/2024 – 02/2025 — **Member** of the Student Selection Committee at ESO, as Student Representative (Germany)

02/2024 — **Organizer** of the Mental Health Awareness Event at ESO (Germany)

09/2023 – 02/2025 — **Developer** of the "EDI for my future: Equity, Diversity and Inclusion discussion serie" (Germany)

09/2023 – 05/2025 — **Co-organizer** of the "Stellar Coffee and Planetary Tea" topical meeting at ESO (Germany)

03/2023 — **LOC member** of "All-hands-on-deck Meeting 2023 - SPP 1992" (Munich, Germany)

01/2023 – 02/2025 — **Co-organizer** of the Astronomy-for-Non-Astronomers talk series at ESO (Germany)

Activities as a Referee

11/2024 — **Scientific Assistant** for the Period 115, Observing Programs Committee (OPC) (ESO, Germany).

10/2024 – present — **Scientific Reviewer** for the Atmospheric Measurment Techniques (AMT) Copernicus journal.

05/2023 – present — **Scientific Reviewer** for VLT in the Distributed Peer Review (DPR) process.

Observing Proposals and Experience

Awarded Telescope Time as Principal Investigator (PI)

07/2025 — **Principal investigator, Prog. 116.28PP (PI: Roccetti)**, ESO, 16 hours, VLT/CRIRES and VLT/FORS2: *"Earth as a Benchmark: Habitability via VIS/NIR Spectropolarimetry"*

Principal investigator, Prog. 116.28QS (PI: Roccetti), ESO, 8 hours, VLT/CRIRES: *"Biomarkers of an exo-Earth: high-resolution spectropolarimetry of Earthshine"*

02/2025 — **Principal investigator, Prog. 115.27XA (PI: Roccetti)**, ESO, 20 hours, VLT/CRIRES: *"Titan as a laboratory for Early-Earth type exoplanets"*

02/2024 — **Principal investigator, Prog. 113.26KY (PI: Roccetti)**, ESO, 16 hours, VLT/FORS2: *"Proof of Concept for the Characterization of Exoplanet Atmospheres by Polarimetry"*

Awarded Telescope Time as co-Investigator (co-I)

02/2025 — **Co-Investigator, Prog. 115.28HW (PI: Rudkee)**, ESO VLT and ESA XMM shared proposal, 0.6 nights, VLT/CRIRES: *"MARSH - Methane Atmosphere Related to Stellar Host"*

03/2024 — **Co-Investigator of DTT proposal, Prog. 112.26X6 (PI: Zak)**, ESO, 5.2 hours, VLT/ESPRESSO: *"How do resonant planetary chains form and survive?"*

07/2023 — **Co-Investigator, Prog. 112.25VR (PI: Sterzik)**, ESO, ∼2 nigths, VLT/FORS2: *"Detecting Oceans on Earth as an exoplanet"*

02/2023 — **Co-Investigator of DTT proposal, Prog. 110.25AV (PI: Bagnulo)**, ESO, 2.5 hours, VLT/FORS2: *"Characterization of Aerosols caused by Wildfires in Southern Chile over Paranal"*

Observing Proposals and Experience (continued)

Observing Experience

01/2026 **Two nights of simultaneous observations at Paranal with VLT/CRIRES+ and VLT/FORS2 as a Visitor Astronomer**, part of the Prog, 116.28PP (PI: Roccetti): *"Earth as a Benchmark: Habitability via VIS/NIR Spectropolarimetry"*

10/2025 **Two night of observations at Paranal with VLT/CRIRES+ as a Visitor Astronomer**, part of the Prog, 116.28QS (PI: Roccetti): *"Biomarkers of an exo-Earth: high-resolution spectropolarimetry of Earthshine"*

12/2023 **Three nights of observations at Paranal with VLT/FORS2 as a Visitor Astronomer**, part of the Prog, 112.25VR (PI: Sterzik, co-I: Roccetti): *"Detecting Oceans on Earth as an Exoplanet"*

IT and Programming Skills

Programming Languages	Python | C/C++ | Fortran | MATLAB | SQL (basic) | HTML (basic) | R/R Studio | Visual Studio (basic)
Machine Learning Libraries	Keras | TensorFlow | Scikit-learn | PyTorch
Operating Systems	Linux (Ubuntu) | Windows | Linux Mint | MacOS
Word Editor	LaTeX | Microsoft Office Suite | Google Suite (Gmail, Google Drive, Google Docs, Google Sheets, Google Slides)

Languages

Languages

Italian (mother tongue)
English (proficient)
Spanish (intermediate)
French, German (basic)