

Cristian Montanaro

DATE OF BIRTH

NATIONALITY: Italian

ORCID:



Isernia, IS, Italy



LANGUAGES

MOTHER TONGUE: Italian

OTHER LANGUAGES: English | Spanish | German

KEY SKILLS

Subsurface and surface mapping of geothermal systems

Petrophysical testing: permeability, porosity, mechanical strength

Steam/fluid explosivity experiments and energy budget modelling

Geothermal hazard analysis and mitigation strategy design

Integration of lab, field, and geophysical data

Software knowledge of GIS, Leapfrog (basic) MATLAB, TOUGH2 (familiar) Python (basic)

ABOUT ME:

Geoscientist with 10+ years of international experience in volcanic and geothermal systems, combining deep expertise in petrophysics, fluid-rock interaction, and steam-driven eruption dynamics. I integrate field mapping, laboratory shock-tube experiments, and geophysical data (seismic, GNSS) to assess hydrothermal aquifer properties, rock strength, and fragmentation energetics.

I've led field campaigns in complex geothermal and volcanic terrains across Italy, Iceland, New Zealand, USA and Guadeloupe, supporting hazard assessment and reservoir evaluation. My work bridges research and application—collaborating with Landsvirkjun and Mercury NZ to translate surface and subsurface data into risk-informed strategies.

Earlier in my career, I worked in the geophysical industry with FUGRO and Geoteam, processing seismic and marine geohazard data for infrastructure and subsurface analysis – adding an operational, applied dimension to my scientific approach.

EDUCATION

2012 – 2016 - Munich, Germany

Ph.D. in Volcanology funded by Marie Skłodowska-Curie (NEMOH project)

Earth and Environmental Sciences, Ludwig Maximilian University (LMU)

2008 - Rome, Italy

MSc (Laurea) in Geophysics with specialization in Volcanology

La Sapienza University

WORK EXPERIENCES

Present - Napoli, Italy

Research grant

National Institute of Geophysics and Volcanology (INGV)

- Acquisition and analysis of field-experimental data, and PhD supervision

2019 – 2023 - Munich, Germany

Post-Doc Researcher

Earth and Environmental Sciences, LMU

- Designed and conducted experiments, authored scientific publications, supervised students, communicated science, and collaborated with geothermal industry to assess disruptive magma-hydrothermal aquifer interactions

2016 – 2018 - Auckland, New Zealand

Post-Doc Researcher

School of Environment, University of Auckland

- Conducted fieldworks in geothermal areas, authored scientific publications, supervised students and postdoctoral researchers, engaged in science communication, and collaborated with industry on geothermal hazard mitigation strategies

February – June 2016 - Munich, Germany

Research fellowship within the MED-SUV project

Earth and Environmental Sciences, LMU

- Evaluation of soil permeability and its relationship with the likelihood of explosions

2008 – 2012 - Rome, Italy

CNR Italy and University of Fairbanks/FUGRO Oceansismica S.p.A. and Geoteam S.p.A.

Research grants/ Employment as Geophysicist

- Lead on-site operations and participate in research vessel field campaigns, conducting geophysical data analysis for marine geohazard assessment and infrastructure planning, investigating volcanic submarine landslides, preparing scientific reports, and authoring scientific publications

TECHNICAL SKILLS

Microsoft Word / Excel / PowerPoint / Google Docs / Drive / Photography and video editing (Adobe Photoshop, Lightroom, DXO PhotoLab, Premiere Pro) / GIS (ArcGIS, QGIS) / Document management (One Drive, Google Drive, Dropbox)

DRIVING LICENSE

Type B

PUBLICATIONS

10 representative publications in ISI journals (journal Impact Factor and citations from Scopus):

- 1. Montanaro, C.,** Cronin, S.J., Lerner, G.A., Simpson, M.P., Brooks-Clarke, I., Swanney, G., Milicich, S.D., Calibugan, A., Bardsley, C., Scheu, B., 2024. Natural processes leading to large, pre-historic hydrothermal eruptions in geothermal areas: Rotokawa geothermal field, New Zealand. *GSA Bulletin*, 136(1-2), 27-56. DOI: 10.1130/B36509.1 [IF=4.212; Cit.=3]
- 2. Montanaro, C.,** Ray, L., Cronin, S.J., Calibugan, A., Rott, S., Bardsley, C., Scheu, B., 2023. Linking top and subsoil types, alteration and degassing processes at Rotokawa geothermal field, New Zealand. *Frontiers in Earth Science*, 10, 1067012. DOI: 10.3389/feart.2022.1067012 [IF=3.661; Cit.=7]
- 3. Montanaro, C.,** Mick, E., Salas-Navarro, J., Caudron, C., Cronin, S.J., Scheu, B., 2022. Phreatic and hydrothermal eruptions: From overlooked to looking over. *Bulletin of Volcanology*, 84(6), 64. DOI: 10.1007/s00445-022-01571-7 [IF=2.538; Cit.=30]
- 4. Montanaro, C.,** Mortensen, A.K., Weisenberger, T.B., Dingwell, D.B., Scheu, B., 2021. Stratigraphic reconstruction of the Víti breccia at Krafla volcano (Iceland): Insights into pre-eruptive conditions priming explosive eruptions in geothermal areas. *Bulletin of Volcanology*, 83, 1-27. DOI: 10.1007/s00445-020-01439-5 [IF=2.538; Cit.=12]
- 5. Montanaro, C.,** Cronin, S.J., Scheu, B., Kennedy, B., Scott, B.J., Dingwell, D.B., 2021. Host Rock Variability Powers the Diversity of Steam-Driven Eruptions. *Geophysical Research Letters*, 48(1), e2020GL089025. DOI: 10.1029/2020GL089025 [IF=4.720; Cit.=5]
- 6. Gallagher, A., Montanaro, C.,** Cronin, S., Scott, B., Dingwell, D.B., Scheu, B., 2020. Hydrothermal eruption dynamics reflecting vertical variations in host rock geology and geothermal alteration, Champagne Pool, Wai-o-tapu, New Zealand. *Bulletin of Volcanology*, 82, 1-19. DOI: 10.1007/s00445-020-01389-y [IF=2.538; Cit.=23]
- 7. Montanaro, C.,** Cronin, S., Scheu, B., Kennedy, B., Scott, B., 2020. Complex crater fields formed by steam-driven eruptions: Lake Okaro, New Zealand. *Bulletin of Volcanology*, 132(9-10), 1914-1930. DOI: 10.1007/s00445-020-01402-4 [IF=2.538; Cit.=17]
- 8. Montanaro, C.,** Scheu, B., Mayer, K., Orsi, G., Moretti, R., Isaia, R., Dingwell, D.B., 2016. Experimental investigations on the explosivity of steam-driven eruptions: A case study of Solfatara volcano (Campi Flegrei). *Journal of Geophysical Research: Solid Earth*, 121(11), 7996-8014. DOI: 10.1002/2016JB013273 [IF=3.956; Cit.=46]
- 9. Mayer, K.,** Scheu, B., **Montanaro, C.,** Yilmaz, T.I., Isaia, R., Aßbichler, D., 2016. Hydrothermal alteration of surficial rocks at Solfatara (Campi Flegrei): Petrophysical properties and implications for phreatic eruption processes. *Journal of Volcanology and Geothermal Research*, 320, 128-143. DOI: 10.1016/j.epsl.2015.12.043 [IF=3.14; Cit.=82]
- 10. Montanaro, C.,** Scheu, B., Gudmundsson, M.T., Vogfjörð, K., Reynolds, H.I., Dürig, T., Strehlow, K., Rott, S., Reuschlé, T., Dingwell, D.B., 2016. Multidisciplinary constraints of hydrothermal explosions based on the 2013 Gengissig lake events, Kverkfjöll volcano, Iceland. *Earth and Planetary Science Letters*, 434, 308-319. DOI: 10.1016/j.epsl.2015.12.043 [IF=5.39; Cit.=65]

AWARDED GRANTS

2023 – LMU Munich, Germany

LMU Excellence Grant – PSF Funds

Grant of €2,500 for fieldwork at Krafla, Iceland

- Fieldwork in Hveragil and Viti, Krafla: sampling of unaltered reservoir rocks (hyaloclastites, lavas) from Krafla caldera and comparison with altered breccias from Hveragil and Viti craters

2022 – LMU Munich, Germany

LMU Excellence Grant – PSF Funds

Grant of €4,300 for fieldwork in Yellowstone National Park, USA

- Sampling and study of hydrothermal alteration vs. mechanical and hydraulic properties of eruptive rocks at Pocket Basin, Twin Buttes (Lower Geyser Basin), and Mary Bay Crater

2021 – INGV Pisa, Italy

EUROVOLC Transnational Access Grant

Visiting Researcher grant in collaboration with Dr. Cerminara

- Integration of experimental data and ASHEE-based modelling to constrain source parameters and dynamics of explosive eruptions

2021 – LMU Munich, Germany

LMU Excellence Grant – Förderung Mittelbau

Grant of €5,700 for specialised scientific equipment

- Acquisition of analytical tools (multi-parameter fluid analyser and thermal camera) for monitoring chemical and thermal processes in rock alteration experiments and geothermal fieldwork

2021 – LMU Munich, Germany

LMU Excellence Grant – Junior Research Fund

Principal Investigator (€50,000 for postdoctoral researcher employment)

- Support for experiments and scientific publications on hydrothermal instability and phreatic eruption dynamics, in collaboration with the University of Auckland and industry partners, as part of preparatory work for an ERC Starting Grant proposal

2019–2021 – LMU Munich, Germany

DFG – German Research Foundation

Principal Investigator (€208,000) – **Project title:** *Permeability's role around magma bodies: a way for gradually deforming or suddenly erupting*

- Geological and experimental research on the role of permeability around magma bodies
- Supervision of MSc and PhD students
- Scientific publications and international conference presentations

2019–2021 – University of Auckland, New Zealand

MBIE – Smart Ideas Grant

Co-Principal Investigator with Prof. Shane Cronin (926,000 NZD) – **Project title:** *Stable geothermal power generation through reduced hydrothermal eruption hazard*

- Field and laboratory studies on eruption triggers and dynamics at Rotokawa geothermal field
- Supervision of MSc, PhD, and postdoctoral researchers
- Scientific publications and international conference presentations

2019–2020 – University of Auckland, New Zealand

Royal Society of New Zealand – Catalyst Fund

Co-Principal Investigator with Prof. Shane Cronin (50,000 NZD) – **Project title:** *Understanding eruption column stability and ash production through experimental studies*

- Experimental study of ash formation dynamics in volcanic conduits and vents
- Supervision of MSc students
- Presentation of results at scientific conferences

TRAINING AND FIELD ACTIVITIES – NEMOH & MED-SUV PROJECTS

Through intensive participation in the **NEMOH** and **MED-SUV** projects (<https://nemoh.pi.ingv.it>, <https://project.eurovolc.eu>), I acquired advanced skills in experimental volcanology, numerical and inverse modelling, geophysical data analysis, volcanic hazard forecasting, and thermo-fluid dynamic simulations. I received hands-on training during international schools and fieldwork campaigns in Italy, Iceland, and the UK, focusing on volcanic processes, soil permeability, degassing, magma-hydrothermal interactions, and crustal deformation. These activities included collaborative field mapping, sampling, lab work, and outreach events, and involved direct application of MATLAB, OpenFOAM, and stochastic methods. I presented scientific results in international meetings and engaged with both academic and industry representatives, strengthening my ability to communicate science and operate within multidisciplinary teams.

KEY COLLABORATIONS ON EXPLOSIVE ACTIVITY IN VOLCANIC AND GEOTHERMAL AREAS

Prof. S. J. Cronin – Volcanic and hydrothermal eruption hazards, University of Auckland, New Zealand. **Dr. M. Simpson, Dr. S. Milicich, Dr. A. Calibugan** – Hydrothermal reservoir structure and fluid-rock interaction modelling, GNS Science and Mercury Energy, New Zealand. **Dr. A. Mortensen, Dr. T. Weisenberger** – Hydrothermal reservoir geochemistry, Landsvirkjun and University of Iceland, Iceland. **Dr. M. Cerminara, Dr. R. Isaia, Dr. M. Pistolesi, Dr. M. de Micheli Vitturi** – Experimental data modelling for conduit processes and volcanic projectile dynamics; study of soil alteration and degassing in the Campi Flegrei geothermal area; eruptive dynamics of Solfatara volcano through rock characterization and shock tube experiments for numerical models, INGV, Italy. **Dr. D. Dempsey** – Modelling and geothermal resource engineering, University of Canterbury, New Zealand. **Dr. L. A. Morgan, Dr. P. Shanks, Dr. S. Hurwitz** – Physical processes of hydrothermal eruptions, United States Geological Survey (USGS), USA. **Prof. M. T. Guðmundsson** – Geophysical surveying of volcanoes, University of Iceland, Iceland. **Prof. A. Arciniega-Ceballos** – Volcanic seismology and numerical modelling, School of Sciences, National Autonomous University of Mexico (UNAM), Mexico.