Giovanni Baccolo

Assistant Professor in Physical Geography and Climate Change

Department of Science | Roma Tre University | Rome, Italy
giovanni.baccolo@uniroma3.it | ORCID: 0000-0002-1246-8968 | Scopus Author ID: 55929305200 | Scholar Profile

Research profile

I am a researcher in physical geography at Roma Tre University. My research investigates environmental and climatic change in Alpine and polar regions through ice-core geochemistry, environmental radioactivity and quantitative geomorphology. I have studied geochemical processes in Antarctic ice, the accumulation of fallout radionuclides on glaciers, and the preservation of climatic information in melting glaciers. I am currently leading ALERT (FIS2, 2026–2029), a research project applying fallout radionuclides, geomorphometry, remote sensing and machine learning to quantify soil erosion in mountain grasslands. I teach physical geography and climate change and I am active in scientific communication through books, articles and public events.

Research interests

- Glaciology and ice-core geochemistry; paleoclimatic archives and post-depositional alteration.
- Environmental radioactivity, fallout radionuclides and transport processes in glacier and soil systems.
- Mountain geomorphology, soil erosion, terrain analysis, remote sensing and quantitative methods.
- Glacier retreat and its environmental, climatic and cultural implications.

Academic appointments and education

Feb 2024–present Researcher (RTD-B), Department of Science, Roma Tre University, Italy.

Oct 2022–Jan 2024 Postdoctoral Researcher, Ice Core Research Group, Paul Scherrer Institute, Switzerland.

Apr–Sep 2022 Research Fellow, Department of Environmental and Earth Sciences, University of Milano-Bicocca, Italy.

Feb 2018–Jan 2022 Postdoctoral Research Fellow, University of Milano-Bicocca, Italy.

2017 PhD in Environmental, Geological and Polar Sciences, University of Siena, Italy.

2013 MSc in Environmental Sciences, University of Milano-Bicocca, Italy.

2010 BSc in Environmental Sciences, University of Milano-Bicocca, Italy.

Research funding and leadership

ALERT | 2026–2029 | €1,320,440 Principal Investigator. Italian Science Fund (FIS2), Ministry of University and Research. “Mapping soil erosion in mountain grasslands with environmental radioactivity”: integration of fallout radionuclides, geomorphometry, remote sensing and machine learning.

EAIIST Phase 2 | 2024–ongoing | €132,000 Principal Investigator following a change of PI. Italian National Antarctic Research Programme (PNRA). Glaciochemical and physical properties of megadunes in East Antarctica.

RadIce | 2022 | €21,070 Principal Investigator. INTERACT Transnational Access. Expedition to Flade Isblink, northeast Greenland, to investigate the environmental radioactivity of cryoconite.

TALDEEP | 2019–2023 | €95,500 Principal Investigator. Italian National Antarctic Research Programme (PNRA). Geochemistry of deep Talos Dome ice and post-depositional processes affecting its climate record.

JSPS fellowship | 2021 | €22,000 Awarded a research fellowship for a planned visit to Hokkaido University, Japan; the visit did not take place due to COVID-19 restrictions.

Selected scientific contributions

- **Ice-core geochemistry and planetary analogues:** Developed and applied analytical approaches based on synchrotron X-ray absorption spectroscopy to investigate iron mineralogy and chemical transformations in trace quantities of Antarctic ice-core dust. Results provided evidence of in-ice mineral alteration with relevance to interpretations of Martian surface materials (Baccolo et al., Nature Communications, 2021).
- **Fallout radioactivity in glacial environments:** Investigated the accumulation and redistribution of natural and artificial radionuclides in cryoconite, linking radiological signatures to supraglacial processes and the release of legacy contaminants as glaciers melt (Baccolo et al., The Cryosphere, 2020; Beard et al., Environmental Science & Technology, 2024).
- **Radionuclides as tracers of mountain soil erosion:** Evaluated fallout radionuclides as tracers of erosion and deposition in mountain grasslands, including the use of excess lead-210 where heterogeneous Chernobyl fallout complicates caesium-137 applications. This research underpins the ALERT project (Baccolo et al., Earth Surface Processes and Landforms, 2023).
- **Climate archives in temperate Alpine ice:** Contributed to ice-core drilling and interpretation at the Adamello Glacier, investigating the preservation of geochemical and chronological signals in temperate ice under ongoing glacier change. First-authored a review on temperate ice cores, with a focus on how meltwater-driven post-depositional processes modify or preserve climatic and environmental signals (Di Stefano et al., The Cryosphere, 2024; Baccolo et al., Journal of Glaciology, 2026).

Teaching and supervision

University teaching: Climate Change (6 cfu); Physical Geography and Laboratory / Cartography (6 cfu); end-of-course fieldwork for MSc geology students (2 cfu). Courses taught at Roma Tre University from academic year 2024/25.

Student supervision: Supervised approximately 22 BSc and MSc dissertations in Environmental Sciences, Geology, Physics and Natural Sciences. PhD supervision includes one co-supervised doctorate at the University of Siena and an ongoing doctoral project at Roma Tre.

Fieldwork and technical expertise

Field campaigns Ice-core drilling at Lys Glacier (2012, 2014) and Adamello Glacier (2021); fieldwork at Flade Isblink, Greenland (2022), and Tödi, Swiss Alps (2023); sampling of mountain grassland soils near Passo Rolle for ALERT (2026). I have been the scientific or expedition leader in most campaigns.

Laboratory methods Gamma-ray spectrometry, instrumental neutron activation analysis, ICP-MS, synchrotron X-ray absorption spectroscopy and X-ray fluorescence, and particle-size analysis with Coulter counters.

Data and spatial analysis R, MATLAB, developing Python skills, QGIS and SAGA GIS; geomorphometric analysis of high-resolution elevation models and fallout-radionuclide inventory conversion approaches, including MODERN.

Academic service and recognition

- Member of the Department of Science Orientation Committee, Roma Tre University (since 2024); member of the Roma Tre Sustainability Working Group (since 2025).
- Journal peer reviewer (81 reviews); guest editor for special issues on cryospheric and environmental science.
- Convener of scientific sessions at EGU General Assemblies (2022 and 2024).
- Member of the scientific panel of the Lombardy Glaciological Service (since 2023).
- Italian National Scientific Qualification for Associate Professor in Physical Geography, Geomorphology and Applied Geology.
- Selected awards: Premio Meroni per la Cultura Alpina (2025); Best Young Researcher Talk at the International Conference on Radioanalytical and Nuclear Chemistry (2016); third place in the Accademia dei Lincei Young Talent competition (2018 and 2021).

Selected invited scientific presentations

- University of Bern / Swiss Society for Quaternary Research, “Glaciers as paleoclimatic archives in a warming world” (2024).

- Arctic Science Summit Week, “Looking for radioactive contamination in the High Arctic” (2023).
- University of Plymouth, “Cryoconite: a glacial sponge” (2018).
- Diamond Light Source User Meeting, X-ray spectroscopy and ice-core science (2016).

Selected peer-reviewed publications

A thematic selection; full publication history available through Roma Tre IRIS and Scholar

Securo, A. et al. (2025). The glaciers of the Dolomites: the last 40 years of melting. *The Cryosphere 19, 1335–1352.* DOI

Beard, D. et al. (2024). Accumulation of environmental radioactivity on the surface of a high Arctic ice cap (Flade Isblink, NE Greenland). *Environmental Science & Technology 58, 17004–17014.* DOI

Di Stefano, E. et al. (2024). Temporal markers in a temperate ice core: insights from 3H and 137Cs profiles from the Adamello Glacier. *The Cryosphere 18, 2865–2874.* DOI

Baccolo, G. et al. (2023). 210Pbxs is a viable alternative to 137Cs for tracing soil redistribution in mountain pastures affected by heterogeneous Chernobyl fallout. *Earth Surface Processes and Landforms 48, 708–720.* DOI

Baccolo, G. et al. (2021). Jarosite formation in deep Antarctic ice provides a window into acidic, water-limited weathering on Mars. *Nature Communications 12, 436.* DOI

Baccolo, G. et al. (2021). Deep ice as a geochemical reactor: insights from iron speciation and mineralogy of dust in the Talos Dome ice core (East Antarctica). *The Cryosphere 15, 4807–4822.* DOI

Baccolo, G. et al. (2020). Cryoconite: an efficient accumulator of radioactive fallout in glacial environments. *The Cryosphere 14, 657–672.* DOI

Baccolo, G. et al. (2017). Cryoconite as a temporary sink for anthropogenic species stored in glaciers. *Scientific Reports 7, 9623.* DOI

Books and science communication

Books I ghiacciai raccontano (People, 2024); Piccoli ghiacciai alpini. Sulle tracce di Bruno Castiglioni tra le Pale di San Martino (Cierre Edizioni, 2021).

Editorial and writing activities Contributor to L’Altra Montagna; science communication articles for Le Scienze, La Repubblica, Il Dolomiti and Lo Scarpone; contributor and editor of the European Geosciences Union Cryosphere blog. Author of the Substack series Nimio.

Public engagement Lectures and conversations at science and mountain festivals, public events and schools, including Festivaletteratura Mantova, Trento Film Festival and science festivals. Topics include glacier retreat, climate change, mountain landscapes and environmental radioactivity.

Updated October 2026

Rome October 19th, 2026

