

Curriculum Vitae

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Permanent Researcher and Assistant Professor

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Academic position

- Since 2002 permanent researcher in the Scientific Disciplinary Sector GEO/08 - Geochemistry and Volcanology (at present GEOS-01/C – Geochemistry and Volcanology) at the University of Siena.
- Since the A.Y. 2011/12 assistant professor in geochemistry and environmental geochemistry at the Department of Physical, Earth and Environmental Sciences, University of Siena.

Research activities

- Main research lines in the field of environmental geochemistry:
 - contamination by potentially toxic elements of air (particulate matter and lichens), soil, stream sediments, surface water and groundwater in urban areas and mining, industrial and agricultural sites
 - assessment of natural background levels of potentially toxic elements in geomaterials (soil and stream sediment)
 - trace element behaviour in the soil and soil-plant system
 - assessment of air and soil quality by using bioindicators
 - chemistry and traceability of plants and vegetable foods
 - use of nanoparticles in environmental applications.
- Scientist in charge and/or coordinator of research unit in research projects funded by Public Institutions (e.g. Italian Ministry of Education, University and Research; Tuscany Region; Regional Agency for Development and Innovation in Agriculture and Forestry of Tuscany Region; University of Siena) and private companies.

- Team member in research projects funded by Public Institutions (e.g. Italian Ministry of Education, University and Research; Italian Ministry of University and Scientific and Technological Research; Italian Ministry of Environment and Territory; Italian Ministry of Defence; EuroGeoSurveys - Association of Geological Surveys of Europe; Italian National Research Council; Italian National Agency for the Protection of the Environment; Italian Institute for Environmental Protection and Research; Tuscany Region; University of Siena; Research Institute for Soil Study and Conservation) and private companies.

Teaching activities

- Lecturer of the following courses in first cycle degrees at the University of Siena:
 - Geochemistry – first cycle degree in Geological Sciences
 - Geochemistry – first cycle degree in Geology for the Environment and Territory
 - Geochemistry – first cycle degree in Geotechnologies
 - Laboratory of geochemistry – first cycle degree in Geological Sciences.
- Lecturer of the following courses in second cycle degrees at the University of Siena:
 - Environmental geochemistry – second cycle degree in Geological Sciences and Technologies
 - Contaminant geochemistry – second cycle degree in Ecotoxicology and Environmental Sustainability
 - Contaminant geochemistry – second cycle degree in Geological resources and hazards for land management
 - Sampling and analysis of surface waters – second cycle degree in Ecotoxicology and Environmental Sustainability
 - Applied geochemistry – second cycle degree in Geosciences and Applied Geology
 - Applied geochemistry – second cycle degree in Geological Sciences and Technologies
 - Soil geochemistry - second cycle degree in Geological Sciences and Technologies
 - Water and soil geochemistry – second cycle degree in Geological Sciences and Technologies
 - Geochemical modelling – second cycle degree in Technologies for the Analysis of Ecotoxicological Impacts
 - Geochemical modelling – second cycle degree in Chemistry for the Sustainable Development
 - Contaminant geochemistry – second cycle degree in Technologies for the Analysis of Ecotoxicological Impacts
 - Soil geochemistry - second cycle degree in Applied Geology
 - Laboratory of environmental geochemistry – second cycle degree in Geology for Territory, Resources and Environment.
- Lecturer of the following courses in Master at the University of Siena:
 - Soil geochemistry – Master of Environmental Geotechnologies

- Groundwater geochemistry - Master of Exploration and Analyses for the Groundwater Management
- Groundwater chemistry - Master in “Water Resources Management: Sustainability, Innovation and Communication - BEST WATER”.
- Lecturer in the “Best Water” Summer School at the University of Siena.
- Teacher in professional courses for geologists and civil servants.

Tutoring activities

- Tutor of:
 - PhD theses (PhD School in Sciences and Technologies Applied to the Environment, University of Siena)
 - First cycle degree theses at the University of Siena
 - Second cycle degree theses at the University of Siena
 - Final dissertations in Master of Environmental Geotechnologies (University of Siena) and Master of Exploration and Analyses for the Groundwater Management (University of Siena).
- Tutor of internships and trainings carried out at the Research Unit of Environmental Geochemistry and Laboratory of Geochemistry of the Department of Environmental, Earth and Physical Sciences, University of Siena.
- Scientific coordinator of research activities carried out in the context of research grants.

Scientific responsibilities and roles

- Member of teaching board of the PhD in Sciences and Technologies Applied to the Environment at the University of Siena (from the A.Y. 2003/04 to the A.Y. 2010/11).
- Member of teaching board of the PhD in Earth, Environmental and Polar Sciences at the University of Siena (from the A.Y. 2011/12 to the A.Y. 2013/14).
- Member of teaching board of the PhD in Environmental, Geological and Polar Sciences and Technologies at the University of Siena (since the A.Y. 2016/17).
- Scientific coordinator of the Research Unit of Environmental Geochemistry at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2011).
- Scientific coordinator of Laboratory of Geochemistry at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2011).
- Scientific coordinator of Laboratory for monitoring and preparation of geomaterials at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2021 to 2024).
- Scientific coordinator of the Optical Microscopy Laboratory at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2025).
- Scientific coordinator of the X-ray Diffractometry Laboratory at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2025).
- Scientific coordinator of the Ultrathin Sections Laboratory at the Department of Physical, Earth and Environmental Sciences, University of Siena (since 2025).

- Member of the scientific committee of the Egis System spin-off of the University of Siena (since 2013 to 2015).
- Member of the scientific council of the Joint Research Laboratory for the Petrology Applied to the Lime Industry (LCPAIC) between University of Siena, Unicalce S.p.A. and PetroLogic Synergy S.r.l. (from 2019 to 2021).

Institutional Roles

- Member of the Quality Assurance Management Group for the first cycle degree in Geological Sciences, the second cycle degree in Geosciences and Applied Geology, and the second cycle degree in Geological Sciences and Technologies (since 2019 to 2022).
- Member of the Committee for the National Scientific Degree Plans – Geology (since 2020 to 2021) at the University of Siena.
- Member of the Teaching Committee for the degree programs in Earth Sciences (since 2021).

Memberships

- Member of Italian Society of Geochemistry (SoGel).

Other activities

- Reviewer for the following peer-reviewed international journals: Applied Soil Ecology, Catena, Chemosphere, Environmental Earth Sciences, Environmental Geochemistry and Health, Environmental Geology, Environmental Monitoring and Assessment, Environmental Pollution, Environmental Pollutants and Bioavailability, International Journal of Environmental Science and Technology, Journal of Environmental Science and Health, Journal of Cleaner Production, Journal of Geochemical Exploration, Minerals, Science of the Total Environment, Soil and Sediment Contamination.
- Reviewer and evaluator of Ph.D. theses.

Publications

- Author of about 190 scientific publications.
 - Articles in international and national journals: 82
 - Books: 1
 - Contributions in collective volumes: 14
 - Conference proceedings: 94.
- Articles in international and national journals in the last 10 years (2014-2023).

Panza G., Montanari M., Lopez D., Fiorani M., Sisti D., Frontalini F., Pasini G., Papa S., Valentini L., Gobbi P., Bagherlou N., Burattini S., Formica M., Fusi V., **Protano G.**, Nannoni F., Santolini R., Canonico B. (2025). Hepatopancreatic cells of *Armadillidium vulgare*: an integrated, flow cytometric-based biomarker approach to unravel the soil ecological disturbance. *Science of The Total Environment*, 996, 180135. doi: doi.org/10.1016/j.scitotenv.2025.180135.

- Bellingeri A., Ale A., Rusconi T., Scattoni M., Lemaire S., **Protano G.**, Venditti I., Corsi I. (2025). Nanosilver Environmental Safety in Marine Organisms: Ecotoxicological Assessment of a Commercial Nano-Enabled Product vs an Eco-Design Formulation. *Toxics*, 13, 338. doi: doi.org/10.3390/toxics13050338
- Grattacaso M., Canali G., Vannini A., **Protano G.**, Nannoni F., De Lucia V., Di Lella L.A., Biagiotti S., Loppl S. (2025). Health and Ecological Risk From Potentially Toxic Elements in Soils and Extra Virgin Olive Oils From Valdichiana Senese, Tuscany (Italy). *Journal of Plant Nutrition and Soil Science*, 188, 241–250. doi: doi.org/10.1002/jpln.202400312.
- Panza G., Frontalini F., Ciacci C., **Protano G.**, Montanari M., Lopez D., Nannoni F., Papa S., Ortolani C., Rebecchi F., Fusi V., Santolini R., Canonico B. (2024). Environmental Diagnosis through a Flow Cytometric Approach. *International Journal of Molecular Sciences*, 25, 11069. doi: 10.3390/ijms252011069.
- Bellingeri A., Bono N., Venditti I., Bertelà F., Burratti LL., Faleri C., **Protano G.**, Paccagnini E., Lupetti P., Candiani G., Corsi I. (2024). Capping drives the behavior, dissolution and (eco)toxicity of silver nanoparticles towards microorganisms and mammalian cells. *Environmental Science: Nano*, 11, 2049-2060. doi: 10.1039/D4EN00063C.
- Menicagli V., Balestri E., Corti S., Arena B., **Protano G.**, Corsi I., Lardicci C. (2023). Effects of TiO₂ ultraviolet filter and sunscreens on coastal dune plant performance and competitive interactions. *Chemosphere*, 343, 140236. doi: 10.1016/j.chemosphere.2023.140236.
- Protano G.**, Bianchi S., De Santis M., Di Lella L.A., Nannoni F., Salleolini M. (2023). New geochemical data for defining origin and distribution of mercury in groundwater of a coastal area in southern Tuscany (Italy). *Environmental Science and Pollution Research*, 30, 50920-50937. doi: 10.1007/s11356-023-25897-7.
- Bellingeri A., Battocchio C., Faleri C., **Protano G.**, Venditti I., Corsi I. (2022). Sensitivity of *Hydra vulgaris* to Nanosilver for Environmental Applications. *Toxics*, 10, 695. doi: 10.3390/toxics10110695.
- Bellingeri A., Scattoni M., Venditti I., Battocchio C., **Protano G.**, Corsi I. (2022). Ecologically based methods for promoting safer nanosilver for environmental applications. *Journal of Hazardous Materials*, 438, 129523. doi: 10.1016/j.jhazmat.2022.129523.
- Nigro L., Freitas R., Maggioni D., Hamza H., Coppola F., **Protano G.**, Della Torre C. (2021). Coating with polysaccharides influences the surface charge of cerium oxide nanoparticles and their effects to *Mytilus galloprovincialis*. *NanoImpact*, 24, 100362. doi: 10.1016/j.impact.2021.100362.
- Vannini A., Bianchi E., Avi D., Damaggio N., Di Lella L.A., Nannoni F., **Protano G.**, Loppi S. (2021). Biochar Amendment Reduces the Availability of Pb in the Soil and Its Uptake in Lettuce. *Toxics*, 9, 268. doi: 10.3390/toxics9100268.
- Guidi P., Bernardeschi M., Palumbo M., Scarcelli V., Genovese M., **Protano G.**, Vitiello V., Pontorno L., Bonciani L., Buttino I., Chiaretti G., Pellegrini D., Fiorati A., Riva L., Punta C., Corsi I., Frenzilli G. (2021). Cellular Responses Induced by

- Zinc in Zebra Mussel Haemocytes. Loss of DNA Integrity as a Cellular Mechanism to Evaluate the Suitability of Nanocellulose-Based Materials in Nanoremediation. *Nanomaterials*, 11, 2219. doi: 10.3390/nano11092219.
- Vannini A., Grattacaso M., Canali G., Nannoni F., Di Lella L.A., **Protano G.**, Biaggiotti S., Loppi S. (2021). Potentially Toxic Elements (PTEs) in Soils and Bulbs of Elephant Garlic (*Allium ampeloprasum* L.) Grown in Valdichiana, a Traditional Cultivation Area of Tuscany, Italy. *Applied Sciences*, 11, 7023. doi: 10.3390/app11157023.
- Protano G.**, Di Lella L.A., Nannoni F. (2021). Exploring distribution of potentially toxic elements in soil profiles to assess the geochemical background and contamination extent in soils of a metallurgical and industrial area in Kosovo. *Environmental Earth Sciences*, 80, 486. doi: 10.1007/s12665-021-09771-8.
- Della Torre C., Maggioni D., Nigro L., Farè F., Hamza H., **Protano G.**, Magni S., Fontana M., Riccardi N., Chiara M., Caruso D., Binelli A. (2021). Alginate coating modifies the biological effects of cerium oxide nanoparticles to the freshwater bivalve *Dreissena polymorpha*. *Science of the Total Environment*, 773, 145612. doi: 10.1016/j.scitotenv.2021.145612. doi: 10.1016/j.scitotenv.2021.145612.
- Protano G.**, Baroni D., Bianchi S., Russo C., Salleolini M. (2020). Assessing the impact on groundwater chemistry of an environmental restoration performed using industrial solid waste from TiO₂ production. *Applied Geochemistry*, 120, 104666. doi: 10.1016/j.apgeochem.2020.104666.
- Sturba L., Fattorini N., Liberatori G., Vannuccini M.L., Nannoni F., **Protano G.**, Corsi I. (2020). Multi-model inference analysis of toxicological responses and levels of heavy metals in soft tissue of land snail *Cornu aspersum* caged in proximity to an industrial setting. *Ecological Indicators*, 117, 106688. doi: 10.1016/j.ecolind.2020.106688.
- Protano G.**, Baroni F., Di Lella L.A., Mazzoni A., Nannoni F., Papale A. (2020). How do properties and heavy metal levels change in soils fertilized with regulated doses of urban sewage sludge in the framework of a real agronomic treatment program? *Journal of Soils and Sediments*, 20, 1383–1394. doi: 10.1007/s11368-019-02511-3.
- Liberatori G., Grassi G., Guidi P., Bernardeschi M., Fiorati A., Scarcelli V., Genovese M., Faleri C., **Protano G.**, Frenzilli G., Punta C., Corsi I. (2020). Effect-Based Approach to Assess Nanostructured Cellulose Sponge Removal Efficacy of Zinc Ions from Seawater to Prevent Ecological Risks. *Nanomaterials*, 10, 1283 (Special Issue: Nanotechnology for Environmental and Biomedical Research). doi:10.3390/nano10071283.
- Atrei A., Fiorani M., Bellingeri A., **Protano G.**, Corsi I. (2019). Remediation of acid mine drainage-affected stream waters by means of ecofriendly magnetic hydrogels crosslinked with functionalized magnetite nanoparticles. *Environmental Nanotechnology, Monitoring & Management*, 12, 100263. doi: 10.1016/j.enmm.2019.100263.
- Proposito P., Burratti L., Bellingeri A., **Protano G.**, Faleri C., Corsi I., Battocchio C., Iucci G., Tortora L., Secchi V., Franchi S., Venditti I. (2019). Bifunctionalized

- Silver Nanoparticles as Hg^{2+} Plasmonic Sensor in Water: Synthesis, Characterizations, and Ecosafety. *Nanomaterials*, 9, 1353. doi: 10.3390/nano9101353.
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- Protano G.**, Nannoni F. (2018). Influence of ore processing activity on Hg, As and Sb contamination and fractionation in soils in a former mining site of Monte Amiata ore district (Italy). *Chemosphere*, 199, 320–330. doi: 10.1016/j.chemosphere.2018.02.051.
- Conti E., Costa G., Liberatori G., Vannuccini M.L., **Protano G.**, Nannoni F., Corsi I. (2018). Ariadna spiders as bioindicator of heavy elements contamination in the Central Namib Desert. *Ecological Indicators*, 95, 663–672. doi: 10.1016/j.ecolind.2018.08.014.
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- Uva M., Tambasco M., Grassi G., Corsi I., **Protano G.**, Atrei A. (2017). Carboxymethylcellulose hydrogels cross-linked with magnetite nanoparticles for the removal of organic and inorganic pollutants from water. *Journal of Environmental Chemical Engineering*, 5, 3632–3639. doi: 10.1016/j.jece.2017.07.025.
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- Nannoni F., **Protano G.** (2016). Chemical and biological methods to evaluate the availability of heavy metals in soils of the Siena urban area (Italy). *Science of the Total Environment*, 568, 1–10. doi: 10.1016/j.scitotenv.2016.05.208.
- Nannoni F., Rossi S., **Protano G.** (2016). Potentially toxic element contamination in soil and accumulation in maize plants in a smelter area in Kosovo. *Environmental Science and Pollution Research*, 23(12), 11937–11946. doi: 10.1007/s11356-016-6411-0.

Raco B., Buccianti A., Corongiu M., Lavorini G., Macera P., Manetti F., Mari R., Masetti G., Menichetti S., Nisi B., **Protano G.**, Romanelli S. (2016). GEOBASI: il Database Geochimico della Regione Toscana. *Il Geologo*, 99, 20-23.