



Etna paroxysm of March 4, 2021 photographed from Cesarò. By courtesy of Sergio Calabrese.

# GEOCHEM NEWSLETTER

May 2025, n.19

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So.Ge.I. – ITALIAN GEOCHEMICAL SOCIETY



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# Letter from the President

Orlando Vaselli

Dear Friends and Colleagues,

This is the GeochemNewsletter n. 19 and we have a couple of contributions. The first one is by Carmine Apollaro, Giovanni Vespasiano and Marco Taussi and concerns the Natural Greenhouse Gas Emissions from the Sibari Coastal Plain (Southern Italy) where it is stressed that even in non-volcanic areas an important role can be played in terms of natural CO<sub>2</sub> emissions. This suggests that the global carbon budget cannot fully be made explicit if the role of coastal and wetland areas and other sites is not taken into account. This calls for additional and detailed evaluations of CO<sub>2</sub> flux measurements aimed at obtaining a CO<sub>2</sub> budget not only limited to volcanic and geothermal areas.

The second brief note is by Antonio Langone who reports about the conference *Granulites & Granulites VI – Exploring the Deep Continental Crust* – that was held last September at Verbania (Italy) and that was partly sponsored (two registration fees were paid) by our Society. It was a successful conference since 135 participants from 27 countries attended this event, covering different sectors of solid geochemistry from petrological modelling to crustal dynamics. Two students were awarded during the conference: Ankan Bhattacharyya (University of Bern, Switzerland) as best student contribution for his talk on garnet trace element composition across metamorphic grades, and Caliméria Passos do Carmo (University of Toulouse, France) for her poster on crustal assimilation and magma hybridisation in the lower crust.

Since next June to October 2025, there will be a “hot period” since several scientific meetings and schools will be involving our

community. We start with the *Summer School on in-situ measurements and sampling of volcanic gases* (<https://www.societageochemica.it/wp-content/uploads/2025/01/Vulcano-Summer-School-2025-brochure.pdf>) that will be held at Vulcano (Aeolian Islands) from the 9<sup>th</sup> to the 14<sup>th</sup> of June. Currently, more than 160 people (as teachers and scholars) will attend this annual School which is addressed to Master and PhD students and Post-doc researchers. The members of the Scientific and Organizing Committees are Rebecca Biagi, Sergio Calabrese, Lorenza Li Vigni, Guendalina Pecoraino, Antonio Randazzo, Franco Tassi, Francesco Tripodi and Stefania Venturi. This School is free-of-charge and the scholars are responsible for their accommodation, food and travel expenses. It is only the dedication by the organizing members and the large variety of field activities that allow to have an increasing number of participants to this School since 2018 (with only two forced stops in 2020 and 2021 due to the sanitary emergency).

From the 16<sup>th</sup> to the 21<sup>st</sup> of June Cagliari will host the 18<sup>th</sup> *International Symposium on Water-Rock Interaction* and the 15<sup>th</sup> *International Symposium on Applied Isotope Geochemistry* (<https://www.unica-wri-18.it>). I would like to express my deepest gratitude to Giovanni De Giudici for all the efforts that he has put, along with the other components of the Local Organizing Committee, in managing this international event. Several sessions and pre- and post-field trips within the two symposiums have as conveners and organizers, respectively, the SoGel members. The Society contributed to the Cagliari symposiums by a call for the best abstracts presented by young PhD

and post-doc students. Four registration-fees were paid by the Society to: Francesca Amico, Filippo Brugnone, Eduardo Di Marcantonio and Federica Meloni. I would like to thank the members of the committee for the nice work they did. The selection of the best abstracts was actually not very easy.

A few days later after the Cagliari symposiums, there will be the IAVCEI 2025 Scientific Assembly at Geneva from the 29<sup>th</sup> of June to the 4<sup>th</sup> of July (<https://www.iavceivolcano.org/event/scientific-assembly-2025>) where the SoGel members as conveners or participants will attend this event. The IAVCEI Assembly will partly overlap with the 5<sup>th</sup> CAMGEO (*Sampling and Analysis of Geological Matrices*) School that will be held in Naples from the 1<sup>st</sup> to the 4<sup>th</sup> of July at the Department of Earth, Environmental and Resource Sciences. This School has as main target: *Contaminated sites and analysis of the environmental risk*. The School will start on the 1<sup>st</sup> of July at 2.30 pm and end on the 4<sup>th</sup> of July at 1 pm. During these days, several speakers from various universities, research centers and environmental agencies will alternate in the floor to give lectures on different topics. Twenty-one will be the participants who attend this school. Considering the high number of scientific events occurring in this period, I am glad to say that this School is already a success, also due to the dedication by the Organizing Committee (Stefano Albanese, Salvatore Dominech, Barbara Nisi, Fabio Tagliatalata, Stefania Venturi and Marino Vetuschi Zuccolini), which is warmly thanked. More information can be found at <https://www.societageochemica.it/camgeo2025>.



# Letter from the President

Orlando Vaselli

After the summer holidays, from the 7<sup>th</sup> to the 8<sup>th</sup> of September a two-days meeting dedicated to Mercury (as element) will be held at Abbadia San Salvatore (Siena) and supported by the National Park Museum of Mines and the Italian Society of Geochemistry. The title of this meeting is: *Mercury, from a wanted element to a banned element*, although in Italian sounds much better: *Il mercurio, da elemento ricercato ad elemento bandito*. In the following pages of this newsletter, you can find the first circular. Only 50 people can follow this event that is free-of-charge and, similarly to what happens for the Vulcano School, the participants are responsible for their accommodation and travel expenses. Coffee-breaks will instead be offered by the two public organizers. Daniele Rappuoli, Federica Meloni, Stefano Covelli and Elena Pavoni are the members of the local committee.

Padua, from the 16<sup>th</sup> to the 18<sup>th</sup> of September, will host the SIMP (Italian Society of Mineralogy and Petrology) and SGI (Italian Society of Geology) Joint Congress which has as a target *The Geosciences and the Challenges of the 21<sup>st</sup> Century*. There are no members as conveners of the various sessions (<https://www.geoscienze.org/padova2025>) but our community will in any case attend this congress with numerous oral and poster presentations.

Then, we move to October when the European Geothermal Congress (Shaping the Future) will be held at Zurich, from the 6<sup>th</sup> to the 10<sup>th</sup> of October (<https://europeangeothermalcongress.eu>). More news about this congress will be provided with the next issue of the GeochemNewsletter.

Unfortunately, at the beginning of this year we lost two Italian scientists: Prof. Antonio Longinelli and Dr. Paolo Scarsi who were top-researchers in the field of isotope geochemistry and geothermics, respectively. An obituary to remember these important figures of the Italian and international panorama is reported.

I would like conclude this short letter to thank Stefania Venturi for handling all the newsletter issues published so far and Jacopo Cabassi for the incredible work he does for assembling the list of publication of our members. From the beginning of 2025, 104 articles have been published. I do remind you that Jacopo Cabassi sorts the publications by Scopus, independently by the impact factor of the journal. If there are publications that are not quoted by Scopus but are of international relevance, you are kindly asked to send the citations (or the Digital Object Identifier: doi) to my e-mail address.

These papers along with the participation and organization of

our members to schools, congresses, symposiums, workshops and so forth are a sort of thermometer to check the vitality that our community has. Consequently, I do encourage you to submit your contribution for populating this newsletter. All of us are committed to deadlines, classes, projects, calls for proposal, national and international fieldworks and congresses but I believe that is important that the most relevant activities are to be known by the members of the Italian Society of Geochemistry. It is a matter of writing a couple of pages with a couple of photos. Thanks!

Six papers of the Special Issue of the 2<sup>nd</sup> Italian Geochemical Society Congress (Perugia, July 2024): Environmental Geochemistry Session edited by Maurizio Barbieri, Elisabetta Dore and Nicholas Greggio have already been published in Environmental Geochemistry and Health (<https://link.springer.com/collectio/ns/cggdjfjhjb>) while others are under review. Many thanks to the Editors and all the Authors who contributed to the success of this Special Issue.

Concluding, the next issue will be sent to the new mailing list since new members have been added whereas others (though very few) decided not to renew their registration to the Society.

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# IL MERCURIO DA ELEMENTO «RICERCATO» A ELEMENTO «BANDITO»

ABBADIA SAN SALVATORE  
7-8 SETTEMBRE 2025

## A CHI È RIVOLTO IL SEMINARIO

L'evento è indirizzato a ricercatori, dottorandi, professionisti e alle figure tecniche interessati ad ampliare le loro conoscenze sulle problematiche ambientali legate alla presenza del mercurio

**L'iscrizione è gratuita ed aperta fino al 30 giugno 2025!**

**L'ingresso è limitato ad un massimo di 50 persone!**

Il modulo di iscrizione è disponibile qui: <https://forms.gle/GeCzMor7tT2DCeXQ7>

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Orlando Vaselli - Università di Firenze

Federica Meloni - Università di Firenze

Stefano Covelli - Università di Trieste

Elena Pavoni - Università di Trieste



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MUSEO DELLE  
MINIERE DELL'AMIATA

## IL MERCURIO DA ELEMENTO «RICERCATO» A ELEMENTO «BANDITO»



### IL PROGRAMMA

#### DOMENICA 7 SETTEMBRE

- 14:00 - 14:30 Registrazione
- 14:45 - 15:15 Saluti
- 15:15 - 15:45 Il censimento dei giacimenti mercuriferi del Parco Nazionale
- 15:45 - 16:15 Le imprese minerarie amiatine tra mutamento economico, sociale e paesaggistico
- 16:15 - 16:45 Materiali per una storia del paesaggio storico-produttivo del Monte Amiata.  
Il censimento del patrimonio archeominerario del Parco Nazionale
- Coffee break
- 17:15 - 18:00 La bonifica nell'ex area mineraria di Abbadia San Salvatore

**ABBADIA SAN SALVATORE  
7-8 SETTEMBRE 2025**

#### LUNEDÌ 8 SETTEMBRE

- 08.30 - 09:30 Registrazione
- 09:30 - 10:15 Introduzione alla geochimica del mercurio e fonti di emissione naturali ed antropiche
- 10:15 - 11:00 Il mercurio gassoso nelle aree contaminate da attività minerarie
- Coffee break
- 11:30 - 12:00 Problematiche ambientali legate al mercurio in ambiente minerario
- 12:00 - 12:30 Gli isotopi del mercurio quale strumento per tracciare i processi biogeochimici del metallo
- 12:30 - 13:00 Scambi all'interfaccia acqua-aria e suolo-aria
- Lunch break
- 14:00 - 14:30 La speciazione del mercurio nei suoli
- 14:30 - 15:00 Case Study: i giacimenti minerali a mercurio della Toscana meridionale
- 15:00 - 15:30 Case Study: Almaden, la culla mondiale del mercurio
- 15:30 - 16:00 Il mercurio nei sedimenti costieri del Nord Adriatico: dal Golfo di Trieste alla Laguna di Marano e Grado
- 16:00 - 16:30 Processi di rimobilizzazione e trasformazione del mercurio nei sedimenti e possibili strategie di mitigazione
- Coffee break
- 17:00 - 17:30 Contaminazione da mercurio negli ambienti costieri del Nord Adriatico: evidenze lungo la catena trofica
- 17:30 - 18:30 Visita alla ex-area mineraria di Abbadia San Salvatore
- 20:00 - 23:00 Cena finale

#### A CHI È RIVOLTO IL SEMINARIO

L'evento è indirizzato a **ricercatori, dottorandi, professionisti e alle figure tecniche** interessati ad ampliare le loro conoscenze sulle problematiche ambientali legate alla presenza del mercurio

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## Members' Activities

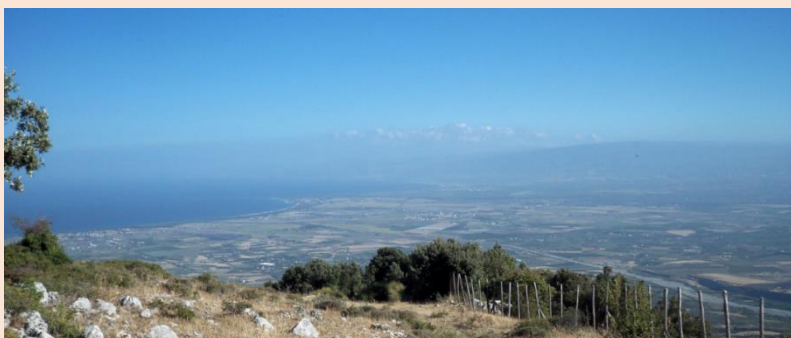
# Natural Greenhouse Gas Emissions from Coastal Plains: A Pilot Study on the Sibari Coastal Plain (Southern Italy)

Carmine Apollaro, Giovanni Vespasiano, Marco Taussi

Understanding the contribution of natural sources to Carbon Dioxide emissions has become a critical part of global climate research. While anthropogenic activities are often the primary focus in climate discussions, natural processes like those occurring in soil also play a critical role.

Biological (e.g., soil respiration, organic matter decomposition) and abiotic (e.g., volcanic and/or hydrothermal activities and metamorphic processes involving carbonate species) are pivotal components of Earth's ecosystem functioning and are fundamental processes in the exchange of CO<sub>2</sub> between land and the atmosphere. The amount of CO<sub>2</sub> emitted from soils can be highly variable, and the study of the spatial distribution of these emissions permits tracing the amount of gas emitted per specific surface area, identifying possible correlations with local structures, lithologies, and other factors.

In this context, coastal plains (CP) are still poorly studied regarding their GHG emissions but can significantly contribute to the global carbon balance. CP are regions where the land meets the sea, and they typically feature a mix of freshwater and saltwater environments, including marshes, estuaries, and wetlands. These areas are geologically dynamic, often characterized by shallow sediments, high organic matter content, and complex tectonic structures. Such characteristics can enhance the release of greenhouse gases, making these regions important contributors to atmospheric carbon levels.



*Fig. 1 Panoramic view of the Sibari Coastal Plain seen from North-North-West.*

To better understand the contribution of these ecosystems to the global Carbon balance, the Sibari Coastal Plain, located in the Calabria region of Southern Italy (*Fig. 1*), was surveyed for soil CO<sub>2</sub> emissions as it is characterized by various geological and ecological features that potentially influence GHG emissions.

In detail, the main objectives of the work were: (i) quantifying the total amount of CO<sub>2</sub> emitted from the soils of the area; (ii) exploring the relationship between emitted gases and environmental factors such as land use, organic matter content, and local tectonic structures, and (iii) understanding the potential environmental implications of these emissions for the global carbon budget.

The relationship between CO<sub>2</sub> emissions and the geological features of the Sibari CP was a key focus of the study. The area is currently mainly devoted to crops consisting of fruit trees and rice fields, interrupted occasionally by urbanized and industrialized areas, while from a geological point of view, it is

characterized by a mix of sedimentary deposits, organic-rich layers such as peat, and regional tectonic structures that can enhance the release of gases.

Four hundred fifty-nine soil CO<sub>2</sub> flux measurements were conducted along the study area (197 km<sup>2</sup>) through the accumulation chamber method. The study used statistical and geostatistical methods to analyze the collected data. These methods helped identify different populations of CO<sub>2</sub> fluxes and generate prediction maps to estimate total emissions.

By applying statistical methods, three distinct populations of CO<sub>2</sub> fluxes were distinguished. The highest flux population had a mean value of 63.65 g · m<sup>-2</sup> · d<sup>-1</sup>, with most of the measurements of this population located near the mouth of the Crati River (*Fig. 2*). The high CO<sub>2</sub> flux in this area was attributed to the substantial presence of abundant buried organic matter, primarily peat. The lowest flux population, with a mean value of 1.85 g · m<sup>-2</sup> · d<sup>-1</sup>, was observed in areas where low permeability or thick aquifers may limit the release of gases.

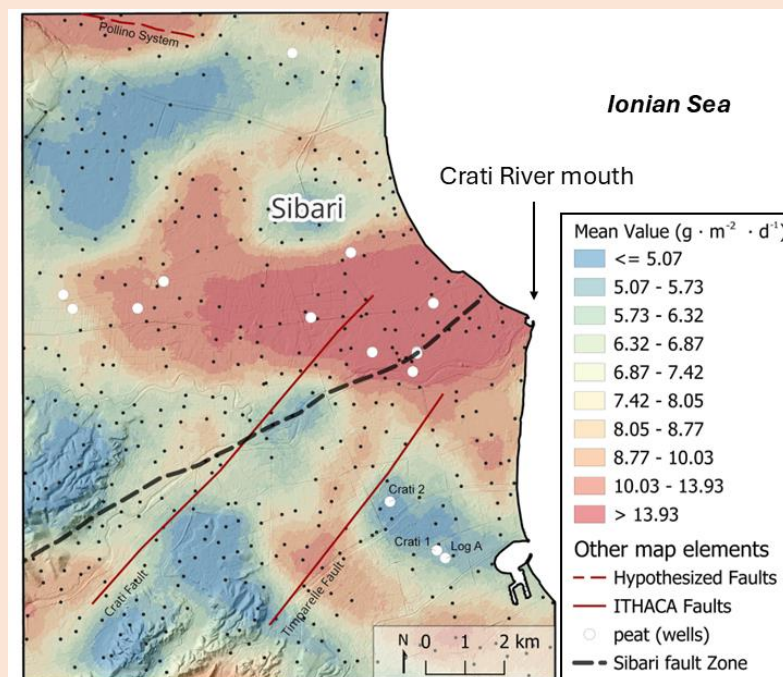


Finally, the medium-flux population (mean value of  $8.37 \text{ g} \cdot \text{m}^{-2} \cdot \text{d}^{-1}$ ) represents areas where soil respiration is the primary source of  $\text{CO}_2$  emissions. This variability in emissions across different regions of the plain highlights the importance of understanding the local geological context when assessing  $\text{CO}_2$  emissions from soils.

The total  $\text{CO}_2$  emissions counted for an estimated release of approximately 2671 tons per day ( $\text{t} \cdot \text{d}^{-1}$ ) from the Sibari CP. When compared to the estimated flux from simple soil respiration ( $1284 \text{ t} \cdot \text{d}^{-1}$ ), this value represents a significant contribution to the overall carbon balance in the region, thus suggesting that, despite being a non-volcanic area, the Sibari CP plays an important role in natural  $\text{CO}_2$  emissions. Moreover, the study also confirmed that organic matter, particularly peat, is a significant factor in  $\text{CO}_2$  fluxes, as anaerobic conditions in peat bogs promote the release of carbon into the atmosphere.

The findings of this study underscore the importance of coastal plains in the global carbon budget. While the role of coastal and wetland areas in GHG emissions is often underestimated, this research highlights that these regions can be significant contributors to atmospheric  $\text{CO}_2$  levels.

Understanding the spatial distribution of GHG emissions from soils can help improve global carbon cycling and climate change models. Given that around 10% of the atmosphere's carbon passes through soils each year, even modest changes in soil emissions



*Fig. 2 Soil  $\text{CO}_2$  mean flux distribution computed from sG<sub>s</sub> estimations (100 realizations; cell of  $50 \text{ m} \cdot 50 \text{ m}$ ). Measurement points, main fault systems and wells crossing peat layers, are also reported. Figure modified from Apollaro et al. (2025).*

can noticeably impact atmospheric  $\text{CO}_2$  concentrations. Eventually, this research opens the door for further investigations into the carbon balance of other coastal and wetland areas

worldwide, thus contributing to global GHG budgets and their potential role in the broader context of climate regulation.

#### References

Apollaro, C., Vespasiano, G., Fuoco, I., Taussi, M., De Rosa, R., La Russa, M.F., Guido, A., Di Curzio, D., Renzulli, A., Russo, L., Ciniglia, F., D'Amico, F., Cipriani, M., Maruca, G., Virgili, G. & Bloise, A., 2025. Impact and evaluation of potential implications of coastal plains on soil greenhouse gas emissions: Insights from the Sibari Coastal Plain (Calabria, Southern Italy). *Science of The Total Environment*, 964, <https://doi.org/10.1016/j.scitotenv.2025.178611>.



# Granulites & Granulites VI - Exploring the Deep Continental Crust - September 2024 Verbania, Italy

Antonio Langone

Granulites are high-grade metamorphic rocks that form in the middle to lower continental crust and record a wide range of geological processes, including crustal anatexis, melt extraction and migration, the structure and composition of the lower crust, and crust–mantle interactions. These complex processes were the focus of the sixth edition of the *Granulites & Granulites* Conference, held from 2–6 September 2024 in Verbania, on the picturesque shores of Lake Maggiore in northern Italy.

The event was supported by three national societies: the French Society of Mineralogy and Crystallography (SFMC), the Swiss Geological Society, and the Italian Geochemical Society. The international organizing committee featured: **Bernardo Cesare** (University of Padova), **Christian Chopin** (École Normale Supérieure de Paris, CNRS and SFMC), **Patrizia Fiannacca** (University of Catania), **Jacob Forshaw**, **Jörg Hermann**, **Pierre Lanari** (all University of Bern, with Lanari also affiliated with University of Lausanne and SFMC), **Antonio Langone** (University of Pavia), **Othmar Müntener** (University of Lausanne), **Daniela Rubatto** (Chair, University of Bern and University of Lausanne), and **Alberto Zanetti** (CNR, Italy).

The conference brought together 135 participants from 27 countries across 6 continents, with 37% female representation. Over four days, attendees delivered 66 oral and 55 poster presentations, covering topics from petrological modeling to crustal dynamics. A major focus was on the reconstruction of deep crustal processes, supported by petrochronology and thermodynamic modeling. Sessions included presentations on long-term melt generation, ultrahigh-temperature metamorphism and its duration, crustal thickening, melt focusing and

migration, the persistence of lower crustal roots, and the exhumation of metamorphic rocks.

One session focused on geochemical tracers of processes such as crustal differentiation, melt loss, mafic crust melting, and volatile recycling—also addressing the “curse and blessing” of trace element mobility. The timing of metamorphic events was explored through presentations on zircon dissolution–precipitation, in situ U–Pb and Lu–Hf dating of garnet, and ultrafast metamorphic reactions.

A dedicated session spotlighted the Ivrea–Verbano Zone, exploring topics such as carbon content and mobility, melt–rock interactions, accessory mineral behaviour, radiogenic heat production, ultramylonite and amphibolite geochemistry, geochronology, and geophysical properties of the lower crust. Broader lithospheric-scale processes were also discussed, including mechanisms for generating hot crust, global temperature–pressure peaks in granulites, lithosphere-scale fluid flow, and earthquake-induced fluid movement in the lower crust.

Early career researchers played a prominent role, contributing 43 oral and poster presentations. Thanks to sponsorship from the European Association of Geochemistry, the Swiss Geological Society, the Italian Geochemical Society, the University of Padova, and industry partners such as Zeiss, Assing, and JEOL, they benefited from reduced registration fees. Awards for best student contributions went to **Ankan Bhattacharyya** (University of Bern, Switzerland) for his talk on garnet trace element composition across metamorphic grades, and **Caliméria Passos do Carmo** (University of Toulouse, France) for her poster on crustal assimilation and magma hybridisation in the lower crust.



## Granulites & Granulites 2024

The conference also featured a rich program of mid-week activities, including an excursion to the Moho, a thermodynamic modelling workshop led by Nicholas Riel (Johannes Gutenberg University Mainz, Germany), and a visit to the famed pinkish marble of Candoglia used in the construction of Milan’s Duomo.

Field excursions—a traditional highlight of the conference—were a key component of this edition as well. The **pre-conference field trip**, led by Omar Bartoli, Jörg Hermann, Antonio Langone, Othmar Müntener, and Daniela Rubatto, guided around 60 participants through the Ivrea–Verbano crustal section, from mantle peridotites to volcanic rocks. The **post-conference excursions** included:

- A **three-day tour** of the Finero Complex and the Central Alps (northern Italy and southern Switzerland), led by Jörg Hermann and Alberto Zanetti, focusing on granulites within an orogenic cycle;

- A **four-day trip** to the Serre Massif, Capo Vaticano Promontory, and Palmi area in Calabria (southern Italy), led by Patrizia Fiannacca and Antonio Langone, showcasing crustal differentiation, anatexis, magma hybridisation, and melt extraction.

During the closing session, bids for the upcoming editions of the conference were presented: the next will take place in **Canada (2027)**, followed by **Finland (2030)**.



*Delegates at the Granulites & Granulites Conference 2024 with the Lake Maggiore in the background. Photo: Pierre Lanari.*



*Some participants of the field trip in central Calabria. Photo: Antonio Langone.*



## Memorial keepsakes

# Prof. Antonio Longinelli

Antonio Longinelli, Academician and eminent Geochemist of international fame has been one of the most famous Italian geochemists. He was born on April 26, 1930 and died on March 4, 2025 at 95 years old.

He obtained a Degree in Geological Sciences at the University of Pisa in 1955.

Ezio Tongiorgi's laboratory in Pisa, together with Fritz Houtermans' Physikalisches Institut in Bern, were for many years the most advanced centers of European research in Isotopic Geochemistry. This is the environment where Prof. Longinelli formed as a researcher and a top-quality experimentalist.

Since 1975, the year in which he became associate professor and then full professor of Geochemistry at the University of Palermo (where he remained until 1983), then in Trieste and finally Parma (until 2014), Antonio brought with him his precious instruments (continuously improved by him) and founded and cooperated with four Isotopic Geochemistry

laboratories, still operational, with a high-quality scientific production, as testified by about 200 high-impact scientific articles. In 1989 he became member of the European Academy and in 2008 he was designated as member of the Accademia Nazionale dei Lincei. In 1996-1997 he was director of the Institute of Fluid Geochemistry of the CNR, which later merged into the National Institute of Geophysics and Volcanology as the "Palermo Section". He was also awarded the Feltrinelli Prize in 1996 for the category of Physical, Mathematical and Natural Sciences. His major contribution was on the geochemistry of stable isotopes with particular attention to climate markers (EPICA project). Member of the European Academy since 1989 and Academician of the Lincei since 2008,

Prof. Longinelli is part of the group of pioneers who started and developed research in the field of isotopic geochemistry and geochronology in Italy. He can be considered one of the

founding fathers of both analytical methodologies and applications of stable isotopes in paleoclimatology and the environment. The breadth of the topics covered and his importance as a leading scientist at an international level led him to collaborate with great scientists such as Harmon Craig and Jean Charles Fontes and to spend long periods in prestigious universities and research centers in Europe, the United States, Canada, Mexico, New Zealand, the former USSR, China and Brazil.



# Dr. Paolo Squarci

## Antonio Caprai

He graduated in geology in 1958 at the University of Pisa. At the end of February 2025 Paolo Squarci has died. Since 1970, when International Institute for Geothermal Research (CNR-IIRG) in Pisa had been established he dedicated himself to geothermal studies. He has also played an important role in the new Institute of Geosciences and Earth Resources (CNR-IGG) that was established in 2000. The CNR-IIRG participated in all national geothermal projects, coordinating all the assessments of the Italian geothermal resources. The CNR-IIRG has organized several International Schools of Geothermal Energy and founded Geothermics (now, an Elsevier journal) and supervised the construction of the National Geothermal Data Bank. Paolo Squarci was always fully involved in all these

activities and his contribution has been very important.

Dr. Paolo Squarci was the head of the CNR-IIRG from 1990 to 2002 when the Institute was then transformed into the CNR-IGG. He has published numerous papers (over 140) in international peer-review journals in the fields of geology, geotechnics, hydrogeology and, the last but not the least, in Geothermics. He was a member of the Italian Geological Society, during which he developed various projects. At a local level, he dedicated himself to various activities for the Municipality of Rosignano Marittimo. He significantly contributed to the structural plan in terms of geotechnics of the Volterra basin as well as the hydraulic hazard in the province of Leghorn from Rosignano to San Vincenzo.

He was recognized as one of the world's leading experts in the geothermal sector, contributing to bring the CNR-IGG to be recognized at worldwide level.





## Members' Publications

# List of Members' Publications

referred to the period January 01– April 29, 2025

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# Members' Publications



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