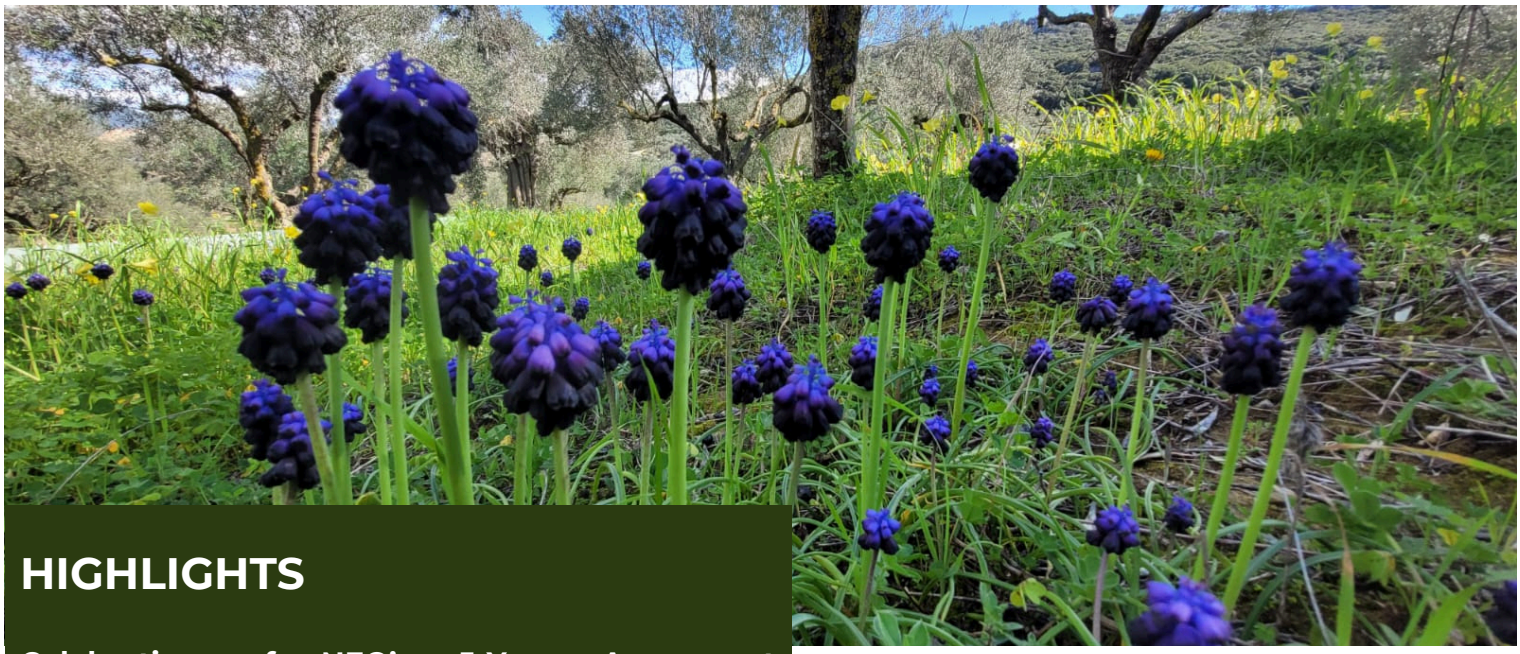
NEWSLETTER

NAVARINO ENVIRONMENTAL OBSERVATORY

NEONEA 45: JANUARY-APRIL 2025



HIGHLIGHTS

Celebration of NEO's 5-Year Agreement Renewal: Celebration at Stockholm University with leadership, faculty, and Greek Embassy representatives, reaffirming NEO's regional research and education mission.

NEO Joins the DICIT Project: NEO's atmospheric station in Methoni is now part of the Direct and Indirect Climate Forcing of Volcanic EmIssions in The Mediterranean-DICIT project, coordinated by Pasquale Sellitto-Université Paris est Créteil Val de Marne. With the installation of a Multi-Filter Rotating Shadowband Radiometer (MFRSR), we will be able to detect volcanic, dust, and fire-related emissions in the Mediterranean.

Cross-University Engagement: NEO joined the CIVIS Blended Intensive Program in Naxos, which provided lectures and fieldwork on sustainability, soil erosion, and land use, to 30 students from 5 European universities.

LATEST NEWS

Research:

- **SALAM-MED:** Investigating sustainable land and water management in Mediterranean olive orchards.
- **Towards co-management of Gialova Lagoon:** Monitoring water quality and supporting collaborative conservation planning to restore the lagoon's ecological status.
- **Students' thesis:** Insights on soil health and biodiversity in olive orchards, and seagrass dynamics.

Education:

- **YADES Winter School** on climate & heritage risks.
- **Stockholm BSc students** engaged in landscape and ecosystem research at NEO.
- **University of Patras MSc students** engaged in training for atmospheric monitoring.

Science communication:

- **Engaging School Teachers** in Climate and Environmental Education.
- Participation at **EGU General Assembly.**
- Scientific publications

Learn more about our research and educational programs inside!

RESEARCH-monitoring and analysis

TRACKING MEDITERRANEAN AIR POLLUTION

Background info:

Since 2011, the NEO atmospheric monitoring station in Methoni, Greece, has been playing a vital role in tracking climate change signals and air pollution, contributing to a better understanding of air quality trends and climate dynamics across the Mediterranean basin.
The station is part of the PANhellenic infrastructure for Atmospheric Composition and climatE change (**PANACEA**), and the European Research Infrastructure for the observation of Aerosol, Clouds and Trace Gases (**ACTRIS**). It continuously monitors and analyses the physical, optical, and chemical properties of aerosols, as well as atmospheric composition and pollution on local to regional scales.

Latest News:

NEO Joins the DICIT Project: On April 3rd, NEO participated in the launch meeting of the DICIT project in Paris, marking the start of a collaborative initiative focused on advanced atmospheric observations and climate-related research.
As a key project partner, NEO will contribute through its atmospheric monitoring station in Methoni, which has been selected as one of the primary sites for the deployment of a Multi-Filter Rotating Shadowband Radiometer (MFRSR). This high-precision instrument will enable detailed monitoring of aerosol particle dispersion in the region, with an emphasis on detecting volcanic aerosol signatures originating from Mt. Etna. Beyond volcanic emissions, the MFRSR will also support the study of transboundary dust transport from the Sahara desert, as well as pollution from local and distant forest fires and other anthropogenic sources. This initiative strengthens NEO's role in regional atmospheric research and provides valuable data to the wider scientific community working to understand air quality and climate dynamics across the Mediterranean.
For more information: Mr. Christos Pantazis (chpantazis@noa.gr)

TOWARDS CO-MANAGEMENT OF GIALOVA LAGOON

Background info:

Gialova Lagoon is a typical example of a Mediterranean coastal wetland in dire need of urgent conservation actions to restore the wetland's hydrology, and ultimately improve its ecological status. The project brings researchers, practitioners and policy makers to work together for tackling challenges related to management of multi-functional areas, such as coastal wetlands, and provides an example for other similar areas in Greece and around the Mediterranean. Our work focuses on monitoring key water quality parameters (e.g. salinity, dissolved oxygen, pH, water level, nutrients, etc.), and on fostering collaboration between researchers, practitioners and policy makers towards the co-management of GL.

Latest News:

Field sampling and analysis: With the use of chemical fertilizers during the winter season, an increase in nutrient pollutants is expected in groundwater resources. In April, NEO's research team conducted fieldwork at Gialova Lagoon to investigate nutrient levels and their connection to surrounding agricultural practices. This effort included in situ water quality measurements, data retrieval from installed sensors, and the collection of groundwater and surface water samples for chemical analysis at NEO's laboratory. The team also carried out maintenance of monitoring equipment and made detailed ecological observations throughout the wetland to support ongoing environmental monitoring.
For more information: Dr. Georgios Maneas (giorgos.maneas@natgeo.su.se)

SALAM-MED EU PROJECT

The **SALAM-MED** project, focusing on Sustainable Approaches to LAnd and water Management in MEditerranean Drylands, continues to make significant strides. This PRIMA 2021-funded RIA project (2022-2025) is a collaborative effort dedicated to developing and implementing sustainable practices in the Mediterranean region.

Our work within SALAM-MED – led by the Research Centre for Atmospheric Physics and Climatology of the Academy of Athens – focuses on assessing agri-ecological farming practices to improve soil quality and water retention, in close collaboration with local farmers and stakeholders.

5TH General Assembly:

Between February 12th to 14th, NEO researcher (Christos Pantazis) participated in the SALAM - MED General Assembly in Morocco, contributing to sustainable land and water management through innovation and collaboration.

The event included field visits to reforestation and pastoralism sites in the Essaouira region, providing direct insight into restoration efforts. Researchers also presented key updates on Living Labs activities, engaged in dynamic discussions within Working Package groups, and took part in focused sessions on impact scaling, sustainability, and the future development of Living Labs.

Key Activities and Latest News:

Soil management experiment: Soil erosion is a significant challenge in hilly terrains due to runoff and slope instability, but the use of cover crops can effectively reduce erosion by stabilizing the soil, improving water retention, and enhancing soil health. An idea mixture for olive orchards is wheat, peas and vicia. These crops include legumes, grasses, and brassicas, each selected based on the specific needs of the land. Cover crops can be planted using various methods, including seed-balls, which allow for natural germination without disturbing the soil. Over time, they contribute to a more resilient and balanced farming system, making them a valuable tool for sustainable land management.

Irrigation experiment: In this experimental set up we are focusing on a cutting-edge irrigation experiment that could transform water management in olive cultivation. The suggested treatment, phenology-based irrigation, is an advanced agricultural technique that aligns water application with the specific growth stages of plants. In olive orchards, this method optimizes water use, enhances tree health, and improves olive oil quality while addressing water scarcity concerns. The crucial irrigation periods of olive trees are:

- **FLOWERING** (Mar – Apr): flower formation, fruit growth
- **FRUIT SET** (May): enhancing olive fruit growth
- **PIT HARDENING** (Jun): optimizing fruit expansion
- **YIELD FORMATION** (Aug-Oct): increasing oil content.

EDUCATION-students' thesis

SOIL QUALITY AND BIOMASS CHARACTERISTICS IN MEDITERRANEAN ORCHARDS

Marwa Sayari, a master's student from the Mediterranean Agronomic Institute of Chania, recently completed her thesis research as part of the SALAM-MED project, focusing on soil and biodiversity assessment in olive orchards. During a two-week field campaign at NEO during April, she carried out bulk density measurements and collected soil samples from the experimental plots. In addition to soil analysis, she gathered plant material-including leaves, stems, and roots-for further examination. At the NEO laboratory, Marwa also conducted taxonomic classification of arthropods, contributing valuable insights to ongoing studies on soil health, ecosystem function, and sustainable olive cultivation.

Main supervisor: Dr. Vasilis Gkisakis, Hellenic Agricultural Organization-DEMETER (gkisakis@elgo.gr)

EXPLORING SEAGRASS DYNAMICS IN NAVARINO BAY

Martin Nyblin, a bachelor's student at the Department of Physical Geography, Stockholm University, visited NEO in April to conduct research on eelgrass density at four sites within Navarino Bay for his thesis project. His study aims to explore how different hydrological conditions affect seagrass beds, focusing on areas influenced by varying levels of freshwater inputs from local rivers, as well as areas influenced by the canal that connects the lagoon with the sea. To assess environmental factors and map eelgrass distribution, Martin combined water sample analysis with remote sensing techniques. His findings are expected to offer valuable insights into how freshwater inflows and lagoon-sea connectivity influence the health of coastal ecosystems.

Main supervisor: Assoc. Professor Fernando Jaramillo, Stockholm University (fernando.jaramillo@natgeo.su.se)

STOCKHOLM BSC STUDENTS DIVE INTO A HANDS-ON EXPLORATION OF LANDSCAPES & ENVIRONMENTAL PROCESSES

Thirty BSc students from the Department of Physical Geography, Stockholm University, visited NEO in March. Divided into project groups, the students engaged in a range of field activities, including soil sampling, tree coring for dendrochronology, in situ soil analysis, and various environmental measurements. Their projects investigated key environmental processes such as dune formation, soil classification, moisture retention, land use, and tree-ring analysis. This immersive hands-on research experience gave students the opportunity to apply theoretical knowledge in real-world settings, reinforcing their skills in physical geography research, deepening their practical understanding of the field. During excursions, students explored various bedrock formations, such as calcareous deposits, softer flysch formations, badlands, and ravines. Discussions included natural and human-induced erosion, coastal abrasion, and the impact of wildfires on soil and biodiversity. They also examined the role of Aleppo pines, invasive species, and ecosystem evolution in diverse landscapes of the Taygetos Mountains.

Course Instructor: Prof. Sara Cousins, Stockholm University (sara.cousins@natgeo.su.se)

HANDS-ON CLIMATE SCIENCE: POSTGRADUATE STUDENTS FROM UNIVERSITY OF PATRAS TRAIN AT NEO

Fifteen postgraduate students from the M.Sc. program Applied Meteorology & Environmental Physics at the Laboratory of Atmospheric Physics, University of Patras, participated in a three-day training session at NEO. During their visit, the students were introduced to NEO's ongoing research activities and toured the NEO atmospheric station in Methoni. This state-of-the-art facility monitors a wide range of atmospheric parameters, including the physical, chemical, and optical properties of aerosols, various meteorological factors, atmospheric trace gases, and different components of solar radiation. As part of their training, the students engaged in group fieldwork, conducting hands-on measurements of PM2.5 concentrations and zenith sky temperature—gaining practical experience in environmental monitoring techniques and data collection.

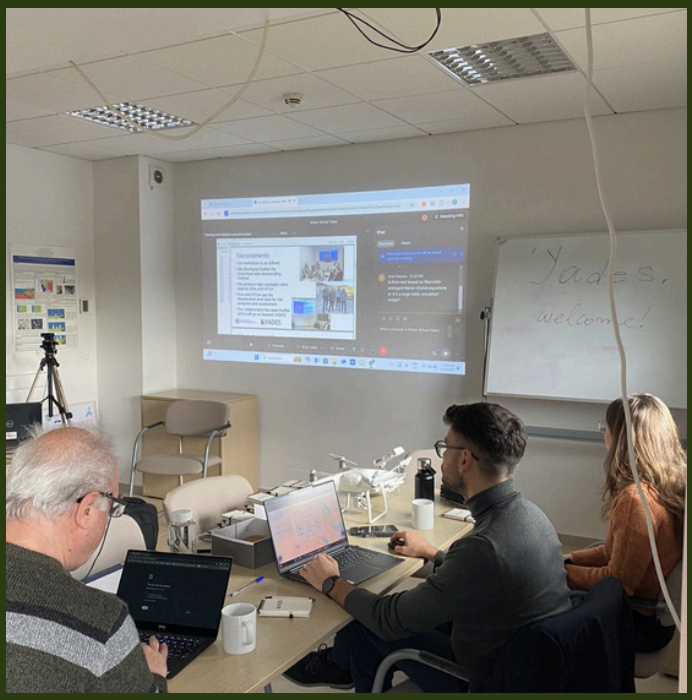
Course Instructor: Prof. Andreas Kazanzidis, University of Patras (akaza@upatras.gr)

YADES PROJECT WINTER SCHOOL: ADVANCING SUSTAINABILITY & CULTURAL HERITAGE CONSERVATION

This January, NEO successfully hosted the YADES Project Hybrid Winter School for 3 days, bringing together experts from across Europe to address sustainability, climate change, and cultural heritage preservation. The event was organized by Prof. Panagiotis Nastos from the National and Kapodistrian University of Athens and Prof. Anastasios Doulamis from the National and Technical University of Athens. A total of 25 participants took part in the event, with 12 attending on-site and 13 joining online, fostering an engaging and collaborative learning environment. The Winter School featured insightful presentations and interactive workshops on:

- Quantifying Climatic, Hydrological, and Atmospheric Stressors
- Multi-Hazard Modelling
- Structural and Geotechnical Risk Assessment
- Environmental and Material Monitoring

YADES is dedicated to the sustainable reconstruction and conservation of cultural heritage amid climate change challenges. By integrating advanced scientific tools with interdisciplinary research, the project fosters collaboration among leading institutions to safeguard Europe's heritage. For more information about YADES and its initiatives, visit the official website: **YADES Project**.



CIVIS BIP AT NAXOS : A CROSS-CULTURAL LEARNING EXPERIENCE

NEO researchers from Stockholm University joined a Blended Intensive Program (BIP) organized by the European Civic University Alliance (CIVIS), alongside educators from universities in Aix-Marseille, Athens, Bucharest, and Stockholm. After five weeks of online lectures, including sessions from NEO management team Martina Hättestrand and Georgios Maneas, 30 students and nine tutors gathered on Naxos, Greece, during the period March 10-14. Over five immersive days, participants explored diverse natural environments, including mountains, coasts, landslides, caves. Human interaction with the landscape, such as building of houses in areas of coastal erosion and mining of marble was also studied. As part of the program, students collaborated on group projects to create short videos summarizing key learnings from the course. Additionally, the experience was enriched through cultural exchanges, such as cooking workshops and traditional dancing from all involved countries, fostering a dynamic and interdisciplinary learning environment. At the side of the excursion, Prof. Niki Evelpidou, Prof Arjen Stroeven and Dr. Georgios Maneas were interviewed for a Greek documentary on soils erosion and its impacts on agriculture.

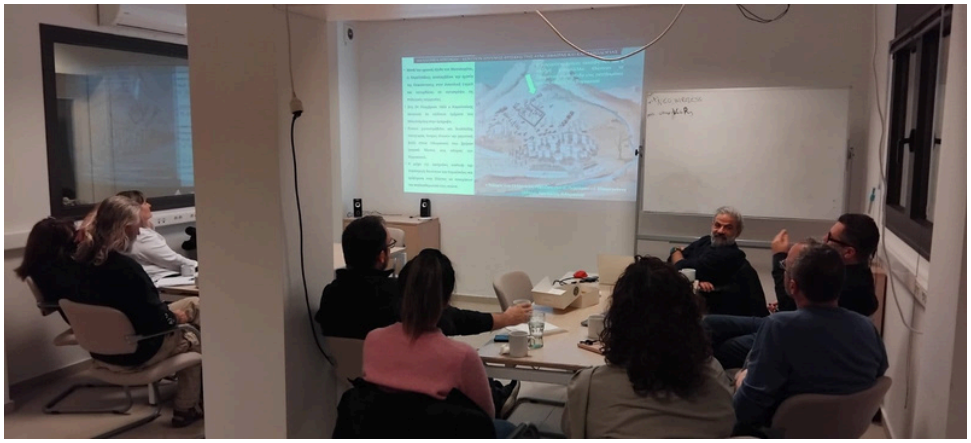
EVENTS & WORKSHOPS

CELEBRATING THE NEW 5-YEAR AGREEMENT FOR NEO AT STOCKHOLM UNIVERSITY

On March 6, NEO organized an event at Stockholm University to celebrate the renewal of the 5-year agreement for the next five years. The event featured insightful presentations on NEO's infrastructure, education, research, and partnerships, followed by a networking session at the Faculty Club. Approximately 50 guests attended, including Karin Holmgren, Johan Kleman and Karin Ulfsdotter Crépin, all of whom have made significant contributions to NEO. The event was also attended by the President of Stockholm University, the Dean of the Faculty of Science, and representatives from the Embassy of Greece in Stockholm. This milestone reaffirms NEO's commitment to advancing environmental research and education on climate change and environmental sustainability in the Mediterranean region, and strengthening collaborations between science, business, society, and policy stakeholders.

BUILDING CLIMATE AND ENVIRONMENTAL EDUCATION FOR SCHOOLS: FIRST MEETING HIGHLIGHTS

NEO organized and hosted a meeting with school teachers from Messinia to explore opportunities for creating new educational resources for students. Dr. Stavros Solomos opened the session by presenting background information on climate change, highlighting its impacts on societies and cultural heritage. Additionally, Dr. Georgios Maneas discussed broader environmental challenges, emphasizing the connections between human activities, biodiversity loss, and ecosystem services, all within the broader context of climate change. The second part of the meeting focused on collaborative discussions about how to translate complex scientific information into accessible educational materials, and on identifying possible next steps for developing these resources. This first meeting was highly appreciated by all participants, generating strong engagement and providing valuable food for thought. Building on this momentum, further meetings are planned to continue the collaboration and to advance the creation of innovative educational tools for school students.

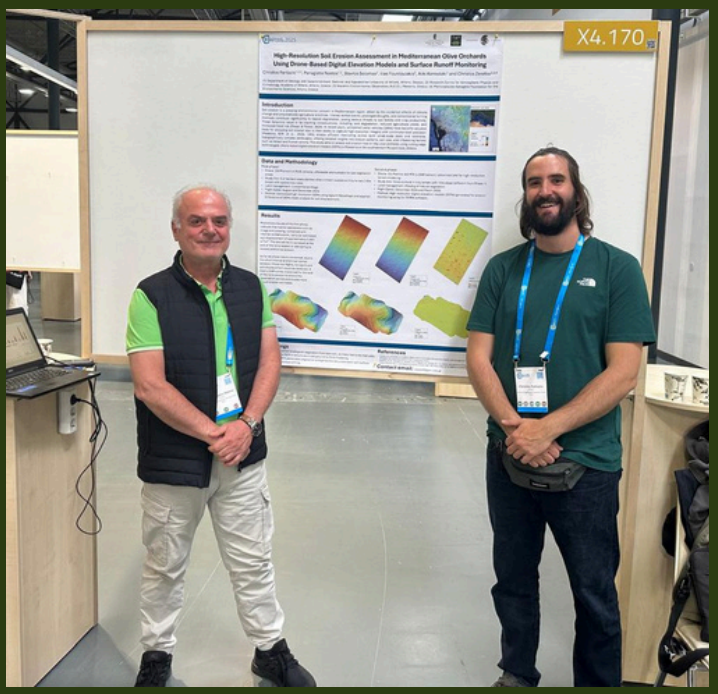


SCIENCE COMMUNICATION

EGU GENERAL ASSEMBLY 2025

NEO actively participated in the EGU Conference 2025 with a poster and an oral presentation, showcasing ongoing research efforts in sustainable agriculture and climate resilience. The poster, titled "High-Resolution Soil Erosion Assessment in Mediterranean Olive Orchards Using Drone-Based Digital Elevation Models and Surface Runoff Monitoring," extended the work of the SALAM-MED project by highlighting innovative methods for measuring and addressing soil erosion in olive groves.

Additionally, an oral presentation, "Leveraging a Living Lab Approach for Sustainable Olive Cultivation: Addressing Climate Challenges and Enhancing Agroecosystem Resilience," introduced NEO's participatory research model, emphasizing collaboration with local stakeholders to co-develop adaptive solutions for climate-resilient farming.



SCIENTIFIC PUBLICATIONS

Michail, I.; Pantazis, C.; Solomos, S.; Michailidis, M.; Molassiotis, A.; Gkisakis, V. Cover Crops for Carbon Mitigation and Biodiversity Enhancement: A Case Study of an Olive Grove in Messinia, Greece. Agriculture 2025, 15, 898. https://doi.org/10.3390/agriculture15080898

Maneas, G., Pantazis, C., Solomos, S., Fountoulakis, I., and Zerefos, C. S.: Leveraging a Living Lab Approach for Sustainable Olive Cultivation: Addressing Climate Challenges and Enhancing Agroecosystem Resilience, EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025, EGU25-21253, https://doi.org/10.5194/egusphere-egu25-21253, 2025.

Pantazis, C., Nastos, P., Solomos, S., Fountoulakis, I., Konsolaki, A., and Zerefos, C.: High-Resolution Soil Erosion Assessment in Mediterranean Olive Orchards Using Drone-Based Digital Elevation Models and Surface Runoff Monitoring, EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025, EGU25-12941, https://doi.org/10.5194/egusphere-egu25-12941, 2025.