NEWSLETTER

NAVARINO ENVIRONMENTAL OBSERVATORY

NEONEA 44: SEPTEMBER-DECEMBER 2024

HIGHLIGHTS

Renewal of the NEO cooperation agreement: We are thrilled to announce the renewal of NEO collaboration between Stockholm University, the Academy of Athens and TEMES SA for the next five years, reinforcing our commitment to advancing research and education on climate change and environmental sustainability in the Mediterranean region.

New NEO Assocciated members: We are delighted to join forces with Professor Niki Evelpidou (Department of Geology and Geoenvironment, National and Kapodistrian University of Athens) and Assistant Professor Christoforos Pappas (Geodesy and Geodetic Applications Lab, Department of Civil Engineering, University of Patras). Our common aim is to boost our research and education capacity in the fields of geomorphology and geomatics.

Best Paper Award: Congratulations to our colleagues working on the SALAM-MED project, who received the Best Paper Award in the Environmental Earth Science track at the Mediterranean Geoscience Union (MedGU) 2024 conference entitled “Impact of Climate Variability and Agricultural Practices on Olive Orchards in Messenia: A Field Experiment Approach “

LATEST NEWS

Research:

- **SALAM-MED**: Investigating sustainable land and water management in Mediterranean olive orchards.
- **Bumblebee Research**: Studying how bumblebees navigate, choose flowers, and adapt to climate change.
- **Drone & LiDAR**: Mapping soil erosion in olive groves using cutting-edge technology.
- **Microplastics**: Research reveals higher microplastic accumulation on sheltered beaches.
- **Soil & Arthropods**: Exploring the link between soil health and biodiversity in olive orchards.

Education:

- **International Student Visits**: Welcomed students from Stockholm, Heidelberg, and Giessen Universities for fieldwork and research.
- **Ecohydrology Course**: Hosted an intensive course on Mediterranean water resource management.
- **Long-Term Partnerships**: Continued collaborations with Värmdö Gymnasium (11th year) and the American College of Greece (ACG).
- **Hands-on Learning**: Provided unique field experiences for students studying geography, biology, and environmental science.

Learn more about our research and educational programs inside!

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RESEARCH

SALAM-MED PROJECT

Work @ NEO

Our work within SALAM-MED – led by Dr. Stavros Solomos, Mr. Christos Pantazis and Dr. Georgios Maneas from 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.

Key Activities and Latest News:

Continued Collaboration & Supporting Future Researchers: We are proud to collaborate with esteemed institutions, fostering innovation in environmental science and sustainability. We are also committed to supporting the next generation of researchers in this important field.

Fieldwork Campaign: Giovani Marino, Sabrina Mazzoni and Felicia Menicucci, colleagues from the Institute for Sustainable Plant Protection (National Research Council of Italy) recently visited NEO for the third fieldwork campaign. This campaign focused on NEO's olive orchard irrigation experiment, a crucial component in developing sustainable land and water management practices.

Student Involvement: We are pleased to have MSc student Marwa Sayari (Mediterranean Agronomic institute of Chania - Ciheam Maich) and PhD student Ioanna Mihail (Aristotle University of Thessaloniki & ELGO Dimitra) contributing to the project. Under the guidance of Dr. Vasilis Gkisakis (Hellenic Agricultural Organization-DEMETER), conducted fieldwork on soil density, sampling, root/leaf/stem analysis, cover cropping, and photosynthesis measurement.

DRONE AND LIDAR TECHNOLOGY FOR SOIL EROSION ASSESSMENT

In collaboration with Prof. Panagiotis Nastos and PhD student Aliki Konsolaki from the **Laboratory of Climatology and Atmospheric Environment at the National and Kapodistrian University of Athens**, we are using cutting-edge technology to address pressing environmental challenges as part of Christos Pantazis's PhD research at NEO. During the mid-December fieldwork in hilly olive orchards, the team utilized drones to create high-resolution digital elevation models (DEMs), crucial for estimating soil erosion and informing sustainable land management. The integration of LiDAR technology provided even greater data precision, leading to a more detailed understanding of erosion patterns and topographical changes. This combined approach offers a powerful toolkit for preserving agricultural landscapes. The team is currently analyzing the data and looks forward to sharing their findings.

BUMBLEBEE BEHAVIOR RESEARCH

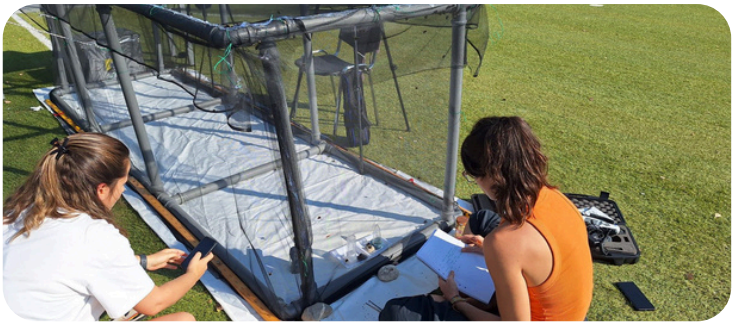
Researchers from the **Department of Zoology at Stockholm University**, led by Prof. Emily Baird, conducted exciting new research at NEO in November, building on promising results from their April fieldwork. Postdoctoral researcher Dr. Priscila Araújo, along with MSc students Silvia de Assis, Gilda Degrassi, and Emma van der Marel, carried out innovative experiments:

Celestial Navigation Under Challenging Conditions: Projects 1 & 2 investigated how bumblebees navigate using celestial cues, even under overcast skies or at dusk. Using specialized arenas and high-resolution cameras, they studied how bees' visual systems adapt to varying light conditions.

Celestial Cues and Flower Choice: Project 3 explored whether celestial cues help bumblebees distinguish between previously visited or unrewarded flowers. This research provides insights into their foraging strategies.

Climate Change Impacts on Bumblebees: Project 4 examined the effects of temperature fluctuations on bumblebee foraging behaviour, hive dynamics, and body temperature, providing crucial data on how these vital pollinators might adapt to climate change.

These experiments significantly advance our understanding of bumblebee behaviour and resilience in the face of environmental changes.



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STUDENTS' THESIS

MICROPLASTIC STUDY REVEALS ACCUMULATION PATTERNS ON MEDITERRANEAN BEACHES

Elin Johansson, a BSc student from **Stockholm University's Department of Physical Geography**, spent a week at NEO in November, studying microplastic distribution on Mediterranean beaches. Her interest in microplastics was sparked during her summer internship at NEO.

For her thesis research, she compared microplastic levels on exposed, high-energy beaches, like Romanos beach, with those on sheltered bay beaches, like Voidokoilia beach. Elin measured microplastic distribution along both the width and length of the beaches, using sieves to collect particles of the desired size and seawater flotation to separate the microplastics from the sediment.

Microscopic analysis of the samples at the NEO laboratory revealed a significantly higher concentration of microplastics in the bay areas. This difference in accumulation patterns between beach types is statistically significant. This research provides crucial insights into how microplastics accumulate in different coastal environments, informing efforts to protect these valuable ecosystems.

Main supervisor: **Assoc. Professor Anna Treydte**

SUSTAINABLE OLIVE ORCHARDS: A STUDY ON SOIL AND BIODIVERSITY

Kodie Chontos, an MSc student in **Landscape Ecology at the Department of Physical Geography, Stockholm University**, recently spent over a month at NEO exploring the intricate connections between soil, arthropods, and olive orchards in Messenia.

Her research investigates how different soil management practices and the presence of ground cover influence both soil quality and the diversity of arthropods (insects, spiders, etc.) living within these vital agricultural landscapes.

This research contributes to developing more sustainable farming practices that benefit both the environment and local agriculture.

Main supervisor: **Assoc. Professor Håkan Berg**

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INTERNATIONAL STUDENTS

LEARNING FROM THE LANDSCAPE: GIESSEN GEOGRAPHY STUDENTS EXPLORE MESSENIA'S FUTURE

In September, nine geography students from the **Department of Geography at Justus Liebig University Giessen** embarked on a field trip to Messenia, hosted by NEO. The BSc and MSc students explored key sites like the Gialova Lagoon, Paleokastro, and Methoni, examining the region's unique environmental challenges and opportunities for a sustainable future in the face of climate change. A highlight of their visit was a tour of the SALAM-MED project's experimental plots, where they learned about innovative approaches to restoring degraded land and enhancing the resilience of Mediterranean ecosystems.
Course Instructor: **Dr. Elena Xoplaki**

FROM WATERFALLS TO OLIVE GROVES: HEIDELBERG STUDENTS EXPLORE THE PELOPONNESE

As part of a two-week field trip across the Peloponnese, twenty BSc geography students from the **Institute of Geography at Heidelberg University** visited Messinia in late September. The students used NEO as a base to explore the region's diverse landscapes. At NEO, their activities included learning about the SALAM-MED project on soil protection and sustainable olive farming, investigating beach rock formation, and conducting hydrological measurements at the nearby Polylimnio waterfalls. The broader field trip also encompassed explorations of karst hydrology, geomorphology, and other regional features.
Course Instructor: **Professor Dr. Ingmar Unkel**

STOCKHOLM MSC STUDENTS DIVE INTO ECOHYDROLOGY @ NEO

Six MSc students from the Department of **Physical Geography at Stockholm University** traveled to NEO in early October for an intensive "Ecohydrology: A Mediterranean Perspective" course. The program combined lectures, fieldwork, and excursions, all facilitated by NEO's resources and expertise. Students participated in lectures by Prof. Jaramillo and Dr. Georgios Maneas, laying the groundwork for their hands-on learning experiences. A key highlight was the field trip focusing on the hydrological challenges faced by wetland ecosystems, offering valuable insights into sustainable water management practices in the Mediterranean region. Course Instructor: **Assoc. Professor Fernando Jaramillo**

NEO WELCOMES VÄRMDÖ GYMNASIUM FOR 11TH CONSECUTIVE YEAR

For the 11th year in a row, NEO hosted the 22NAD class from the NaSa program at **Värmdö Gymnasium** in Stockholm. During their visit in October, students engaged in various excursions and fieldwork activities, exploring the geography, biology, and history of Greece and the Mediterranean. A key focus was the Natura 2000-protected Gialova Lagoon. This year, the students also initiated two new projects at NEO: investigating microplastic presence on local beaches and exploring the seabed.
Course Instructor: **Tomas Ardell**

ACG STUDENTS GAIN HANDS-ON EXPERIENCE IN GIALOVA THROUGH NEO

The **American College of Greece** (ACG) and NEO are working together to provide students with invaluable hands-on experience in environmental stewardship. In November, over 20 students from various majors at ACG's Athens campus visited NEO for 3 days to explore the unique biodiversity of the Natura 2000 protected Gialova Lagoon. Through collaborative workshops and field research activities at NEO, students gained a deeper understanding of this fragile and important ecosystem.
ACG contact person: **Ass. Professor Michael Valahas**