

NAVARINO ENVIRONMENTAL OBSERVATORY

NEO Management

Wednesday, 16 July 2014

NEO NEA #13 (April - June, 2014)

NEO stands for Navarino Environmental Observatory. But NEO in Greek (νέο) means news as well and NEA is its plural. So this is our news!

Foreword

Greetings from NEO!

Another three months have passed with lots of NEO activities as you will see from this newsletter! One of the highlights, and a milestone for NEO I think, is that the first NEO-funded Doctor of Philosophy has been “produced”. Our warmest congratulations to Katerina Mazi, who successfully defended her thesis at a public defense on 12 June, 2014! The title of the thesis is: “Seawater intrusion risks and controls for safe use of coastal groundwater under multiple change pressures”.

Karin Ulfsdotter-Crepin left her position at Stockholm University on 4 July 2014 for taking on a position as Director of Strategic partnerships at The Swedish School of Sports and Health Sciences (GIH). GIH is the oldest university college in the world within its field. On behalf of all NEO partners I would like to thank you, Karin, for your invaluable contributions to NEO! Without you NEO would not have existed! Thanks for your professional work, for your enthusiasm and always positive attitude! We will definitely miss you, but I hope that you will come and visit us often! Let us stay in contact and I wish you all the best in your new position!

Activities

Past

Research

Field work

- During the period 19-26 May, Tabea Hennig, Radovan Krejci and Peter Tunved were on a maintenance trip to NEO and the new measurement location at Methoni. The purpose of the stay was to perform routine maintenance on the aerosol Differential Mobility Particle Sizer (DMPS) as well as aerosol Particle Soot Absorption Photometer (PSAP), including calibration of sizing, validation and quality assurance of the data. Another goal was to improve the sizing range of the DMPS system and to install a system that assures that instrumentation operates under driest possible conditions. For this purpose a compressor was implemented in the system setup to provide the instrument with pre-dried air, thus increasing the accuracy and precision of the data produced.

So far it seems that the new location of the instrument setup (i.e. Methoni) is influenced by the same type of sources as at Costa Navarino, at least for months January-February, which is a good indicator that also previous location in the library tower at Costa Navarino was able to capture the more large scale features of flow conditions and source profiles. This helps building confidence in the now 3 year-long data set.

During the period 23-25 May Evangelos Gerasopoulos joined the group and the group proceeded with data analyses and planning for publications. The results from the observations performed to date were presented at COMECAP Conference in Heraklion, Crete, during the week following the maintenance trip.

- Ruben Fritzon, Bradley Goodfellow and Mikael Amlert from Stockholm University visited Messinia and Lakonia in April. They were searching for normal faults with fresh scarps which can tell the story about the history of earthquakes in the area. They started in the area of Kalamata and continued down to Gerolimenas. The small village of Gereolimas has a beautiful normal fault scarp facing south which can be seen from the village. The fault scarp was analysed with a portable XRF in order to find geochemical information about the slip history of the fault. The scientists also visited the Sparta fault and the area north of the Gulf of Corinth.



Figure 1: The fault scarp at Gerolimenas

- During the period 26-28 June, Mr. Palaiologou and Mr. Tataris, PhD candidates of the University of Aegean visited NEO to perform sampling for land use mapping within the Messinia and neighboring prefectures. The scope of the field trip was to gather information towards producing the input data for forest fires behavior

models. This is an extension of the collaboration with the AoA group of NEO, within the frame of the XENIOS project "Climate Change Impacts on the Touristic Development of Sensitive Areas in Greece. Pilot Study: Messinia - Area of Integrated Tourist Development" coordinated by Prof. Zerefos under National funding. Prof. Kalabokidis (University of the Aegean) sent a thank you letter, cordially acknowledging facilities and NEO management treatment.

- During May 2014, Dr. Mikael Andéhn, researcher at the Stockholm Business School – Stockholm University, set out to delve into the potential and need for the implementation of a unified communication strategy for the region of Messinia. Andehn interviewed a number of stakeholders in the region, including business owners, entrepreneurs and officials, on how Messinia's future as a place will be shaped. Will the institutional embodiment of this change be successful and able to carry out meaningful change without falling into the trap of organizational autocracy as so many regional development campaigns have done before?



Figure 2: Home-bottled olive oil sold in a restaurant, the purveyor of this oil stated that he'd rather dump the oil than sell it at the current wholesale price; selling hand-painted bottles to tourists provided him with an alternative to simply wasting the product.

According to Dr. Andéhn, the future of Messinia appears bright, the optimism and will to rebuild what was lost in the Eurozone crisis appears strong in the region, but the way forward is wrought with challenges.

Scientific Publications

- The first NEO PhD thesis!

Katerina Mazi, 2014. Seawater intrusion risks and controls for safe use of coastal groundwater under multiple change pressures. PhD Dissertation, No 42 (Physical Geography), Department of Physical Geography and Quaternary Geology, Stockholm University, Sweden. ISSN 1653-7211, ISBN 978-91-7447-907-2, Print: US-AB, Stockholm, 2014.

Abstract

In the era of the Anthropocene, with multiple change pressures on water resources, the loss of coastal groundwater resources by increased seawater intrusion, driven by climate, sea-level and landscape changes, may be critical for many people living in commonly densely populated coastal regions. It is therefore important to assess the risks and dominant controls associated with seawater intrusion, in order to enable safe use of coastal groundwater under coupled human-natural and spatiotemporally variable forcing conditions.

Analytical solutions of interface flow in coastal aquifers allow for relatively simple quantification of coastal system response to change pressures under a variety of conditions. Such solutions are suitable for first-order regional vulnerability assessment and mapping of the implications of climate- and landscape-driven change scenarios, and related comparisons across various coastal regions of the world. However, previous analytical

solutions of seawater intrusion in coastal aquifers ignored the hydraulically significant aquifer bed-slope. By accounting for the bed-slope, a new analytical model of interface flow in unconfined coastal aquifers has been developed in this thesis, which generalizes and enables more realistic quantification of aquifer responses to change. Solutions have been derived for the toe location of a fresh-seawater sharp interface and have been used to assess vulnerability and safe exploitation of regional coastal groundwater.

Thesis results show high nonlinearity of seawater intrusion responses to hydro-climatic and groundwater pumping changes on the landside, and sea-level rise on the marine side. This non-linearity implies some thresholds, or tipping points, which, if crossed, may lead abruptly to major seawater invasion of the coastal aquifer. Furthermore, critical limits of pumping well intrusion or of complete aquifer intrusion under coastal groundwater change and exploitation have been identified and quantified in direct relation to prevailing local-regional conditions and stresses, defining a safe operating space for the human use of coastal groundwater. In general, coastal groundwater management should focus on control of the fresh groundwater discharge to the sea, rather than on maintaining a certain hydraulic head at some aquifer location, in order to control seawater intrusion.

Concrete first-order vulnerability assessments have been performed for three regional Mediterranean coastal aquifers, the Nile Delta Aquifer (NDA), the Israel Coastal Aquifer (ICA) and the Cyprus Akrotiri Aquifer (CAA). The results show that NDA is seriously threatened by the advance of seawater due to decreasing net recharge, ICA is not immediately threatened but approaches the critical state of well intrusion, while groundwater pumping in the CAA could potentially still be increased by 30% over current levels before intrusion criticality is reached. A safe operating space determined for ICA and CAA shows that, under declining groundwater recharge, none of the current pumping schemes is sustainable.

- The third, NEO related publication, for 2014 is published:

Mazi K. , Koussis A. D. , and Destouni G., Intensively exploited Mediterranean aquifers: resilience to seawater intrusion and proximity to critical thresholds, *Hydrol. Earth Syst. Sci.*, 18, 1663–1677, 2014.

Research Applications

- In their role as Directors for Navarino Environmental Observatory and Stockholm University Institute for Turkish Studies, respectively, Karin Holmgren and Paul Levin have been allocated a planning grant of 95 000 SEK for coordinating a research proposal on ***Climate Change & the Water-Energy-Food Nexus in the Maritsa River Basin***. The project proposal is a response to the Horizon 2020 call for “Integrated approaches to food security, low-carbon energy, sustainable water management and climate change mitigation” (H2020-WATER-2b-2014/2015), due April 2015 (first stage).

PhD's news

- Christos Katrantsiotis has been employed as a PhD student at the Department of Physical Geography and Quaternary Geology, Stockholm University. Christos PhD project is part of the on-going research program entitled '*Past climate and vegetation variability in southern Greece*'. Project collaborators include Karin Holmgren, Elin Norström and Nikos Zacharias.

The purpose of the study is to carry out a high-resolution reconstruction of Holocene environmental and climate changes in southern Peloponnese. For the purpose of the investigation, sediment cores retrieved from Agios Floros fen, (at the floodplain of River Pamisos, 16km NW of Kalamata, Messenia) and Gialova lagoon, near Pylos, and examined using a combined lithostratigraphic, microfossil (diatoms and pollen) and geochemical approach. The age control of the cores is based on radiocarbon and OSL measurements. This multiproxy method will assist us to understand the nature of landscape changes and the interaction between human and nature in one of the richest agricultural and most densely populated areas of the ancient Greek world.

- Meighan Boyd is continuing work with speleothems from Alepotrypa Cave. New analysis are being conducted at Stockholm University Dendrochronology lab using ITRAX XRF to produce records of trace elements from both modern and mid-Holocene stalagmites. Uranium series dates are being run in Germany, with initial results showing speleothem growth occurred between ~70 000-18 000 years BP in one stalagmite and ~6000 to 1400 years BP in three stalagmites.

Education

Courses

- **“Course on Plant Biodiversity and Evolution”**
Master students’ course, Stockholm University (May 3-10)

The third Masters course "Plant Biodiversity and evolution - a global perspective", took place at NEO on May 3–10. Catarina Rydin was the instructor of the field course. During the excursion, the students visited a number of different sites mainly in Messinia. Among them, the Gialova/Navarino Bay area, Taygetos mountain, Polylimnio and the surroundings of NEO. Moreover, the students met with Andrianna Lappa owner at the soap factory ‘**Naked King**’ in Gialova and got a demonstration on how herbs are used for soap production.



Figure 3: Students and teachers from Stockholm University during a soap making demonstration at ‘**Naked King**’ soap factory in Gialova

Plant diversity and evolution is a course at the master level, given by Stockholm University. During 10 weeks, students explore plant diversity in time and space. One week is spent in Messinia, Greece, and this week is a central part of the course. The students study the diversity of the area, and this knowledge forms the basis of minor individual research projects conducted by the students when back in Stockholm.

- **“Course on Biology - Earth sciences”**
Bachelor students’ course, Stockholm University (May 10-17)

A group of students from the Biology-Earth science programme, Department of Physical Geography and Quaternary Geology, SU, carried out field work for their Bachelor degree thesis with NEO as the base station this spring! The students dealt with different projects on biodiversity, nature conservation, ecosystems services and ecotourism and were supervised by Bo Eknert, Christina Schaffer, Maria Danberg and Giorgos Maneas. After the field work in Greece, the students wrote and presented their reports in a seminar at Stockholm University on June 19th. The reports will be made available on the NEO web, when the final editions are available.



Figure 4: Students and teachers from Stockholm University during the Biology-Earth course in Gialova

This course has been made possible through a generous economic contribution from 'Captain Vassilis Foundation'.

Internships

For the period May – June 2014 Giorgos Kosmopoulos - student at the Physics department, University of Patras - implemented his internship at NEO on '*Validation of solar radiation estimations at NEO*'. Moreover, Giorgos participated in the day-to-day activities concerning the running of the NEO station such as collecting data at the new measurement location at Methoni and providing assistance to researchers and students visiting NEO

Dissemination

- **NEO presentation at the SIA Annual meeting**
Athens, April 3

Karin Holmgren gave a lecture on "**Climate, environment and past societies. What do we want to know - and why?**" following an invitation from the Swedish Institute in Athens (SIA). The lecture that also included a presentation of NEO, was given at SIA's official annual meeting, held in the Acropolis Museum. In the audience were, among others, the Swedish Ambassador in Greece, representatives for all Swedish Institutes in the Mediterranean Region and several members from NEO Steering Committee.

- **Interview**
NEO station, May 14

Giorgos Maneas gave an interview to a Greek national TV channel (ANT1 "Se Proto Plano") about NEO and its activities in research, education and dissemination of sciences. Part of the interview was shown on June 22 in a TV-show aiming to present the broader picture of Costa Navarino, from different angles, as well as the relation with local communities. The program is available online: http://www.antenna.gr/webtv/watch?cid=4lk423_dc_f9_e%3d

- **Café-NEO**
Patra, June 5

The second **Café-NEO** event was realised in Patras on the Word Environment Day. The event entitled "**Solar Radiation: Myths and Reality**" was realized at '**Discover**' a bookstore/ café/ reading hall at the center of Patras. The attendees had the opportunity to discuss with Dr. Andreas Kazantzidis, Associated Professor at the University of Patras, the impacts and the benefits of the solar radiation to humans and the environment.



Figure 5: The second **Café-NEO** at Discover cafe in Patra

- **NEO related workshop: presentation of the XENIOS project results,**
Athens, June 4

A workshop dedicated to the results of the XENIOS project "Climate Change Impacts on the Touristic Development of Sensitive Areas in Greece. Pilot Study: Messinia - Area of Integrated Tourist Development" coordinated by Prof. Zerefos under National funding, was organized in Athens at the Cultural Center of the University of Athens. The XENIOS project, a collaboration of the University of Athens, the National Observatory of Athens and TEMES S.A., is devoted to the investigation of climate change impacts as well as the consequences of geophysical phenomena, which are accelerated and enhanced by anthropogenic factors, such as tourism. The workshop offered an excellent opportunity to communicate the goals and achievements of NEO.

The workshop was under the auspices of SETE (Association of Greek Tourism Enterprises) and was partly attended by the General Secretary of Tourism Prof. Kokossis.



Figure 6: Participants at the presentation of the XENIOS project results.

- ***Geoarchaeology Working Group***
NEO station, June 9

As part of their field trip in Greece, students and teachers from the University of Tübingen working in the fields of geology and archaeology visited NEO in order to learn more about the research activities. Giorgos Maneas, welcomed them at the station and gave them a presentation on past, on-going and future activities implemented under the umbrella of NEO.

- ***NEO film, June 2014***

Our second documentary about NEO activities, focusing on past climate is published! Please enjoy the video and choose 1080p in Youtube [here](#).

- ***Astronomy nights, Costa Navarino, summer 2014***

The 'Astronomy Nights' event started in May this season. The event, held by Giorgos Maneas, is very popular among the hotel guests and till now more than 50 visitors have participated.



Figure 6: The telescope used at the National Observatory of Athens.

In parallel, NEO in collaboration with the HR department at the hotel organized an Astronomy tour introducing the event as well as the night sky to Costa Navarino Associates.

Events

Workshops

- **“Mediterranean Holocene Climate and Human Societies”, April 23-25**

In total 60 scientists from natural sciences, humanities and social sciences from 16 countries participated in a workshop entitled **“Mediterranean Holocene climate and human societies”** which was held at Navarino Environmental Observatory and at Costa Navarino.



Figure 7: Participants at the **“Mediterranean Holocene climate and human societies”** held at NEO and Costa Navarino.

The workshop was devoted to the interrelation between climate, environment and human societies in a historical perspective. One outcome of the workshop will be a special issue in the scientific journal “Quaternary Science Reviews”, with ~20 contributions from the workshop. Another outcome will be to try and develop the idea proposed, of organizing regularly occurring, interdisciplinary “Navarino Summer Schools” and “Navarino Workshops”, for improving communication between research communities to help developing methodologies towards fully integrated conceptual models, on climate-environment-societies interactions.

The workshop was co-organised by the NEO, the CNRS LSCE & PaleoMex, the Hellenic Centre for Marine Research (HCMR) and the Justus-Liebig University Giessen. The workshop was co-sponsored by PAGES, NEO, the MISTRALS/ PaleoMex program, the Labex OT-Med, the Bolin Centre for Climate Research, Stockholm University and the Institute of Oceanography, Hellenic Centre for Marine Research.

NEO management

- NEO Steering Committee was held on 4 April at TEMES offices in Athens.
- Karin Holmgren, Vangelis Gerasopoulos and Girogos Maneas participated in a meeting with the rector of the University of Peloponnese, Kostas Masselos, and Associate Professor Nikos Zacharias on 4 April. The aim of the meeting was to discuss a proposal by Prof Zacharias to initiate a 2-year Master program on **“Natural and Cultural Environmental Studies”** and the possible participation by NEO and NOA.

Upcoming

Research

- Karin Holmgren, Meighan Boyd and Giorgos Maneas will meet with the Greek-American team of archaeologists, studying the human history in and around Alepotrypa Cave in July.
- Researchers Johan Kleman and Ingmar Borgstrom are planning for a field trip on Taygetos summit this September.

Education

- Students of the Justus-Liebig University of Giessen (a NEO Associated Member), Germany, will visit NEO in September as part of their-course "Climate, Climate Change Impacts: Greece".

Dissemination

- The **Café-NEO** meetings, organized by Navarino Environmental Observatory, will take place at several coffee shops in the Peloponnese as well as at University canteens, with a range of topics such as "Why Messinia? From Homer to Spielberg" or "How to educate your kids to respect nature".

Visits to and from NEO

- Karin Holmgren, will be at NEO from June 29 - July 12.
- Giorgos Maneas will visit Tarfala field station in September (6 -13/ 9) for exchange of work experiences with the Station Manager of Tarfala.