UNIVERSITY OF PATRAS

SCHOOL OF SCIENCE

DEPARTMENT OF PHYSICS

LABORATORY OF ATMOSPHERIC PHYSICS

Activity Report 2014

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Laboratory of Atmospheric Physics of the University of Patras

Activity Report 2014

Note of the Head of the LAPUP

This is the third issue of the Activity Report of the Laboratory of Atmospheric Physics of the University of Patras, for the year 2014. Your comments are more than welcome and can be addressed to athanarg@upatras.gr

You can follow our activities via the following links:

Laboratory Web Page: www.atmosphere-upatras.gr

LAPUP weather forecast page: www.weather.upatras.gr

The LAPUP on Facebook:

https://www.facebook.com/LaboratoryOfAtmosphericPhysicsUniversityOfPatras

Staff

Faculty Members

- Athanassios A. Argiriou, Physicist (U. Patras) - D.E.A. (I.N.P. Grenoble) - Ph.D. (Univ. Aix-Marseille 1), Professor (Head of the LAPUP)
- Andreas Kazantzidis, Physicist - M.Sc. - Ph.D. (Aristotle University of Thessaloniki), Assistant Professor with tenure
- Ioannis Kioutsioukis, Physicist - M.Sc. - Ph.D. (Aristotle University of Thessaloniki), Lecturer
- Anastasia Rapti, Physicist - Ph.D. (University of Patras), Lecturer with tenure

Graduate Students

Ph.D. Candidates

- Galanaki Elissavet, Physicist, M.Sc. in Environmental Physics & Meteorology, National & Kapodistrian University of Athens, (Climatology of lightning activity in Greece)
- Kolokythas Constantinos, Hellenic Air Force - Meteorologist, M.Sc. in Environmental Sciences, University of Patras (Wind energy forecast – Topography and extreme weather events impact)
- Kotti Maria – Christina, Physicist, University of Patras – M.Sc., National & Kapodistrian University of Athens (Use of modern techniques for solar radiation measurement and estimation for energy applications)
• Mamara Anna, Mathematician – M.Sc., University of the Aegean (Homogenization of meteorological parameters)
• Proestakis Manolis, Physicist, M.Sc. in Environmental Physics, University of Bremen (Study of the indirect effect of aerosols in clouds using ground and satellite measurements)
• Roukounakis Nikolaos, MEng Chemical Engineering, University of Birmingham, MSc Environmental Technology, Imperial College London (The application of a high-resolution weather forecasting model for estimating GPS tropospheric delay over complex terrain)
• Salamalikis Vasileios, Physicist - M.Sc., University of Patras (Stable isotopes in atmospheric processes)
• Tzoumanikas Panayiotis, Computer and Informatics Engineer, M.Sc., University of Patras, (Estimation of atmospheric parameters using digital image processing)
• Varotsou Eufrosyni, Physicist, M.Sc. in Environmental Sciences, University of Patras (Study and characteristics of the urban microclimate in Patras, Greece – Urban heat island effect)

Research Associates

• Dimopoulos Spyridon, Computer Engineer, M.Sc., Ph.D. (Under contract in the frame of the ETCP MED 2007 - 2013 Program “POSEIDON”)
• Kanakaris Ioannis, Informatics for Business Planning Engineer (Under contract in the frame of the ETCP Greece – Italy 2007 -2013 Program “CESAPO” and ETCP MED 2007 - 2013 Program “POSEIDON”)
• Karagiannidis Athanassios, Physicist – M.Sc. – Ph.D. (Under contract in the frame of the ETCP Greece – Italy 2007 -2013 Program “CESAPO” and ETCP MED 2007 - 2013 Program “POSEIDON”)
• Kokonozi Athina, Physist, (Under contract in the FP7 Program “ENORASIS”)
• Liora Natalia, Physicist – M.Sc. (Under contract in the frame of the ETCP Greece – Italy 2007 -2013 Program “CESAPO”)
• Poupkou Anastasia, Physicist – M.Sc. – Ph.D. (Under contract in the frame of the ETCP Greece – Italy 2007 -2013 Program “CESAPO”)
Teaching Activities
During the reporting period, the LAPUP faculty taught the following undergraduate and graduate courses.

Undergraduate Programs

- Atmospheric Physics I (7th semester, Dept. of Physics, University of Patras)
- Atmospheric Physics II (8th semester, Dept. of Physics, University of Patras)
- Atmospheric Pollution (7th semester, Dept. of Physics, University of Patras)
- Differential Equations (2nd semester, Dept. of Physics, University of Patras)
- Environmental Physics (3rd semester, Dept. of Physics, University of Patras)
- Meteorology – Climatology (7th semester, Dept. of Geology, University of Patras)
- Physics Laboratory III (Thermodynamics – Waves – Optics) (3rd semester, Dept. of Physics, University of Patras)
- Physics Laboratory IV (Electromagnetism) (4th semester, Dept. of Physics, University of Patras)
- Physics (1st semester, Dept. of Biology)

Graduate Programs

Graduate Program on Energy & Environment, Department of Physics, University of Patras

- Dynamic Meteorology (1st Semester)
- Environmental Physics (1st Semester)
- Atmospheric modeling (1st Semester)
- Radiative transfer modeling (1st Semester)

Interdisciplinary Graduate Program on Environmental Sciences, University of Patras

- Environmental Physics (1st Semester)
- Meteorological Sensors (2nd Semester)

Interdisciplinary Graduate Program on Electronics and Information Processing, University of Patras

- Meteorological Sensors (2nd Semester)
- Geophysical – Atmospheric Signals and Remote Sensing (2nd Semester)

Environmental & Marine Geochemistry Program on Environmental Sciences, Dept. of Geology, University of Patras

- Atmospheric Pollution Meteorology (1st Semester)
The diploma, M.Sc. and Ph.D. theses, presented in 2014 were:

**Diploma Theses**
1. Petropoulos Nikolaos, Estimation of solar surface irradiance from synchronized measurements of sunshine duration
2. Kaltsi Chariklia, Estimation of risks and benefits from human exposure on ultraviolet radiation in Greece with the synergetic use of climate data and radiative transfer models

**Research Activities**
The main research axes of the LAPUP include:

- Measurements, quality control, processing and homogenization of meteorological and environmental time series.
- Stable isotopes ($\delta^{18}O$ & $\delta^2H$) in rain and in atmospheric water vapor.
- Ultraviolet radiation: Measurements, modeling and biological dose rates.
- Solar Radiation: Measurements, modeling and solar energy.
- Energy meteorology.
- Artificial intelligence methods applied to atmospheric and environmental physics problems.
- Chemical Weather forecasting
- Atmospheric Modelling and Predictability
- Ensemble Forecasting
- Uncertainty propagation and Sensitivity analysis of model output

In the frame of the above research axes, the LAPUP carried out a number of research projects that led to a series of publications in international scientific journals and conferences.

**Research projects**

• ENvironmental Optimization of IRrigation Management with the Combined uSe and Integration of High Precision Satellite Data, Advanced Modelling, Process Control and Business Innovation (ENORASIS), FP7-ENV Project ENORASIS, Grant Agreement 282949, 01/ 2012 – 12/2014, www.enorasis.eu/


• Modelling approach to determine the duration and intensity of sunlight exposure required to maintain and achieve adequate vitamin D status in winter in ‘at risk’ population groups, Subcontractor, University of Manchester, funded by the Department of Health, UK, 12/2012 – 5/2014.


• Food-based solutions for optimal vitamin D nutrition and health through the life cycle (ODIN), FP7-Health Project, 7/2014 – 9/2014.

Publications in peer-reviewed journals

Presentations in peer-reviewed international conferences


12. Salamalikis V., P. Blanc, A. Kazantzidis, On the induced uncertainties in direct normal irradiance calculations under cloud-free conditions due to aerosol optical depth from MACC re-analysis data, 14th EMS Annual Meeting/ 10th European Conference on Applied Climatology (ECAC), 06-10 October 2014, Prague, Czech Republic.


Organization of Conferences and Workshops

- COST ES 1002 international workshop on “Processing techniques for the detection of atmospheric constituents and the estimation and forecasting of solar irradiance from all-sky images”, 24-25/6/2014, Patras, Greece (http://www.sky-camera-workshop.info/).

Dissemination activities

- Courses on sailing meteorology, at the Sailing Club of Patras.
- Set-up of 1 km by 1 km horizontal resolution forecasts for the area of the Gulf of Patras, in the frame of the organization of the Hellenic Offshore Sailing Championship 2014 - International Offshore Sailing Regatta in Patras by the Sailing Club of Patras (ΙΟΠ), June 2014.
• “Ozone and UV radiation: myths and reality”, Science Cafe event, Patras, Greece, June 5, 2014. Talk by A. Kazantzidis in the series of lectures organized by the Navarino Environmental Observatory.
• Weather forecasts for several local media.