Laboratory of Atmospheric Physics of the University of Patras

Activity Report 2017

Note of the Head of the LAPUP

This is the fifth issue of the Activity Report of the Laboratory of Atmospheric Physics of the University of Patras, for the year 2017. It is also the very first issue I’m editing as new Head of the Lab.

For ten years, LAPUP was run by Professor Athanassios Argiriou. LAPUP started with dilapidated infrastructure, practically zero personnel and infrastructure. In fact, there was no reason to publish an Activity report. At that time, I was still working as a postdoc researcher at the Aristotle University of Thessaloniki: LAPUP was completely unknown, I was not aware of it despite that the Greek research community in atmospheric sciences is small and well-connected. Nowadays, LAPUP is able to present a bouquet of activities including fully renewed Bachelor and MSc courses with new instrumentation, IT facilities, upgraded lab exercises as well as a variety of international collaborations and research projects.

I am indebted Professor Athanasios Argiriou for his leadership and continuous support all these years. Moreover, I thank him for giving me the opportunity to serve the LAPUP as the new Head although he has the highest ranking. I do hope that with his experience and expertise, the remarkable job of our third faculty member, Assistant Professor Ioannis Kioutsioukis, as well as the great support by our postdoc researchers and PhD students, we will continue to report progress, innovation and enjoy atmospheric physics!

Patras, April 25, 2018

Associate Professor Andreas Kazantzidis

Your comments are more than welcome and can be addressed to akaza@upatras.gr
You can follow our activities via the following links:
Laboratory Web Page: www.atmoshpere-upatras.gr
LAPUP weather forecast page: www.weather.upatras.gr
The LAPUP on Facebook: https://www.facebook.com/LaboratoryOfAtmosphericPhysicsUniversityOfPatras
Staff

Faculty Members

- Andreas Kazantzidis, Physicist, M.Sc., Ph.D. (Aristotle University of Thessaloniki), Associate Professor (2015 - ).
- Ioannis Kloutsioukis, Physicist, M.Sc. (Aristotle University of Thessaloniki), Ph.D. (Aristotle University of Thessaloniki, Joint Research Centre Ispra), Assistant Professor (2016 - ).

Postgraduate Researchers

- Salamalikis Vasileios, Physicist - M.Sc., University of Patras (Stable isotopes in atmospheric processes).

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).
- 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).
- Ioannis Vamvakas, Physicist – M.Sc., University of Patras (Cloud and aerosol effects on solar irradiance).
- Elias Dimadis, Matematician (University of Patras), M.Sc. (University of Piraeus) (Homogenization of Atmospheric Time Series).

Research Associates

- Kanakaris Ioannis, Informatics for Business Planning Engineer (Technical Educational Institute of Patras), M.Sc. in Accounting (Price Waterhouse Coopers S.A.)
Teaching Activities

During the reporting period, the LAPUP faculty taught the following undergraduate and graduate courses.

**Undergraduate Programs**

- Atmospheric Physics I - Meteorology (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)
- Calculus (1st semester, Dept. of Physics, University of Patras)
- Differential Equations (2nd semester, Dept. of Physics, University of Patras)
- Introduction to Environmental Physics (5th semester, Dept. of Physics, University of Patras)
- Dynamical Systems (7th semester, Dept. of Physics, University of Patras)
- Meteorology – Climatology (7th semester, Dept. of Geology, University of Patras)
- Atmospheric Physics I-Meteorology I (7th semester, Dept. of Mathematics, University of Patras)
- Atmospheric Physics II-Meteorology II (8th semester, Dept. of Mathematics, University of Patras)
- Physics Laboratory II (Mechanics – Fluid Mechanics) (2nd semester, Dept. of Physics, 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)

**Graduate Programs**

**Graduate Program on Applied Meteorology and Environmental Physics**

- Dynamic and Synoptic Meteorology (1st semester)
- Radiation and Atmosphere (1st semester)
- Measurements and Data Processing in Atmospheric Sciences (1st semester)
- Energy Meteorology (2nd semester)
- Statistical Methods in Atmospheric Sciences (2nd semester)
- Atmospheric Modelling (2nd semester)

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

- Dynamic Meteorology (1st semester)
- Environmental Physics (1st semester)
- Radiation and Atmosphere (1st semester)
• Atmospheric modeling (2\textsuperscript{nd} semester)
• Energy Meteorology (2\textsuperscript{nd} semester)

**Interdisciplinary Graduate Program on Environmental Sciences, University of Patras**

• Environmental Physics (1\textsuperscript{st} Semester)
• Meteorological Sensors (2\textsuperscript{nd} Semester)

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

• Meteorological Sensors (2\textsuperscript{nd} Semester)
• Geophysical – Atmospheric Signals and Remote Sensing (2\textsuperscript{nd} Semester)

**Interdisciplinary Graduate Program on Distributed green electricity and advanced network infrastructure management and economy, University of Patras**

• Energy Meteorology (2\textsuperscript{nd} semester)

**Theses**

**Ph.D. Theses**

-  

**M.Sc. Theses**

Solar resource methodologies and typical values in Greece, Apostolopoulou Ekaterini

**Research Activities**

The main research axes of the LAPUP include:

• Measurements, quality control, processing and homogenization of meteorological and environmental time series.
• Stable isotopes (δ\textsuperscript{18}O & δ\textsuperscript{2}H) 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 Modeling, Ensemble Forecasting, and Predictability.
• Uncertainty propagation and Sensitivity analysis of model output.
• Modeling Environment and Vector-borne Disease Interaction.
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.

**On-going research projects**


**Publications in peer-reviewed journals**


Presentations in peer-reviewed international conferences


15. Air pollution monitoring in ports: experience gained from EU and potential applications in Greek ports, P. Symeonidis, A. Kazantzidis, T. Bakkas, A. Charalambous, I. Basiotis, 7th Greek Conference on Management and Improvement of Coastal Zones, 20-22/11/2017, Athens, Greece


Organization of Conferences and Workshops


Dissemination activities

- Sailing Meteorology – A free course offered for the students of the sailing schools of the Sailing Club of Patras (IOP).
- Guided visits in the Lab for high school students.
- Weather forecasts for several local news media.
- Talks in events organized by local nonprofit organizations.
- Talks and exercises on Copernicus data

Invited talks

-
Weather Bulletin

Summary

<table>
<thead>
<tr>
<th>2012</th>
<th>Min</th>
<th>Max</th>
<th>Annual Average (Total for precipitation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T (°C)</td>
<td>-0.1</td>
<td>38.4</td>
<td>17.9</td>
</tr>
<tr>
<td>RH (%)</td>
<td>8.5</td>
<td>91.3</td>
<td>61.5</td>
</tr>
<tr>
<td>WV [gust] (m.s⁻¹)</td>
<td></td>
<td>19.2 [30]</td>
<td></td>
</tr>
<tr>
<td>RF (mm)</td>
<td></td>
<td></td>
<td>1 182.8</td>
</tr>
<tr>
<td>p (hPa)</td>
<td>978</td>
<td>1027</td>
<td>1009</td>
</tr>
</tbody>
</table>

T: air temperature, RH: relative humidity, RF: precipitation, p (pressure at 24.78 m)
T: air temperature, RH: relative humidity, RF: precipitation, p (pressure at 24.78 m)
### 2014 Weather Data

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>Annual Average (Total for precipitation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T (°C)</strong></td>
<td>3.2</td>
<td>35.8</td>
<td>17.3</td>
</tr>
<tr>
<td><strong>RH (%)</strong></td>
<td>9.4</td>
<td>91.2</td>
<td>68.1</td>
</tr>
<tr>
<td><strong>WV [gust] (m.s(^{-1}))</strong></td>
<td>19.2 [30]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RF (mm)</strong></td>
<td>989</td>
<td>1023</td>
<td>976.6</td>
</tr>
<tr>
<td><strong>p (hPa)</strong></td>
<td>989</td>
<td>1023</td>
<td>1009</td>
</tr>
</tbody>
</table>

T: air temperature, RH: relative humidity, RF: precipitation, p (pressure at m.s.l.h.)

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**Frequency of counts by wind direction (%)**

- 0 to 2
- 2 to 4
- 4 to 6
- 6 to 19.21
<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>Annual Average (Total for precipitation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T (°C)</td>
<td>-0.5</td>
<td>37.9</td>
<td>18.2</td>
</tr>
<tr>
<td>RH (%)</td>
<td>5.8</td>
<td>97.7</td>
<td>63</td>
</tr>
<tr>
<td>WV [gust] (m.s⁻¹)</td>
<td></td>
<td>17 (53)</td>
<td></td>
</tr>
<tr>
<td>RF (mm)</td>
<td></td>
<td></td>
<td>803.6</td>
</tr>
<tr>
<td>p (hPa)</td>
<td>987</td>
<td>1030</td>
<td>1010</td>
</tr>
</tbody>
</table>

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<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>T (°C)</td>
<td>1.0(4)</td>
<td>38.8</td>
<td>19.2</td>
</tr>
<tr>
<td>RH (%)</td>
<td>11.73</td>
<td>97.7</td>
<td>64</td>
</tr>
<tr>
<td>WV [gust] (m.s(^{-1}))</td>
<td>17 [53]</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>RF (mm)</td>
<td>772.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p (hPa)</td>
<td>990</td>
<td>1029</td>
<td>1010</td>
</tr>
</tbody>
</table>

T: air temperature, RH: relative humidity, RF: precipitation, p (pressure at 24.78 m)

**Frequency of counts by wind direction (°%)**

![Wind direction frequency chart](image_url)
<table>
<thead>
<tr>
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<th>Max</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>T (°C)</td>
<td>-1.2</td>
<td>40.4</td>
<td>18.1</td>
</tr>
<tr>
<td>RH (%)</td>
<td>9.15</td>
<td>97.7</td>
<td>62.7</td>
</tr>
<tr>
<td>RF (mm)</td>
<td></td>
<td>813.0</td>
<td></td>
</tr>
<tr>
<td>p (hPa)</td>
<td>978</td>
<td>1026</td>
<td>1010.3</td>
</tr>
</tbody>
</table>

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