Florin Unga, Ph.D

73100 – Lecce, Italy
Mobile: 0039 3451748120
Email: f.unga@isac.cnr.it / florin.unga@gmail.com

Highlights

- Active participation in **long-term measurements** and **field measurements campaigns (on site, mobile and airborne)** involving **aerosol remote sensing, in-situ instrumentation, and small cost effective sensors mounted on UAVs/ULMs. Operation, maintenance and data analysis from ACTRIS stations.**
- Experience with in-situ **size-segregated sampling** and characterization of atmospheric aerosols' physical and chemical properties by **analytical electron microscopy** (TEM/EDX, SEM/EDX).
- Modeling of **aerosol optical properties and inversion algorithms** (Mie scattering codes, GRASP).
- **Statistical analysis** of data and programming skills (Fortran, Scilab, Matlab, LabView, OriginLab).

Education

University of Lille - Science and Technology, France
Ph.D. in Atmospheric Aerosol Sciences **March 2017**
Alexandru Ioan Cuza University of Iasi, Faculty of Physics, Romania
M.Sc. in Physics and Environmental Protection sciences **2011 - 2013**
B.Sc. in Computational Physics **2008 - 2011**

Research interests

Research fellow

Advisors: Daniela Cesari, Daniele Contini **November 2021 – present**
Istituto di Scienze dell'Atmosfera e del Clima, Consiglio Nazionale delle Ricerche, (ISAC-CNR), Lecce Italy (https://www.isac.cnr.it/)

- Research and technical activities of ACTRIS stations

Postdoctoral Researcher

Advisor: Jean Sciare **August 2018 – July 2021**
The Cyprus Institute – CARE-C (https://emme-care.cyi.ac.cy/), Nicosia, Cyprus
Detection of Non-Anthropogenic Air Pollution (DNAAP) project (http://www.aerosol.si/dnaap/) in collaboration with AEROSOL D.o.o company, Slovenia

- In-situ measurements of scattering and absorption properties of aerosol particles (nephelometer and aethalometer) in synergy with various measured aerosol properties (OPC, GRIMM, FIDAS, TEOM-FDMS).
- Intercomparison of aerosol vertical profiles derived from remote sensing instruments (LIDAR) with mini and cost effective instruments (OPC, aethalometer) mounted on UAV during research flights.
- Maintenance and troubleshooting of ACTRIS in-situ stations (regional background and urban) in Cyprus.

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- Operation, maintenance of the remote sensing instruments (LIDAR and sun photometers (CIMEL, PREDE)), data analysis and intercomparisons.
- Pollen particle sampling at the CARE-C facility in Nicosia, Cyprus.
- Enhancing collaborations between The Cyprus Institute and international research groups.
- Writing of reports and articles for publishing in peer reviewed scientific journals.

Advisor: Philippe Goloub **March 2017 - December 2017**
Laboratoire d'Optique Atmosphérique – LOA (http://www-loa.univ-lille1.fr), University of Lille, France, in the framework of CPER CLIMIBO project (http://climibio.univ-lille.fr)

- Climatology and seasonal trends in air pollution on short/long time periods in the North of France: particulate matter (PM) concentrations from air quality monitoring stations (ATMO-HDF), aerosols optical properties (AERONET) and boundary layer height derived from LIDAR measurements.
- Participation in mobile on-road measurements campaigns in France to study the spatial variability of PM mass concentration from optical particle counters;
- Writing of reports and articles for publishing in peer reviewed scientific journals.

Graduate Researcher **October 2013 - March 2017**

Advisors: Marie Choël, Yevgeny Derimian and Philippe Goloub
Laboratoire d'Optique Atmosphérique - LOA and Laboratoire de Spectrochimie Infrarouge et Raman - LASIR (https://lasir.univ-lille1.fr) in the framework of CaPPA Labex project (http://www.labex-cappa.fr).
PhD Thesis title: “Investigation of atmospheric aerosol mixing state effect on measured and retrieved optical characteristics: an approach integrating individual particle analysis, remote sensing and numerical simulations”, https://www.theses.fr/202352013

- Field measurement campaigns (on site and airborne) in western Africa (Senegal), northern France and Spain (Tenerife) for interdisciplinary studies on the physicochemical properties of atmospheric aerosols and their effects on optical and radiative properties;
- Atmospheric aerosol sampling by cascade impaction techniques in various environments (near surface and at altitude in urban/industrial, marine, desert and biomass burning environments);
- Analytical microscopy (TEM/EDX, SEM/EDX) and image analysis of electron micrographs by Fiji/ImageJ software for determination of the microphysical properties and chemical composition of atmospheric aerosols;
- In-situ characterization of aerosols, size distribution and mass concentration derived from optical particle counters measurements;
- Complementary analysis of microphysical and optical characteristics retrieved by active and passive remote sensing with meteorological parameters, air masses trajectories and chemical composition;
- Modeling of aerosol optical properties and inversion algorithms in single scattering approximation based on observed or theoretical microphysical and microchemical properties (Mie scattering codes, GRASP).
- Writing of annual reports and articles for publishing in peer reviewed scientific journals.

Undergraduate M.Sc. Student **October 2011 – July 2013**

Advisors: Silviu Gurlui and Marius Mihai Cazacu
Atmosphere Optics, Spectroscopy and Lasers Laboratory – LOASL (http://spectroscopy.phys.uaic.ro), UAIC Iasi, Faculty of Physics, Romania
Dissertation title: “Characterization of tropospheric aerosols. Sun photometer”

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- Analysis and interpretation of sun/sky photometer data, lidar, HYSPLIT air mass trajectories, meteorological parameters and PMx mass concentration measurements.

Trainings and internships

Erasmus LLP practice stage **June – September 2012**
University of Lille, on the topic: Atmospheric aerosol optical and retrieved properties from sun/sky photometer and AERONET data. (Advisor: Philippe Goloub/LOA)
Online Training NI LabVIEW for students and teachers **June 2011**

Teaching experience

Certificate of graduation of Psycho-Pedagogical Module I **2009 - 2011**
Teaching practice during 1 year of General Physics to high school students.

Mentorship experience

Co-supervisor of ERASMUS+ students during a short practice stage:
Lidia Marta Amarandi **June – September 2017**
- Aerosols characterization using optical sensors.

Madalina Iftime **July – October 2015**
- Optical analysis of atmospheric aerosols using a handheld sun photometer. A case study of Calitoo system.

Personal skills

Mother tongue: Romanian

Other languages:	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
French	B2	B2	B2	B2	B1

Driving license: AM, B

Patents:

Patent Pending no. 19193244.1: A method for quantification of mineral dust in air based on optical absorption of particles concentrated by a virtual impactor and a device performing the said method, in the project DNAAP (http://aerosol.si/dnaap/)

Grants:

ITC Conference Grants - 4th ITC call, COST-inDUST

Publications

Published

1. Kezoudi M, Keleshis C, Antoniou P, Biskos G, Bronz M, Constantinides C, Desservettaz M, Gao R-S, Girdwood J, Harnetiaux J, Kandler K, Leonidou A, Liu Y, Lelieveld J, Marenco F, Mihalopoulos N, Močnik G, Neitola K, Paris J-D, Pikridas M, Sarda-Esteve R, Stopford C, **Unga F**, Vrekoussis M, Sciare J. The Unmanned Systems Research Laboratory (USRL): A New Facility for UAV-Based Atmospheric Observations. Atmosphere. 2021; 12(8):1042. https://doi.org/10.3390/atmos12081042
2. Baalbaki, R., Pikridas, M., Jokinen, T., Laurila, T., Dada, L., Bezantakos, S., Ahonen, L., Neitola, K., Maisser, A., Bimenyimana, E., Christodoulou, A., **Unga, F.**, Savvides, C., Lehtipalo, K., Kangasluoma, J., Biskos, G., Petäjä, T., Kerminen, V.-M., Sciare, J., and Kulmala, M.: Towards understanding the mechanisms of new particle formation in the Eastern Mediterranean, Atmos. Chem. Phys. Discuss. [preprint], https://doi.org/10.5194/acp-2020-1066, in review, 2020.
3. Drinovec, L., Sciare, J., Stavroulas, I., Bezantakos, S., Pikridas, M., **Unga, F.**, Savvides, C., Višić, B., Remškar, M., and Močnik, G.: A new optical-based technique for real-time measurements of

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mineral dust concentration in PM10 using a virtual impactor, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2019-506, in review, 2020. (Accepted for AMT)
4. **Unga, F**., Choël, M., Derimian, Y., Deboudt, K., Dunovik, O., Goloub, P., Microscopic observations of core-shell particle structure and implications for atmospheric aerosol remote sensing, Journal of Geophysical Research: Atmospheres, November 2018, 123. https://doi.org/10.1029/2018JD028602.
5. Popovici, I. E., Goloub, P., Podvin, T., Blarel, L., Loisil, R., **Unga, F.**, Mortier, A., Deroo, C., Victori, S., Ducos, F., Torres, B., Delegove, C., Choël, M., Pujol-Söhne, N., and Pietras, C.: Description and applications of a mobile system performing on-road aerosol remote sensing and in situ measurements, Atmos. Meas. Tech., 11, 4671-4691, https://doi.org/10.5194/amt-11-4671-2018, 2018.
6. Popovici, I. E., Goloub, P., Mortier, A., Podvin, T., Blarel, L., Loisil, R., Deroo, C., Victori, S., Torres, B., **Unga, F**., Choël, M., A mobile system for the study of vertical distribution of aerosols in the atmosphere: description and first results, Polluton Atmosphérique, http://lodel.irevues.inist.fr/pollution-atmospherique/index.php?id=6510, February 2018.
7. Amarandi L. M., **Unga, F**., Popovici, I. E., Goloub, P., Cazacu, M. M., Gurlui, S. O., Blarel, L., and Choël, M., Investigation of atmospheric particulate matter (PM) mass concentration spatial variability by means of on-foot mobile measurements in Lille, northern France, Bulletin of the Polytechnic Institute of Jassy, Online ISSN 2537-2726, February 2018.
8. Derimian, Y., Choël, M., Rudich, Y., Deboudt, K., Dubovik, O., Laskin, A., Legrand, M., Damiri, B., Koren, I., **Unga, F**., Moreau, M., Andreae, M. O., and Karnieli, A., Effect of sea breeze circulation on aerosol mixing state and radiative properties in a desert setting, Atmospheric Chemistry and Physics, 17, 11331-11353, https://doi.org/10.5194/acp-17-11331-2017, 2017.
9. Cazacu, M. M., Timofte, A., **Unga, F**., Albina, B., and Gurlui, S., AERONET data investigation of the aerosol mixtures over Iasi area, One-year time scale overview, Journal of Quantitative Spectroscopy and Radiative Transfer, 153, 57–64, https://doi.org/10.1016/j.jqsrt.2014.09.004, 2015.
10. **Unga, F.**, M. M. Cazacu, A. Timofte, D. Bostan, A. Mortier, D. G. Dimitriu, S. Gurlui, and P. Goloub, Study of tropospheric aerosol types over Iasi, Romania, during summer of 2012, Environmental Engineering and Management Journal, 12(2), 297–303, 2013.
11. Cazacu, M. M., Timofte, A., Talianu, C., Nicolae, D., Danila, M. N., **Unga, F**., Dimitriu, D. G., Gurlui, S., Grímsvötn Volcano: Atmospheric volcanic ash cloud investigations, modeling-forecast and experimental environmental approach upon the Romanian area, Journal of Optoelectronics and Advanced Materials, 14(5-6): 517-522, May 2012.
12. Danila, M., **Unga, F**., Cazacu, M., et al. (2015). LIDAR Measurements Comparison of Two Volcanic Eruptions: Environmental Influences Upon the Romanian Territory. Annals of West University of Timisoara - Physics, 56(1), pp. 68-75, https://doi.org/10.1515/awutp-2015-0010, 2011.

Conference papers:

1. Choël, M., **Unga, F**., Simonetti, R., Derimian, Y., Duponchel, L., Combined use of TEM/EDX, microRaman and AFM for characterizing single atmospheric particles, Goldschmidt Conference 2015, Aug 2015, Prague, Czech Republic. (Invited paper)

2. **Unga, F**., Choël, M., Derimian, Y., Goloub, P., Etude des relations entre les propriétés physico-chimiques et optiques des aérosols à partir de mesures de télédétection et d'analyses de laboratoire, Journées Interdisciplinaires de la Qualité de l'air, 2014, http://www.jiqa.fr/doc/2014/Article/UNGA.pdf.

Oral communications

Conferences:
1. Sciare, J., Sarda-Estève, R., Oikonomou, K., Bimenyimana, E., Pikridas, M., **Unga, F.**, and Christodoulou, A.: Real-time source apportionment of local vs regional dust in a semi-arid urban environment of the Eastern Mediterranean Middle East (EMME) region, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-14115, https://doi.org/10.5194/egusphere-egu21-14115, 2021.
2. Pikridas, M; Drewnick, F; Crowley, J N.; Vrekoussis, M; Vouterakos, P; Barmpounis, K; Derimian, Y; **Unga, Florin**; Evans, R; Jezek, I; Brooks, J; Borrmann, S; Sciare, J; Lelieveld, J, Mass closure

study of submicron particles and their light scattering properties in the Mediterranean and Middle East regions during the AQABA shipborne campaign, EGU2019, 7-12 April, 2019 in Vienna, Austria.
3. Bezantakos, S; Barmpounis, K; Pikridas, M; **Unga, F**; Brooks, J; Darbyshire, E; Drewnick, F; Fachinger, F; Borrman, S; Lelieveld, J; Biskos, G, Physical Properties of Fine Aerosol Particles in the South Eastern Mediterranean and around the Arabian Peninsula During The AQABA Campaign: Hygroscopicity, Mixing State and Potential Cloud Droplet Numbers, EGU2019, 7-12 April, 2019 in Vienna, Austria.
4. **Unga, F.**, Popovici, I, Dubois, G, Blarel, L., Pikridas, M, Vouterakos, P., Sciare, J., Goloub, P., Torres, B., Victori, S., Maupin, F., Canini, M., Mortier, A., Lelieveld, J., Mobile ship-borne sun/sky/lunar photometer and ceilometer observations during the AQABA campaign, EGU2019, 7-12 April, 2019 in Vienna, Austria.
5. Popovici, I., Goloub, P., Podvin, T., Blarel, L., Loisil, R., Mortier, A., Deroo, C., **Unga, F.**, Choël, M., Torres, B., Victori, S., Mapping of aerosol spatial variability with mobile LiDAR, European Lidar Conference, Jul 2018, Thessaloniki, Greece
6. Derimian, Y., **Unga, F**., Choël, M., Lapyonok, T., Analysis of core-shell aerosol structure significance for advanced remote sensing, Advancement of polarimetric observations: calibration and improved aerosol retrievals (APOLO2017), Hefei, Anhui, China.
7. **Unga, F**., Choël, M., Derimian, Y., Deboudt, K., Goloub, P., Internally mixed aerosols observed by individual particle analysis and effect on optical properties, European Aerosol Conference, AC 2016, 4- 9 Septembre 2016 Tours, France.
8. Derimian, Y., Choël, M., Rudich, Y., Deboudt, K., Dubovik, O., Laskin, A., Legrand, M., Bahaiddin, D., Koren, I., **Unga, F**., Moreau, M., Karnieli, A., Sea breeze effect on aerosol mixing state and radiative properties in the Negev desert of Israel, Atmospheric Processes in the Mediterranean, APM 2016.
9. Choël, M., **Unga, F**., Simonetti, R., Derimian, Y., Duponchel, L., Combined use of TEM/EDX, microRaman and AFM for characterizing single atmospheric particles, Goldschmidt Conference 2015, Aug 2015, Prague, Czech Republic.
10. **Unga, F**., Choël, M., Derimian, Y, Goloub, P., Aerosol physico-chemical and optical properties observed in desert and urban sites, DUST2014 International Conference on Atmospheric Dust, Italy, 1-6 June 2014.
11. Choël, M., **Unga, F**., Derimian, Y., Deboudt, K., Goloub, P., Investigation of aerosol physicochemical properties by electron and photon-induced microanalysis, DUST2014 International Conference on Atmospheric Dust, Italy, 1-6 June 2014.

Scientific popularization:
1. "What are we breathing?" presented at "Fête de la Science" – 2014: Lumière sur la pollution de l'air, 9-11 October 2014, at CNRS building, Lille.
2. "What are we breathing?" and "Aerosol chemical composition in Mbour, Senegal, Africa and sampling techniques", presented at "Portes Ouvertes", IRD Mbour, 11 April 2015.

Awards

First prize for best scientific poster:
1. "Impact of the physicochemical changes of atmospheric aerosols during transport on their optical properties", F. Unga, M. Choël, Y. Derimian, P. Goloub, presented at Journée de Découverte de la Recherche en Chimie organisée par l'UFR de Chimie de l'Université de Lille 1, 26 Mars 2014.
2. "The automation of Ozone monitoring system using the graphical programming platform LabVIEW", F. Unga, M. N. Dănilă, Physics and Modern Educational Technologies, 19 May 2012, Iasi, Romania.

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