



**Centre
for Polar
Studies**

Centre for Polar Studies
ul. Będzińska 60
41-200 Sosnowiec
POLAND
polarknow@us.edu.pl



PhD student position at environmental Interdisciplinary Polar Studies

in Centre for Polar Studies, Leading National Scientific Centre (KNOW)

Reference No: CSP/2015/IGF/7

Title of PhD project:

LIDAR and photometric measurements synergy to investigation of aerosol variability in polar regions

Location: Centre for Polar Studies/ Institute of Geophysics PAS

Deadline: 15th August 2015 r.

Interviews: 10th – 13th September 2015, venue will be indicated later

(http://www.polarknow.us.edu.pl/wp-content/uploads/Location_CPS_partners.pdf)

In the case of students from abroad the interview will be performed in the form of video conferencing.

Mode of study: full-time

Degree to be obtained: Doctor of Philosophy in Earth Sciences, discipline – Geophysics

Duration: 4 years (8 semesters), from October 2015

Language: Polish and English, Polish is not obligatory for students from abroad

Scholarship: citizens of Poland, EU citizens and owners of Card of the Pole can apply for scholarships funded by the KNOW (Leading National Scientific Centre) 2 000 – 4000 PLN/month (paid no longer than during four academic years)

Fees applicable: EU citizens applying on a regular basis – no fees; Non-EU citizens: 3 000 EUR per year; More information are available on website <http://admission.us.edu.pl/english/admission-rules>

Required documents and registration online:

http://www.polarknow.us.edu.pl/en/isp_eng/required-documents-and-registration-online/



Krajowy Naukowy
Ośrodek Wiedzy

University of Silesia
Faculty of Earth Sciences
ul. Będzińska 60
41-200 Sosnowiec
www.wnoz.us.edu.pl

Institute of Geophysics
Polish Academy of Sciences
ul. Księcia Janusza 64
01-452 Warszawa
www.igf.edu.pl

Institute of Oceanology
Polish Academy of Sciences
ul. Powstańców Warszawy 55
81-712 Sopot
www.iopan.gda.pl



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Conditions of recruitment:

1. The final result of the completion of the candidate's higher university degree (maximum 6 points, the conversion of diploma ratings: 6.0 (excellent) - 6 pts.; 5.0 - 5 pts. ; 4.5 - 4 pts.; 4.0 - 3 pts.; 3.5 - 2 pts.; 3.0 - 1 point).
2. Interview with a candidate will assess the knowledge, skills (an ability to design experiments to investigate new phenomena, test hypotheses and solve experimental problems), knowledge of English and scientific level of the submitted project of the doctoral dissertation (maximum 15 points).
3. The minimum number of points, which has to be obtained to be selected for the studies, is at least 14 points.
4. Eligible for studies shall be a person who obtain the highest number of ranking points up to fill the limit of places, subject to point 3.
5. Project implementation of doctoral dissertation (max. 2 pages) must be submitted by 15th August 2015.

Requirements:

1. MSc degree (or equivalent) in Physics, Geophysics, Environmental Sciences, Applied Mathematics, Computer Science or similar science discipline. A candidate may submit application if the MSc Degree will be received not later than on 9th September 2015.
2. Experience in the field of Atmospheric Physics or Polar Researches
3. General knowledge of physics and applied mathematics and statistics.
4. Candidate should be familiar with numerical methods and possess fundamental skills in computer programming (e.g. Matlab, IDL, C, Fortran).
5. Understanding of various measurement methods of aerosol optical properties.
6. Good communication skills and capability to write in English in order to be able to participate in the international workshops and conferences as well as to present research results. Polish is not required.
7. Ability to work as a team member and to collaborate with other people.
8. Creativity and ability to think critically.
9. Previous participation in atmospheric conferences and/or co-authorship in research publications will be considered as an advantage.



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Tasks description:

1. Estimation of lidar constant and overlap function for various LIDAR parameters and create of coincident lidar – photometer measurements database.
2. Application of lidar and photometric measurements synergy to estimation of vertical profiles for fine and coarse aerosol mode at Hornsund station. Use of LIRIC and/or GARLIC algorithms is planned.
3. Completing of database containing air-mass backward trajectories for Hornsund station.
4. Statistical analysis of obtained results. In particular relation of aerosol properties to air-mass history. An attempt to determination of potential aerosol source regions.
5. Work on research papers and scientific conference presentations.
6. Study scientific literature related to the research aims of the project.
7. Write regular progress reports according to the agreed schedule.
8. Participate in institutional seminars and day-to-day work at the Institute of Geophysics of the Polish Academy of Sciences.

Abstract

Atmospheric aerosol, because of their role in climate system, has been in field of interest of many scientific investigations for many years. Various measurement networks was established to study aerosol in continental (EARLINET) and global scale (AERONET) as well as from the space. Many programs are focused on integration of different measurements methods, e.g. ACTRIS program resulted in LIRIC and GARLIC codes (Lopatin et al., 2013; Wagner et al., 2013) that uses synergy between LIDAR and Sun-photometer measurements.

PhD candidate employed in this project will apply mentioned codes to data collected in Polish Polar Station at Hornsund. There are Sun-photometer from AERONET and LIDAR owned by IGF PAS collocated at the station which given a unique opportunity to utilize synergy between LIDARs lidar and photometer to investigate aerosol variability in polar regions. PhD candidate will also perform statistical analysis of obtained results and relate them to air-mass history. Such an analysis will allow to estimate potential source of aerosol transported to polar regions.

PhD candidate will be able to use methods, developed by European programs like ACTRIS as well as that founded by national agencies, e.g. NCN, for application to polar regions. This will provide the candidate research workshop and training by collaboration with European partners. On the other



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hand this will bring a new quality through the use of advanced research methods applied to unique dataset collected at Hornsund station.

AEROENT – aeronet.gsfc.nasa.gov

EARLINET – earlinet.org

ACTRIS – actris.eu

Lopatin, A., Dubovik, O., Chaikovsky, A., Goloub, P., Lapyonok, T., Tanré, D., and Litvinov, P.: Enhancement of aerosol characterization using synergy of lidar and sun-photometer coincident observations: the GARRLiC algorithm, *Atmos. Meas. Tech.*, 6, 2065-2088, doi:10.5194/amt-6-2065-2013, 2013.

Wagner, J., Ansmann, A., Wandinger, U., Seifert, P., Schwarz, A., Tesche, M., Chaikovsky, A., and Dubovik, O.: Evaluation of the Lidar/Radiometer Inversion Code (LIRIC) to determine microphysical properties of volcanic and desert dust, *Atmos. Meas. Tech.*, 6, 1707-1724, doi:10.5194/amt-6-1707-2013, 2013.

Other information:

1. The thesis supervisor will be Associate Professor **Aleksander Pietruczuk (IGF PAS)**.
2. In addition to the candidate's application submitted to KNOW it would be mandatory to send CV and the motivation letter to: alek@igf.edu.pl.
3. Contact: polarknow@us.edu.pl – Leading National Research Centre (PhD. D. Ignatiuk)