Międzynarodowa Środowiskowa Szkoła Doktorska
przy Centrum Studiów Polarnych
w Uniwersytecie Śląskim w Katowicach

ul. Będzińska 60
41-200 Sosnowiec
tel. +48 32 368 93 80
polarknow@us.edu.pl
www.mssd.us.edu.pl

Reference No: IEDS/2020/IO PAN/02

Impact of organic matter released from permafrost on the marine CO2 system

Leading unit: International Environmental Doctoral School associated with the Centre for Polar Studies at the University of Silesia in Katowice (IEDS) -
Institute of Oceanology Polish Academy of Sciences

Mode of study: full-time

Degree to be obtained: PhD in the field of natural sciences, in the discipline of Earth and related environmental sciences

Duration: 4 years (8 semesters), from October 2020

Language: English

Scholarship: 4000 PLN per month throughout the entire period of the study (4 years)

Requirements and regulations: www.mssd.us.edu.pl/kandydat-mssd/

Registration online: www.irk.us.edu.pl

Conditions of recruitment:
https://www.mssd.us.edu.pl/wp-content/uploads/2020/06/Regulamin_projekty-NCN.pdf

Deadline: 27th August 2020

Required documents: § 8, section 3:
https://www.mssd.us.edu.pl/wp-content/uploads/2020/06/requirement_IEDS_2020_2021.pdf

Requirements:

1. MSc degree (or equivalent) in chemistry, oceanography, environmental protection or related disciplines.
2. Knowledge on carbon cycling in the environment (knowledge of marine CO2 system will be an advantage).
3. Experience in laboratory work and chemical analyses.
4. Very good written and spoken English.

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5. Experience in fieldwork, public presentations and preparation of scientific manuscripts will be an additional advantage.

Tasks description:

1. Preparation, organization and participation in research cruises to the Spitsbergen fjords.
2. Assessing the marine CO2 system variability in regions affected by the release of organic matter from thawing permafrost.
3. Quantifying the effects of organic acids and organic matter remineralization on the marine CO2 system and especially on pCO2 and pH variability in seawater.
4. Performing statistical analyses and interpretation of the obtained results.
5. Preparing scientific articles
6. Presenting the obtained results at national and international scientific conferences.

Abstract

The Earth system changes at a rapid pace, with serious regional or even global consequences. These are for instance: climate change, global warming, sea level rise or ocean acidification. The root cause of all these changes is continuously rising CO2 concentration in the atmosphere. This increase is partially mitigated by the world ocean, which absorbs about 22% of anthropogenic CO2 emissions. Most of the mechanisms shaping the CO2 content in seawater are identified, even though some of them have not been perfectly parametrized yet. However, there is one feedback loop that has entirely escaped the attention of Earth system scientists so far, but may exert a significant impact on the Arctic marine ecosystems and the global carbon cycle. This is the influence of organic acids released from permafrost via their acidic functional groups on the acid-base balance in the marine environment. This interaction together with remineralization of permafrost-derived organic matter have a potential to change the marine CO2 system and seawater pH.
The main goal of the doctoral dissertation will be to characterize the marine CO2 system variability in regions affected by the release of organic matter from thawing permafrost. Particular attention will be paid to quantifying the influence of organic acids and organic matter remineralization on seawater pH and the air/sea CO2 exchange. Field studies will be conducted in Spitsbergen fjords, while the analytical part in the laboratories of the Institute of Oceanology of the Polish Academy of Sciences in Sopot.

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The PhD student's tasks include: (1) preparation, organization and participation in research cruises in the Spitsbergen fjords, (2) assessing the marine CO2 system variability in regions affected by the release of organic matter from thawing permafrost, (3) Quantifying the effects of organic acids and organic matter remineralization on the marine CO2 system and especially on pCO2 and pH variability in seawater (4) performing statistical analyses and interpretation of the obtained results, (5) preparing scientific articles, (6) presenting the obtained results at national and international scientific conferences.
The proposed PhD work will be part of the PROSPECTOR project (PROSPECTOR: do Permafrost-Released OrganicS amPlify ocEan aCidificaTiOn in the aRctic?) funded by the Polish National Science Centre and conducted at the Institute of Oceanology of the Polish Academy of Sciences in Sopot.

Other information:

1. The supervisors will be dr hab. Karol Kuliński, prof. IO PAN; kroll@iopan.pl and dr Katarzyna Koziorowska-Makuch; kkozio@iopan.pl; Institute of Oceanology Polish Academy of Sciences, Sopot
2. The scholarship will be paid as a part of the PROSPECTOR project. The candidate must undergo competitive recruitment for the NCN project. Information about the competition procedure for the PROSPECTOR project: https://www.ncn.gov.pl/baza-ofert/?akcja=wyswietl&id=182806
3. Contact to the Secretary of the IEDS Admission Committee: +48 32 3689 380, polarknow@us.edu.pl, www.mssd.us.edu.pl.