

## **Postdoctoral Position, Institute of Oceanology Polish Academy of Sciences, Sopot, Poland**

Deadline: **20 August 2024, 15:00 CEST**

([See post on National Center of Poland website](#))

A Post-doc position is available in the Remote Sensing Laboratory at Institute of Oceanology Polish Academy of Sciences in Sopot Poland. The candidate will work on the research project funded by the National Science Center, Republic of Poland (project OPUS-26, no. 2023/51/B/ST10/01344) and awarded to professor Piotr Kowalczyk. The research project is in the framework of the OPUS program is entitled *Optical proxies of essential biogeochemical variables and their application in the accuracy assessment of satellite ocean color remote sensing in the North-eastern Greenland shelf*. This project will be conducted in collaboration with the Norwegian Polar Institute, Fram Centre, Tromsø, Norway; the National Institute of Aquatic Resources, Technical University of Denmark, Kgs. Lyngby, Denmark; and the University of Amsterdam, Faculty of Science.

### **Requirements / Profile of candidates:**

- PhD. in Oceanography, Earth Science, Marine Science or related disciplines,
- Experience in participating in scientific projects
- documented scientific achievements including publications in recognized international scientific journals in the field of marine science/oceanography/biogeochemistry (candidates with documented publication record of authorship and co-authorship of 5 papers in journal with IF > 2 will be preferred)
- proven experience in participating in field work (candidates who participated in oceanographic cruises and expeditions preferably in the Arctic environment will be preferred), practical knowledge of conducting physical and chemical oceanographic measurements with use of modern instrumentation, practical knowledge of methods for collecting water samples for determination of concentrations of optically significant sea water constituents and biogeochemical parameters,
- experience in conducting oceanographic measurements the field of physical oceanography, ocean optics and biogeochemistry, proven knowledge of methods and instrumentation used in marine optics
- experience and analytical background in laboratory spectroscopy methods, laboratory analytical skills
- experience and analytical background in calibration and data quality assessment of optical measurements, testing and validation of ocean color remote sensing algorithms, and testing and validation radiative transfer models in marine environment
- experience in data analysis and visualization, knowledge of Ocean Data View, Matlab or R computing environment.
- experience in analysis of spectral data and knowledge of multivariate statistical methods including PCA models
- passion for research, aptitude, and ability to learn new analytical techniques
- independent thinking in data analysis

- foreign experience: ability to work and live in diverse cultural environment, at least one short-term stay at a foreign university/research institute and presentations at international conferences
- fluency in spoken and written English
- ability for full involvement in the project, consisting in regular field and laboratory work, meetings with other members of the project and regular reporting on the progress of work to the PI, and presenting results on conferences and publications writing

## **PROJECT DESCRIPTION:**

Rapid warming over the last decades had led to the reduction of Arctic Ocean sea ice area and thickness, which led to increased primary production and changes in phytoplankton community structure toward smaller organisms. The main goal of the project is to determine set of empirical relationships between selected essential biogeochemical variables and inherent/apparent optical properties in the East Greenland shelf, and in the Fram Strait which is dominated by the Polar Water. We hypothesize that the changes in the energetic level and spectral composition of the natural light field in the Arctic Ocean will change with rising water temperature and associated decrease of perennial sea ice area and thickness. This will lead to an increased amount of solar energy reaching the Arctic Ocean surface and its deposition in the mixed layer as heat. Changes in phytoplankton community structure towards smaller organisms is associated with changes in phytoplankton bio-optical properties as smaller organisms usually absorb solar energy more efficiently. The spectral quality and underwater irradiance intensity in the Arctic Ocean is further modulated by specific inherent optical properties in different water masses. In the proposed research, we aim to address the question of how the distribution of inherent optical properties (IOPs) in both horizontal and vertical scales in distinct bio-optical provinces in the Arctic Ocean impacts the underwater field structure, as well as the return flux of upwelling radiance that could be detected by satellite sensors. We will quantify and determine the relationships between optical properties and essential biogeochemical variables, such as the concentrations of chlorophyll-a, nitrates, particulate and dissolved organic carbon in the study area. Developed relationships between IOPs and selected biogeochemical variables will be used to parametrize the radiative transfer model, which will be used for forward and inverse modelling. The former will be run for the estimation of apparent optical properties (AOPs) based on measured IOPs and the ones derived from biogeochemical variables, whereas the latter will be used for the development of regionally optimized semi-analytical ocean color remote sensing algorithms that would provide us with information on IOPs and biogeochemical variables based on AOPs measured in situ and from satellites. The main goal of this project will be achieved through re-analysis of existing data sets of IOPs and AOPs during previous international projects, collection of new environmental data and laboratory analysis and statistical analysis of field and laboratory data. Field work will be undertaken in summer months of 2024, 2025 and 2026 onboard of Norwegian and Danish research ships. We will conduct instrumental in situ measurements of physical and chemical characteristics of water column vertical profiles of salinity, temperature, and IOPs including in situ DOM and chlorophyll-a fluorescence. Simultaneously, spectral distribution of incident solar radiation and upwelling radiance with depth will be measured by a multispectral C-OPS submersible profiling radiometer. The intensity of incident solar irradiance at sea level will be measured with deck reference radiometer. Direct measurements of remote sensing reflectance, will be performed with us a small floating platform equipped with a hyperspectral radiometer.

Radiometric data will be analyzed together with in situ measured and water samples IOP to develop regionally validated empirical OCS algorithms for retrieval of concentrations of chlorophyll-a, IOPs and concentrations of optically significant seawater constituents and the phytoplankton community structure. Developed algorithms will be applied to satellite products from various satellite mission to generate time series maps essential biogeochemical variables in the Arctic Ocean. Water samples will be collected on sampling stations at fixed depths for analyses in land based laboratories at Institute of Oceanology, Polish Academy of Sciences and Danish Technical University, National Institute of Aquatic Resources. With this work we aim to contribute to a better mechanistic understanding of the consequences of global climate change, in particular warming and longer ice free periods on the cycling of carbon in the Arctic Ocean, which will be important for informing biogeochemical or carbon-climate feedback mode.

**Research tasks:**

- participation in field work in the Arctic region, collection and preservation of samples,
- conducting measurements of inherent and apparent optical properties with use of in situ optical instruments during field work activities
- spectroscopic laboratory analysis: of chlorophyll-a, CDOM and particulate absorption and fluorescence measurements of dissolved organic matter,
- data analysis, running radiative transfer model, statistical analysis and modeling – PCA model for spectroscopic, chromatographic, chemical, and environmental data,
- participation in development of empirical formulas for optical proxies of biogeochemical variables and development of the regionally optimized ocean color remote sensing algorithm for estimation of selected inherent and apparent optical properties of Arctic Ocean waters
- participation in external consultations with foreign cooperating researchers and institutions, preparation of figures, tables, and writing manuscripts of scientific papers, presentation of results at conferences,
- participation in project promotion and dissemination

**Position start date:** September 2024

**Gross Salary** (before taxation): approx. 9 744 PLN/2255 Euro per month. The candidate will be employed under a fixed term, full time employment contract, and will be eligible for a special remuneration plan for field work at sea. IOPAN employees in scientific positions are eligible for 36 days of paid holiday and an allowance for holidays and recreational/cultural spending and Christmas bonus according to IOPAN employees social assistance plan.

**Terms of employment:** The contract of employment (full-time) for a period of up to 36 months. Maximum period of employment agreement: from 1st September of 2024 to 31 August 2027,

**Additional information:** Additional information about the project and employment terms could be enquired from the project PI **Prof. Piotr Kowalczyk** ([piotr@iopan.pl](mailto:piotr@iopan.pl))

## HOW TO APPLY

All documents prepared by the candidate (see below) shall be sent by e-mail to: [office@iopan.pl](mailto:office@iopan.pl) with obligatory notification in subject ***Offer for employment opportunity at post-doc position for project no: OPUS-26, no.2023/51/B/ST10/01344***, and a copied to Prof Piotr Kowalczyk ([piotr@iopan.pl](mailto:piotr@iopan.pl))

### Required documents (applications in English; .pdf format):

- CV
- Motivation letter (maximum 1 page)
- 2 letters of reference
- Copy of PhD diploma
- Candidates may include additional information or copies of documents/certificates in support of the application, specifically: seafarer's medical certificate or ENG11 (STCW95) and Personal Survival Techniques (PST) certificate (STCW95) will give a preference for a candidate
- Consent clause\* (see below)

Candidates will be evaluated upon their scientific achievements (number of publication, impact factor of the journal they have published, and number of citations), field work experience, and motivation letter

\*Please attach a signed document with the following consent clause:

I hereby consent to have my personal data processed by the Institute of Oceanology Polish Academy of Science pursuant to Article 6 paragraph 1 letter a of the General Data Protection Regulation (GDPR), for the purpose of carrying out a recruitment process for the Post-doc position I also declare that I have read the information on the processing of personal data provided by the Institute in accordance with Article 13 GDPR.

.....

(place and date) (signature of the declarant)

INFORMATION ON THE PROCESSING OF PERSONAL DATA:

[https://old.iopan.pl/praca/INFORMATION\\_ON\\_THE\\_PROCESSING\\_OF\\_PERSONAL\\_DATA.pdf](https://old.iopan.pl/praca/INFORMATION_ON_THE_PROCESSING_OF_PERSONAL_DATA.pdf)